

COMUNE DI BOLOGNA

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO
Via Zacconi, Bologna



PROGETTO ESECUTIVO

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PROGETTO STRUTTURE



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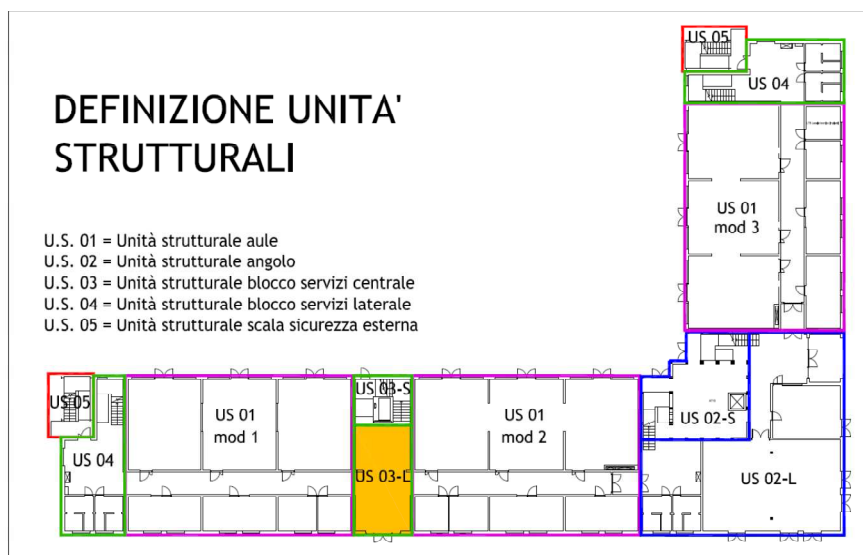
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1 PREMESSA

La presente relazione riporta i principali calcoli e considerazioni svolti dagli scriventi per il corretto dimensionamento delle opere strutturali di un edificio ad uso scolastico denominato “*Polo Dinamico*” da realizzarsi presso l’area del Liceo Copernico di Bologna, in Via Zacconi, in zona Fiera.

In questa relazione si riportano i calcoli relativi all’unità strutturale US 03, identificativa del Blocco servizi centrale posto tra due unità US 01 identificativo delle zone adibite ad aule, suddivisa in due sotto unità identificate come US 03-L ed US 03-S, come definita nell’elaborato “ST-R 01 Relazione generale”, rimandando a quest’ultimo le informazioni che interessano a carattere generale l’insieme del Polo dinamico.

Nelle immagini di seguito riportate si identificano, mediante retinatura di colore arancione, le unità strutturali oggetto della presente.



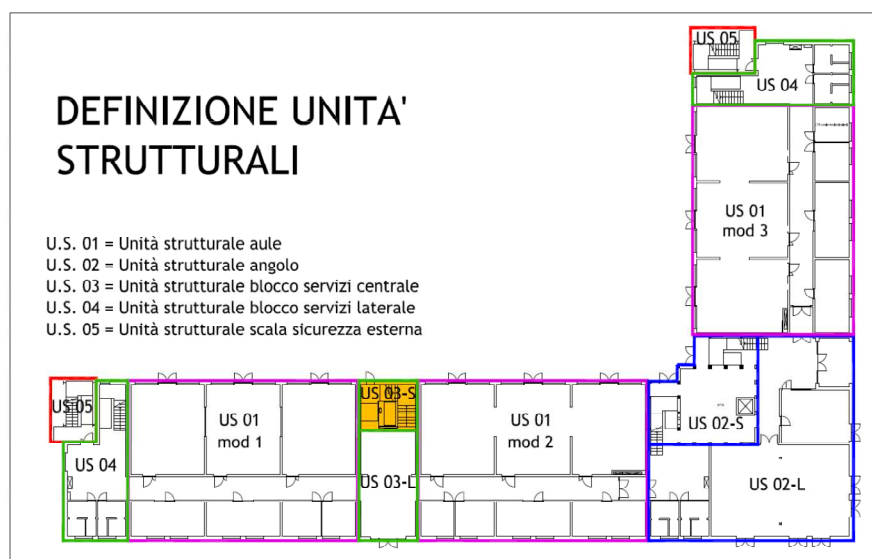


Figura 1: Planimetria generale Polo dinamico con individuazione delle Unità strutturali 03-L e 03-S relative al blocco servizi centrale

La presente relazione di calcolo viene illustrata seguendo le indicazioni della DGR 1373 del settembre 2011 della Regione Emilia Romagna, facendo riferimento a quanto richiesto al punto B.2.2. (“Contenuti della Illustrazione Sintetica degli elementi essenziali del progetto strutturale”), evidenziando in modo sintetico le modalità che hanno portato il relatore alle scelte progettuali, riportando i risultati delle analisi più significativi e le verifiche del caso. In apposito elaborato (ST-R 07) si riporta il tabulato di calcolo relativo alla modellazione strutturale agli elementi finiti eseguita mediante programma di calcolo.

2 LOCALIZZAZIONE INTERVENTO

Il progetto del Polo Dinamico sarà inserito nell’ampia area verde a servizio della palestra del liceo Copernico, in posizione sud-ovest del lotto, lungo la via Zacconi da cui potrà avere accesso diretto. Le immagini di seguito riportate mostrano la localizzazione del sito oggetto di intervento con identificazione delle informazioni catastali e delle coordinate geografiche.

essere considerate come "opera ordinaria" caratterizzate da una Vita Nominale $VN \geq 50$ anni, mentre relativamente alla Classe d'uso si ritiene di inserirle all'interno della "Classe III" che prevede *"Costruzioni il cui uso preveda affollamenti significativi. Industrie con attività pericolose per l'ambiente. Reti viarie extraurbane non ricadenti in Classe d'uso IV. Ponti e reti ferroviarie la cui interruzione provochi situazioni di emergenza. Dighe rilevanti per le conseguenze di un loro eventuale collasso"*.

L'obiettivo del progetto è di realizzare un edificio scolastico che possa rispondere "dinamicamente" nel tempo, e con poche e semplici modifiche, a diverse esigenze didattiche delle scuole di volta in volta interessate a crescite ed espansioni delle proprie iscrizioni, oppure per sede temporanea per scuole destinate a parziali chiusure per necessità manutentive.

La particolarità della flessibilità è pertanto pensata dalla possibilità di separare le attività sia in senso verticale, che per piano, realizzando così porzioni utilizzabili autonomamente, "unità didattiche" composte da cinque aule e servizi, e multipli.

Questo progetto quindi prevede la realizzazione di "moduli" ripetibili in serie costituiti da due tipologie di "blocchi tipo" assemblabili tra loro, ma autonomi nella dotazione di servizi e impiantistica.

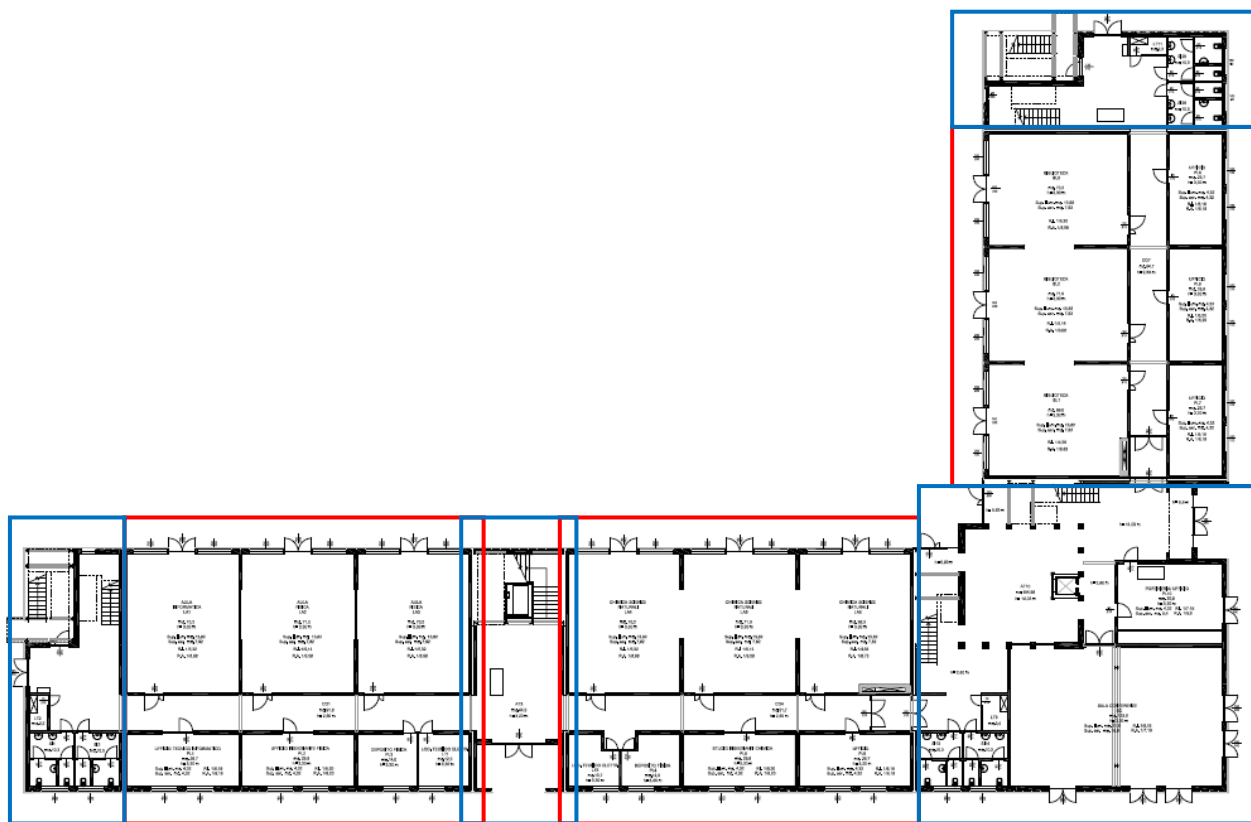


Figura 4: Individuazione moduli: in rosso i blocchi aule e in blu i blocchi servizi

La prima tipologia è un "blocco aule" che si sviluppa su tre piani: al piano terra trovano posto tre grandi laboratori con accesso diretto da un portico esterno. La possibilità di accesso dall'esterno garantisce l'utilizzo dello stesso laboratorio ad una o più scuole, ottimizzando così l'utilizzo degli spazi. La flessibilità compositiva permetterebbe comunque, con poca spesa, di poter chiudere il portico e/o utilizzare in tutto o in parte gli spazi per servizi accessori (segreterie, spazi collettivi, ecc....) a seconda delle specifiche necessità del momento.

I piani superiori sono composti da cinque grandi aule dimensionate per accogliere anche 30 studenti, oltre che uno spazio centrale “open space” che, tramite chiusure vetrate richiudibili, può essere utilizzato quale ulteriore spazio “flessibile” (riunioni, sala professori, ulteriore aula, spazio relax, biblioteca, sala studio, ecc....)

Il “**blocco servizi**” è posizionato alle due estremità del “blocco aule” e, a seconda delle configurazioni possibili, può accogliere, oltre ai connettivi verticali (scale + ascensore), i servizi igienici o spazio aperto per altri usi (atrio o locale di servizio). I “blocchi servizi” costituiscono anche, tramite appositi filtri areati, le eventuali separazioni tra le varie unità didattiche.

I due blocchi si collegano alternativamente in modo che ogni “blocco aule” sia separato da un altro tramite un “blocco servizi”.

La particolare conformazione altimetrica dell’area interessata vede un dislivello nella zona centrale di circa 2,50 m. per cui, sfruttando questa particolarità, si potrà accedere direttamente alle aule del piano primo, mentre il piano terra si aprirà verso l’area verde sportiva. Si prevede la costruzione di tre moduli posizionati ad L, due allineati lungo la direttrice stradale ed il terzo perpendicolare, in direzione via Garavaglia. I primi due moduli costituiranno il primo stralcio assieme al corpo quadrato di collegamento, che verrà utilizzato per le attività di servizio e locali ad uso collettivo, che sarà punto di intersezione della L.

Nello specifico della presente relazione, l’**Unità Strutturale 03 relativa al Modulo “Servizi”** è costituita da ulteriori due sotto unità strutturali denominate, nel seguito e negli elaborati grafici, US 03-L rappresentativa della porzione da realizzare in legno con sistema X-lam, e US 03-S rappresentativa della porzione in acciaio.

L’unità strutturale “**US 03-L**” si sviluppa su tre piani fuori terra, è realizzata interamente mediante strutture verticali portanti in legno con pannelli XLAM e strutture orizzontali sempre in legno ma di tipo lamellare GL32h. La forma dell’edificio è rettangolare e presenta dimensioni in pianta di circa 6 x 11 ml. L’altezza massima dell’edificio è pari a circa 11,20 ml.

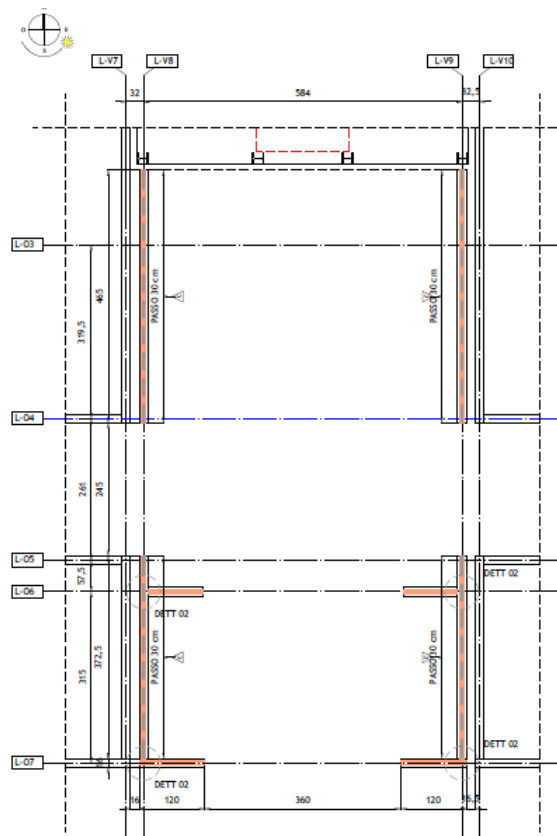


Figura 5: planimetria piano terra

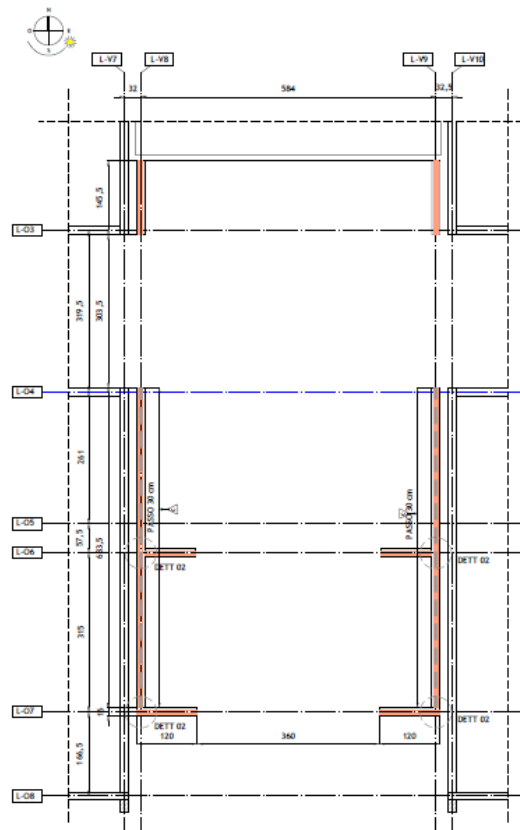


Figura 6: planimetria piano primo

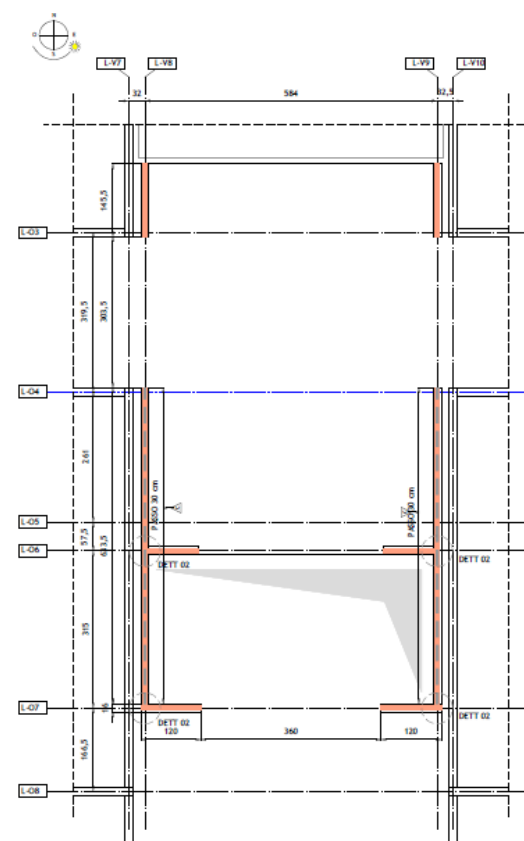


Figura 7: planimetria piano secondo

Per quanto riguarda i pannelli parete si è optato per pannelli verticali a 5 strati di spessore 40+20+40+20+40 mm per uno spessore di parete pari a 160 mm, di larghezza in modulo pari a 120 cm. Per quanto riguarda gli elementi di collegamento tra i pannelli verticali, quali le porzioni sopra e sotto le aperture, si utilizzano sempre i medesimi pannelli in direzione orizzontale, e quindi con asse della fibratura principale e secondaria ruotato rispetto ai pannelli verticali.

I solai del piano primo e secondo presentano uno spessore di 22 cm e sono costituiti da travi in legno lamellare GL32h di dimensioni 16x100 cm posizionate in orizzontale e collegate tra di loro mediante un collegamento che conferisca al solaio un comportamento di piano rigido. A livello dei solaio di piano, in corrispondenza dei 4 allineamenti trasversali che delimitano i campi del solaio, in sommità delle pareti, vi sono travi in legno lamellare GL32 h con lo scopo di ridistribuire anche i carichi delle zone a sbalzo; a livello del primo solaio tali travi si estendono per tutta la larghezza dell'edificio. Tali travi risultano con estradosso a filo dell'estradosso del solaio, e ad esso collegate mediante giunti legno-legno e opportunamente collegate con connettori metallici.

Il solaio di copertura presenta le medesime caratteristiche dei solai posti ai piani sottostanti con uno spessore leggermente inferiore pari a 18 cm.

Le opere di fondazione sono in conglomerato cementizio armato di tipo superficiale a platea dello spessore di 50 cm, per essa si rimanda alla relativa relazione di calcolo.

Per quanto riguarda la parte metallica (unità strutturale "US 03-S") presenta una pianta rettangolare, di dimensioni pari a 6,07x4,95 ml, all'interno della quale si trova la struttura dell'ascensore, sempre realizzata in carpenteria metallica. L'unico solaio presente risulta essere quello di copertura del vano scale, realizzato in legno lamellare GL32h, e presenta uno spessore di 18 cm e si va a raccordare alla

porzione di copertura che interessa la sotto unità in legno, raggiungendo un'altezza massima pari a 11,20 ml.

Il vano scale è realizzato da un telaio costituito da montanti realizzati con profili metallici HEB 200 e travi realizzate con profili metallici HEB 200 e disposte in luce tra i montanti.

I cosciali delle rampe delle scale sono realizzati con piatti metallici di dimensioni 15x220 mm. I Gradini sono in lamiera piegata di acciaio con sezione a "z" di spessore 4 mm e dimensioni in pianta pari a 30x120 mm.

I Pianerottoli presentano struttura in grigliato anti tacco 15x76 mm con barre portanti 50x3 mm.

Queste strutture si estendono in altezza per tutto lo sviluppo altimetrico del volume, non avendo solai di piano. Nei due lati S-A e S-D sono presenti controventi realizzati con profili UPN 200.

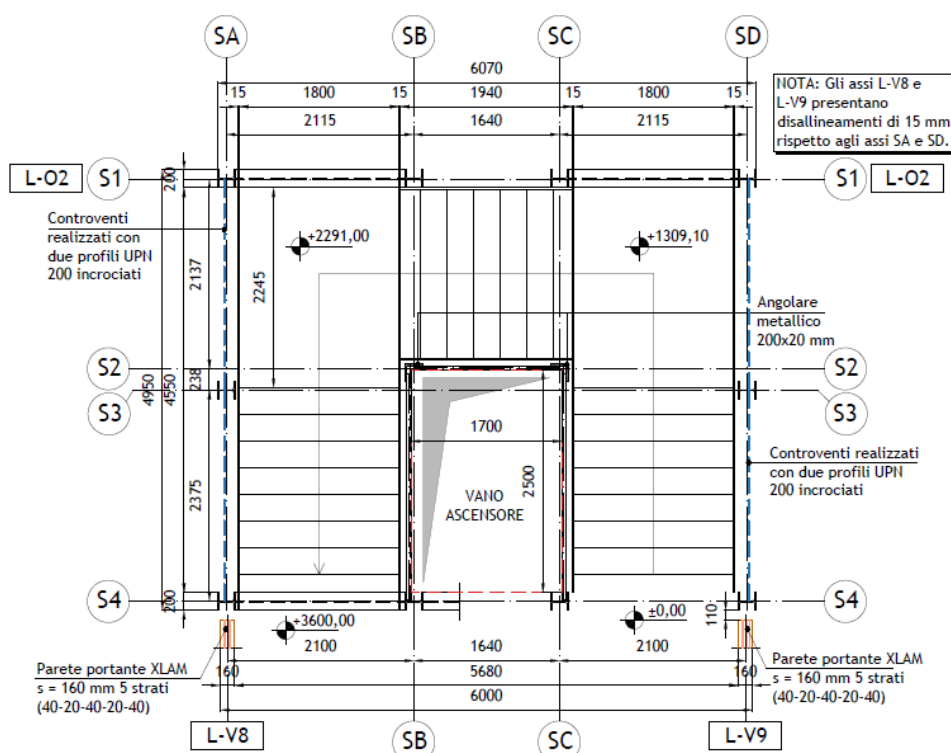


Figura 8: US 03-S planimetria piano terra

Le opere di fondazione sono in conglomerato cementizio armato di tipo superficiale a platea dello spessore di 50 cm, per essa si rimanda alla relativa relazione di calcolo.

4 NORMATIVA DI RIFERIMENTO

1. D.Min. Infrastrutture Min. Interni e Prot. Civile 17 Gennaio 2018 e allegate "Norme tecniche per le costruzioni".
2. Circolare n.7 del C.S.LL.PP. del 21 gennaio 2019: "Istruzioni per l'applicazione dell'Aggiornamento delle Norme tecniche per le costruzioni di cui al decreto ministeriale 17 gennaio 2018".
3. D.Min. Infrastrutture Min. Interni e Prot. Civile 14 Gennaio 2008 e allegate "Norme tecniche per le costruzioni".

4. D.Min. Infrastrutture e trasporti 14 Settembre 2005 e allegate "Norme tecniche per le costruzioni".
5. D.M. LL.PP. 9 Gennaio 1996 "Norme tecniche per il calcolo, l'esecuzione ed il collaudo delle strutture in cemento armato, normale e precompresso e per le strutture metalliche".
6. D.M. LL.PP. 16 Gennaio 1996 "Norme tecniche relative ai <<Criteri generali per la verifica di sicurezza delle costruzioni e dei carichi e sovraccarichi>>".
7. D.M. LL.PP. 16 Gennaio 1996 "Norme tecniche per le costruzioni in zone sismiche".
8. Circolare 4/07/96, n.156AA.GG./STC. istruzioni per l'applicazione delle "Norme tecniche relative ai <<Criteri generali per la verifica di sicurezza delle costruzioni e dei carichi e sovraccarichi>>" di cui al D.M. 16/01/96.
9. Circolare 10/04/97, n.65AA.GG. istruzioni per l'applicazione delle "Norme tecniche per le costruzioni in zone sismiche" di cui al D.M. 16/01/96.
10. UNI 9502 - Procedimento analitico per valutare la resistenza al fuoco degli elementi costruttivi di conglomerato cementizio armato, normale e precompresso - edizione maggio 2001
11. Ordinanza del Presidente del Consiglio dei Ministri n. 3274 del 20 marzo 2003 "Primi elementi in materia di criteri generali per la classificazione sismica del territorio nazionale e di normative tecniche per le costruzioni in zona sismica" e successive modificazioni e integrazioni.
12. UNI EN 1990:2006 13/04/2006 Eurocodice 0 - Criteri generali di progettazione strutturale.
13. UNI EN 1991-1-1:2004 01/08/2004 Eurocodice 1 - Azioni sulle strutture - Parte 1-1: Azioni in generale - Pesì per unità di volume, pesì propri e sovraccarichi per gli edifici.
14. UNI EN 1991-2:2005 01/03/2005 Eurocodice 1 - Azioni sulle strutture - Parte 2: Carichi da traffico sui ponti.
15. UNI EN 1991-1-3:2004 01/10/2004 Eurocodice 1 - Azioni sulle strutture - Parte 1-3: Azioni in generale - Carichi da neve.
16. UNI EN 1991-1-4:2005 01/07/2005 Eurocodice 1 - Azioni sulle strutture - Parte 1-4: Azioni in generale - Azioni del vento.
17. UNI EN 1991-1-5:2004 01/10/2004 Eurocodice 1 - Azioni sulle strutture - Parte 1-5: Azioni in generale - Azioni termiche.
18. UNI EN 1992-1-1:2005 24/11/2005 Eurocodice 2 - Progettazione delle strutture di calcestruzzo - Parte 1-1: Regole generali e regole per gli edifici.
19. UNI EN 1992-1-2:2005 01/04/2005 Eurocodice 2 - Progettazione delle strutture di calcestruzzo - Parte 1-2: Regole generali - Progettazione strutturale contro l'incendio.
20. UNI EN 1993-1-1:2005 01/08/2005 Eurocodice 3 - Progettazione delle strutture di acciaio - Parte 1-1: Regole generali e regole per gli edifici.
21. UNI EN 1993-1-8:2005 01/08/2005 Eurocodice 3 - Progettazione delle strutture di acciaio - Parte 1-8: Progettazione dei collegamenti.
22. UNI EN 1994-2:2006 12/01/2006 Eurocodice 4 - Progettazione delle strutture composte acciaio-calcestruzzo - Parte 2: Regole generali e regole per i ponti.
23. UNI EN 1995-1-1:2005 01/02/2005 Eurocodice 5 - Progettazione delle strutture di legno - Parte 1-1: Regole generali - Regole comuni e regole per gli edifici.

24. UNI EN 1995-2:2005 01/01/2005 Eurocodice 5 - Progettazione delle strutture di legno - Parte 2: Ponti.
25. UNI EN 1997-1:2005 01/02/2005 Eurocodice 7 - Progettazione geotecnica - Parte 1: Regole generali.
26. UNI EN 1998-1:2005 01/03/2005 Eurocodice 8 - Progettazione delle strutture per la resistenza sismica - Parte 1: Regole generali, azioni sismiche e regole per gli edifici.
27. UNI EN 1998-5:2005 01/01/2005 Eurocodice 8 - Progettazione delle strutture per la resistenza sismica - Parte 5: Fondazioni, strutture di contenimento ed aspetti geotecnici.

5 VALUTAZIONE DEI CARICHI AMBIENTALI

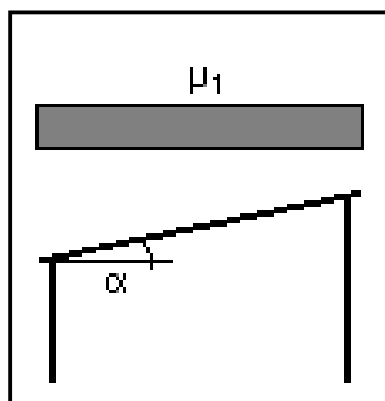
In questo paragrafo si procede alla valutazione dei carichi ambientali agenti ed in modo particolare il carico neve ed il carico vento, funzione della localizzazione e delle condizioni geometriche dell'edificio. Prima di passare alla determinazione occorre osservare come l'edificio viene edificato in una zona urbana ma priva, nel primo intorno, di altri edifici, con un'altezza non superiore a 12,00 m (altezza presa a riferimento) con una copertura pressoché piana con una inclinazione dell'ordine di 1-2° (pari a circa il 2% come da progetto). Si considera, in accordo con la classe d'uso III dell'edificio, un periodo di ritorno pari a 75 anni.

5.1 CARICO NEVE

Facendo riferimento a quanto previsto dalle NTC 2018 si trova che:

- Zona neve: I Mediterranea;
- c_e (coefficiente di esposizione al vento) = 1,00;
- valore caratteristico del carico al suolo pari a $q_{sk} c_e = 1,50 \text{ kN/mq}$;
- copertura ad una semplice falda con un angolo di inclinazione pari a $\alpha = 3^\circ$;
- $\mu_1 = 0,80 \rightarrow q_1 = 1,20 \text{ kN/mq}$.

Si riporta lo schema di carico come previsto dalla norma:



In definitiva il carico caratteristico neve risulta pari a 1,20 kN/mq.

5.2 CARICO VENTO

Facendo riferimento a quanto previsto dalle NTC 2018 si trova che:

- Zona vento: 2;



Fig. 3.3.1 - Mappa delle zone in cui è suddiviso il territorio italiano

- Dalla Tab. 3.3.I si trova che la velocità base della zona $v_{b,0} = 25,0$ m/sec;
- Dalla Tab. 3.3.I si trova che l'altitudine base della zona $a_0 = 750$ m;
- Altitudine del sito pari a circa $a_s = 54$ m s.l.m.;
- Coefficiente di altitudine $c_a = 1$ per $a_s \leq a_0$;
- Velocità base di riferimento $v_b = v_{b,0}$ ca = 25,00 m/sec;
- Periodo di ritorno: in modo del tutto prudentiale si considera un periodo di ritorno coincidente con quello dell'azione sismica ovvero 75 anni essendo la costruzione in classe d'uso III con coefficiente d'uso pari ad 1,5;
- Coefficiente di ritorno $c_r = 0,75 \sqrt{1 - 0,2 \ln \left[-\ln \left(1 - 1/T_R \right) \right]} = 1,023$;
- Velocità riferita al periodo di ritorno di progetto: $v_r = v_b c_r = 25,59$ m/sec;
- Classe di rugosità del terreno: B (Aree urbane (non di classe A), suburbane, industriali e boschive). Tale scelta è dettata dall'ampia zona aperta che contorna la zona interessata malgrado questa sia all'interno di una zona urbanizzata;
- Categoria di esposizione: tipo IV in quanto trattasi di zona d'entroterra posta ad una quota inferiore ai 500 m s.l.m. (la città di Bologna presenta una quota media di circa 50-51 m s.l.m.);
- Con tale classificazione i parametri di riferimento risultano:
 - $k_r = 0,22$;
 - $z_0 = 0,30$ m;
 - $z_{min} = 8,0$ m.
- la pressione cinetica di riferimento risulta pari a $q_b = 0,41$ kN/mq;
- si considera la quota massima (in eccesso dell'edificio) pari a 12 m da cui i vari coefficienti assumono i rispettivi valori:
 - $c_p = 1,00$;
 - $c_d = 1,00$;
 - $c_e = 1,91$;
 - $c_t = 1,00$;
- pressione del vento: $p_b = q_b \Pi_i c_i = 0,78$ kN/mq.

Vista che la quota di riferimento z_{min} risulta pari a 8,0 m si riopera il calcolo considerando la quota di 8 m per determinare il valore da considerare nella parte bassa. Si trova che $c_e = 1,67$ con $p_b = 0,67$ kN/mq.

Con tali carichi, facendo le dovute valutazioni del caso, si procederà alla loro applicazione, in termini globali e/o locali, sulla struttura in esame.

6 AZIONE SISMICA

Come previsto dalle NTC 2018 e vista l'importanza della costruzione (o meglio costruzioni) ricadenti in classe d'uso III (al punto 2.4.2 viene riportato come le costruzioni il cui uso preveda affollamenti significativi, come ad esempio è riconducibile un edificio ad uso scolastico, ricadono in classe d'uso III), al fine della determinazione dello spettro di risposta, valutato in termini di accelerazione, sia stata eseguita una Risposta Sismica Locale (RSL) attraverso idonei strumenti. L'analisi è stata eseguita, facendo riferimento anche a quanto riportato nella relazione geologica - sismica a firma del Dott. Geol. Alberto Filelfi, in modo monodimensionale reperendo, al contempo, gli spettri relativi a tutti gli stati limite previsti dalla normativa in funzione della probabilità di superamento del rischio atteso. Nello specifico si ricorda la tabella 3.2.I delle già richiamate NTC 2018 che riporta:

Stati limite	P _{V,R} : Probabilità di superamento nel periodo di riferimento V _R	
Stati limite di esercizio	SLO	81%
	SLD	63%
Stati limite ultimi	SLV	10%
	SLC	5%

In funzione di tali percentuali di superamento è possibile calcolare il periodo di ritorno di riferimento con la formula [3.2.0] che riporta $T_R = -V_R / \ln(1 - P_{V_R}) = -C_U V_N / \ln(1 - P_{V_R})$.

Essendo l'edificio in classe d'uso III si ha che $C_U = 1,5$ da cui è immediato valutare i relativi periodi di ritorno partendo dalla vita nominale (V_N). Facendo riferimento alla Circolare 7 del 21 gennaio 2019 si trova che la vita nominale di progetto di un'opera è, convenzionalmente, definita come il numero di anni nel quale l'opera, purché ispezionata e mantenuta come previsto dal progetto, mantiene i livelli prestazionali e svolge le funzioni per la quale è stata progettata. Tale viene assunta pari a 50 anni in quanto, anche se trattasi di una scuola, si ritiene che l'opera rientri in quelle richieste prestazioni ordinarie.

Nella *Figura 9* si riporta il diagramma relativo in cui sono individuate le relative corrispondenze.

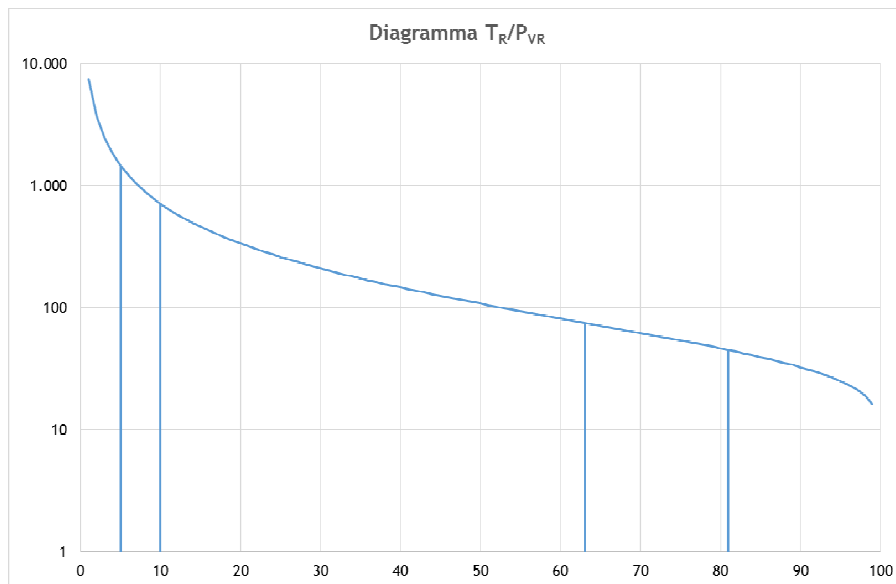


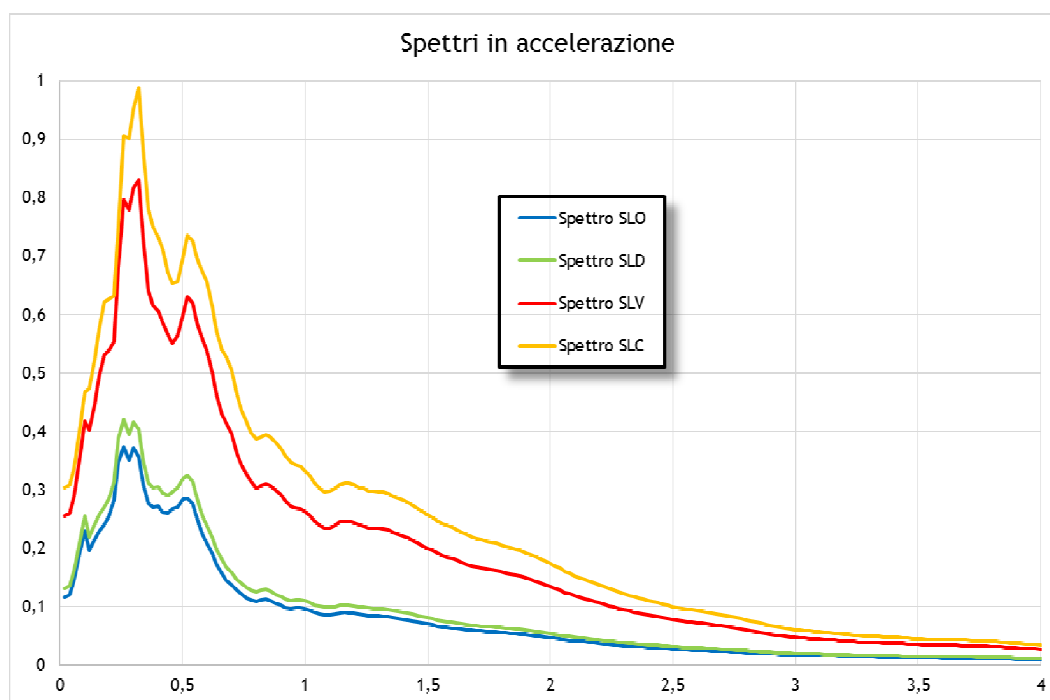
Figura 9: diagramma del periodo di ritorno in funzione della probabilità di superamento dell'evento atteso

Facendo riferimento a quanto riportato sopra si trova che:

Stati limite		$P_{V,R}$	T_R
Stati limite di esercizio	SLO	81%	45
	SLD	63%	75
Stati limite ultimi	SLV	10%	712
	SLC	5%	1.462

Con tali valori di riferimento si riportano sia gli spettri di normativa, in funzione dello stato limite da considerare, sia gli spettri derivati dalla risposta sismica locale, spettri di tipo elastico su cui si opereranno le relative riduzioni in funzione del coefficiente di comportamento q che verrà ritenuto più corretto per la struttura da esaminare.

Si riporta in termine grafico la sovrapposizione degli spettri, in termini di accelerazione, dei quattro stati limite da esaminare, ovvero SLO (stato limite di operatività), SLD (stato limite di danno), SLV (stato limite di salvaguardia della vita) ed SLC (stato limite di collasso).



Risulta evidente come gli spettri risultano, per forma, molto simili tra loro in quanto tratti da un'analisi 1D e valgono per entrambe le direzioni in piano (x e y).

Per maggiore chiarezza si riportano anche le sovrapposizione dei singoli spettri, nella considerazione dei relativi stati limite da considerare, in funzione di quanto previsto dalla normativa in assenza di valutazione diretta con RSL. Prima di operare tale confronto si valutano i parametri sismici di sito attraverso un programma freeware riscontrabile in Internet denominato EdiLus MS ® della Acca software.

Rimandando a quanto riscontrabile nella *Figura 10*, si vogliono riportare, per maggiore chiarezza, i valori determinati. Le coordinate di sito risultano essere:

- Latitudine: 44°,507226;
- Longitudine: 11°,365167.

I parametri sismici vengono riportati in forma tabellare.

Stato limite	T_R	a_g/g	F_o	T^*_c
	[anni]	[#]	[#]	[sec]
Operatività	45	0,064	2,478	0,268
Danno	75	0,079	2,482	0,281
Salvaguardia della vita	712	0,191	2,399	0,312
Prevenzione collasso	1.462	0,241	2,433	0,318

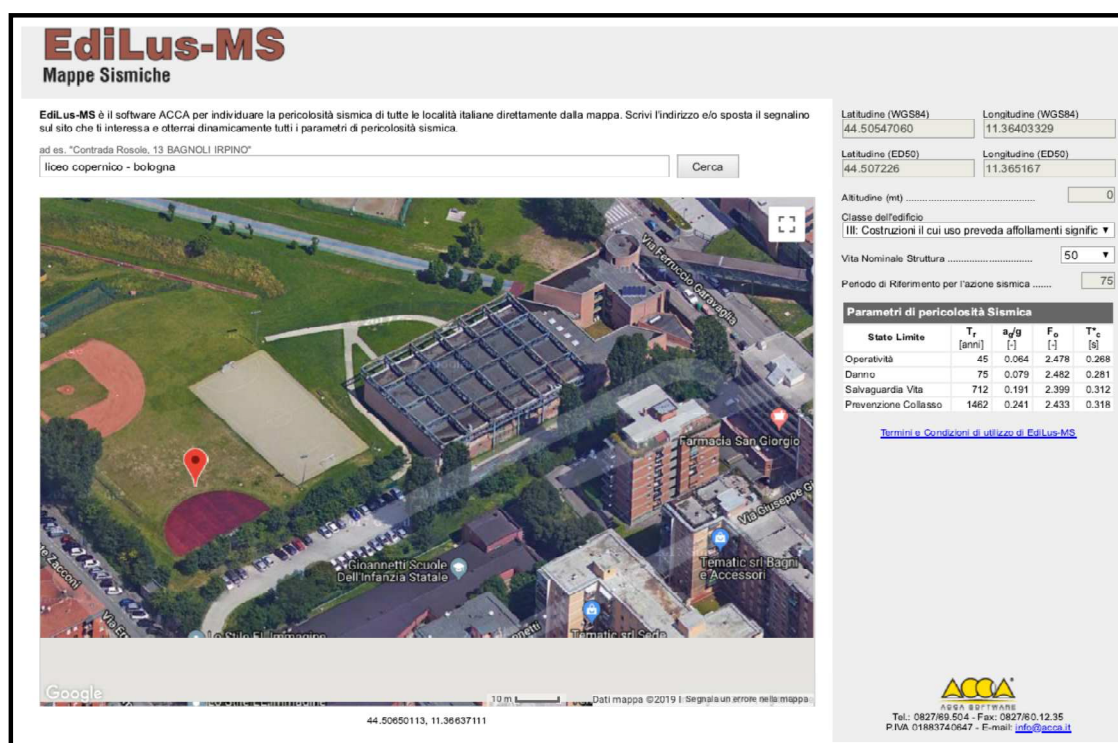


Figura 10: localizzazione intervento e parametri sismici

Con questi parametri si costruiscono i diagrammi degli spettri, funzione dello stato limite, e si confrontano con quelli derivati dalla RSL considerando che l'analisi geofisica ha riconosciuto il terreno appartenente alla classe C.

Nel seguito si riportano, per ogni stato limite esaminato, la sovrapposizione dei diagrammi degli spettri ottenuti con i riferimenti normativi (in rosso) e quelli ottenuti attraverso RSL (in blu)

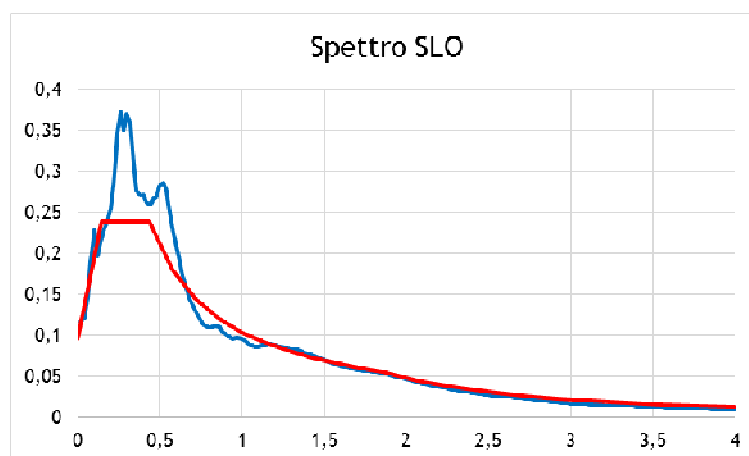


Figura 11: sovrapposizione spettri allo SLO

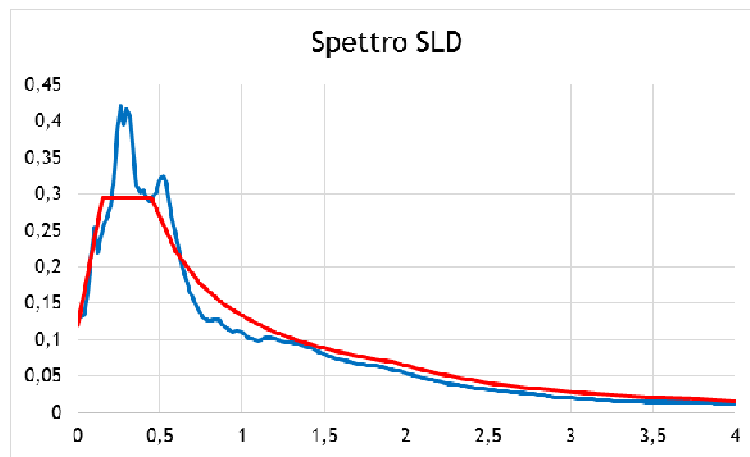


Figura 12: sovrapposizione spettri allo SLD

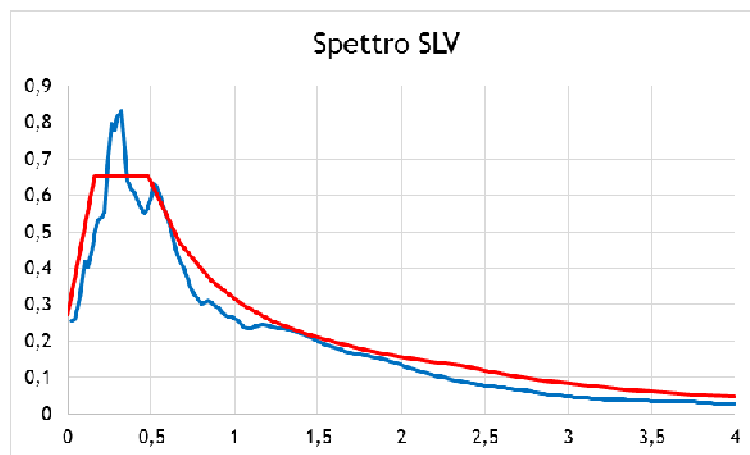


Figura 13: sovrapposizione spettri allo SLV

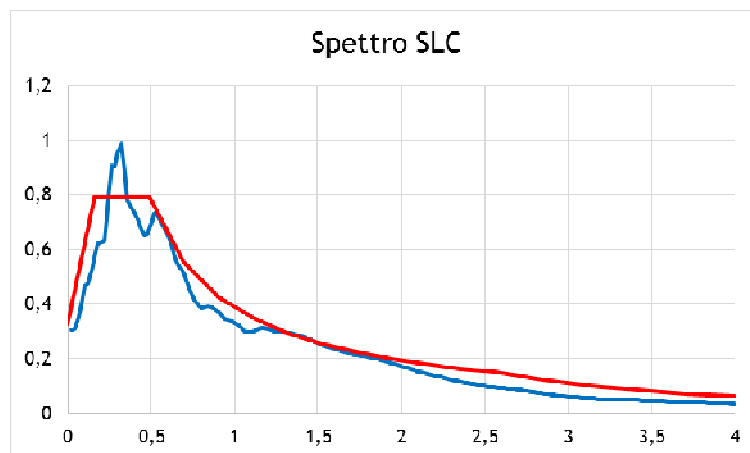


Figura 14: sovrapposizione spettri allo SLC

A prescindere dal fattore di scala, risulta immediato osservare come gli spettri ottenuti attraverso la RSL risultano essere molto simili a quelli di normativa per valori di periodi superiori ad 1-1,5 sec (periodi particolarmente alti) mentre si trovano picchi di amplificazione per periodi tra i 0,2 e 0,3 sec, periodi a cui si attestano la maggior parte degli edifici residenziali di 2-5 piani (si ricorda al proposito come la bibliografia riporta come stima del primo periodo la formula $0,1n$ dove n è il numero dei piani dell'edificio ed anche la formulazione empirica di $0,048 H^{3/4}$ da cui, operando all'inverso, si trovano

valori di H compresi tra i 6,5 m ed gli 11,5 m, valori molto prossimi all'altezza dell'edificio in questione).

7 ANALISI DEI CARICHI

Facendo riferimento alla stratigrafia riportata e fornita dal progetto architettonico, si riporta nel seguito l'analisi dei carichi relativa all'unità strutturale considerata.

7.1 SOLAIO DI INTERPIANO ZONA SERVIZI

La stratigrafia, partendo dall'intradosso ove viene posizionato il solaio in legno che sarà lasciato a vista, risulta così costituita:

- Solaio strutturale ligneo realizzato con travi in legno lamellare poste in orizzontale dello spessore complessivo di 22 cm con peso specifico di 5,00 kN/mc: $g_{k1} = 1,10$ kN/mq;
- Lastra in fibrogesso tipo fermacell® dello spessore di 20 mm con peso specifico di 12,00 kN/mc, valore dedotto dalle schede tecniche: $g_{k2,1} = 0,02 \times 12,00 = 0,24$ kN/mq;
- Isolamento in fibra di legno dello spessore di 30 mm con peso specifico di 1,40 kN/mc, valore dedotto dalle schede tecniche: $g_{k2,2} = 0,03 \times 1,40 = 0,04$ kN/mq;
- Isolamento acustico realizzato con Phonestar Tri 15 ® dello spessore di 15 mm con peso, ricavato dalle schede tecniche, pari a $g_{k2,3} = 0,18$ kN/mq;
- Lastra in fibrocemento tipo Acquapanel ® Floor della Knauf dello spessore di 22 mm come sottofondo a secco della pavimentazione dal peso, da scheda tecnica, pari $g_{k2,4} = 0,37$ kN/mq;
- Pavimentazione in linoleum dello spessore di 2-4 mm, in funzione della fornitura, avente un peso, desunto da scheda tecnica per lo spessore di 4 mm, pari a $g_{k2,5} = 0,05$ kN/mq;
- Impiantistica diffusa a livello di intradosso in alcune zone $g_{k2,6} = 0,10$ kN/mq;
- Sovraccarico variabile $q_k = 3,00$ kN/mq.

In definitiva il solaio delle zone in cui risultano presenti le aule presenta la seguente analisi dei carichi:

- $g_{k1} = 1,10$ kN/mq;
- $g_{k2} = 0,24 + 0,04 + 0,18 + 0,37 + 0,05 + 0,10 = 0,98$ kN/mq $\approx 1,00$ kN/mq;
- $q_k = 3,00$ kN/mq.

Nelle zone di sporto, posizionate al piano primo, risulta presente, nella zona intradossale, una coibentazione in lana di roccia dello spessore di 16 cm finita con rasatura dello spessore di circa 5 mm. Tale situazione apporta un'ulteriore voce di carico pari a:

- coibentazione termica in lana di roccia dal peso specifico, dedotto da scheda tecnica, di 0,90 kN/mc per uno spessore di 16 cm: $g_{k2,7} = 0,16 \times 0,90 = 0,14$ kN/mq;
- rasatura della superficie con malta adesiva per uno spessore di 4 mm minimo ad elevata permeabilità al vapore posta in opera con adeguata rete d'armatura che presenta peso, da scheda tecnica, pari a circa 1,5 kg/mq per mm di spessore: $g_{k2,8} = 4 \times 0,015 = 0,06$ kN/mq.

Nelle zone di sbalzo, fatto salvo carichi concentrati che verranno valutati in modo puntuale, il carico permanente portato risulta modificato da quanto sopra riportato. L'analisi riporta:

- $g_{k2} = 0,24 + 0,04 + 0,18 + 0,37 + 0,05 + 0,14 + 0,06 + 0,10 = 1,18$ kN/mq $\approx 1,20$ kN/mq.

Si può osservare come la variazione del carico risulta modesta.

7.2 SOLAIO COPERTURA

Il solaio di coperto viene realizzato sempre in legno con travi in lamellare poste sdraiate. L'analisi dei carichi, indipendentemente dalla zona considerata (zona aule, servizi,...), risulta sempre la seguente e precisamente quanto riportato nel seguito:

- Solaio strutturale ligneo realizzato con travi in legno lamellare poste in orizzontale dello spessore complessivo di 18 cm con peso specifico di 5,00 kN/mc: $g_{k1} = 0,90$ kN/mq;
- Freno a vapore tipo USB Micro Strong della Riwega dello spessore di circa 1 mm dal peso, da scheda tecnica, pari a circa 0,002 kN/mq, pressoché trascurabile;
- Pannello coibente in lana di roccia a doppia densità tipo Durock Energy della Ruckwool di spessore 20 cm con peso specifico, da scheda tecnica, pari 1,50 kN/mc: $g_{k2,1} = 0,2 \times 1,50 = 0,30$ kN/mq;
- Membrana traspirante tipo USB Protector GOLD 330 della Riwega dello spessore di circa 0,85 mm dal peso, da scheda tecnica, pari a circa 0,003 kN/mq, pressoché trascurabile;
- Copertura in alluminio 5754 dello spessore di 1 mm tipo Riverclak® 500 dal peso, da scheda tecnica, pari a $g_{k2,2} = 0,04$ kN/mq;
- Pannelli fotovoltaici per produzione energia in posto aventi peso medio da indagine su prodotti commerciali pari a circa $g_{k2,3} = 0,15$ kN/mq;
- Sovraccarico variabile neve $q_k = 1,20$ kN/mq.

In definitiva il solaio di copertura presenta la seguente analisi dei carichi:

- $g_{k1} = 0,90$ kN/mq;
- $g_{k2} = 0,30 + 0,04 + 0,15 = 0,49$ kN/mq $\approx 0,50$ kN/mq;
- $q_k = 1,20$ kN/mq.

8 RELAZIONE MATERIALI

8.1 ELENCO DEI MATERIALI IMPIEGATI E LORO MODALITA' DI MESSA IN OPERA

Di seguito vengono riportati i materiali da impiegare nella realizzazione dell'edificio con alcune caratteristiche e modalità per la loro messa in opera.

CONGLOMERATO CEMENTIZIO con le seguenti caratteristiche:

CONGLOMERATO CEMENTIZIO PER FONDAZIONE

-	Definizione:	C 25/30
-	Resistenza a compressione:	
	per provini cubici	$R_{ck} = 30$ N/mm ²
	per provini cilindrici	$f_{ck} = 25$ N/mm ²
-	Resistenza media a compressione:	$f_{cm} = 33$ N/mm ²
-	Resistenza a trazione:	
	media a trazione assiale	$f_{ctm} = 2,6$ N/mm ²
	media a trazione per flessione	$f_{ctm} = 3,1$ N/mm ²

	caratteristica per frattile 0,05	$f_{ctk} = 1,8 \text{ N/mm}^2$
-	Resistenza tangenziale di aderenza:	$f_{bk} = 4,05 \text{ N/mm}^2$
-	Modulo di Elasticità:	$E_{cm} = 31.447 \text{ N/mm}^2$
-	Dimensione massima dell'aggregato:	22 mm
-	Classe di esposizione:	XC2
-	Classe di consistenza:	S3
-	Contenuto massimo di cloruri:	0,4%
-	Peso specifico del calcestruzzo:	$\gamma_{cls} = 24,0 \text{ kN/m}^3$
-	Peso specifico del calcestruzzo armato:	$\gamma_{ca} = 25,0 \text{ kN/m}^3$
-	Coeff. Poisson:	$\nu = 0,2$
-	Dilatazione termica:	$\alpha = 1,00\text{E-}005 \text{ } ^\circ\text{C}^{-1}$

CONGLOMERATO CEMENTIZIO PER ELEVAZIONE

-	Definizione:	C 25/30
-	Resistenza a compressione:	
	per provini cubici	$R_{ck} = 30 \text{ N/mm}^2$
	per provini cilindrici	$f_{ck} = 25 \text{ N/mm}^2$
-	Resistenza media a compressione:	$f_{cm} = 33 \text{ N/mm}^2$
-	Resistenza a trazione:	
	media a trazione assiale	$f_{ctm} = 2,6 \text{ N/mm}^2$
	media a trazione per flessione	$f_{ctm} = 3,1 \text{ N/mm}^2$
	caratteristica per frattile 0,05	$f_{ctk} = 1,8 \text{ N/mm}^2$
-	Resistenza tangenziale di aderenza:	$f_{bk} = 4,05 \text{ N/mm}^2$
-	Modulo di Elasticità:	$E_{cm} = 31.447 \text{ N/mm}^2$
-	Dimensione massima dell'aggregato:	16 mm
-	Classe di esposizione:	XC1
-	Classe di consistenza:	S4
-	Contenuto massimo di cloruri:	0,4%
-	Peso specifico del calcestruzzo:	$\gamma_{cls} = 24,0 \text{ kN/m}^3$
-	Peso specifico del calcestruzzo armato:	$\gamma_{ca} = 25,0 \text{ kN/m}^3$
-	Coeff. Poisson:	$\nu = 0,2$
-	Dilatazione termica:	$\alpha = 1,00\text{E-}005 \text{ } ^\circ\text{C}^{-1}$

Per quanto riguarda il calcestruzzo si ricorda che:

- Il materiale dovrà giungere in cantiere provvisto delle certificazioni previste dalla Normativa vigente e dai Documenti di Trasporto;
- Il calcestruzzo preconfezionato dovrà essere fornito da impianto dotato delle certificazioni in materia;
- Dovranno essere prelevati i cubetti nella misura prevista dalla Normativa vigente e schiacciati tra il 28° ed il 45° giorno;
- In caso di temperatura inferiore ai 4°C si dovranno sospendere i getti ovvero eseguirli con aggiunta di acceleranti previa autorizzazione della D.L.

Per quanto riguarda i singoli elementi della miscela del conglomerato cementizio si ha:

- CEMENTO:** sono utilizzati cementi Portland tipo 32,5 o 42,5 conforme alla Norma UNI-EN 197-1.
- SABBIA e GHIAIA:** aggregati provvisti di marcatura CE conformi alle Norme UNI-EN 12620 e 8520-2. La composizione granulometrica della miscela è determinata dal fuso di Fuller, privilegiando le caratteristiche di resistenza del calcestruzzo.
- ACQUA:** l'acqua d'impasto è conforme alla Norma UNI-EN 1008
- ADDITIVI:** fluidificanti e superfluidificanti in % inferiore al 1% in peso del cemento secondo le disposizioni della Ditta produttrice ed in accordo con la Norma UNI-EN 934-2. Nel confezionamento del calcestruzzo si fa riferimento alla Norma UNI 9858.
- DURABILITA':** Nei riguardi della durabilità della struttura si fa riferimento a quanto previsto dal Prospetto 1 della Norma UNI EN 206-1 e relative istruzioni complementari UNI 11104 (marzo 2004).

ACCIAIO PER CEMENTO ARMATO AD ADERENZA MIGLIORATA con le seguenti caratteristiche:

BARRE E RETI ELETTROSALDATE

- | | |
|---|------------------------------------|
| - Definizione: | B450 C |
| - Tensione caratteristica di rottura: | $f_{tk} = 540 \text{ N/mm}^2$ |
| - Tensione caratteristica di snervamento: | $f_{yk} = 450 \text{ N/mm}^2$ |
| - Resistenza tangenziale di aderenza: | $f_{bk} = 5,76 \text{ N/mm}^2$ |
| - Densità: | $\rho = 78,50 \text{ kN/mm}^3$ |
| - Modulo di Elasticità: | $E_{acc} = 206.000 \text{ N/mm}^2$ |

L'acciaio sarà accettato dalla Direzione dei Lavori solo se munito di certificato di origine dello stabilimento di Trasformazione; le armature dovranno essere accompagnate da tre spezzoni di 1 ml cadauno per ciascuno dei diametri utilizzati. Le barre non dovranno presentare eccessive corrosioni, ossidazioni o difetti superficiali, né dovranno essere ricoperte da sostanze che possono ridurre l'aderenza al conglomerato (grassi, oli, terra, fango,...), e pertanto i fasci dei vari diametri dovranno essere scaricati ed accatastati in un luogo asciutto. Inoltre, prima della messa in opera, che avverrà tramite il posizionamento di distanziatori di materiale adeguato, si dovrà provvedere alla loro pulizia. Le caratteristiche meccaniche minime dovranno essere:

$f_{y,nom} \geq 450,00 \text{ MPa}$ e $f_{t,nom} \geq 540,00 \text{ MPa}$ ed inoltre:

$f_{yk} \geq f_{y,nom}$ con un frattile del 5%;

$f_{tk} \geq f_{t,nom}$ con un frattile del 5%;

$(f_t/f_y)_k \geq 1,15$ ed $\leq 1,35$ con un frattile del 10%;

$f_{yk}/f_{y,nom} \leq 1,25$ con un frattile del 10%;

allungamento $(A_{gt})_k \geq 7,5\%$ con un frattile del 10%.

ACCIAIO PER PROFILI: Classe S275

Snervamento: $f_{y,k} \geq 275 \text{ N/mm}^2$

Rottura: $f_{t,k} \geq 430 \text{ N/mm}^2$

BULLONI PER COLLEGAMENTI: Classe 8.8 o come indicato negli elaborati grafici

PANNELLI XLAM

Pannelli in legno tipo C24 secondo UNI EN 338/2016

Pannelli verticali $s = 160 \text{ mm}$ a 5 strati: 40+20+40+20+40 mm

$$f_{Rk} = 1,2 \text{ N/mm}^2 \text{ (Resistenza a taglio per rotolamento)}$$

(Le caratteristiche geometriche e meccaniche utilizzate per il dimensionamento strutturale sono state desunte da documento ETA di un produttore specifico esistente sul mercato).

LEGNO LAMELLARE GL32h

Massa volumica:	$\rho_k = 550 \text{ kg/m}^3$
- Flessione	$f_{m,g,k} = 32,0 \text{ N/mm}^2$;
- Trazione	$f_{t,0,g,k} = 25,6 \text{ N/mm}^2$;
	$f_{t,90,g,k} = 0,5 \text{ N/mm}^2$;
- Compressione	$f_{c,0,g,k} = 32,0 \text{ N/mm}^2$;
	$f_{c,90,g,k} = 2,5 \text{ N/mm}^2$;
- Taglio	$f_{v,g,k} = 3,5 \text{ N/mm}^2$;
- Modulo di elasticità	$E_{0,g,mean} = 14.200,0 \text{ N/mm}^2$;
	$E_{0,g,05} = 11.800,0 \text{ N/mm}^2$;
	$E_{90,g,mean} = 300,0 \text{ N/mm}^2$;
	$E_{90,g,05} = 250,0 \text{ N/mm}^2$;
- Modulo a taglio	$G_{g,mean} = 650,0 \text{ N/mm}^2$;
	$G_{g,05} = 540,0 \text{ N/mm}^2$;
- Densità	$\rho_{g,k} = 440,0 \text{ kg/m}^3$;
	$\rho_{g,mean} = 490,0 \text{ kg/m}^3$.

9 ILLUSTRAZIONE DEI CRITERI DI PROGETTAZIONE E DI MODELLAZIONE

9.1 US 03-L

Per quanto riguarda la sotto unità in legno US 03-L, la tipologia strutturale è quella di edificio in legno e il sistema costruttivo dell'edificio in oggetto è un sistema a pannelli massicci in legno X-Lam.

Gli elementi strutturali verticali sono realizzati da pannelli X-lam di legno massiccio a strati incrociati ed incollati, giuntati verticalmente tra loro. I pannelli parete sono composti da 5 strati di tavole sovrapposti a fibratura incrociata ed incollati con collanti poliuretanici privi di formaldeide, di spessore totale pari a 160 mm e stratigrafia delle tavole pari a 40-20-40-20-40 mm. L'incrocio delle fibre dei vari strati permette di ridurre le deformazioni meccaniche del materiale legno dovute ai classici fattori (umidità, temperatura etc.) di un ordine di grandezza rispetto alle travi lamellari utilizzate per le coperture: si ottiene così un pannello in legno estremamente stabile ed indeformabile.

Il comportamento dell'edificio in legno realizzato con pannelli X-LAM è quello di una struttura scatolare con diaframmi di piano e pareti collegati mediante elementi meccanici. Le pareti hanno il compito di assorbire le sollecitazioni verticali e orizzontali (carichi verticali, sisma e vento). Il collegamento fra la struttura in legno e le fondazioni in c.a. viene assicurato mediante opportune piastre e barre filettate in acciaio o tasselli a pressione.

L'analisi impiegata per la struttura in questione risulta essere il metodo di riferimento, vale a dire l'analisi dinamica lineare o analisi modale con spettro di risposta, effettuata mediante un codice di calcolo di comprovata affidabilità (PRO SAP della ZSI S.r.l.).

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 25 DI 151

Gli stati limite analizzati nella progettazione sono per gli stati limite ultimi (SLU), lo stato limite di salvaguardia della vita (SLV) e lo stato limite di collasso (SLC), mentre per gli stati limite di esercizio (SLE), lo stato limite di operatività (SLO) e lo stato limite di danno (SLD).

La Normativa impone di utilizzare lo spettro elastico $S_e(T)$ per la verifica sismica agli stati limite d'esercizio, mentre per la verifica agli stati limite ultimi permette di considerare il comportamento plastico delle strutture, riducendo il valore dell'azione sismica di progetto allo spettro di risposta plastico $S_d(T)$ mediante il fattore di comportamento q .

Il fattore di comportamento è utilizzato in fase di progettazione per ridurre le forze ottenute da un'analisi elastica lineare al fine di tenere conto della risposta non-lineare di una struttura; è associato al materiale, al sistema strutturale ed al procedimento di progettazione (rif. Par. 7.3.1).

Il coefficiente di comportamento q viene definito come:

$$q = q_0 \times K_R$$

dove $K_R = 1$ (edificio regolare in altezza) oppure 0,8 (edificio irregolare in altezza), mentre q_0 viene definito all'interno della Tabella 7.3.II e del Paragrafo 7.7.3. del D.M. 17.01.2018 (per costruzioni di legno).

Considerando una classe di duttilità bassa CD "B", e la non regolarità in altezza per l'edificio in esame, si desume dalla tabella sopra citata, in funzione della tipologia strutturale quale "Costruzioni di legno - pannelli di tavole incollate a strati incrociati, collegati mediante chiodi, viti, bulloni", un valore base del fattore di comportamento q_0 pari a 2,5. Da questo si ricava il valore del fattore di comportamento utilizzato nelle analisi che è pari a: $q = 2,5 \times 0,8 = 2$

L'unità strutturale in esame risulta inserita nel complesso del Polo dinamico affiancata ad altre unità strutturali dalle quali è isolata mediante giunti strutturali di spessore 16 cm. Si rimanda all'elaborato "ST-R 01 Relazione generale" per la verifica delle dimensioni dei giunti tra i vari blocchi.

9.2 US 03-S

Per quanto riguarda la sotto unità in acciaio US 03-S, la tipologia strutturale è quella di edificio in acciaio.

Il vano scala con posto all'interno il vano ascensore è realizzato da telai costituiti da montanti realizzati con profili metallici HEB 200 e travi realizzate con profili metallici HEB 200 e disposte in luce tra i montanti.

I cosciali delle rampe delle scale sono realizzati con piatti metallici di dimensioni 15x220 mm. I Gradini sono in lamiera piegata di acciaio con sezione a "z" di spessore 4 mm e dimensioni in pianta pari a 30x120 mm.

I Pianerottoli presentano struttura in grigliato anti tacco 15x76 mm con barre portanti 50x3 mm.

L'analisi impiegata per la struttura in questione risulta essere il metodo di riferimento, vale a dire l'analisi dinamica lineare o analisi modale con spettro di risposta, effettuata mediante un codice di calcolo di comprovata affidabilità (PRO SAP della 2SI S.r.l.).

Gli stati limite analizzati nella progettazione sono per gli stati limite ultimi (SLU), lo stato limite di salvaguardia della vita (SLV) e lo stato limite di collasso (SLC), mentre per gli stati limite di esercizio (SLE), lo stato limite di operatività (SLO) e lo stato limite di danno (SLD).

La Normativa impone di utilizzare lo spettro elastico $S_e(T)$ per la verifica sismica agli stati limite d'esercizio, mentre per la verifica agli stati limite ultimi permette di considerare il comportamento

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 26 DI 151

plastico delle strutture, riducendo il valore dell'azione sismica di progetto allo spettro di risposta plastico $S_d(T)$ mediante il coefficiente di struttura q .

Il coefficiente di struttura è utilizzato in fase di progettazione per ridurre le forze ottenute da un'analisi elastica lineare al fine di tenere conto della risposta non-lineare di una struttura; è associato al materiale, al sistema strutturale ed al procedimento di progettazione.

Nel caso in questione, trattandosi di strutture in acciaio che presentano scarsa duttilità (ovvero capacità di dissipare in caso di azione sismica) si adotta il valore minimo del coefficiente di struttura q pari a 1,5.

L'unità strutturale in esame risulta inserita nel complesso del Polo dinamico affiancata ad altre unità strutturali dalle quali è isolata mediante giunti strutturali di spessore 16 cm. Si rimanda all'elaborato "ST-R 01 Relazione generale" per la verifica delle dimensioni dei giunti tra i vari blocchi.

10 COMBINAZIONI DELLE AZIONI

Le combinazioni sono effettuate secondo il metodo semiprobabilistico agli stati limite considerando le azioni definite dalle normative citate.

Ai fini delle verifiche degli stati limite si definiscono le seguenti combinazioni delle azioni:

Combinazione fondamentale SLU

$$\gamma G_1 \cdot G_1 + \gamma G_2 \cdot G_2 + \gamma P \cdot P + \gamma Q_1 \cdot Q_{k1} + \gamma Q_2 \cdot \psi_{02} \cdot Q_{k2} + \gamma Q_3 \cdot \psi_{03} \cdot Q_{k3} + \dots$$

Combinazione caratteristica (rara) SLE

$$G_1 + G_2 + P + Q_{k1} + \psi_{02} \cdot Q_{k2} + \psi_{03} \cdot Q_{k3} + \dots$$

Combinazione frequente SLE

$$G_1 + G_2 + P + \psi_{11} \cdot Q_{k1} + \psi_{22} \cdot Q_{k2} + \psi_{23} \cdot Q_{k3} + \dots$$

Combinazione quasi permanente SLE

$$G_1 + G_2 + P + \psi_{21} \cdot Q_{k1} + \psi_{22} \cdot Q_{k2} + \psi_{23} \cdot Q_{k3} + \dots$$

Combinazione sismica, impiegata per gli stati limite ultimi e di esercizio connessi all'azione sismica E

$$E + G_1 + G_2 + P + \psi_{21} \cdot Q_{k1} + \psi_{22} \cdot Q_{k2} + \dots$$

Combinazione eccezionale, impiegata per gli stati limite connessi alle azioni eccezionali

$$G_1 + G_2 + A_d + P + \psi_{21} \cdot Q_{k1} + \psi_{22} \cdot Q_{k2} + \dots$$

Dove i valori dei coefficienti Ψ per le azioni di progetto considerate sono i seguenti:

Categoria/Azione	Ψ_{0i}	Ψ_{1i}	Ψ_{2i}
Categoria C - Ambienti suscettibili di affollamento	0,7	0,7	0,6
Vento	0,6	0,2	0,0
Neve (a quota < 1000 m s.l.m.)	0,5	0,2	0,0

Nelle verifiche possono essere adottati in alternativa due diversi approcci progettuali:

- per l'approccio 1 si considerano due diverse combinazioni di gruppi di coefficienti di sicurezza parziali per le azioni, per i materiali e per la resistenza globale (combinazione 1 con coefficienti A1 e combinazione 2 con coefficienti A2),

- per l'approccio 2 si definisce un'unica combinazione per le azioni, per la resistenza dei materiali e per la resistenza globale (con coefficienti A1).

NTC 2018 Tabella 2.6.I

		Coefficiente γ_f	EQU	A1	A2
Carichi permanenti	Favorevoli	γ_{G1}	0,9	1,0	1,0
	Sfavorevoli		1,1	1,3	1,0
Carichi permanenti non strutturali (Non compiutamente definiti)	Favorevoli	γ_{G2}	0,8	0,8	0,8
	Sfavorevoli		1,5	1,5	1,3
Carichi variabili	Favorevoli	γ_{Qj}	0,0	0,0	0,0
	Sfavorevoli		1,5	1,5	1,3

Le verifiche per le strutture di legno vengono effettuate con le seguenti ipotesi:

- classe di servizio 2;
- Il coefficiente di sicurezza sul materiale legno per le verifiche agli SLU è preso pari a $\gamma_m=1,45$ per gli elementi di legno lamellare e per i pannelli X-lam e $\gamma_m=1,50$ per le unioni, come indicato nella Tabella 4.4.III del D.M.18.
- Il coefficiente correttivo K_{mod} è assunto pari a:
 - $K_{mod} = 0,60$ per classe di durata del carico Permanente
 - $K_{mod} = 0,70$ per classe di durata del carico Lunga
 - $K_{mod} = 0,80$ per classe di durata del carico Media
 - $K_{mod} = 0,90$ per classe di durata del carico Breve
 - $K_{mod} = 1,00$ per classe di durata del carico Istantanea

Se una combinazione di carico comprende azioni appartenenti a differenti classi di durata del carico si dovrà scegliere un valore di k_{mod} che corrisponde all'azione di minor durata.

- $K_{def} = 0,80$

Di seguito vengono riportate le tabelle riassuntive dei casi di carico, coefficienti di carico e combinazioni adottate per il dimensionamento della struttura per l'edificio.

10.1 US 03-L

ID Arch.	Tipo	G1k kN/ m2	G2k kN/ m2	Qk kN/ m2	Fatt. A	s sis.	Psi 0	Psi 1	Psi 2	Psi S 2	Fatt. Fi
1	Variab.	1.10	1.00	3.00		1.00	0.70	0.70	0.60	0.60	1.00
2	Neve	0.90	0.50	1.20		1.00	0.50	0.20	0.0	0.0	1.00

Elem.	Tipo	ID Arch.	Mat.	Spessore	Orditura	G1k kN/ m2	G2k kN/ m2	Qk kN/ m2	Nodo 1/6	Nodo 2/7	Nodo 3/8	Nodo	Nodo
1	CM	1 m=78		22.0	0.0	1.10	1.00	3.00	155	162	169	176	183
									189	196	203	209	308
									302	295	288	282	275
									268	261	254	241	235
									234	222	216	148	
2	CM	1 m=78		22.0	0.0	1.10	1.00	3.00	216	222	234	235	241
									247	87	88	95	102
									109	116	123	442	69
									136	75	425	418	62
									55	48	41	34	27

								26	379	372	365	358
								147	148			
3	CM	1 m=78	22.0	0.0	1.10	1.00	3.00	430	423	64	390	384
								377	370	363	356	350
								603	609	525	519	513
								479	480	487	494	501
								507	454	455	461	467
								416				
4	CM	2 m=78	22.0	0.0	0.90	0.50	1.20	711	705	610	688	682
								676	670	664	658	652
								399	405	789	783	777
								746	747	753	759	765
								771	722	723	729	735
								699				
5	CM	2 m=78	22.0	0.0	0.90	0.50	1.20	646	640	634	628	622
								621	393	855	854	843
								837	831	825	819	813
								807	801	795	777	783
								789	405	399	652	

CDC	Tipo	Sigla Id	Note
1	Ggk	CDC=Ggk (peso proprio della struttura)	
2	Gsk	CDC=G1sk (permanente solai-coperture)	
3	Gsk	CDC=G2sk (permanente solai-coperture n.c.d.)	
4	Qsk	CDC=Qsk (variabile solai)	
5	Qnk	CDC=Qnk (carico da neve)	
6	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. +)	partecipazione:1.00 per 1 CDC=Ggk (peso proprio della struttura)
			partecipazione:1.00 per 2 CDC=G1sk (permanente solai-coperture)
			partecipazione:1.00 per 3 CDC=G2sk (permanente solai-coperture n.c.d.)
			partecipazione:1.00 per 4 CDC=Qsk (variabile solai)
			partecipazione:1.00 per 5 CDC=Qnk (carico da neve)
7	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. -)	come precedente CDC sismico
8	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. +)	come precedente CDC sismico
9	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. -)	come precedente CDC sismico
10	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. +)	come precedente CDC sismico
11	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. -)	come precedente CDC sismico
12	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. +)	come precedente CDC sismico
13	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. -)	come precedente CDC sismico
14	Edk	CDC=Ed (dinamico SLO) alfa=0.0 (ecc. +)	come precedente CDC sismico
15	Edk	CDC=Ed (dinamico SLO) alfa=0.0 (ecc. -)	come precedente CDC sismico
16	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. +)	come precedente CDC sismico
17	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. -)	come precedente CDC sismico
18	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. +)	come precedente CDC sismico
19	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. -)	come precedente CDC sismico
20	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. +)	come precedente CDC sismico
21	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. -)	come precedente CDC sismico

Cmb	Tipo	Sigla Id	effetto P-delta
1	SLU	Comb. SLU A1 1	
2	SLU	Comb. SLU A1 2	
3	SLU	Comb. SLU A1 3	
4	SLU	Comb. SLU A1 4	
5	SLU	Comb. SLU A1 5	
6	SLU	Comb. SLU A1 6	
7	SLU	Comb. SLU A1 7	
8	SLU	Comb. SLU A1 8	
9	SLU	Comb. SLU A1 9	
10	SLU	Comb. SLU A1 10	
11	SLU	Comb. SLU A1 11	
12	SLU	Comb. SLU A1 12	
13	SLU	Comb. SLU A1 13	
14	SLU	Comb. SLU A1 14	

Cmb	Tipo	Sigla Id	effetto P-delta
15	SLU	Comb. SLU A1 (SLV sism.) 15	
16	SLU	Comb. SLU A1 (SLV sism.) 16	
17	SLU	Comb. SLU A1 (SLV sism.) 17	
18	SLU	Comb. SLU A1 (SLV sism.) 18	
19	SLU	Comb. SLU A1 (SLV sism.) 19	
20	SLU	Comb. SLU A1 (SLV sism.) 20	
21	SLU	Comb. SLU A1 (SLV sism.) 21	
22	SLU	Comb. SLU A1 (SLV sism.) 22	
23	SLU	Comb. SLU A1 (SLV sism.) 23	
24	SLU	Comb. SLU A1 (SLV sism.) 24	
25	SLU	Comb. SLU A1 (SLV sism.) 25	
26	SLU	Comb. SLU A1 (SLV sism.) 26	
27	SLU	Comb. SLU A1 (SLV sism.) 27	
28	SLU	Comb. SLU A1 (SLV sism.) 28	
29	SLU	Comb. SLU A1 (SLV sism.) 29	
30	SLU	Comb. SLU A1 (SLV sism.) 30	
31	SLU	Comb. SLU A1 (SLV sism.) 31	
32	SLU	Comb. SLU A1 (SLV sism.) 32	
33	SLU	Comb. SLU A1 (SLV sism.) 33	
34	SLU	Comb. SLU A1 (SLV sism.) 34	
35	SLU	Comb. SLU A1 (SLV sism.) 35	
36	SLU	Comb. SLU A1 (SLV sism.) 36	
37	SLU	Comb. SLU A1 (SLV sism.) 37	
38	SLU	Comb. SLU A1 (SLV sism.) 38	
39	SLU	Comb. SLU A1 (SLV sism.) 39	
40	SLU	Comb. SLU A1 (SLV sism.) 40	
41	SLU	Comb. SLU A1 (SLV sism.) 41	
42	SLU	Comb. SLU A1 (SLV sism.) 42	
43	SLU	Comb. SLU A1 (SLV sism.) 43	
44	SLU	Comb. SLU A1 (SLV sism.) 44	
45	SLU	Comb. SLU A1 (SLV sism.) 45	
46	SLU	Comb. SLU A1 (SLV sism.) 46	
47	SLD(sis)	Comb. SLE (SLD Danno sism.) 47	
48	SLD(sis)	Comb. SLE (SLD Danno sism.) 48	
49	SLD(sis)	Comb. SLE (SLD Danno sism.) 49	
50	SLD(sis)	Comb. SLE (SLD Danno sism.) 50	
51	SLD(sis)	Comb. SLE (SLD Danno sism.) 51	
52	SLD(sis)	Comb. SLE (SLD Danno sism.) 52	
53	SLD(sis)	Comb. SLE (SLD Danno sism.) 53	
54	SLD(sis)	Comb. SLE (SLD Danno sism.) 54	
55	SLD(sis)	Comb. SLE (SLD Danno sism.) 55	
56	SLD(sis)	Comb. SLE (SLD Danno sism.) 56	
57	SLD(sis)	Comb. SLE (SLD Danno sism.) 57	
58	SLD(sis)	Comb. SLE (SLD Danno sism.) 58	
59	SLD(sis)	Comb. SLE (SLD Danno sism.) 59	
60	SLD(sis)	Comb. SLE (SLD Danno sism.) 60	
61	SLD(sis)	Comb. SLE (SLD Danno sism.) 61	
62	SLD(sis)	Comb. SLE (SLD Danno sism.) 62	
63	SLD(sis)	Comb. SLE (SLD Danno sism.) 63	
64	SLD(sis)	Comb. SLE (SLD Danno sism.) 64	
65	SLD(sis)	Comb. SLE (SLD Danno sism.) 65	
66	SLD(sis)	Comb. SLE (SLD Danno sism.) 66	
67	SLD(sis)	Comb. SLE (SLD Danno sism.) 67	
68	SLD(sis)	Comb. SLE (SLD Danno sism.) 68	
69	SLD(sis)	Comb. SLE (SLD Danno sism.) 69	
70	SLD(sis)	Comb. SLE (SLD Danno sism.) 70	
71	SLD(sis)	Comb. SLE (SLD Danno sism.) 71	
72	SLD(sis)	Comb. SLE (SLD Danno sism.) 72	
73	SLD(sis)	Comb. SLE (SLD Danno sism.) 73	
74	SLD(sis)	Comb. SLE (SLD Danno sism.) 74	
75	SLD(sis)	Comb. SLE (SLD Danno sism.) 75	
76	SLD(sis)	Comb. SLE (SLD Danno sism.) 76	
77	SLD(sis)	Comb. SLE (SLD Danno sism.) 77	
78	SLD(sis)	Comb. SLE (SLD Danno sism.) 78	
79	SLD(sis)	Comb. SLE (SLO Operativo sism.) 79	
80	SLD(sis)	Comb. SLE (SLO Operativo sism.) 80	
81	SLD(sis)	Comb. SLE (SLO Operativo sism.) 81	
82	SLD(sis)	Comb. SLE (SLO Operativo sism.) 82	
83	SLD(sis)	Comb. SLE (SLO Operativo sism.) 83	
84	SLD(sis)	Comb. SLE (SLO Operativo sism.) 84	
85	SLD(sis)	Comb. SLE (SLO Operativo sism.) 85	
86	SLD(sis)	Comb. SLE (SLO Operativo sism.) 86	
87	SLD(sis)	Comb. SLE (SLO Operativo sism.) 87	
88	SLD(sis)	Comb. SLE (SLO Operativo sism.) 88	

Cmb	Tipo	Sigla Id	effetto P-delta
89	SLD(sis)	Comb. SLE (SLO Operativo sism.) 89	
90	SLD(sis)	Comb. SLE (SLO Operativo sism.) 90	
91	SLD(sis)	Comb. SLE (SLO Operativo sism.) 91	
92	SLD(sis)	Comb. SLE (SLO Operativo sism.) 92	
93	SLD(sis)	Comb. SLE (SLO Operativo sism.) 93	
94	SLD(sis)	Comb. SLE (SLO Operativo sism.) 94	
95	SLD(sis)	Comb. SLE (SLO Operativo sism.) 95	
96	SLD(sis)	Comb. SLE (SLO Operativo sism.) 96	
97	SLD(sis)	Comb. SLE (SLO Operativo sism.) 97	
98	SLD(sis)	Comb. SLE (SLO Operativo sism.) 98	
99	SLD(sis)	Comb. SLE (SLO Operativo sism.) 99	
100	SLD(sis)	Comb. SLE (SLO Operativo sism.) 100	
101	SLD(sis)	Comb. SLE (SLO Operativo sism.) 101	
102	SLD(sis)	Comb. SLE (SLO Operativo sism.) 102	
103	SLD(sis)	Comb. SLE (SLO Operativo sism.) 103	
104	SLD(sis)	Comb. SLE (SLO Operativo sism.) 104	
105	SLD(sis)	Comb. SLE (SLO Operativo sism.) 105	
106	SLD(sis)	Comb. SLE (SLO Operativo sism.) 106	
107	SLD(sis)	Comb. SLE (SLO Operativo sism.) 107	
108	SLD(sis)	Comb. SLE (SLO Operativo sism.) 108	
109	SLD(sis)	Comb. SLE (SLO Operativo sism.) 109	
110	SLD(sis)	Comb. SLE (SLO Operativo sism.) 110	
111	SLU	Comb. SLU A1 (SLC sism.) 111	
112	SLU	Comb. SLU A1 (SLC sism.) 112	
113	SLU	Comb. SLU A1 (SLC sism.) 113	
114	SLU	Comb. SLU A1 (SLC sism.) 114	
115	SLU	Comb. SLU A1 (SLC sism.) 115	
116	SLU	Comb. SLU A1 (SLC sism.) 116	
117	SLU	Comb. SLU A1 (SLC sism.) 117	
118	SLU	Comb. SLU A1 (SLC sism.) 118	
119	SLU	Comb. SLU A1 (SLC sism.) 119	
120	SLU	Comb. SLU A1 (SLC sism.) 120	
121	SLU	Comb. SLU A1 (SLC sism.) 121	
122	SLU	Comb. SLU A1 (SLC sism.) 122	
123	SLU	Comb. SLU A1 (SLC sism.) 123	
124	SLU	Comb. SLU A1 (SLC sism.) 124	
125	SLU	Comb. SLU A1 (SLC sism.) 125	
126	SLU	Comb. SLU A1 (SLC sism.) 126	
127	SLU	Comb. SLU A1 (SLC sism.) 127	
128	SLU	Comb. SLU A1 (SLC sism.) 128	
129	SLU	Comb. SLU A1 (SLC sism.) 129	
130	SLU	Comb. SLU A1 (SLC sism.) 130	
131	SLU	Comb. SLU A1 (SLC sism.) 131	
132	SLU	Comb. SLU A1 (SLC sism.) 132	
133	SLU	Comb. SLU A1 (SLC sism.) 133	
134	SLU	Comb. SLU A1 (SLC sism.) 134	
135	SLU	Comb. SLU A1 (SLC sism.) 135	
136	SLU	Comb. SLU A1 (SLC sism.) 136	
137	SLU	Comb. SLU A1 (SLC sism.) 137	
138	SLU	Comb. SLU A1 (SLC sism.) 138	
139	SLU	Comb. SLU A1 (SLC sism.) 139	
140	SLU	Comb. SLU A1 (SLC sism.) 140	
141	SLU	Comb. SLU A1 (SLC sism.) 141	
142	SLU	Comb. SLU A1 (SLC sism.) 142	
143	SLE(r)	Comb. SLE(rara) 143	
144	SLE(r)	Comb. SLE(rara) 144	
145	SLE(r)	Comb. SLE(rara) 145	
146	SLE(r)	Comb. SLE(rara) 146	
147	SLE(r)	Comb. SLE(rara) 147	
148	SLE(r)	Comb. SLE(rara) 148	
149	SLE(r)	Comb. SLE(rara) 149	
150	SLE(f)	Comb. SLE(freq.) 150	
151	SLE(f)	Comb. SLE(freq.) 151	
152	SLE(f)	Comb. SLE(freq.) 152	
153	SLE(f)	Comb. SLE(freq.) 153	
154	SLE(f)	Comb. SLE(freq.) 154	
155	SLE(p)	Comb. SLE(perm.) 155	
156	SLE(p)	Comb. SLE(perm.) 156	

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
1	1.30	1.30	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
2	1.30	1.30	1.50	0.0	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
3	1.30	1.30	1.50	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
4	1.30	1.30	1.50	1.50	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
5	1.00	1.00	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
6	1.00	1.00	0.80	0.0	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
7	1.00	1.00	0.80	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
8	1.00	1.00	0.80	1.50	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
9	1.30	1.30	1.50	0.0	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
10	1.30	1.30	1.50	1.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
11	1.30	1.30	1.50	1.05	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
12	1.00	1.00	0.80	0.0	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
13	1.00	1.00	0.80	1.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
14	1.00	1.00	0.80	1.05	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
15	1.00	1.00	1.00	0.60	0.0	-1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
16	1.00	1.00	1.00	0.60	0.0	-1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
17	1.00	1.00	1.00	0.60	0.0	1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
18	1.00	1.00	1.00	0.60	0.0	1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
19	1.00	1.00	1.00	0.60	0.0	-1.00	0.0	0.0	-0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
20	1.00	1.00	1.00	0.60	0.0	-1.00	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
21	1.00	1.00	1.00	0.60	0.0	1.00	0.0	0.0	-0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
22	1.00	1.00	1.00	0.60	0.0	1.00	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
23	1.00	1.00	1.00	0.60	0.0	0.0	-1.00	-0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
24	1.00	1.00	1.00	0.60	0.0	0.0	-1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
25	1.00	1.00	1.00	0.60	0.0	0.0	1.00	-0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
26	1.00	1.00	1.00	0.60	0.0	0.0	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
27	1.00	1.00	1.00	0.60	0.0	0.0	-1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
28	1.00	1.00	1.00	0.60	0.0	0.0	-1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
29	1.00	1.00	1.00	0.60	0.0	0.0	1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
30	1.00	1.00	1.00	0.60	0.0	0.0	1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
31	1.00	1.00	1.00	0.60	0.0	-0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
32	1.00	1.00	1.00	0.60	0.0	-0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
33	1.00	1.00	1.00	0.60	0.0	0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
34	1.00	1.00	1.00	0.60	0.0	0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
35	1.00	1.00	1.00	0.60	0.0	0.0	-0.30	-1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
36	1.00	1.00	1.00	0.60	0.0	0.0	-0.30	1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
37	1.00	1.00	1.00	0.60	0.0	0.0	0.30	-1.00	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
38	1.00	1.00	1.00	0.60	0.0	0.0	0.30	1.00	0.0	0.0	0.0	0.0	0.0	0.0

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
39	1.00	1.00	1.00	0.60	0.0	-0.30	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
40	1.00	1.00	1.00	0.60	0.0	-0.30	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
41	1.00	1.00	1.00	0.60	0.0	0.30	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
42	1.00	1.00	1.00	0.60	0.0	0.30	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
43	1.00	1.00	1.00	0.60	0.0	0.0	-0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
44	1.00	1.00	1.00	0.60	0.0	0.0	-0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
45	1.00	1.00	1.00	0.60	0.0	0.0	0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
46	1.00	1.00	1.00	0.60	0.0	0.0	0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
47	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	-0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
48	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
49	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	1.00	0.0	-0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
50	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
51	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.0	-0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
52	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.0	0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
53	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	-0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
54	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
55	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	-0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
56	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
57	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	1.00	-0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
58	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.30	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
59	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	-0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
60	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
61	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	-0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
62	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.30	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
63	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	-1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
64	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
65	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.30	0.0	-1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
66	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.30	0.0	1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
67	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-0.30	-1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
68	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-0.30	1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
69	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.30	-1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
70	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.30	1.00	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
71	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	0.0	-1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
72	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	0.0	1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
73	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	-1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
74	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
75	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	-1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
76	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
77	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.30	0.0	-1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
78	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.30	0.0	1.00	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
79	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
	0.0	-0.30	0.0	0.0	0.0	0.0	0.0							
80	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
	0.0	0.30	0.0	0.0	0.0	0.0	0.0							
81	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00
	0.0	-0.30	0.0	0.0	0.0	0.0	0.0							
82	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00
	0.0	0.30	0.0	0.0	0.0	0.0	0.0							
83	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
	0.0	0.0	-0.30	0.0	0.0	0.0	0.0							
84	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
	0.0	0.0	0.30	0.0	0.0	0.0	0.0							
85	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00
	0.0	0.0	-0.30	0.0	0.0	0.0	0.0							
86	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00
	0.0	0.0	0.30	0.0	0.0	0.0	0.0							
87	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-1.00	-0.30	0.0	0.0	0.0	0.0	0.0							
88	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-1.00	0.30	0.0	0.0	0.0	0.0	0.0							
89	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.00	-0.30	0.0	0.0	0.0	0.0	0.0							
90	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.00	0.30	0.0	0.0	0.0	0.0	0.0							
91	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-1.00	0.0	-0.30	0.0	0.0	0.0	0.0							
92	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-1.00	0.0	0.30	0.0	0.0	0.0	0.0							
93	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.00	0.0	-0.30	0.0	0.0	0.0	0.0							
94	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.00	0.0	0.30	0.0	0.0	0.0	0.0							
95	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.30
	0.0	-1.00	0.0	0.0	0.0	0.0	0.0							
96	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.30
	0.0	1.00	0.0	0.0	0.0	0.0	0.0							
97	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.30
	0.0	-1.00	0.0	0.0	0.0	0.0	0.0							
98	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.30
	0.0	1.00	0.0	0.0	0.0	0.0	0.0							
99	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-0.30	-1.00	0.0	0.0	0.0	0.0	0.0							
100	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-0.30	1.00	0.0	0.0	0.0	0.0	0.0							
101	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.30	-1.00	0.0	0.0	0.0	0.0	0.0							
102	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.30	1.00	0.0	0.0	0.0	0.0	0.0							
103	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.30
	0.0	0.0	-1.00	0.0	0.0	0.0	0.0							
104	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.30
	0.0	0.0	1.00	0.0	0.0	0.0	0.0							
105	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.30
	0.0	0.0	-1.00	0.0	0.0	0.0	0.0							
106	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.30
	0.0	0.0	1.00	0.0	0.0	0.0	0.0							
107	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-0.30	0.0	-1.00	0.0	0.0	0.0	0.0							
108	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-0.30	0.0	1.00	0.0	0.0	0.0	0.0							
109	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.30	0.0	-1.00	0.0	0.0	0.0	0.0							
110	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.30	0.0	1.00	0.0	0.0	0.0	0.0							
111	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
	0.0	0.0	0.0	-1.00	0.0	-0.30	0.0							
112	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-1.00	0.0	0.30	0.0							
113	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	1.00	0.0	-0.30	0.0							
114	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	1.00	0.0	0.30	0.0							
115	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-1.00	0.0	0.0	-0.30							
116	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-1.00	0.0	0.0	0.30							
117	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	1.00	0.0	0.0	-0.30							
118	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	1.00	0.0	0.0	0.30							
119	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-1.00	-0.30	0.0							
120	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-1.00	0.30	0.0							
121	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	1.00	-0.30	0.0							
122	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	1.00	0.30	0.0							
123	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-1.00	0.0	-0.30							
124	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-1.00	0.0	0.30							
125	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	1.00	0.0	-0.30							
126	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	1.00	0.0	0.30							
127	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-0.30	0.0	-1.00	0.0							
128	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-0.30	0.0	1.00	0.0							
129	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.30	0.0	-1.00	0.0							
130	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.30	0.0	1.00	0.0							
131	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-0.30	-1.00	0.0							
132	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-0.30	1.00	0.0							
133	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.30	-1.00	0.0							
134	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.30	1.00	0.0							
135	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-0.30	0.0	0.0	-1.00							
136	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	-0.30	0.0	0.0	1.00							
137	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.30	0.0	0.0	-1.00							
138	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.30	0.0	0.0	1.00							
139	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-0.30	0.0	-1.00							
140	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	-0.30	0.0	1.00							
141	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.30	0.0	-1.00							
142	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.30	0.0	1.00							
143	1.00	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
144	1.00	1.00	1.00	0.0	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
145	1.00	1.00	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
146	1.00	1.00	1.00	1.00	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
147	1.00	1.00	1.00	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
148	1.00	1.00	1.00	0.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
149	1.00	1.00	1.00	0.70	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
150	1.00	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
151	1.00	1.00	1.00	0.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
152	1.00	1.00	1.00	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
153	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
154	1.00	1.00	1.00	0.60	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
155	1.00	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
156	1.00	1.00	1.00	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0							

10.2 US 03-S

Id	Tipo	Pos.	fx	fy	fz	mx	my	mz
		m	kN/ m	kN/ m	kN/ m	kN	kN	kN
1	Vento-DG:Fyi=-0.65 Fyf=-0.65	0.0	0.0	-0.65	0.0	0.0	0.0	0.0
		0.0	0.0	-0.65	0.0	0.0	0.0	0.0
2	Vento2-DG:Fyi=-0.45 Fyf=-0.45	0.0	0.0	-0.45	0.0	0.0	0.0	0.0
		0.0	0.0	-0.45	0.0	0.0	0.0	0.0
3	Vetro-DG:Fzi=-1.00 Fzf=-1.00	0.0	0.0	0.0	-1.00	0.0	0.0	0.0
		0.0	0.0	0.0	-1.00	0.0	0.0	0.0
4	Ceramica-DG:Fzi=-2.50 Fzf=-2.50	0.0	0.0	0.0	-2.50	0.0	0.0	0.0
		0.0	0.0	0.0	-2.50	0.0	0.0	0.0
5	Ceramica2-DG:Fzi=-3.50 Fzf=-3.50	0.0	0.0	0.0	-3.50	0.0	0.0	0.0
		0.0	0.0	0.0	-3.50	0.0	0.0	0.0

CDC	Tipo	Sigla Id	Note
1	Ggk	CDC=Ggk (peso proprio della struttura)	
2	Gsk	CDC=G1sk (permanente solai-coperture)	
3	Qsk	CDC=Qsk (variabile solai)	
4	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. +)	partecipazione:1.00 per 1 CDC=Ggk (peso proprio della struttura)
			partecipazione:1.00 per 2 CDC=G1sk (permanente solai-coperture)
			partecipazione:1.00 per 3 CDC=Qsk (variabile solai)
			partecipazione:1.00 per 13 CDC=G1k Vetro (permanente generico)
			partecipazione:1.00 per 14 CDC=G1k Lastre ceramica (permanente generico)
5	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. -)	come precedente CDC sismico
6	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. +)	come precedente CDC sismico
7	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. -)	come precedente CDC sismico
8	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. +)	come precedente CDC sismico
9	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. -)	come precedente CDC sismico
10	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. +)	come precedente CDC sismico
11	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. -)	come precedente CDC sismico
12	Qvk	CDC=Qvk (carico da vento)	D2 : 161 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 : 161 Azione : Vento2-DG:Fyi=-0.45 Fyf=-0.45
			D2 :da 177 a 178 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 :da 180 a 183 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 : 192 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 : 196 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 : 196 Azione : Vento2-DG:Fyi=-0.45 Fyf=-0.45
			D2 : 204 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 :da 209 a 212 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
			D2 :da 230 a 233 Azione : Vento-DG:Fyi=-0.65 Fyf=-0.65
13	Gk	CDC=G1k Vetro (permanente generico)	D2 :da 87 a 89 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 :da 91 a 93 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 :da 95 a 101 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 :da 103 a 105 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 :da 107 a 113 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 : 115 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 : 228 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
			D2 :da 244 a 245 Azione : Vetro-DG:Fzi=-1.00 Fzf=-1.00
14	Gk	CDC=G1k Lastre ceramica (permanente generico)	D2 :da 154 a 155 Azione : Ceramica-DG:Fzi=-2.50 Fzf=-2.50

CDC	Tipo	Sigla Id	Note
			D2 : 175 Azione : Ceramica2-DG:Fzi=-3.50 Fzf=-3.50
			D2 : 220 Azione : Ceramica2-DG:Fzi=-3.50 Fzf=-3.50
15	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. +)	come precedente CDC sismico
16	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. -)	come precedente CDC sismico
17	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. +)	come precedente CDC sismico
18	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. -)	come precedente CDC sismico
19	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. +)	come precedente CDC sismico
20	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. -)	come precedente CDC sismico

Cmb	Tipo	Sigla Id	effetto P-delta
1	SLU	Comb. SLU A1 1	
2	SLU	Comb. SLU A1 2	
3	SLU	Comb. SLU A1 3	
4	SLU	Comb. SLU A1 4	
5	SLU	Comb. SLU A1 5	
6	SLU	Comb. SLU A1 6	
7	SLU	Comb. SLU A1 7	
8	SLU	Comb. SLU A1 8	
9	SLE(r)	Comb. SLE(rara) 9	
10	SLE(r)	Comb. SLE(rara) 10	
11	SLE(r)	Comb. SLE(rara) 11	
12	SLE(r)	Comb. SLE(rara) 12	
13	SLE(f)	Comb. SLE(freq.) 13	
14	SLE(f)	Comb. SLE(freq.) 14	
15	SLE(f)	Comb. SLE(freq.) 15	
16	SLE(f)	Comb. SLE(freq.) 16	
17	SLE(p)	Comb. SLE(perm.) 17	
18	SLE(p)	Comb. SLE(perm.) 18	
19	SLU	Comb. SLU A1 (SLV sism.) 19	
20	SLU	Comb. SLU A1 (SLV sism.) 20	
21	SLU	Comb. SLU A1 (SLV sism.) 21	
22	SLU	Comb. SLU A1 (SLV sism.) 22	
23	SLU	Comb. SLU A1 (SLV sism.) 23	
24	SLU	Comb. SLU A1 (SLV sism.) 24	
25	SLU	Comb. SLU A1 (SLV sism.) 25	
26	SLU	Comb. SLU A1 (SLV sism.) 26	
27	SLU	Comb. SLU A1 (SLV sism.) 27	
28	SLU	Comb. SLU A1 (SLV sism.) 28	
29	SLU	Comb. SLU A1 (SLV sism.) 29	
30	SLU	Comb. SLU A1 (SLV sism.) 30	
31	SLU	Comb. SLU A1 (SLV sism.) 31	
32	SLU	Comb. SLU A1 (SLV sism.) 32	
33	SLU	Comb. SLU A1 (SLV sism.) 33	
34	SLU	Comb. SLU A1 (SLV sism.) 34	
35	SLU	Comb. SLU A1 (SLV sism.) 35	
36	SLU	Comb. SLU A1 (SLV sism.) 36	
37	SLU	Comb. SLU A1 (SLV sism.) 37	
38	SLU	Comb. SLU A1 (SLV sism.) 38	
39	SLU	Comb. SLU A1 (SLV sism.) 39	
40	SLU	Comb. SLU A1 (SLV sism.) 40	
41	SLU	Comb. SLU A1 (SLV sism.) 41	
42	SLU	Comb. SLU A1 (SLV sism.) 42	
43	SLU	Comb. SLU A1 (SLV sism.) 43	
44	SLU	Comb. SLU A1 (SLV sism.) 44	
45	SLU	Comb. SLU A1 (SLV sism.) 45	
46	SLU	Comb. SLU A1 (SLV sism.) 46	
47	SLU	Comb. SLU A1 (SLV sism.) 47	
48	SLU	Comb. SLU A1 (SLV sism.) 48	
49	SLU	Comb. SLU A1 (SLV sism.) 49	
50	SLU	Comb. SLU A1 (SLV sism.) 50	
51	SLD(sis)	Comb. SLE (SLD Danno sism.) 51	
52	SLD(sis)	Comb. SLE (SLD Danno sism.) 52	
53	SLD(sis)	Comb. SLE (SLD Danno sism.) 53	
54	SLD(sis)	Comb. SLE (SLD Danno sism.) 54	
55	SLD(sis)	Comb. SLE (SLD Danno sism.) 55	
56	SLD(sis)	Comb. SLE (SLD Danno sism.) 56	
57	SLD(sis)	Comb. SLE (SLD Danno sism.) 57	
58	SLD(sis)	Comb. SLE (SLD Danno sism.) 58	
59	SLD(sis)	Comb. SLE (SLD Danno sism.) 59	
60	SLD(sis)	Comb. SLE (SLD Danno sism.) 60	
61	SLD(sis)	Comb. SLE (SLD Danno sism.) 61	
62	SLD(sis)	Comb. SLE (SLD Danno sism.) 62	
63	SLD(sis)	Comb. SLE (SLD Danno sism.) 63	

Cmb	Tipo	Sigla Id	effetto P-delta
64	SLD(sis)	Comb. SLE (SLD Danno sism.) 64	
65	SLD(sis)	Comb. SLE (SLD Danno sism.) 65	
66	SLD(sis)	Comb. SLE (SLD Danno sism.) 66	
67	SLD(sis)	Comb. SLE (SLD Danno sism.) 67	
68	SLD(sis)	Comb. SLE (SLD Danno sism.) 68	
69	SLD(sis)	Comb. SLE (SLD Danno sism.) 69	
70	SLD(sis)	Comb. SLE (SLD Danno sism.) 70	
71	SLD(sis)	Comb. SLE (SLD Danno sism.) 71	
72	SLD(sis)	Comb. SLE (SLD Danno sism.) 72	
73	SLD(sis)	Comb. SLE (SLD Danno sism.) 73	
74	SLD(sis)	Comb. SLE (SLD Danno sism.) 74	
75	SLD(sis)	Comb. SLE (SLD Danno sism.) 75	
76	SLD(sis)	Comb. SLE (SLD Danno sism.) 76	
77	SLD(sis)	Comb. SLE (SLD Danno sism.) 77	
78	SLD(sis)	Comb. SLE (SLD Danno sism.) 78	
79	SLD(sis)	Comb. SLE (SLD Danno sism.) 79	
80	SLD(sis)	Comb. SLE (SLD Danno sism.) 80	
81	SLD(sis)	Comb. SLE (SLD Danno sism.) 81	
82	SLD(sis)	Comb. SLE (SLD Danno sism.) 82	
83	SLD(sis)	Comb. SLE (SLO Operativo sism.) 83	
84	SLD(sis)	Comb. SLE (SLO Operativo sism.) 84	
85	SLD(sis)	Comb. SLE (SLO Operativo sism.) 85	
86	SLD(sis)	Comb. SLE (SLO Operativo sism.) 86	
87	SLU	Comb. SLU A1 (SLC sism.) 87	
88	SLU	Comb. SLU A1 (SLC sism.) 88	
89	SLU	Comb. SLU A1 (SLC sism.) 89	
90	SLU	Comb. SLU A1 (SLC sism.) 90	
91	SLU	Comb. SLU A1 (SLC sism.) 91	
92	SLU	Comb. SLU A1 (SLC sism.) 92	
93	SLU	Comb. SLU A1 (SLC sism.) 93	
94	SLU	Comb. SLU A1 (SLC sism.) 94	
95	SLU	Comb. SLU A1 (SLC sism.) 95	
96	SLU	Comb. SLU A1 (SLC sism.) 96	
97	SLU	Comb. SLU A1 (SLC sism.) 97	
98	SLU	Comb. SLU A1 (SLC sism.) 98	
99	SLU	Comb. SLU A1 (SLC sism.) 99	
100	SLU	Comb. SLU A1 (SLC sism.) 100	
101	SLU	Comb. SLU A1 (SLC sism.) 101	
102	SLU	Comb. SLU A1 (SLC sism.) 102	
103	SLU	Comb. SLU A1 (SLC sism.) 103	
104	SLU	Comb. SLU A1 (SLC sism.) 104	
105	SLU	Comb. SLU A1 (SLC sism.) 105	
106	SLU	Comb. SLU A1 (SLC sism.) 106	
107	SLU	Comb. SLU A1 (SLC sism.) 107	
108	SLU	Comb. SLU A1 (SLC sism.) 108	
109	SLU	Comb. SLU A1 (SLC sism.) 109	
110	SLU	Comb. SLU A1 (SLC sism.) 110	
111	SLU	Comb. SLU A1 (SLC sism.) 111	
112	SLU	Comb. SLU A1 (SLC sism.) 112	
113	SLU	Comb. SLU A1 (SLC sism.) 113	
114	SLU	Comb. SLU A1 (SLC sism.) 114	
115	SLU	Comb. SLU A1 (SLC sism.) 115	
116	SLU	Comb. SLU A1 (SLC sism.) 116	
117	SLU	Comb. SLU A1 (SLC sism.) 117	
118	SLU	Comb. SLU A1 (SLC sism.) 118	

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
1	1.30	1.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	1.30	1.30
	0.0	0.0	0.0	0.0	0.0	0.0								
2	1.30	1.30	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	1.30	1.30
	0.0	0.0	0.0	0.0	0.0	0.0								
3	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
4	1.00	1.00	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
5	1.30	1.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	1.30	1.30
	0.0	0.0	0.0	0.0	0.0	0.0								
6	1.30	1.30	1.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	1.30	1.30
	0.0	0.0	0.0	0.0	0.0	0.0								
7	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
8	1.00	1.00	1.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	1.00	1.00

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
	0.0	0.0	0.0	0.0	0.0	0.0								
9	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.60	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
10	1.00	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.60	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
11	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
12	1.00	1.00	0.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
13	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
14	1.00	1.00	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
15	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
16	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
17	1.00	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
18	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
19	1.00	1.00	0.30	-1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
20	1.00	1.00	0.30	-1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
21	1.00	1.00	0.30	1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
22	1.00	1.00	0.30	1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
23	1.00	1.00	0.30	-1.00	0.0	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
24	1.00	1.00	0.30	-1.00	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
25	1.00	1.00	0.30	1.00	0.0	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
26	1.00	1.00	0.30	1.00	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
27	1.00	1.00	0.30	0.0	-1.00	-0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
28	1.00	1.00	0.30	0.0	-1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
29	1.00	1.00	0.30	0.0	1.00	-0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
30	1.00	1.00	0.30	0.0	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
31	1.00	1.00	0.30	0.0	-1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
32	1.00	1.00	0.30	0.0	-1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
33	1.00	1.00	0.30	0.0	1.00	0.0	-0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
34	1.00	1.00	0.30	0.0	1.00	0.0	0.30	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
35	1.00	1.00	0.30	-0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
36	1.00	1.00	0.30	-0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
37	1.00	1.00	0.30	0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
38	1.00	1.00	0.30	0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
39	1.00	1.00	0.30	0.0	-0.30	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
40	1.00	1.00	0.30	0.0	-0.30	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
41	1.00	1.00	0.30	0.0	0.30	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
42	1.00	1.00	0.30	0.0	0.30	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
43	1.00	1.00	0.30	-0.30	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
44	1.00	1.00	0.30	-0.30	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
45	1.00	1.00	0.30	0.30	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
46	1.00	1.00	0.30	0.30	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
47	1.00	1.00	0.30	0.0	-0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
48	1.00	1.00	0.30	0.0	-0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
49	1.00	1.00	0.30	0.0	0.30	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
50	1.00	1.00	0.30	0.0	0.30	0.0	1.00	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
51	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-1.00	0.0	-0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
52	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-1.00	0.0	0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
53	1.00	1.00	0.30	0.0	0.0	0.0	0.0	1.00	0.0	-0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
54	1.00	1.00	0.30	0.0	0.0	0.0	0.0	1.00	0.0	0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
55	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-1.00	0.0	0.0	-0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
56	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-1.00	0.0	0.0	0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
57	1.00	1.00	0.30	0.0	0.0	0.0	0.0	1.00	0.0	0.0	-0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
58	1.00	1.00	0.30	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
59	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-1.00	-0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
60	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-1.00	0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
61	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	1.00	-0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
62	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	1.00	0.30	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
63	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	-0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
64	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
65	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	1.00	0.0	-0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
66	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.30	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
67	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-0.30	0.0	-1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
68	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-0.30	0.0	1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
69	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.30	0.0	-1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
70	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.30	0.0	1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
71	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-0.30	-1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
72	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-0.30	1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
73	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.30	-1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
74	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.30	1.00	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
75	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-0.30	0.0	0.0	-1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
76	1.00	1.00	0.30	0.0	0.0	0.0	0.0	-0.30	0.0	0.0	1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
77	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.30	0.0	0.0	-1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
78	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.30	0.0	0.0	1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
79	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	-1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
80	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	-0.30	0.0	1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
81	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.30	0.0	-1.00	0.0	1.00	1.00

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
	0.0	0.0	0.0	0.0	0.0	0.0								
82	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.30	0.0	1.00	0.0	1.00	1.00
	0.0	0.0	0.0	0.0	0.0	0.0								
83	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	-1.00	0.0	0.0	0.0	0.0	0.0								
84	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	1.00	0.0	0.0	0.0	0.0	0.0								
85	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	-1.00	0.0	0.0	0.0	0.0								
86	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	1.00	0.0	0.0	0.0	0.0								
87	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-1.00	0.0	-0.30	0.0								
88	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-1.00	0.0	0.30	0.0								
89	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	1.00	0.0	-0.30	0.0								
90	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	1.00	0.0	0.30	0.0								
91	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-1.00	0.0	0.0	-0.30								
92	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-1.00	0.0	0.0	0.30								
93	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	1.00	0.0	0.0	-0.30								
94	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	1.00	0.0	0.0	0.30								
95	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-1.00	-0.30	0.0								
96	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-1.00	0.30	0.0								
97	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	1.00	-0.30	0.0								
98	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	1.00	0.30	0.0								
99	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-1.00	0.0	-0.30								
100	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-1.00	0.0	0.30								
101	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	1.00	0.0	-0.30								
102	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	1.00	0.0	0.30								
103	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-0.30	0.0	-1.00	0.0								
104	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-0.30	0.0	1.00	0.0								
105	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.30	0.0	-1.00	0.0								
106	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.30	0.0	1.00	0.0								
107	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-0.30	-1.00	0.0								
108	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-0.30	1.00	0.0								
109	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.30	-1.00	0.0								
110	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.30	1.00	0.0								
111	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-0.30	0.0	0.0	-1.00								
112	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	-0.30	0.0	0.0	1.00								
113	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.30	0.0	0.0	-1.00								
114	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.30	0.0	0.0	1.00								
115	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-0.30	0.0	-1.00								
116	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	-0.30	0.0	1.00								
117	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.30	0.0	-1.00								

Cmb	CDC 1/15	CDC 2/16	CDC 3/17	CDC 4/18	CDC 5/19	CDC 6/20	CDC 7/21	CDC 8/22	CDC 9/23	CDC 10/24	CDC 11/25	CDC 12/26	CDC 13/27	CDC 14/28
118	1.00	1.00	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	1.00
	0.0	0.0	0.0	0.30	0.0	1.00								

11 INDICAZIONE METODO DI ANALISI SEGUITO

L'analisi impiegata per la struttura in questione risulta essere il metodo di riferimento, vale a dire l'analisi dinamica lineare o analisi modale con spettro di risposta, effettuata mediante un codice di calcolo di comprovata affidabilità (PRO SAP della ZSI S.r.l.). Per quanto attiene ai risultati delle analisi sismiche si riportano le tabelle relative ai risultati delle analisi sismiche forniti dal programma di calcolo per l'edificio in esame.

Il programma consente l'analisi di diverse configurazioni sismiche.

Sono previsti, infatti, i seguenti casi di carico:

9. Esk caso di carico sismico con analisi statica equivalente

10. Edk caso di carico sismico con analisi dinamica

Ciascun caso di carico è caratterizzato da un angolo di ingresso e da una configurazione di masse determinante la forza sismica complessiva (si rimanda al capitolo relativo ai casi di carico per chiarimenti inerenti questo aspetto).

Nella colonna Note, in funzione della norma in uso sono riportati i parametri fondamentali che caratterizzano l'azione sismica: in particolare possono essere presenti i seguenti valori:

Angolo di ingresso	Angolo di ingresso dell'azione sismica orizzontale
Fattore di importanza	Fattore di importanza dell'edificio, in base alla categoria di appartenenza
Zona sismica	Zona sismica
Accelerazione ag	Accelerazione orizzontale massima sul suolo
Categoria suolo	Categoria di profilo stratigrafico del suolo di fondazione
Fattore q	Fattore di struttura/di comportamento. Dipendente dalla tipologia strutturale
Fattore di sito S	Fattore dipendente dalla stratigrafia e dal profilo topografico
Classe di duttilità CD	Classe di duttilità della struttura - "A" duttilità alta, "B" duttilità bassa
Fattore riduz. SLD	Fattore di riduzione dello spettro elastico per lo stato limite di danno
Periodo proprio T1	Periodo proprio di vibrazione della struttura
Coefficiente Lambda	Coefficiente dipendente dal periodo proprio T1 e dal numero di piani della struttura
Ordinata spettro Sd(T1)	Valore delle ordinate dello spettro di progetto per lo stato limite ultimo, componente orizzontale (verticale Svd)
Ordinata spettro Se(T1)	Valore delle ordinate dello spettro elastico ridotta del fattore SLD per lo stato limite di danno, componente orizzontale (verticale Sve)
Ordinata spettro S (Tb-Tc)	Valore dell'ordinata dello spettro in uso nel tratto costante
numero di modi considerati	Numero di modi di vibrare della struttura considerati nell'analisi dinamica

Per ciascun caso di carico sismico viene riportato l'insieme di dati sotto riportati (le masse sono espresse in unità di forza):

a) **analisi sismica statica equivalente:**

- quota, posizione del centro di applicazione e azione orizzontale risultante, posizione del baricentro delle rigidezze, rapporto r/L_s (per strutture a nucleo), indici di regolarità e/r secondo EC8 4.2.3.2
- azione sismica complessiva

b) **analisi sismica dinamica con spettro di risposta:**

- quota, posizione del centro di massa e massa risultante, posizione del baricentro delle rigidezze, rapporto r/L_s (per strutture a nucleo) , indici di regolarità e/r secondo EC8 4.2.3.2
- frequenza, periodo, accelerazione spettrale, massa eccitata nelle tre direzioni globali per tutti i modi
- massa complessiva ed aliquota di massa complessiva eccitata.

Per ciascuna combinazione sismica definita SLD o SLO viene riportato il livello di deformazione ϵ_T (dr) degli elementi strutturali verticali. Per semplicità di consultazione il livello è espresso anche in unità $1000 \cdot \epsilon_T/h$ da confrontare direttamente con i valori forniti nella norma (es. 5 per edifici con tamponamenti collegati rigidamente alla struttura, 10.0 per edifici con tamponamenti collegati elasticamente, 3 per edifici in muratura ordinaria, 4 per edifici in muratura armata).

Con riferimento al **Documento di Affidabilità** “Test di validazione del software di calcolo PRO_SAP e dei moduli aggiuntivi PRO_SAP Modulo Geotecnico, PRO_CAD nodi acciaio e PRO_MST” - versione Maggio 2011, disponibile per il download sul sito www.2si.it, si segnalano i seguenti esempi applicativi:

Test N°	Titolo
23	DM 2008: SPETTRO
29	SISMICA 1000/H, SOMMA V, EFFETTO P- Δ
30	ANALISI DI UN EDIFICIO CON ISOLATORI SISMICI
70	MASSE SISMICHE
75	PROGETTO DI ISOLATORI ELASTOMERICI
76	VERIFICA DI ISOLATORI ELASTOMERICI
77	VERIFICA DI ISOLATORI FRICTION PENDULUM

11.1 TABELLA ANALISI SISMICHE US 03 L

CDC	Tipo	Sigla Id	Note
6	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.650 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	-0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	-0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	-0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	-0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.539	0.650	0.223	532.99	73.9	0.0	0.0	0.0	0.0	0.0	0.0
2	4.088	0.245	0.354	0.15	2.04e-02	8.81e-05	1.22e-05	0.0	0.0	0.0	0.0
3	4.808	0.208	0.272	149.21	20.7	4.64e-04	6.44e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.268	9.33e-05	1.29e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.730	0.149	0.232	7.35	1.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.445	0.096	0.202	15.64	2.2	3.46e-06	0.0	1.74e-06	0.0	0.0	0.0
7	12.225	0.082	0.179	3.24e-06	0.0	89.04	12.3	17.22	2.4	0.0	0.0
8	16.746	0.060	0.145	1.56e-05	2.16e-06	0.65	8.96e-02	0.22	3.03e-02	0.0	0.0
9	19.053	0.052	0.139	1.93	0.3	1.56e-03	2.16e-04	3.19e-06	0.0	0.0	0.0
10	20.574	0.049	0.136	2.33e-03	3.23e-04	6.48	0.9	73.48	10.2	0.0	0.0
11	22.004	0.045	0.134	0.08	1.10e-02	0.03	4.71e-03	33.57	4.7	0.0	0.0
12	23.258	0.043	0.132	0.02	2.32e-03	0.14	1.88e-02	153.49	21.3	0.0	0.0
13	24.922	0.040	0.130	2.27e-04	3.15e-05	0.66	9.11e-02	2.94	0.4	0.0	0.0
14	31.628	0.032	0.129	0.11	1.56e-02	0.15	2.03e-02	130.72	18.1	0.0	0.0
15	33.522	0.030	0.128	9.46	1.3	1.65e-03	2.29e-04	1.67	0.2	0.0	0.0
16	51.991	0.019	0.127	0.01	1.76e-03	0.06	7.92e-03	96.20	13.3	0.0	0.0
17	79.369	0.013	0.127	2.70e-03	3.74e-04	0.98	0.1	175.05	24.3	0.0	0.0
18	81.389	0.012	0.127	5.74e-04	7.95e-05	10.32	1.4	11.85	1.6	0.0	0.0
Risulta				716.95		719.49		697.33			
In %				99.38		99.73		96.66			

CDC	Tipo	Sigla Id	Note
7	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.688 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.455	0.688	0.204	531.98	73.7	0.0	0.0	0.0	0.0	0.0	0.0
2	4.024	0.248	0.365	22.20	3.1	2.69e-05	3.72e-06	0.0	0.0	0.0	0.0
3	4.682	0.214	0.274	129.29	17.9	5.85e-04	8.11e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.268	8.16e-05	1.13e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.290	0.159	0.245	5.00	0.7	6.60e-06	0.0	0.0	0.0	0.0	0.0
6	11.100	0.090	0.193	16.56	2.3	2.18e-05	3.02e-06	7.35e-06	1.02e-06	0.0	0.0
7	12.226	0.082	0.179	9.70e-06	1.34e-06	89.07	12.3	17.22	2.4	0.0	0.0
8	16.798	0.060	0.145	8.30e-06	1.15e-06	0.64	8.84e-02	0.23	3.19e-02	0.0	0.0
9	19.401	0.052	0.139	4.95	0.7	3.92e-05	5.43e-06	2.69e-03	3.73e-04	0.0	0.0
10	20.622	0.048	0.136	6.39e-04	8.85e-05	6.51	0.9	81.73	11.3	0.0	0.0
11	23.086	0.043	0.132	6.13e-04	8.49e-05	0.15	2.09e-02	173.98	24.1	0.0	0.0
12	24.583	0.041	0.130	0.11	1.48e-02	0.48	6.68e-02	7.39	1.0	0.0	0.0
13	26.906	0.037	0.129	0.57	7.84e-02	0.14	1.98e-02	0.25	3.51e-02	0.0	0.0
14	31.600	0.032	0.129	0.12	1.67e-02	0.14	1.94e-02	130.09	18.0	0.0	0.0
15	36.343	0.028	0.128	6.26	0.9	6.97e-04	9.66e-05	4.05	0.6	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
16	53.185	0.019	0.127	0.16	2.24e-02	0.08	1.18e-02	104.91	14.5	0.0	0.0
17	80.082	0.012	0.127	0.02	2.84e-03	5.06	0.7	107.84	14.9	0.0	0.0
18	82.602	0.012	0.127	0.04	5.19e-03	6.25	0.9	69.85	9.7	0.0	0.0
Risulta				717.26		719.52		698.48			
In %				99.42		99.73		96.81			

CDC	Tipo	Sigla Id	Note
8	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.192 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.211	531.65	73.7	0.16	2.25e-02	1.50e-06	0.0	0.0	0.0
2	4.051	0.247	0.360	3.89	0.5	11.57	1.6	5.25e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.274	142.88	19.8	25.38	3.5	0.03	4.11e-03	0.0	0.0
4	5.218	0.192	0.268	4.03	0.6	573.67	79.5	0.90	0.1	0.0	0.0
5	6.508	0.154	0.238	5.99	0.8	0.27	3.81e-02	2.15e-03	2.99e-04	0.0	0.0
6	10.648	0.094	0.199	16.27	2.3	4.62	0.6	0.40	5.51e-02	0.0	0.0
7	12.303	0.081	0.178	0.45	6.20e-02	84.31	11.7	16.98	2.4	0.0	0.0
8	15.298	0.065	0.153	0.36	4.93e-02	0.28	3.92e-02	0.04	6.02e-03	0.0	0.0
9	17.054	0.059	0.144	0.27	3.80e-02	0.29	4.03e-02	0.09	1.31e-02	0.0	0.0
10	19.648	0.051	0.138	0.28	3.88e-02	2.66	0.4	11.89	1.6	0.0	0.0
11	21.247	0.047	0.135	0.22	3.06e-02	3.93	0.5	110.96	15.4	0.0	0.0
12	23.266	0.043	0.132	1.84	0.3	0.43	6.01e-02	89.94	12.5	0.0	0.0
13	23.708	0.042	0.131	3.45	0.5	0.27	3.69e-02	29.70	4.1	0.0	0.0
14	25.785	0.039	0.129	1.38e-03	1.91e-04	0.10	1.33e-02	41.59	5.8	0.0	0.0
15	33.566	0.030	0.128	3.16e-03	4.38e-04	0.17	2.36e-02	132.58	18.4	0.0	0.0
16	45.472	0.022	0.128	6.67	0.9	1.38e-03	1.92e-04	0.04	5.17e-03	0.0	0.0
17	68.968	0.014	0.127	3.47e-04	4.81e-05	0.03	3.79e-03	249.74	34.6	0.0	0.0
18	79.698	0.013	0.127	3.70e-04	5.13e-05	11.12	1.5	0.92	0.1	0.0	0.0
Risulta				718.26		719.27		685.83			
In %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
9	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.192 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18

CDC	Tipo	Sigla Id	Note
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	-0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	-0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	-0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	-0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X	%	M efficace Y	%	M efficace Z	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.211	531.66	73.7	0.16	2.23e-02	1.68e-06	0.0	0.0	0.0
2	4.051	0.247	0.360	3.90	0.5	11.47	1.6	5.26e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.274	142.92	19.8	25.07	3.5	0.03	4.08e-03	0.0	0.0
4	5.218	0.192	0.268	3.98	0.6	574.08	79.6	0.90	0.1	0.0	0.0
5	6.508	0.154	0.238	5.99	0.8	0.28	3.86e-02	2.19e-03	3.04e-04	0.0	0.0
6	10.648	0.094	0.199	16.28	2.3	4.60	0.6	0.39	5.46e-02	0.0	0.0
7	12.303	0.081	0.178	0.44	6.12e-02	84.34	11.7	16.99	2.4	0.0	0.0
8	15.302	0.065	0.153	0.36	4.97e-02	0.28	3.86e-02	0.05	6.24e-03	0.0	0.0
9	17.078	0.059	0.144	0.28	3.88e-02	0.30	4.13e-02	0.10	1.32e-02	0.0	0.0
10	19.690	0.051	0.138	0.25	3.40e-02	2.77	0.4	12.92	1.8	0.0	0.0
11	21.268	0.047	0.135	0.20	2.71e-02	3.82	0.5	110.94	15.4	0.0	0.0
12	23.260	0.043	0.132	2.15	0.3	0.42	5.78e-02	80.51	11.2	0.0	0.0
13	23.650	0.042	0.131	3.17	0.4	0.29	3.97e-02	38.08	5.3	0.0	0.0
14	25.766	0.039	0.129	1.56e-03	2.16e-04	0.10	1.33e-02	41.45	5.7	0.0	0.0
15	33.556	0.030	0.128	7.18e-04	9.95e-05	0.17	2.35e-02	132.74	18.4	0.0	0.0
16	45.319	0.022	0.128	6.69	0.9	8.43e-04	1.17e-04	5.39e-03	7.47e-04	0.0	0.0
17	68.956	0.015	0.127	5.02e-05	6.96e-06	0.03	3.84e-03	249.77	34.6	0.0	0.0
18	79.722	0.013	0.127	2.31e-04	3.20e-05	11.13	1.5	0.93	0.1	0.0	0.0
Risulta				718.25		719.27		685.81			
In %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
10	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.650 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	-0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	-0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	-0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	-0.55	3.00	1.46	0.695	0.0	0.153

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
2.33	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	-0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X %	M efficace Y %	M efficace Z %	Energia	Energia x v
	Hz	sec	g	x g	x g	x g		
1	1.539	0.650	0.190	532.99	73.9	0.0	0.0	0.0
2	4.088	0.245	0.396	0.15	2.04e-02	8.81e-05	1.22e-05	0.0
3	4.808	0.208	0.295	149.21	20.7	4.64e-04	6.44e-05	0.0
4	5.178	0.193	0.279	9.33e-05	1.29e-05	610.98	84.7	0.94
5	6.730	0.149	0.246	7.35	1.0	0.0	0.0	0.0
6	10.445	0.096	0.245	15.64	2.2	3.46e-06	0.0	1.74e-06
7	12.225	0.082	0.213	3.24e-06	0.0	89.04	12.3	17.22
8	16.746	0.060	0.161	1.56e-05	2.16e-06	0.65	8.96e-02	0.22
9	19.053	0.052	0.152	1.93	0.3	1.56e-03	2.16e-04	3.19e-06
10	20.574	0.049	0.146	2.33e-03	3.23e-04	6.48	0.9	73.48
11	22.004	0.045	0.142	0.08	1.10e-02	0.03	4.71e-03	33.57
12	23.258	0.043	0.139	0.02	2.32e-03	0.14	1.88e-02	153.49
13	24.922	0.040	0.135	2.27e-04	3.15e-05	0.66	9.11e-02	2.94
14	31.628	0.032	0.133	0.11	1.56e-02	0.15	2.03e-02	130.72
15	33.522	0.030	0.133	9.46	1.3	1.65e-03	2.29e-04	1.67
16	51.991	0.019	0.131	0.01	1.76e-03	0.06	7.92e-03	96.20
17	79.369	0.013	0.131	2.70e-03	3.74e-04	0.98	0.1	175.05
18	81.389	0.012	0.131	5.74e-04	7.95e-05	10.32	1.4	11.85
Risulta				716.95		719.49		697.33
In %				99.38		99.73		96.66

CDC	Tipo	Sigla Id	Note
11	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.688 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X %	M efficace Y %	M efficace Z %	Energia	Energia x v
	Hz	sec	g	x g	x g	x g		
1	1.455	0.688	0.163	531.98	73.7	0.0	0.0	0.0
2	4.024	0.248	0.402	22.20	3.1	2.69e-05	3.72e-06	0.0
3	4.682	0.214	0.303	129.29	17.9	5.85e-04	8.11e-05	0.0
4	5.178	0.193	0.279	8.16e-05	1.13e-05	610.98	84.7	0.94
5	6.290	0.159	0.255	5.00	0.7	6.60e-06	0.0	0.0
6	11.100	0.090	0.232	16.56	2.3	2.18e-05	3.02e-06	7.35e-06
7	12.226	0.082	0.213	9.70e-06	1.34e-06	89.07	12.3	17.22
8	16.798	0.060	0.161	8.30e-06	1.15e-06	0.64	8.84e-02	0.23
9	19.401	0.052	0.150	4.95	0.7	3.92e-05	5.43e-06	2.69e-03
10	20.622	0.048	0.146	6.39e-04	8.85e-05	6.51	81.73	11.3

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
11	23.086	0.043	0.139	6.13e-04	8.49e-05	0.15	2.09e-02	173.98	24.1	0.0	0.0
12	24.583	0.041	0.136	0.11	1.48e-02	0.48	6.68e-02	7.39	1.0	0.0	0.0
13	26.906	0.037	0.134	0.57	7.84e-02	0.14	1.98e-02	0.25	3.51e-02	0.0	0.0
14	31.600	0.032	0.133	0.12	1.67e-02	0.14	1.94e-02	130.09	18.0	0.0	0.0
15	36.343	0.028	0.132	6.26	0.9	6.97e-04	9.66e-05	4.05	0.6	0.0	0.0
16	53.185	0.019	0.131	0.16	2.24e-02	0.08	1.18e-02	104.91	14.5	0.0	0.0
17	80.082	0.012	0.131	0.02	2.84e-03	5.06	0.7	107.84	14.9	0.0	0.0
18	82.602	0.012	0.131	0.04	5.19e-03	6.25	0.9	69.85	9.7	0.0	0.0
Risulta				717.26		719.52		698.48			
In %				99.42		99.73		96.81			

CDC	Tipo	Sigla Id	Note
12	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.192 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.175	531.65	73.7	0.16	2.25e-02	1.50e-06	0.0	0.0	0.0
2	4.051	0.247	0.399	3.89	0.5	11.57	1.6	5.25e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.303	142.88	19.8	25.38	3.5	0.03	4.11e-03	0.0	0.0
4	5.218	0.192	0.278	4.03	0.6	573.67	79.5	0.90	0.1	0.0	0.0
5	6.508	0.154	0.251	5.99	0.8	0.27	3.81e-02	2.15e-03	2.99e-04	0.0	0.0
6	10.648	0.094	0.240	16.27	2.3	4.62	0.6	0.40	5.51e-02	0.0	0.0
7	12.303	0.081	0.212	0.45	6.20e-02	84.31	11.7	16.98	2.4	0.0	0.0
8	15.298	0.065	0.174	0.36	4.93e-02	0.28	3.92e-02	0.04	6.02e-03	0.0	0.0
9	17.054	0.059	0.160	0.27	3.80e-02	0.29	4.03e-02	0.09	1.31e-02	0.0	0.0
10	19.648	0.051	0.149	0.28	3.88e-02	2.66	0.4	11.89	1.6	0.0	0.0
11	21.247	0.047	0.144	0.22	3.06e-02	3.93	0.5	110.96	15.4	0.0	0.0
12	23.266	0.043	0.139	1.84	0.3	0.43	6.01e-02	89.94	12.5	0.0	0.0
13	23.708	0.042	0.138	3.45	0.5	0.27	3.69e-02	29.70	4.1	0.0	0.0
14	25.785	0.039	0.134	1.38e-03	1.91e-04	0.10	1.33e-02	41.59	5.8	0.0	0.0
15	33.566	0.030	0.133	3.16e-03	4.38e-04	0.17	2.36e-02	132.58	18.4	0.0	0.0
16	45.472	0.022	0.131	6.67	0.9	1.38e-03	1.92e-04	0.04	5.17e-03	0.0	0.0
17	68.968	0.014	0.131	3.47e-04	4.81e-05	0.03	3.79e-03	249.74	34.6	0.0	0.0
18	79.698	0.013	0.131	3.70e-04	5.13e-05	11.12	1.5	0.92	0.1	0.0	0.0
Risulta				718.26		719.27		685.83			
In %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
13	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.192 sec.
			numero di modi considerati: 18

CDC	Tipo	Sigla Id	Note
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	-0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	-0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	-0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	-0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.175	531.66	73.7	0.16	2.23e-02	1.68e-06	0.0	0.0	0.0
2	4.051	0.247	0.399	3.90	0.5	11.47	1.6	5.26e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.303	142.92	19.8	25.07	3.5	0.03	4.08e-03	0.0	0.0
4	5.218	0.192	0.278	3.98	0.6	574.08	79.6	0.90	0.1	0.0	0.0
5	6.508	0.154	0.251	5.99	0.8	0.28	3.86e-02	2.19e-03	3.04e-04	0.0	0.0
6	10.648	0.094	0.240	16.28	2.3	4.60	0.6	0.39	5.46e-02	0.0	0.0
7	12.303	0.081	0.212	0.44	6.12e-02	84.34	11.7	16.99	2.4	0.0	0.0
8	15.302	0.065	0.174	0.36	4.97e-02	0.28	3.86e-02	0.05	6.24e-03	0.0	0.0
9	17.078	0.059	0.160	0.28	3.88e-02	0.30	4.13e-02	0.10	1.32e-02	0.0	0.0
10	19.690	0.051	0.149	0.25	3.40e-02	2.77	0.4	12.92	1.8	0.0	0.0
11	21.268	0.047	0.144	0.20	2.71e-02	3.82	0.5	110.94	15.4	0.0	0.0
12	23.260	0.043	0.139	2.15	0.3	0.42	5.78e-02	80.51	11.2	0.0	0.0
13	23.650	0.042	0.138	3.17	0.4	0.29	3.97e-02	38.08	5.3	0.0	0.0
14	25.766	0.039	0.134	1.56e-03	2.16e-04	0.10	1.33e-02	41.45	5.7	0.0	0.0
15	33.556	0.030	0.133	7.18e-04	9.95e-05	0.17	2.35e-02	132.74	18.4	0.0	0.0
16	45.319	0.022	0.131	6.69	0.9	8.43e-04	1.17e-04	5.39e-03	7.47e-04	0.0	0.0
17	68.956	0.015	0.131	5.02e-05	6.96e-06	0.03	3.84e-03	249.77	34.6	0.0	0.0
18	79.722	0.013	0.131	2.31e-04	3.20e-05	11.13	1.5	0.93	0.1	0.0	0.0
Risulta				718.25		719.27		685.81			
ln %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
14	Edk	CDC=Ed (dinamico SLO) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.650 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	-0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	-0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	-0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
1.75	9.87	3.00	4.76	0.0	-0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.539	0.650	0.165	532.99	73.9	0.0	0.0	0.0	0.0	0.0	0.0
2	4.088	0.245	0.353	0.15	2.04e-02	8.81e-05	1.22e-05	0.0	0.0	0.0	0.0
3	4.808	0.208	0.265	149.21	20.7	4.64e-04	6.44e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.249	9.33e-05	1.29e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.730	0.149	0.219	7.35	1.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.445	0.096	0.221	15.64	2.2	3.46e-06	0.0	1.74e-06	0.0	0.0	0.0
7	12.225	0.082	0.195	3.24e-06	0.0	89.04	12.3	17.22	2.4	0.0	0.0
8	16.746	0.060	0.145	1.56e-05	2.16e-06	0.65	8.96e-02	0.22	3.03e-02	0.0	0.0
9	19.053	0.052	0.136	1.93	0.3	1.56e-03	2.16e-04	3.19e-06	0.0	0.0	0.0
10	20.574	0.049	0.131	2.33e-03	3.23e-04	6.48	0.9	73.48	10.2	0.0	0.0
11	22.004	0.045	0.127	0.08	1.10e-02	0.03	4.71e-03	33.57	4.7	0.0	0.0
12	23.258	0.043	0.124	0.02	2.32e-03	0.14	1.88e-02	153.49	21.3	0.0	0.0
13	24.922	0.040	0.121	2.27e-04	3.15e-05	0.66	9.11e-02	2.94	0.4	0.0	0.0
14	31.628	0.032	0.119	0.11	1.56e-02	0.15	2.03e-02	130.72	18.1	0.0	0.0
15	33.522	0.030	0.118	9.46	1.3	1.65e-03	2.29e-04	1.67	0.2	0.0	0.0
16	51.991	0.019	0.116	0.01	1.76e-03	0.06	7.92e-03	96.20	13.3	0.0	0.0
17	79.369	0.013	0.116	2.70e-03	3.74e-04	0.98	0.1	175.05	24.3	0.0	0.0
18	81.389	0.012	0.116	5.74e-04	7.95e-05	10.32	1.4	11.85	1.6	0.0	0.0
Risulta				716.95		719.49		697.33			
In %				99.38		99.73		96.66			

CDC	Tipo	Sigla Id	Note
15	Edk	CDC=Ed (dinamico SLO) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.688 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.455	0.688	0.141	531.98	73.7	0.0	0.0	0.0	0.0	0.0	0.0
2	4.024	0.248	0.358	22.20	3.1	2.69e-05	3.72e-06	0.0	0.0	0.0	0.0
3	4.682	0.214	0.273	129.29	17.9	5.85e-04	8.11e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.249	8.16e-05	1.13e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.290	0.159	0.226	5.00	0.7	6.60e-06	0.0	0.0	0.0	0.0	0.0
6	11.100	0.090	0.210	16.56	2.3	2.18e-05	3.02e-06	7.35e-06	1.02e-06	0.0	0.0
7	12.226	0.082	0.195	9.70e-06	1.34e-06	89.07	12.3	17.22	2.4	0.0	0.0
8	16.798	0.060	0.145	8.30e-06	1.15e-06	0.64	8.84e-02	0.23	3.19e-02	0.0	0.0
9	19.401	0.052	0.135	4.95	0.7	3.92e-05	5.43e-06	2.69e-03	3.73e-04	0.0	0.0
10	20.622	0.048	0.131	6.39e-04	8.85e-05	6.51	0.9	81.73	11.3	0.0	0.0
11	23.086	0.043	0.125	6.13e-04	8.49e-05	0.15	2.09e-02	173.98	24.1	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
12	24.583	0.041	0.121	0.11	1.48e-02	0.48	6.68e-02	7.39	1.0	0.0	0.0
13	26.906	0.037	0.120	0.57	7.84e-02	0.14	1.98e-02	0.25	3.51e-02	0.0	0.0
14	31.600	0.032	0.119	0.12	1.67e-02	0.14	1.94e-02	130.09	18.0	0.0	0.0
15	36.343	0.028	0.118	6.26	0.9	6.97e-04	9.66e-05	4.05	0.6	0.0	0.0
16	53.185	0.019	0.116	0.16	2.24e-02	0.08	1.18e-02	104.91	14.5	0.0	0.0
17	80.082	0.012	0.116	0.02	2.84e-03	5.06	0.7	107.84	14.9	0.0	0.0
18	82.602	0.012	0.116	0.04	5.19e-03	6.25	0.9	69.85	9.7	0.0	0.0
Risulta				717.26		719.52		698.48			
In %				99.42		99.73		96.81			

CDC	Tipo	Sigla Id	Note
16	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.192 sec.
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.152	531.65	73.7	0.16	2.25e-02	1.50e-06	0.0	0.0	0.0
2	4.051	0.247	0.356	3.89	0.5	11.57	1.6	5.25e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.273	142.88	19.8	25.38	3.5	0.03	4.11e-03	0.0	0.0
4	5.218	0.192	0.248	4.03	0.6	573.67	79.5	0.90	0.1	0.0	0.0
5	6.508	0.154	0.223	5.99	0.8	0.27	3.81e-02	2.15e-03	2.99e-04	0.0	0.0
6	10.648	0.094	0.217	16.27	2.3	4.62	0.6	0.40	5.51e-02	0.0	0.0
7	12.303	0.081	0.194	0.45	6.20e-02	84.31	11.7	16.98	2.4	0.0	0.0
8	15.298	0.065	0.158	0.36	4.93e-02	0.28	3.92e-02	0.04	6.02e-03	0.0	0.0
9	17.054	0.059	0.144	0.27	3.80e-02	0.29	4.03e-02	0.09	1.31e-02	0.0	0.0
10	19.648	0.051	0.134	0.28	3.88e-02	2.66	0.4	11.89	1.6	0.0	0.0
11	21.247	0.047	0.130	0.22	3.06e-02	3.93	0.5	110.96	15.4	0.0	0.0
12	23.266	0.043	0.124	1.84	0.3	0.43	6.01e-02	89.94	12.5	0.0	0.0
13	23.708	0.042	0.123	3.45	0.5	0.27	3.69e-02	29.70	4.1	0.0	0.0
14	25.785	0.039	0.120	1.38e-03	1.91e-04	0.10	1.33e-02	41.59	5.8	0.0	0.0
15	33.566	0.030	0.118	3.16e-03	4.38e-04	0.17	2.36e-02	132.58	18.4	0.0	0.0
16	45.472	0.022	0.117	6.67	0.9	1.38e-03	1.92e-04	0.04	5.17e-03	0.0	0.0
17	68.968	0.014	0.116	3.47e-04	4.81e-05	0.03	3.79e-03	249.74	34.6	0.0	0.0
18	79.698	0.013	0.116	3.70e-04	5.13e-05	11.12	1.5	0.92	0.1	0.0	0.0
Risulta				718.26		719.27		685.83			
In %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
17	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.192 sec.
			numero di modi considerati: 18

CDC	Tipo	Sigla Id	Note
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	-0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	-0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	-0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	-0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.152	531.66	73.7	0.16	2.23e-02	1.68e-06	0.0	0.0	0.0
2	4.051	0.247	0.356	3.90	0.5	11.47	1.6	5.26e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.273	142.92	19.8	25.07	3.5	0.03	4.08e-03	0.0	0.0
4	5.218	0.192	0.248	3.98	0.6	574.08	79.6	0.90	0.1	0.0	0.0
5	6.508	0.154	0.223	5.99	0.8	0.28	3.86e-02	2.19e-03	3.04e-04	0.0	0.0
6	10.648	0.094	0.217	16.28	2.3	4.60	0.6	0.39	5.46e-02	0.0	0.0
7	12.303	0.081	0.194	0.44	6.12e-02	84.34	11.7	16.99	2.4	0.0	0.0
8	15.302	0.065	0.158	0.36	4.97e-02	0.28	3.86e-02	0.05	6.24e-03	0.0	0.0
9	17.078	0.059	0.144	0.28	3.88e-02	0.30	4.13e-02	0.10	1.32e-02	0.0	0.0
10	19.690	0.051	0.134	0.25	3.40e-02	2.77	0.4	12.92	1.8	0.0	0.0
11	21.268	0.047	0.129	0.20	2.71e-02	3.82	0.5	110.94	15.4	0.0	0.0
12	23.260	0.043	0.124	2.15	0.3	0.42	5.78e-02	80.51	11.2	0.0	0.0
13	23.650	0.042	0.123	3.17	0.4	0.29	3.97e-02	38.08	5.3	0.0	0.0
14	25.766	0.039	0.120	1.56e-03	2.16e-04	0.10	1.33e-02	41.45	5.7	0.0	0.0
15	33.556	0.030	0.118	7.18e-04	9.95e-05	0.17	2.35e-02	132.74	18.4	0.0	0.0
16	45.319	0.022	0.117	6.69	0.9	8.43e-04	1.17e-04	5.39e-03	7.47e-04	0.0	0.0
17	68.956	0.015	0.116	5.02e-05	6.96e-06	0.03	3.84e-03	249.77	34.6	0.0	0.0
18	79.722	0.013	0.116	2.31e-04	3.20e-05	11.13	1.5	0.93	0.1	0.0	0.0
Risulta				718.25		719.27		685.81			
ln %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
18	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.650 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	-0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	-0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	-0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	-0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	-0.55	3.00	1.48	0.695	0.0	0.181

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
2.92	9.87	3.00	4.77	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	-0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	-0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.539	0.650	0.278	532.99	73.9	0.0	0.0	0.0	0.0	0.0	0.0
2	4.088	0.245	0.394	0.15	2.04e-02	8.81e-05	1.22e-05	0.0	0.0	0.0	0.0
3	4.808	0.208	0.314	149.21	20.7	4.64e-04	6.44e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.312	9.33e-05	1.29e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.730	0.149	0.272	7.35	1.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.445	0.096	0.226	15.64	2.2	3.46e-06	0.0	1.74e-06	0.0	0.0	0.0
7	12.225	0.082	0.203	3.24e-06	0.0	89.04	12.3	17.22	2.4	0.0	0.0
8	16.746	0.060	0.169	1.56e-05	2.16e-06	0.65	8.96e-02	0.22	3.03e-02	0.0	0.0
9	19.053	0.052	0.163	1.93	0.3	1.56e-03	2.16e-04	3.19e-06	0.0	0.0	0.0
10	20.574	0.049	0.160	2.33e-03	3.23e-04	6.48	0.9	73.48	10.2	0.0	0.0
11	22.004	0.045	0.158	0.08	1.10e-02	0.03	4.71e-03	33.57	4.7	0.0	0.0
12	23.258	0.043	0.156	0.02	2.32e-03	0.14	1.88e-02	153.49	21.3	0.0	0.0
13	24.922	0.040	0.154	2.27e-04	3.15e-05	0.66	9.11e-02	2.94	0.4	0.0	0.0
14	31.628	0.032	0.153	0.11	1.56e-02	0.15	2.03e-02	130.72	18.1	0.0	0.0
15	33.522	0.030	0.153	9.46	1.3	1.65e-03	2.29e-04	1.67	0.2	0.0	0.0
16	51.991	0.019	0.152	0.01	1.76e-03	0.06	7.92e-03	96.20	13.3	0.0	0.0
17	79.369	0.013	0.152	2.70e-03	3.74e-04	0.98	0.1	175.05	24.3	0.0	0.0
18	81.389	0.012	0.152	5.74e-04	7.95e-05	10.32	1.4	11.85	1.6	0.0	0.0
Risulta				716.95		719.49		697.33			
In %				99.38		99.73		96.66			

CDC	Tipo	Sigla Id	Note
19	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.688 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.0	0.55	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.0	0.55	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.0	0.55	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.0	0.55	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.0	0.55	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.0	0.55	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.0	0.55	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.0	0.55	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.455	0.688	0.259	531.98	73.7	0.0	0.0	0.0	0.0	0.0	0.0
2	4.024	0.248	0.409	22.20	3.1	2.69e-05	3.72e-06	0.0	0.0	0.0	0.0
3	4.682	0.214	0.315	129.29	17.9	5.85e-04	8.11e-05	0.0	0.0	0.0	0.0
4	5.178	0.193	0.312	8.16e-05	1.13e-05	610.98	84.7	0.94	0.1	0.0	0.0
5	6.290	0.159	0.285	5.00	0.7	6.60e-06	0.0	0.0	0.0	0.0	0.0
6	11.100	0.090	0.217	16.56	2.3	2.18e-05	3.02e-06	7.35e-06	1.02e-06	0.0	0.0
7	12.226	0.082	0.203	9.70e-06	1.34e-06	89.07	12.3	17.22	2.4	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
8	16.798	0.060	0.169	8.30e-06	1.15e-06	0.64	8.84e-02	0.23	3.19e-02	0.0	0.0
9	19.401	0.052	0.163	4.95	0.7	3.92e-05	5.43e-06	2.69e-03	3.73e-04	0.0	0.0
10	20.622	0.048	0.160	6.39e-04	8.85e-05	6.51	0.9	81.73	11.3	0.0	0.0
11	23.086	0.043	0.157	6.13e-04	8.49e-05	0.15	2.09e-02	173.98	24.1	0.0	0.0
12	24.583	0.041	0.155	0.11	1.48e-02	0.48	6.68e-02	7.39	1.0	0.0	0.0
13	26.906	0.037	0.154	0.57	7.84e-02	0.14	1.98e-02	0.25	3.51e-02	0.0	0.0
14	31.600	0.032	0.153	0.12	1.67e-02	0.14	1.94e-02	130.09	18.0	0.0	0.0
15	36.343	0.028	0.153	6.26	0.9	6.97e-04	9.66e-05	4.05	0.6	0.0	0.0
16	53.185	0.019	0.152	0.16	2.24e-02	0.08	1.18e-02	104.91	14.5	0.0	0.0
17	80.082	0.012	0.152	0.02	2.84e-03	5.06	0.7	107.84	14.9	0.0	0.0
18	82.602	0.012	0.152	0.04	5.19e-03	6.25	0.9	69.85	9.7	0.0	0.0
Risulta				717.26		719.52		698.48			
In %				99.42		99.73		96.81			

CDC	Tipo	Sigla Id	Note
20	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.192 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.267	531.65	73.7	0.16	2.25e-02	1.50e-06	0.0	0.0	0.0
2	4.051	0.247	0.403	3.89	0.5	11.57	1.6	5.25e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.315	142.88	19.8	25.38	3.5	0.03	4.11e-03	0.0	0.0
4	5.218	0.192	0.312	4.03	0.6	573.67	79.5	0.90	0.1	0.0	0.0
5	6.508	0.154	0.278	5.99	0.8	0.27	3.81e-02	2.15e-03	2.99e-04	0.0	0.0
6	10.648	0.094	0.223	16.27	2.3	4.62	0.6	0.40	5.51e-02	0.0	0.0
7	12.303	0.081	0.203	0.45	6.20e-02	84.31	11.7	16.98	2.4	0.0	0.0
8	15.298	0.065	0.177	0.36	4.93e-02	0.28	3.92e-02	0.04	6.02e-03	0.0	0.0
9	17.054	0.059	0.168	0.27	3.80e-02	0.29	4.03e-02	0.09	1.31e-02	0.0	0.0
10	19.648	0.051	0.162	0.28	3.88e-02	2.66	0.4	11.89	1.6	0.0	0.0
11	21.247	0.047	0.159	0.22	3.06e-02	3.93	0.5	110.96	15.4	0.0	0.0
12	23.266	0.043	0.156	1.84	0.3	0.43	6.01e-02	89.94	12.5	0.0	0.0
13	23.708	0.042	0.156	3.45	0.5	0.27	3.69e-02	29.70	4.1	0.0	0.0
14	25.785	0.039	0.154	1.38e-03	1.91e-04	0.10	1.33e-02	41.59	5.8	0.0	0.0
15	33.566	0.030	0.153	3.16e-03	4.38e-04	0.17	2.36e-02	132.58	18.4	0.0	0.0
16	45.472	0.022	0.152	6.67	0.9	1.38e-03	1.92e-04	0.04	5.17e-03	0.0	0.0
17	68.968	0.014	0.152	3.47e-04	4.81e-05	0.03	3.79e-03	249.74	34.6	0.0	0.0
18	79.698	0.013	0.152	3.70e-04	5.13e-05	11.12	1.5	0.92	0.1	0.0	0.0
Risulta				718.26		719.27		685.83			
In %				99.56		99.70		95.06			

CDC	Tipo	Sigla Id	Note
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PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 54 DI 151

CDC	Tipo	Sigla Id	Note
21	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.192 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 18
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.50	102.44	3.00	5.55	-0.30	0.0	3.00	1.38	0.692	0.0	0.148
9.92	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
9.33	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.75	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
8.17	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.58	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
7.00	202.44	3.00	6.85	-0.30	0.0	3.00	1.38	0.692	0.0	0.194
6.42	9.33	3.00	3.83	-0.30	0.0	3.00	1.38	0.692	0.0	0.087
5.83	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
5.25	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.67	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
4.08	9.33	3.00	3.82	-0.30	0.0	3.00	1.38	0.692	0.0	0.086
3.50	273.87	3.00	5.42	-0.30	0.0	3.00	1.48	0.695	0.0	0.181
2.92	9.87	3.00	4.77	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
2.33	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
1.75	9.87	3.00	4.76	-0.30	0.0	3.00	1.48	0.695	0.0	0.151
1.17	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
0.58	9.87	3.00	4.76	-0.30	0.0	3.00	1.46	0.695	0.0	0.153
Risulta	721.46									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	1.496	0.668	0.267	531.66	73.7	0.16	2.23e-02	1.68e-06	0.0	0.0	0.0
2	4.051	0.247	0.403	3.90	0.5	11.47	1.6	5.26e-03	7.28e-04	0.0	0.0
3	4.685	0.213	0.315	142.92	19.8	25.07	3.5	0.03	4.08e-03	0.0	0.0
4	5.218	0.192	0.312	3.98	0.6	574.08	79.6	0.90	0.1	0.0	0.0
5	6.508	0.154	0.278	5.99	0.8	0.28	3.86e-02	2.19e-03	3.04e-04	0.0	0.0
6	10.648	0.094	0.223	16.28	2.3	4.60	0.6	0.39	5.46e-02	0.0	0.0
7	12.303	0.081	0.203	0.44	6.12e-02	84.34	11.7	16.99	2.4	0.0	0.0
8	15.302	0.065	0.177	0.36	4.97e-02	0.28	3.86e-02	0.05	6.24e-03	0.0	0.0
9	17.078	0.059	0.168	0.28	3.88e-02	0.30	4.13e-02	0.10	1.32e-02	0.0	0.0
10	19.690	0.051	0.162	0.25	3.40e-02	2.77	0.4	12.92	1.8	0.0	0.0
11	21.268	0.047	0.159	0.20	2.71e-02	3.82	0.5	110.94	15.4	0.0	0.0
12	23.260	0.043	0.156	2.15	0.3	0.42	5.78e-02	80.51	11.2	0.0	0.0
13	23.650	0.042	0.156	3.17	0.4	0.29	3.97e-02	38.08	5.3	0.0	0.0
14	25.766	0.039	0.154	1.56e-03	2.16e-04	0.10	1.33e-02	41.45	5.7	0.0	0.0
15	33.556	0.030	0.153	7.18e-04	9.95e-05	0.17	2.35e-02	132.74	18.4	0.0	0.0
16	45.319	0.022	0.152	6.69	0.9	8.43e-04	1.17e-04	5.39e-03	7.47e-04	0.0	0.0
17	68.956	0.015	0.152	5.02e-05	6.96e-06	0.03	3.84e-03	249.77	34.6	0.0	0.0
18	79.722	0.013	0.152	2.31e-04	3.20e-05	11.13	1.5	0.93	0.1	0.0	0.0
Risulta				718.25		719.27		685.81			
In %				99.56		99.70		95.06			

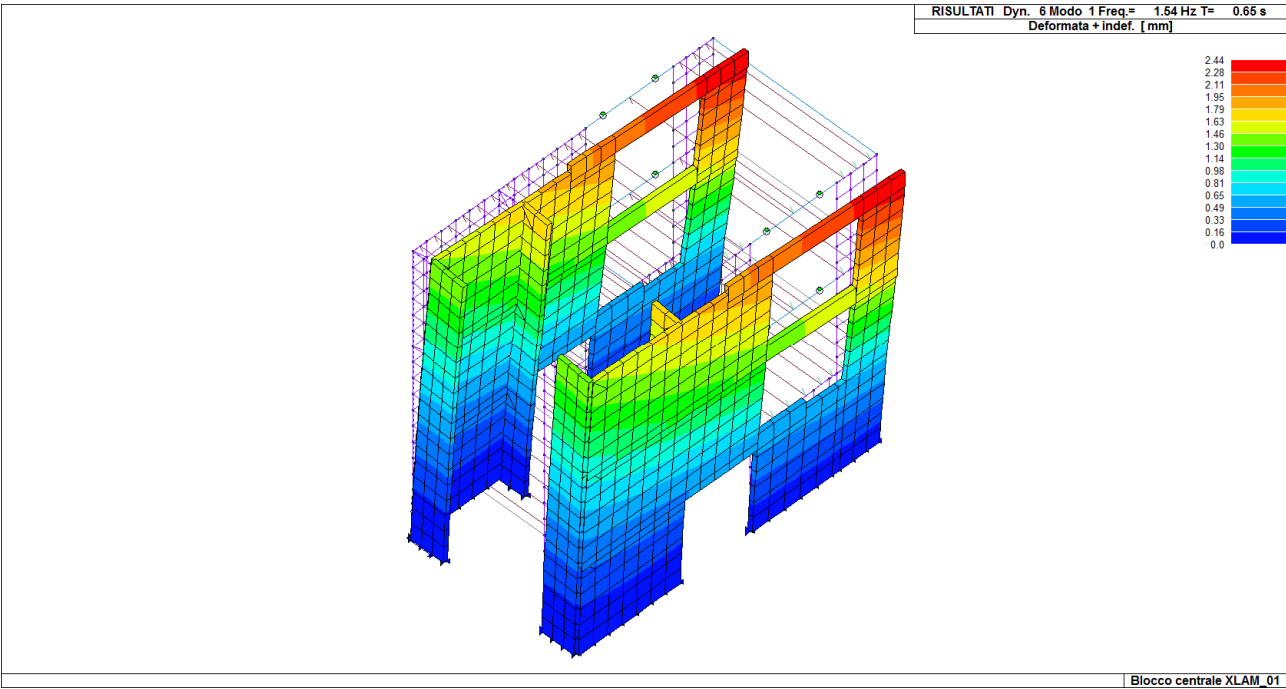


Figura 15: rappresentazione grafica della deformata al modo 1

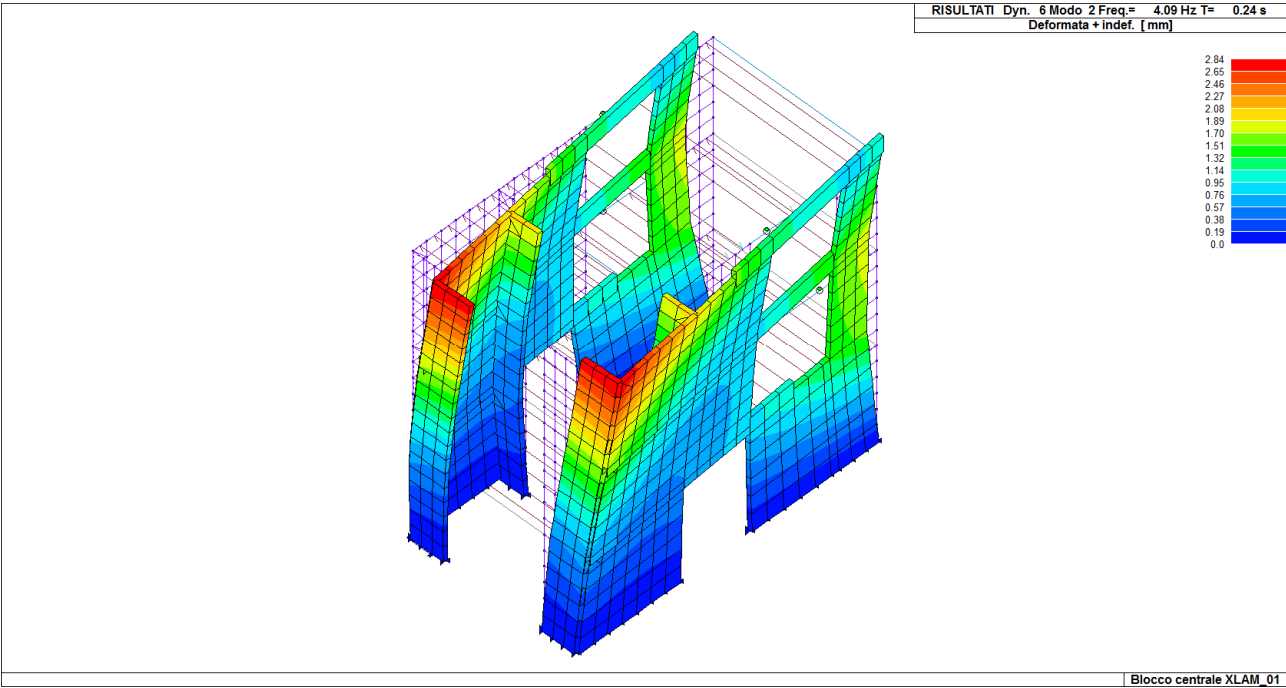


Figura 16: rappresentazione grafica della deformata al modo 2

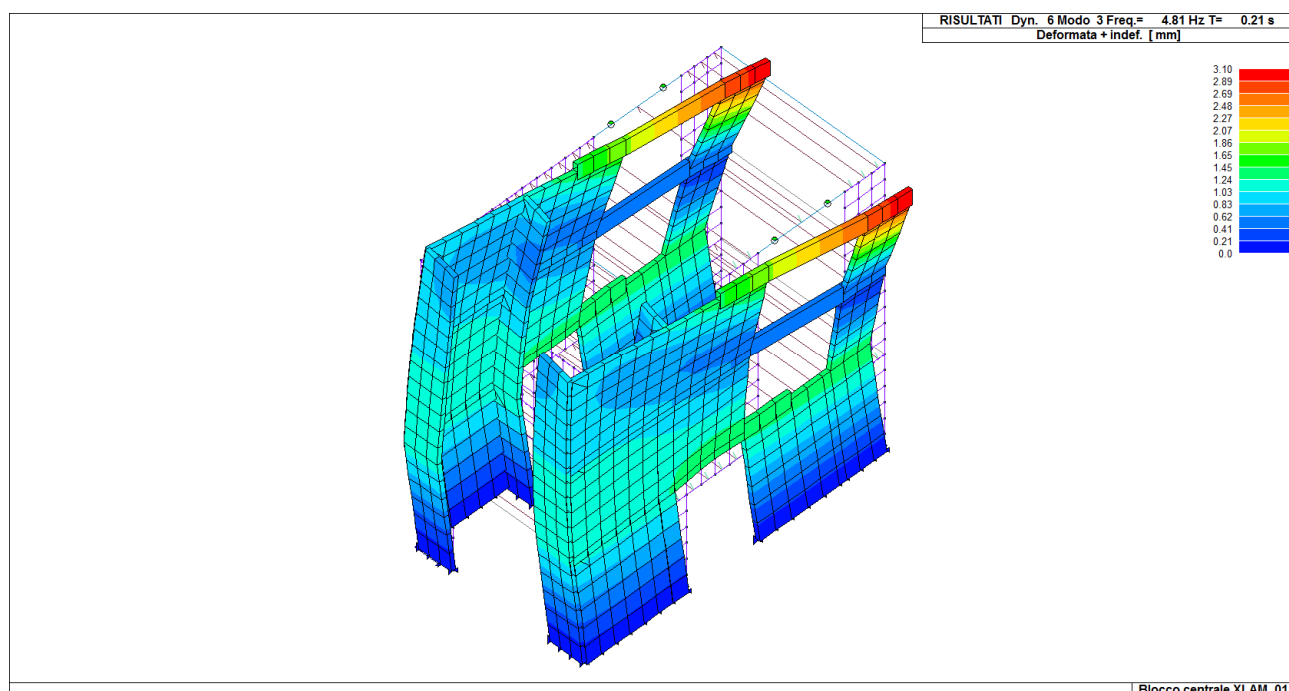


Figura 17: rappresentazione grafica della deformata al modo 3

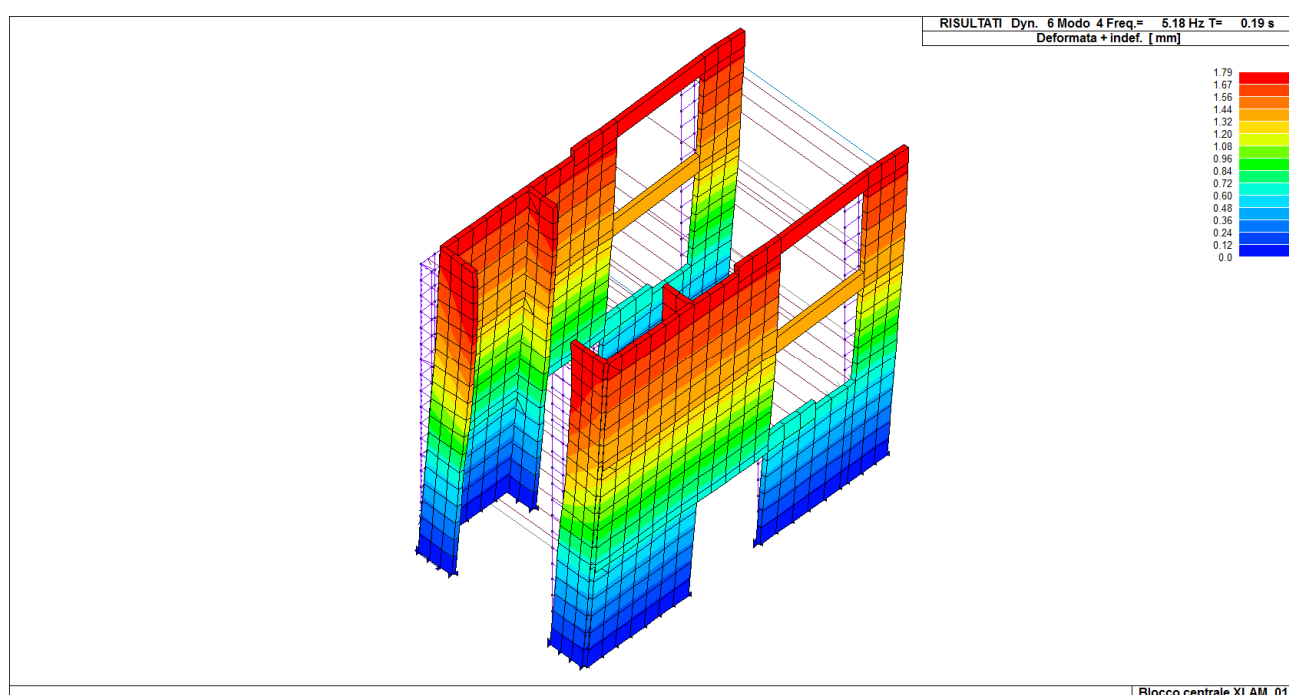


Figura 18: rappresentazione grafica della deformata al modo 4

Per quanto riguarda la valutazione degli spostamenti, considerando che trattasi di struttura a pareti portanti in legno con pochi tramezzi interni realizzati in cartongesso, si considera un limite di verifica pari a $q_{d,r} < 0,0075 \times h$ proprio delle tamponature duttili.

Per la Classe d'Uso utilizzata CU III ci si riferisce allo SLO e gli spostamenti d'interpiano vengono controllati che siano inferiori ai 2/3 del limite sopra riportato.

Dall'immagine sopra riportata si evince un valore superiore al limite di normativa considerato pari a 7,5. Tale valore risulta però localizzato solamente ad alcuni nodi, come si vede dall'immagine riportata

di seguito, mentre nel complesso dei nodi costituenti la modellazione il limite di normativa risulta ampiamente verificato. Si ritiene quindi che la verifica sia soddisfatta.

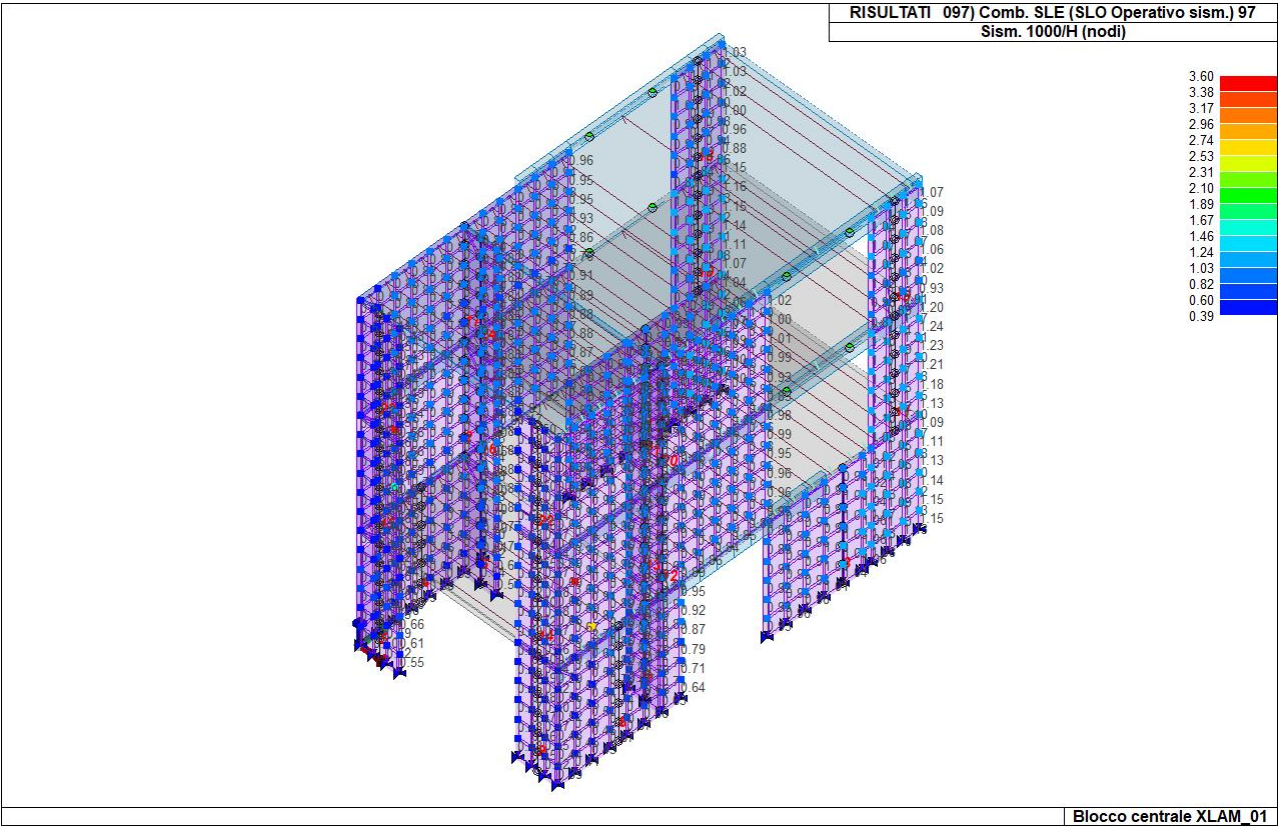


Figura 19: valutazione spostamenti 1000/H allo SLO

11.2 TABELLA ANALISI SISMICHE US 03 S

CDC	Tipo	Sigla Id	Note
4	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.329 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	-0.23	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.0	-0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	-0.12	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.0	-0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	-0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	-0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	-0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	-0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	-0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	-0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	-0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X	%	M efficace Y	%	M efficace Z	%	Energia	Energia x v
	Hz	sec	g	x g		x g		x g			
1	0.409	2.447	0.121	7.03	2.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.416	2.403	0.121	6.80	1.9	0.0	0.0	0.0	0.0	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
3	0.430	2.326	0.121	15.99	4.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.430	2.324	0.121	0.85	0.2	0.0	0.0	0.0	0.0	0.0	0.0
5	0.432	2.315	0.121	6.30	1.8	0.0	0.0	0.0	0.0	0.0	0.0
6	0.438	2.284	0.121	12.55	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	0.438	2.282	0.121	0.79	0.2	0.0	0.0	0.0	0.0	0.0	0.0
8	0.440	2.273	0.121	5.58	1.6	0.0	0.0	0.0	0.0	0.0	0.0
9	3.042	0.329	0.524	234.75	66.3	4.57e-03	1.29e-03	4.08e-05	1.15e-05	0.0	0.0
10	4.624	0.216	0.367	5.28	1.5	8.29e-03	2.34e-03	5.01e-03	1.41e-03	0.0	0.0
11	5.491	0.182	0.355	0.43	0.1	20.74	5.9	1.64	0.5	0.0	0.0
12	5.496	0.182	0.355	0.36	0.1	22.99	6.5	1.37	0.4	0.0	0.0
13	5.586	0.179	0.353	7.76e-03	2.19e-03	8.14	2.3	8.28	2.3	0.0	0.0
14	5.683	0.176	0.349	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	6.311	0.158	0.326	7.70	2.2	2.87e-03	8.10e-04	2.76e-03	7.81e-04	0.0	0.0
16	6.966	0.144	0.302	2.65e-04	7.50e-05	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.276	1.90e-04	5.37e-05	2.83	0.8	2.00	0.6	0.0	0.0
18	9.306	0.107	0.275	0.18	5.04e-02	48.18	13.6	0.09	2.55e-02	0.0	0.0
19	9.447	0.106	0.275	0.20	5.70e-02	51.93	14.7	1.86	0.5	0.0	0.0
20	9.807	0.102	0.277	0.22	6.15e-02	88.39	25.0	0.14	4.08e-02	0.0	0.0
21	10.015	0.100	0.278	0.82	0.2	23.48	6.6	0.01	3.94e-03	0.0	0.0
22	11.242	0.089	0.254	0.07	2.05e-02	0.42	0.1	6.86	1.9	0.0	0.0
23	11.789	0.085	0.245	0.13	3.77e-02	0.52	0.1	5.94	1.7	0.0	0.0
24	12.585	0.079	0.234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	13.044	0.077	0.228	0.19	5.34e-02	2.14e-04	6.05e-05	0.38	0.1	0.0	0.0
26	13.954	0.072	0.218	7.66	2.2	0.03	9.60e-03	1.48	0.4	0.0	0.0
27	15.969	0.063	0.199	0.02	4.98e-03	0.25	7.20e-02	2.82	0.8	0.0	0.0
28	17.063	0.059	0.192	18.02	5.1	0.05	1.29e-02	6.14e-04	1.73e-04	0.0	0.0
29	18.562	0.054	0.187	0.14	4.07e-02	3.03	0.9	0.01	3.28e-03	0.0	0.0
30	19.242	0.052	0.185	0.03	9.57e-03	1.23e-03	3.46e-04	0.02	5.36e-03	0.0	0.0
31	19.296	0.052	0.185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	20.187	0.050	0.183	4.17	1.2	8.97e-03	2.53e-03	0.40	0.1	0.0	0.0
33	21.071	0.047	0.181	9.01	2.5	0.02	6.51e-03	0.03	8.45e-03	0.0	0.0
34	23.771	0.042	0.175	1.96e-03	5.53e-04	43.42	12.3	0.05	1.44e-02	0.0	0.0
35	26.130	0.038	0.173	0.80	0.2	3.96e-04	1.12e-04	8.04e-04	2.27e-04	0.0	0.0
36	29.895	0.033	0.172	1.34	0.4	0.09	2.48e-02	1.24	0.4	0.0	0.0
37	30.070	0.033	0.172	0.79	0.2	0.25	7.04e-02	2.06	0.6	0.0	0.0
38	31.922	0.031	0.172	8.98e-05	2.54e-05	2.16	0.6	1.94	0.5	0.0	0.0
39	33.949	0.029	0.171	0.01	3.53e-03	0.84	0.2	1.99	0.6	0.0	0.0
40	35.975	0.028	0.171	0.01	4.07e-03	0.96	0.3	3.17	0.9	0.0	0.0
41	39.381	0.025	0.171	4.38e-03	1.24e-03	2.01	0.6	5.55	1.6	0.0	0.0
42	42.676	0.023	0.170	0.93	0.3	3.27e-03	9.23e-04	2.17	0.6	0.0	0.0
43	44.799	0.022	0.170	3.53	1.0	1.92e-03	5.44e-04	0.06	1.69e-02	0.0	0.0
44	46.101	0.022	0.170	0.02	5.73e-03	0.12	3.31e-02	49.35	13.9	0.0	0.0
45	47.077	0.021	0.170	3.95e-03	1.12e-03	0.08	2.19e-02	47.35	13.4	0.0	0.0
46	49.752	0.020	0.170	0.05	1.52e-02	0.18	5.09e-02	30.25	8.5	0.0	0.0
47	55.436	0.018	0.170	4.10e-04	1.16e-04	0.12	3.30e-02	69.57	19.7	0.0	0.0
48	59.605	0.017	0.170	0.02	5.37e-03	9.21	2.6	8.62	2.4	0.0	0.0
49	62.078	0.016	0.170	0.01	3.21e-03	6.19	1.7	25.15	7.1	0.0	0.0
50	66.261	0.015	0.170	0.49	0.1	7.36e-03	2.08e-03	1.77	0.5	0.0	0.0
51	70.333	0.014	0.170	5.19e-04	1.47e-04	12.88	3.6	12.24	3.5	0.0	0.0
52	78.948	0.013	0.170	0.01	3.90e-03	9.02e-03	2.55e-03	22.33	6.3	0.0	0.0
53	93.107	0.011	0.170	0.31	8.88e-02	0.02	4.34e-03	1.07	0.3	0.0	0.0
54	100.680	0.010	0.170	4.05e-03	1.14e-03	1.51	0.4	2.28e-03	6.43e-04	0.0	0.0
55	122.583	0.008	0.170	0.04	1.18e-02	3.15e-03	8.91e-04	17.07	4.8	0.0	0.0
56	137.542	0.007	0.170	0.20	5.53e-02	9.68e-05	2.74e-05	2.64	0.7	0.0	0.0
57	155.443	0.006	0.170	1.73e-04	4.89e-05	1.44	0.4	0.82	0.2	0.0	0.0
58	200.013	0.005	0.170	1.15e-03	3.25e-04	5.46e-03	1.54e-03	11.75	3.3	0.0	0.0
Risulta				353.87		353.85		352.63			
In %				100.00		99.99		99.65			

CDC	Tipo	Sigla Id	Note
5	Edk	CDC=Ed (dinamico SLU) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.324 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	0.23	2.92	2.27	1.178	0.001	0.032

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
9.60	13.11	2.92	1.27	0.0	0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	0.12	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.0	0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.455	2.199	0.121	5.68	1.6	0.0	0.0	0.0	0.0	0.0	0.0
2	0.463	2.159	0.121	5.49	1.6	0.0	0.0	0.0	0.0	0.0	0.0
3	0.481	2.078	0.121	6.92	2.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.483	2.069	0.121	10.20	2.9	0.0	0.0	0.0	0.0	0.0	0.0
5	0.484	2.067	0.121	1.51	0.4	0.0	0.0	0.0	0.0	0.0	0.0
6	0.490	2.040	0.121	5.86	1.7	0.0	0.0	0.0	0.0	0.0	0.0
7	0.492	2.031	0.121	7.98	2.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.493	2.029	0.121	1.35	0.4	0.0	0.0	0.0	0.0	0.0	0.0
9	3.085	0.324	0.540	248.31	70.2	2.95e-03	8.35e-04	1.43e-04	4.05e-05	0.0	0.0
10	4.489	0.223	0.381	0.46	0.1	0.01	4.08e-03	3.08e-03	8.69e-04	0.0	0.0
11	5.182	0.193	0.357	5.15e-03	1.45e-03	5.96e-03	1.68e-03	1.81e-03	5.11e-04	0.0	0.0
12	5.217	0.192	0.357	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.493	0.182	0.355	0.0	0.0	43.68	12.3	3.01	0.9	0.0	0.0
14	5.586	0.179	0.353	6.56e-03	1.85e-03	8.18	2.3	8.29	2.3	0.0	0.0
15	6.242	0.160	0.328	5.95	1.7	2.20e-03	6.22e-04	1.40e-04	3.96e-05	0.0	0.0
16	6.966	0.144	0.302	6.12e-04	1.73e-04	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.276	2.63e-04	7.42e-05	2.84	0.8	2.00	0.6	0.0	0.0
18	9.302	0.107	0.275	0.11	3.08e-02	47.90	13.5	0.10	2.72e-02	0.0	0.0
19	9.447	0.106	0.275	0.11	3.05e-02	52.23	14.8	1.86	0.5	0.0	0.0
20	9.808	0.102	0.277	0.09	2.47e-02	90.65	25.6	0.14	3.93e-02	0.0	0.0
21	10.042	0.100	0.277	0.37	0.1	21.21	6.0	8.05e-03	2.28e-03	0.0	0.0
22	11.250	0.089	0.254	0.02	4.48e-03	0.50	0.1	6.69	1.9	0.0	0.0
23	11.813	0.085	0.245	0.03	7.86e-03	0.45	0.1	6.62	1.9	0.0	0.0
24	12.388	0.081	0.236	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.804	0.078	0.231	0.81	0.2	1.81e-03	5.12e-04	1.99e-03	5.62e-04	0.0	0.0
26	14.858	0.067	0.209	11.52	3.3	0.09	2.49e-02	2.51	0.7	0.0	0.0
27	14.904	0.067	0.208	15.84	4.5	1.33e-03	3.77e-04	0.32	9.14e-02	0.0	0.0
28	16.548	0.060	0.194	0.13	3.73e-02	0.31	8.89e-02	1.15	0.3	0.0	0.0
29	17.796	0.056	0.190	1.36e-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	17.829	0.056	0.190	3.83e-04	1.08e-04	0.01	3.57e-03	0.06	1.57e-02	0.0	0.0
31	18.569	0.054	0.187	0.54	0.2	2.77	0.8	0.10	2.86e-02	0.0	0.0
32	19.275	0.052	0.185	9.74	2.8	0.19	5.29e-02	0.49	0.1	0.0	0.0
33	20.351	0.049	0.182	3.62	1.0	7.71e-04	2.18e-04	9.32e-03	2.63e-03	0.0	0.0
34	21.038	0.048	0.181	3.21	0.9	2.96e-03	8.37e-04	0.01	3.96e-03	0.0	0.0
35	23.769	0.042	0.175	3.21e-04	9.06e-05	43.44	12.3	0.05	1.48e-02	0.0	0.0
36	29.992	0.033	0.172	2.22e-04	6.27e-05	0.33	9.41e-02	3.25	0.9	0.0	0.0
37	31.922	0.031	0.172	2.28e-03	6.43e-04	2.17	0.6	1.91	0.5	0.0	0.0
38	32.920	0.030	0.171	0.51	0.1	1.73e-03	4.88e-04	3.45e-03	9.76e-04	0.0	0.0
39	33.421	0.030	0.171	1.72	0.5	0.03	8.91e-03	0.11	3.03e-02	0.0	0.0
40	33.971	0.029	0.171	0.16	4.55e-02	0.80	0.2	1.98	0.6	0.0	0.0
41	35.971	0.028	0.171	0.02	4.66e-03	0.98	0.3	3.13	0.9	0.0	0.0
42	39.412	0.025	0.171	0.02	4.59e-03	1.98	0.6	5.73	1.6	0.0	0.0
43	41.420	0.024	0.171	3.15	0.9	3.63e-03	1.03e-03	0.60	0.2	0.0	0.0
44	44.613	0.022	0.170	0.04	1.10e-02	0.12	3.26e-02	17.13	4.8	0.0	0.0
45	47.030	0.021	0.170	0.25	7.20e-02	0.09	2.67e-02	64.77	18.3	0.0	0.0
46	48.008	0.021	0.170	0.74	0.2	1.46e-03	4.12e-04	38.34	10.8	0.0	0.0
47	52.312	0.019	0.170	0.15	4.22e-02	0.29	8.07e-02	12.28	3.5	0.0	0.0
48	56.342	0.018	0.170	2.96e-03	8.37e-04	0.04	9.95e-03	86.53	24.5	0.0	0.0
49	59.693	0.017	0.170	0.02	6.93e-03	11.57	3.3	0.07	1.99e-02	0.0	0.0
50	63.274	0.016	0.170	0.68	0.2	1.61	0.5	0.02	5.40e-03	0.0	0.0
51	67.648	0.015	0.170	0.02	6.39e-03	8.81	2.5	4.28	1.2	0.0	0.0
52	70.956	0.014	0.170	5.23e-03	1.48e-03	5.75	1.6	38.47	10.9	0.0	0.0
53	89.637	0.011	0.170	0.07	1.97e-02	1.47	0.4	0.19	5.32e-02	0.0	0.0
54	101.796	0.010	0.170	0.06	1.79e-02	0.18	5.16e-02	12.56	3.5	0.0	0.0
55	104.243	0.010	0.170	0.19	5.50e-02	0.18	5.03e-02	5.65	1.6	0.0	0.0
56	138.196	0.007	0.170	0.16	4.58e-02	0.41	0.1	0.38	0.1	0.0	0.0
57	153.392	0.007	0.170	0.03	7.58e-03	1.25	0.4	0.30	8.39e-02	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
58	169.479	0.006	0.170	2.15e-04	6.06e-05	1.42e-03	4.01e-04	19.90	5.6	0.0	0.0
Risulta				353.87		353.84		352.06			
In %				100.00		99.99		99.49			

CDC	Tipo	Sigla Id	Note
6	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.102 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.121	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.121	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.121	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.121	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.121	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.121	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0
7	0.463	2.160	0.121	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.121	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.536	242.17	68.4	8.18e-05	2.31e-05	7.50e-05	2.12e-05	0.0	0.0
10	4.544	0.220	0.369	2.63	0.7	9.40e-04	2.66e-04	4.31e-03	1.22e-03	0.0	0.0
11	5.318	0.188	0.356	0.08	2.14e-02	2.98e-03	8.43e-04	7.56e-04	2.14e-04	0.0	0.0
12	5.381	0.186	0.356	0.0	0.0	37.38	10.6	4.74	1.3	0.0	0.0
13	5.435	0.184	0.355	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	5.704	0.175	0.348	2.95e-03	8.32e-04	14.79	4.2	6.55	1.9	0.0	0.0
15	6.250	0.160	0.328	6.69	1.9	1.19e-04	3.36e-05	1.58e-03	4.47e-04	0.0	0.0
16	6.835	0.146	0.306	3.94e-04	1.11e-04	1.60	0.5	1.00	0.3	0.0	0.0
17	8.105	0.123	0.273	4.21e-04	1.19e-04	2.35	0.7	2.03	0.6	0.0	0.0
18	9.196	0.109	0.274	0.17	4.73e-02	51.34	14.5	1.74	0.5	0.0	0.0
19	9.548	0.105	0.276	0.17	4.80e-02	51.31	14.5	0.06	1.72e-02	0.0	0.0
20	9.822	0.102	0.277	0.19	5.28e-02	83.91	23.7	0.02	6.79e-03	0.0	0.0
21	9.998	0.100	0.278	0.53	0.1	25.51	7.2	0.27	7.62e-02	0.0	0.0
22	11.473	0.087	0.250	0.02	4.27e-03	0.80	0.2	5.64	1.6	0.0	0.0
23	11.563	0.086	0.249	0.08	2.40e-02	0.31	8.71e-02	7.46	2.1	0.0	0.0
24	12.491	0.080	0.235	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.229	0.55	0.2	3.72e-03	1.05e-03	0.08	2.40e-02	0.0	0.0
26	14.382	0.070	0.213	7.65	2.2	7.12e-03	2.01e-03	2.23	0.6	0.0	0.0
27	15.846	0.063	0.200	16.45	4.6	0.01	3.29e-03	0.61	0.2	0.0	0.0
28	16.191	0.062	0.197	2.54	0.7	0.06	1.67e-02	1.52	0.4	0.0	0.0
29	18.454	0.054	0.188	1.72e-06	0.0	5.30e-06	1.50e-06	6.62e-06	1.87e-06	0.0	0.0
30	18.455	0.054	0.188	2.84e-03	8.02e-04	0.04	1.02e-02	0.04	1.07e-02	0.0	0.0
31	18.752	0.053	0.187	0.65	0.2	2.41	0.7	0.09	2.66e-02	0.0	0.0
32	19.757	0.051	0.184	6.84	1.9	0.39	0.1	0.34	9.70e-02	0.0	0.0
33	20.775	0.048	0.181	6.46	1.8	0.07	1.95e-02	0.01	2.86e-03	0.0	0.0
34	22.625	0.044	0.177	1.65	0.5	8.32e-06	2.35e-06	2.12e-03	6.00e-04	0.0	0.0
35	23.768	0.042	0.175	0.02	6.57e-03	43.31	12.2	0.04	1.02e-02	0.0	0.0
36	29.783	0.034	0.172	1.72e-03	4.86e-04	0.09	2.52e-02	4.74	1.3	0.0	0.0
37	31.538	0.032	0.172	1.87	0.5	0.06	1.71e-02	0.08	2.19e-02	0.0	0.0
38	32.133	0.031	0.172	0.15	4.25e-02	2.45	0.7	1.52	0.4	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
39	33.952	0.029	0.171	4.06e-03	1.15e-03	0.89	0.3	0.62	0.2	0.0	0.0
40	36.841	0.027	0.171	0.28	8.02e-02	0.03	9.76e-03	0.22	6.11e-02	0.0	0.0
41	37.008	0.027	0.171	1.42e-04	4.03e-05	0.26	7.38e-02	5.81	1.6	0.0	0.0
42	41.024	0.024	0.171	3.09e-05	8.75e-06	2.35	0.7	4.25	1.2	0.0	0.0
43	42.218	0.024	0.170	2.49	0.7	7.26e-04	2.05e-04	0.84	0.2	0.0	0.0
44	45.599	0.022	0.170	1.52	0.4	0.09	2.61e-02	19.62	5.5	0.0	0.0
45	46.604	0.021	0.170	0.34	9.71e-02	0.15	4.36e-02	50.95	14.4	0.0	0.0
46	48.117	0.021	0.170	6.89e-03	1.95e-03	0.02	5.98e-03	46.41	13.1	0.0	0.0
47	54.229	0.018	0.170	2.44e-04	6.89e-05	0.81	0.2	60.96	17.2	0.0	0.0
48	56.766	0.018	0.170	1.05e-06	0.0	6.81	1.9	17.56	5.0	0.0	0.0
49	62.189	0.016	0.170	0.02	5.11e-03	0.20	5.67e-02	35.18	9.9	0.0	0.0
50	64.978	0.015	0.170	0.48	0.1	4.63	1.3	1.19	0.3	0.0	0.0
51	66.273	0.015	0.170	0.21	5.80e-02	12.66	3.6	0.34	9.59e-02	0.0	0.0
52	73.905	0.014	0.170	7.58e-03	2.14e-03	3.81	1.1	30.02	8.5	0.0	0.0
53	92.702	0.011	0.170	0.03	7.67e-03	0.77	0.2	8.20	2.3	0.0	0.0
54	103.489	0.010	0.170	0.29	8.29e-02	0.21	5.87e-02	0.05	1.33e-02	0.0	0.0
55	119.497	0.008	0.170	0.03	8.97e-03	0.62	0.2	10.05	2.8	0.0	0.0
56	144.484	0.007	0.170	0.13	3.55e-02	0.04	1.15e-02	4.56	1.3	0.0	0.0
57	156.245	0.006	0.170	0.01	4.19e-03	1.15	0.3	1.60	0.5	0.0	0.0
58	182.902	0.005	0.170	2.94e-03	8.30e-04	0.12	3.40e-02	12.94	3.7	0.0	0.0
Risulta				353.87		353.85		352.19			
In %				100.00		99.99		99.52			

CDC	Tipo	Sigla Id	Note
7	Edk	CDC=Ed (dinamico SLU) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.104 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	-0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	-0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	-0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	-0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	-0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	-0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	-0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	-0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	-0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	-0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	-0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.121	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.121	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.121	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.121	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.121	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.121	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0
7	0.463	2.160	0.121	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.121	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.536	242.16	68.4	0.01	3.76e-03	9.30e-05	2.63e-05	0.0	0.0
10	4.544	0.220	0.369	2.63	0.7	0.06	1.79e-02	4.06e-03	1.15e-03	0.0	0.0
11	5.318	0.188	0.356	0.08	2.14e-02	8.96e-04	2.53e-04	7.13e-05	2.01e-05	0.0	0.0
12	5.435	0.184	0.355	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.461	0.183	0.355	6.91e-03	1.95e-03	28.83	8.1	3.64	1.0	0.0	0.0
14	5.627	0.178	0.351	6.71e-05	1.90e-05	22.81	6.4	7.72	2.2	0.0	0.0
15	6.249	0.160	0.328	6.69	1.9	8.01e-03	2.26e-03	1.12e-03	3.18e-04	0.0	0.0
16	7.103	0.141	0.297	4.73e-04	1.34e-04	1.02	0.3	1.09	0.3	0.0	0.0
17	7.811	0.128	0.279	1.36e-04	3.85e-05	3.24	0.9	1.96	0.6	0.0	0.0
18	9.055	0.110	0.273	0.16	4.46e-02	51.42	14.5	0.10	2.92e-02	0.0	0.0
19	9.624	0.104	0.276	0.12	3.34e-02	106.93	30.2	0.55	0.2	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
20	9.698	0.103	0.277	0.34	9.72e-02	19.17	5.4	1.46	0.4	0.0	0.0
21	10.156	0.098	0.275	0.44	0.1	34.67	9.8	0.02	5.41e-03	0.0	0.0
22	11.034	0.091	0.258	0.06	1.59e-02	0.29	8.10e-02	6.57	1.9	0.0	0.0
23	12.061	0.083	0.241	0.06	1.69e-02	0.54	0.2	6.63	1.9	0.0	0.0
24	12.491	0.080	0.235	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.229	0.57	0.2	2.36e-04	6.68e-05	0.10	2.87e-02	0.0	0.0
26	14.465	0.069	0.212	8.00	2.3	0.10	2.83e-02	1.81	0.5	0.0	0.0
27	15.872	0.063	0.200	17.65	5.0	1.62e-05	4.57e-06	0.29	8.12e-02	0.0	0.0
28	16.255	0.062	0.197	1.04	0.3	0.72	0.2	1.92	0.5	0.0	0.0
29	17.916	0.056	0.189	2.60e-03	7.35e-04	2.87	0.8	0.15	4.13e-02	0.0	0.0
30	18.450	0.054	0.188	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	18.463	0.054	0.188	0.03	8.29e-03	4.26e-03	1.20e-03	0.02	6.58e-03	0.0	0.0
32	20.023	0.050	0.183	12.22	3.5	0.04	1.00e-02	0.43	0.1	0.0	0.0
33	21.760	0.046	0.179	1.64	0.5	0.78	0.2	0.05	1.38e-02	0.0	0.0
34	22.625	0.044	0.177	1.61	0.5	0.02	6.71e-03	3.70e-03	1.05e-03	0.0	0.0
35	23.926	0.042	0.175	0.01	3.45e-03	42.63	12.0	0.05	1.38e-02	0.0	0.0
36	29.686	0.034	0.172	1.04e-05	2.95e-06	1.35	0.4	0.71	0.2	0.0	0.0
37	30.990	0.032	0.172	0.04	1.12e-02	0.72	0.2	3.48	1.0	0.0	0.0
38	31.581	0.032	0.172	1.98	0.6	1.18e-03	3.33e-04	0.11	3.10e-02	0.0	0.0
39	34.534	0.029	0.171	0.03	7.19e-03	1.35	0.4	1.93	0.5	0.0	0.0
40	36.124	0.028	0.171	0.04	1.09e-02	1.72	0.5	3.51	1.0	0.0	0.0
41	36.827	0.027	0.171	0.23	6.48e-02	0.02	4.78e-03	0.21	5.90e-02	0.0	0.0
42	38.889	0.026	0.171	0.03	8.13e-03	1.21	0.3	5.64	1.6	0.0	0.0
43	42.313	0.024	0.170	2.50	0.7	5.42e-04	1.53e-04	1.25	0.4	0.0	0.0
44	45.637	0.022	0.170	1.54	0.4	0.10	2.92e-02	19.91	5.6	0.0	0.0
45	46.256	0.022	0.170	0.29	8.32e-02	0.15	4.28e-02	60.60	17.1	0.0	0.0
46	49.334	0.020	0.170	5.87e-03	1.66e-03	0.10	2.73e-02	50.01	14.1	0.0	0.0
47	52.637	0.019	0.170	1.44e-04	4.06e-05	0.21	5.93e-02	9.38	2.7	0.0	0.0
48	56.966	0.018	0.170	6.23e-04	1.76e-04	0.07	2.11e-02	82.27	23.2	0.0	0.0
49	60.841	0.016	0.170	3.20e-03	9.04e-04	16.60	4.7	0.98	0.3	0.0	0.0
50	65.436	0.015	0.170	0.71	0.2	0.02	6.30e-03	0.05	1.46e-02	0.0	0.0
51	70.366	0.014	0.170	7.31e-06	2.07e-06	0.68	0.2	27.87	7.9	0.0	0.0
52	72.710	0.014	0.170	1.17e-04	3.30e-05	10.13	2.9	9.95	2.8	0.0	0.0
53	96.665	0.010	0.170	7.48e-05	2.11e-05	1.62	0.5	3.55	1.0	0.0	0.0
54	103.789	0.010	0.170	0.35	9.90e-02	7.14e-04	2.02e-04	0.08	2.14e-02	0.0	0.0
55	105.361	0.009	0.170	9.35e-04	2.64e-04	0.20	5.58e-02	16.39	4.6	0.0	0.0
56	148.518	0.007	0.170	0.14	4.04e-02	2.76e-06	0.0	6.67e-03	1.89e-03	0.0	0.0
57	154.974	0.006	0.170	3.78e-04	1.07e-04	1.38	0.4	2.21	0.6	0.0	0.0
58	173.458	0.006	0.170	2.27e-05	6.40e-06	0.04	1.05e-02	17.48	4.9	0.0	0.0
Risulta				353.87		353.85		352.14			
ln %				100.00		99.99		99.51			

CDC	Tipo	Sigla Id	Note
8	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.329 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	-0.23	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.0	-0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	-0.12	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.0	-0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	-0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	-0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	-0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	-0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	-0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	-0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	-0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.409	2.447	0.072	7.03	2.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.416	2.403	0.072	6.80	1.9	0.0	0.0	0.0	0.0	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
3	0.430	2.326	0.072	15.99	4.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.430	2.324	0.072	0.85	0.2	0.0	0.0	0.0	0.0	0.0	0.0
5	0.432	2.315	0.072	6.30	1.8	0.0	0.0	0.0	0.0	0.0	0.0
6	0.438	2.284	0.072	12.55	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	0.438	2.282	0.072	0.79	0.2	0.0	0.0	0.0	0.0	0.0	0.0
8	0.440	2.273	0.072	5.58	1.6	0.0	0.0	0.0	0.0	0.0	0.0
9	3.042	0.329	0.380	234.75	66.3	4.57e-03	1.29e-03	4.08e-05	1.15e-05	0.0	0.0
10	4.624	0.216	0.307	5.28	1.5	8.29e-03	2.34e-03	5.01e-03	1.41e-03	0.0	0.0
11	5.491	0.182	0.271	0.43	0.1	20.74	5.9	1.64	0.5	0.0	0.0
12	5.496	0.182	0.271	0.36	0.1	22.99	6.5	1.37	0.4	0.0	0.0
13	5.586	0.179	0.269	7.76e-03	2.19e-03	8.14	2.3	8.28	2.3	0.0	0.0
14	5.683	0.176	0.267	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	6.311	0.158	0.255	7.70	2.2	2.87e-03	8.10e-04	2.76e-03	7.81e-04	0.0	0.0
16	6.966	0.144	0.242	2.65e-04	7.50e-05	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.224	1.90e-04	5.37e-05	2.83	0.8	2.00	0.6	0.0	0.0
18	9.306	0.107	0.241	0.18	5.04e-02	48.18	13.6	0.09	2.55e-02	0.0	0.0
19	9.447	0.106	0.244	0.20	5.70e-02	51.93	14.7	1.86	0.5	0.0	0.0
20	9.807	0.102	0.251	0.22	6.15e-02	88.39	25.0	0.14	4.08e-02	0.0	0.0
21	10.015	0.100	0.254	0.82	0.2	23.48	6.6	0.01	3.94e-03	0.0	0.0
22	11.242	0.089	0.229	0.07	2.05e-02	0.42	0.1	6.86	1.9	0.0	0.0
23	11.789	0.085	0.220	0.13	3.77e-02	0.52	0.1	5.94	1.7	0.0	0.0
24	12.585	0.079	0.207	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	13.044	0.077	0.201	0.19	5.34e-02	2.14e-04	6.05e-05	0.38	0.1	0.0	0.0
26	13.954	0.072	0.189	7.66	2.2	0.03	9.60e-03	1.48	0.4	0.0	0.0
27	15.969	0.063	0.168	0.02	4.98e-03	0.25	7.20e-02	2.82	0.8	0.0	0.0
28	17.063	0.059	0.160	18.02	5.1	0.05	1.29e-02	6.14e-04	1.73e-04	0.0	0.0
29	18.562	0.054	0.154	0.14	4.07e-02	3.03	0.9	0.01	3.28e-03	0.0	0.0
30	19.242	0.052	0.151	0.03	9.57e-03	1.23e-03	3.46e-04	0.02	5.36e-03	0.0	0.0
31	19.296	0.052	0.151	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	20.187	0.050	0.148	4.17	1.2	8.97e-03	2.53e-03	0.40	0.1	0.0	0.0
33	21.071	0.047	0.145	9.01	2.5	0.02	6.51e-03	0.03	8.45e-03	0.0	0.0
34	23.771	0.042	0.138	1.96e-03	5.53e-04	43.42	12.3	0.05	1.44e-02	0.0	0.0
35	26.130	0.038	0.134	0.80	0.2	3.96e-04	1.12e-04	8.04e-04	2.27e-04	0.0	0.0
36	29.895	0.033	0.133	1.34	0.4	0.09	2.48e-02	1.24	0.4	0.0	0.0
37	30.070	0.033	0.133	0.79	0.2	0.25	7.04e-02	2.06	0.6	0.0	0.0
38	31.922	0.031	0.133	8.98e-05	2.54e-05	2.16	0.6	1.94	0.5	0.0	0.0
39	33.949	0.029	0.132	0.01	3.53e-03	0.84	0.2	1.99	0.6	0.0	0.0
40	35.975	0.028	0.132	0.01	4.07e-03	0.96	0.3	3.17	0.9	0.0	0.0
41	39.381	0.025	0.132	4.38e-03	1.24e-03	2.01	0.6	5.55	1.6	0.0	0.0
42	42.676	0.023	0.131	0.93	0.3	3.27e-03	9.23e-04	2.17	0.6	0.0	0.0
43	44.799	0.022	0.131	3.53	1.0	1.92e-03	5.44e-04	0.06	1.69e-02	0.0	0.0
44	46.101	0.022	0.131	0.02	5.73e-03	0.12	3.31e-02	49.35	13.9	0.0	0.0
45	47.077	0.021	0.131	3.95e-03	1.12e-03	0.08	2.19e-02	47.35	13.4	0.0	0.0
46	49.752	0.020	0.131	0.05	1.52e-02	0.18	5.09e-02	30.25	8.5	0.0	0.0
47	55.436	0.018	0.131	4.10e-04	1.16e-04	0.12	3.30e-02	69.57	19.7	0.0	0.0
48	59.605	0.017	0.131	0.02	5.37e-03	9.21	2.6	8.62	2.4	0.0	0.0
49	62.078	0.016	0.131	0.01	3.21e-03	6.19	1.7	25.15	7.1	0.0	0.0
50	66.261	0.015	0.131	0.49	0.1	7.36e-03	2.08e-03	1.77	0.5	0.0	0.0
51	70.333	0.014	0.131	5.19e-04	1.47e-04	12.88	3.6	12.24	3.5	0.0	0.0
52	78.948	0.013	0.131	0.01	3.90e-03	9.02e-03	2.55e-03	22.33	6.3	0.0	0.0
53	93.107	0.011	0.131	0.31	8.88e-02	0.02	4.34e-03	1.07	0.3	0.0	0.0
54	100.680	0.010	0.131	4.05e-03	1.14e-03	1.51	0.4	2.28e-03	6.43e-04	0.0	0.0
55	122.583	0.008	0.131	0.04	1.18e-02	3.15e-03	8.91e-04	17.07	4.8	0.0	0.0
56	137.542	0.007	0.131	0.20	5.53e-02	9.68e-05	2.74e-05	2.64	0.7	0.0	0.0
57	155.443	0.006	0.131	1.73e-04	4.89e-05	1.44	0.4	0.82	0.2	0.0	0.0
58	200.013	0.005	0.131	1.15e-03	3.25e-04	5.46e-03	1.54e-03	11.75	3.3	0.0	0.0
Risulta				353.87		353.85		352.63			
In %				100.00		99.99		99.65			

CDC	Tipo	Sigla Id	Note
9	Edk	CDC=Ed (dinamico SLD) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.324 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	0.23	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.0	0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	0.12	2.92	0.82	2.387	0.0	0.486

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
7.20	42.66	2.63	1.42	0.0	0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.455	2.199	0.072	5.68	1.6	0.0	0.0	0.0	0.0	0.0	0.0
2	0.463	2.159	0.072	5.49	1.6	0.0	0.0	0.0	0.0	0.0	0.0
3	0.481	2.078	0.072	6.92	2.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.483	2.069	0.072	10.20	2.9	0.0	0.0	0.0	0.0	0.0	0.0
5	0.484	2.067	0.072	1.51	0.4	0.0	0.0	0.0	0.0	0.0	0.0
6	0.490	2.040	0.072	5.86	1.7	0.0	0.0	0.0	0.0	0.0	0.0
7	0.492	2.031	0.072	7.98	2.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.493	2.029	0.072	1.35	0.4	0.0	0.0	0.0	0.0	0.0	0.0
9	3.085	0.324	0.393	248.31	70.2	2.95e-03	8.35e-04	1.43e-04	4.05e-05	0.0	0.0
10	4.489	0.223	0.323	0.46	0.1	0.01	4.08e-03	3.08e-03	8.69e-04	0.0	0.0
11	5.182	0.193	0.278	5.15e-03	1.45e-03	5.96e-03	1.68e-03	1.81e-03	5.11e-04	0.0	0.0
12	5.217	0.192	0.278	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.493	0.182	0.271	0.0	0.0	43.68	12.3	3.01	0.9	0.0	0.0
14	5.586	0.179	0.269	6.56e-03	1.85e-03	8.18	2.3	8.29	2.3	0.0	0.0
15	6.242	0.160	0.256	5.95	1.7	2.20e-03	6.22e-04	1.40e-04	3.96e-05	0.0	0.0
16	6.966	0.144	0.242	6.12e-04	1.73e-04	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.224	2.63e-04	7.42e-05	2.84	0.8	2.00	0.6	0.0	0.0
18	9.302	0.107	0.241	0.11	3.08e-02	47.90	13.5	0.10	2.72e-02	0.0	0.0
19	9.447	0.106	0.244	0.11	3.05e-02	52.23	14.8	1.86	0.5	0.0	0.0
20	9.808	0.102	0.251	0.09	2.47e-02	90.65	25.6	0.14	3.93e-02	0.0	0.0
21	10.042	0.100	0.253	0.37	0.1	21.21	6.0	8.05e-03	2.28e-03	0.0	0.0
22	11.250	0.089	0.229	0.02	4.48e-03	0.50	0.1	6.69	1.9	0.0	0.0
23	11.813	0.085	0.219	0.03	7.86e-03	0.45	0.1	6.62	1.9	0.0	0.0
24	12.388	0.081	0.210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.804	0.078	0.204	0.81	0.2	1.81e-03	5.12e-04	1.99e-03	5.62e-04	0.0	0.0
26	14.858	0.067	0.179	11.52	3.3	0.09	2.49e-02	2.51	0.7	0.0	0.0
27	14.904	0.067	0.178	15.84	4.5	1.33e-03	3.77e-04	0.32	9.14e-02	0.0	0.0
28	16.548	0.060	0.163	0.13	3.73e-02	0.31	8.89e-02	1.15	0.3	0.0	0.0
29	17.796	0.056	0.157	1.36e-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	17.829	0.056	0.156	3.83e-04	1.08e-04	0.01	3.57e-03	0.06	1.57e-02	0.0	0.0
31	18.569	0.054	0.153	0.54	0.2	2.77	0.8	0.10	2.86e-02	0.0	0.0
32	19.275	0.052	0.151	9.74	2.8	0.19	5.29e-02	0.49	0.1	0.0	0.0
33	20.351	0.049	0.147	3.62	1.0	7.71e-04	2.18e-04	9.32e-03	2.63e-03	0.0	0.0
34	21.038	0.048	0.145	3.21	0.9	2.96e-03	8.37e-04	0.01	3.96e-03	0.0	0.0
35	23.769	0.042	0.138	3.21e-04	9.06e-05	43.44	12.3	0.05	1.48e-02	0.0	0.0
36	29.992	0.033	0.133	2.22e-04	6.27e-05	0.33	9.41e-02	3.25	0.9	0.0	0.0
37	31.922	0.031	0.133	2.28e-03	6.43e-04	2.17	0.6	1.91	0.5	0.0	0.0
38	32.920	0.030	0.133	0.51	0.1	1.73e-03	4.88e-04	3.45e-03	9.76e-04	0.0	0.0
39	33.421	0.030	0.133	1.72	0.5	0.03	8.91e-03	0.11	3.03e-02	0.0	0.0
40	33.971	0.029	0.132	0.16	4.55e-02	0.80	0.2	1.98	0.6	0.0	0.0
41	35.971	0.028	0.132	0.02	4.66e-03	0.98	0.3	3.13	0.9	0.0	0.0
42	39.412	0.025	0.132	0.02	4.59e-03	1.98	0.6	5.73	1.6	0.0	0.0
43	41.420	0.024	0.131	3.15	0.9	3.63e-03	1.03e-03	0.60	0.2	0.0	0.0
44	44.613	0.022	0.131	0.04	1.10e-02	0.12	3.26e-02	17.13	4.8	0.0	0.0
45	47.030	0.021	0.131	0.25	7.20e-02	0.09	2.67e-02	64.77	18.3	0.0	0.0
46	48.008	0.021	0.131	0.74	0.2	1.46e-03	4.12e-04	38.34	10.8	0.0	0.0
47	52.312	0.019	0.131	0.15	4.22e-02	0.29	8.07e-02	12.28	3.5	0.0	0.0
48	56.342	0.018	0.131	2.96e-03	8.37e-04	0.04	9.95e-03	86.53	24.5	0.0	0.0
49	59.693	0.017	0.131	0.02	6.93e-03	11.57	3.3	0.07	1.99e-02	0.0	0.0
50	63.274	0.016	0.131	0.68	0.2	1.61	0.5	0.02	5.40e-03	0.0	0.0
51	67.648	0.015	0.131	0.02	6.39e-03	8.81	2.5	4.28	1.2	0.0	0.0
52	70.956	0.014	0.131	5.23e-03	1.48e-03	5.75	1.6	38.47	10.9	0.0	0.0
53	89.637	0.011	0.131	0.07	1.97e-02	1.47	0.4	0.19	5.32e-02	0.0	0.0
54	101.796	0.010	0.131	0.06	1.79e-02	0.18	5.16e-02	12.56	3.5	0.0	0.0
55	104.243	0.010	0.131	0.19	5.50e-02	0.18	5.03e-02	5.65	1.6	0.0	0.0
56	138.196	0.007	0.131	0.16	4.58e-02	0.41	0.1	0.38	0.1	0.0	0.0
57	153.392	0.007	0.131	0.03	7.58e-03	1.25	0.4	0.30	8.39e-02	0.0	0.0
58	169.479	0.006	0.131	2.15e-04	6.06e-05	1.42e-03	4.01e-04	19.90	5.6	0.0	0.0
Risulta				353.87		353.84		352.06			

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X % x g	M efficace Y % x g	M efficace Z % x g	Energia	Energia x v
In %				100.00	99.99	99.49		

CDC	Tipo	Sigla Id	Note
10	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.102 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X % x g	M efficace Y % x g	M efficace Z % x g	Energia	Energia x v
	Hz	sec	g	kN	kN	kN		
1	0.430	2.327	0.072	6.36	1.8	0.0	0.0	0.0
2	0.438	2.285	0.072	6.14	1.7	0.0	0.0	0.0
3	0.454	2.201	0.072	19.46	5.5	0.0	0.0	0.0
4	0.455	2.199	0.072	1.30	0.4	0.0	0.0	0.0
5	0.455	2.199	0.072	0.10	2.96e-02	0.0	0.0	0.0
6	0.463	2.161	0.072	15.75	4.4	0.0	0.0	0.0
7	0.463	2.160	0.072	1.24	0.3	0.0	0.0	0.0
8	0.463	2.159	0.072	0.10	2.85e-02	0.0	0.0	0.0
9	3.074	0.325	0.390	242.17	68.4	8.18e-05	2.31e-05	7.50e-05
10	4.544	0.220	0.313	2.63	0.7	9.40e-04	2.66e-04	4.31e-03
11	5.318	0.188	0.275	0.08	2.14e-02	2.98e-03	8.43e-04	7.56e-04
12	5.381	0.186	0.273	0.0	0.0	37.38	10.6	4.74
13	5.435	0.184	0.272	0.0	0.0	0.0	0.0	1.3
14	5.704	0.175	0.266	2.95e-03	8.32e-04	14.79	4.2	6.55
15	6.250	0.160	0.256	6.69	1.9	1.19e-04	3.36e-05	1.58e-03
16	6.835	0.146	0.244	3.94e-04	1.11e-04	1.60	0.5	1.00
17	8.105	0.123	0.222	4.21e-04	1.19e-04	2.35	0.7	2.03
18	9.196	0.109	0.239	0.17	4.73e-02	51.34	14.5	1.74
19	9.548	0.105	0.246	0.17	4.80e-02	51.31	14.5	0.06
20	9.822	0.102	0.251	0.19	5.28e-02	83.91	23.7	0.02
21	9.998	0.100	0.254	0.53	0.1	25.51	7.2	0.27
22	11.473	0.087	0.225	0.02	4.27e-03	0.80	0.2	5.64
23	11.563	0.086	0.223	0.08	2.40e-02	0.31	8.71e-02	7.46
24	12.491	0.080	0.209	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.202	0.55	0.2	3.72e-03	1.05e-03	0.08
26	14.382	0.070	0.184	7.65	2.2	7.12e-03	2.01e-03	2.23
27	15.846	0.063	0.169	16.45	4.6	0.01	3.29e-03	0.61
28	16.191	0.062	0.166	2.54	0.7	0.06	1.67e-02	1.52
29	18.454	0.054	0.154	1.72e-06	0.0	5.30e-06	1.50e-06	6.62e-06
30	18.455	0.054	0.154	2.84e-03	8.02e-04	0.04	1.02e-02	0.04
31	18.752	0.053	0.153	0.65	0.2	2.41	0.7	0.09
32	19.757	0.051	0.149	6.84	1.9	0.39	0.1	0.34
33	20.775	0.048	0.146	6.46	1.8	0.07	1.95e-02	0.01
34	22.625	0.044	0.140	1.65	0.5	8.32e-06	2.35e-06	2.12e-03
35	23.768	0.042	0.138	0.02	6.57e-03	43.31	12.2	0.04
36	29.783	0.034	0.133	1.72e-03	4.86e-04	0.09	2.52e-02	4.74
37	31.538	0.032	0.133	1.87	0.5	0.06	1.71e-02	0.08
38	32.133	0.031	0.133	0.15	4.25e-02	2.45	0.7	1.52
39	33.952	0.029	0.132	4.06e-03	1.15e-03	0.89	0.3	0.62
40	36.841	0.027	0.132	0.28	8.02e-02	0.03	9.76e-03	0.22
41	37.008	0.027	0.132	1.42e-04	4.03e-05	0.26	7.38e-02	5.81
42	41.024	0.024	0.131	3.09e-05	8.75e-06	2.35	0.7	4.25

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
43	42.218	0.024	0.131	2.49	0.7	7.26e-04	2.05e-04	0.84	0.2	0.0	0.0
44	45.599	0.022	0.131	1.52	0.4	0.09	2.61e-02	19.62	5.5	0.0	0.0
45	46.604	0.021	0.131	0.34	9.71e-02	0.15	4.36e-02	50.95	14.4	0.0	0.0
46	48.117	0.021	0.131	6.89e-03	1.95e-03	0.02	5.98e-03	46.41	13.1	0.0	0.0
47	54.229	0.018	0.131	2.44e-04	6.89e-05	0.81	0.2	60.96	17.2	0.0	0.0
48	56.766	0.018	0.131	1.05e-06	0.0	6.81	1.9	17.56	5.0	0.0	0.0
49	62.189	0.016	0.131	0.02	5.11e-03	0.20	5.67e-02	35.18	9.9	0.0	0.0
50	64.978	0.015	0.131	0.48	0.1	4.63	1.3	1.19	0.3	0.0	0.0
51	66.273	0.015	0.131	0.21	5.80e-02	12.66	3.6	0.34	9.59e-02	0.0	0.0
52	73.905	0.014	0.131	7.58e-03	2.14e-03	3.81	1.1	30.02	8.5	0.0	0.0
53	92.702	0.011	0.131	0.03	7.67e-03	0.77	0.2	8.20	2.3	0.0	0.0
54	103.489	0.010	0.131	0.29	8.29e-02	0.21	5.87e-02	0.05	1.33e-02	0.0	0.0
55	119.497	0.008	0.131	0.03	8.97e-03	0.62	0.2	10.05	2.8	0.0	0.0
56	144.484	0.007	0.131	0.13	3.55e-02	0.04	1.15e-02	4.56	1.3	0.0	0.0
57	156.245	0.006	0.131	0.01	4.19e-03	1.15	0.3	1.60	0.5	0.0	0.0
58	182.902	0.005	0.131	2.94e-03	8.30e-04	0.12	3.40e-02	12.94	3.7	0.0	0.0
Risulta				353.87		353.85		352.19			
In %				100.00		99.99		99.52			

CDC	Tipo	Sigla Id	Note
11	Edk	CDC=Ed (dinamico SLD) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.104 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	-0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	-0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	-0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	-0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	-0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	-0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	-0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	-0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	-0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	-0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	-0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.072	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.072	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.072	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.072	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.072	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.072	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0
7	0.463	2.160	0.072	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.072	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.390	242.16	68.4	0.01	3.76e-03	9.30e-05	2.63e-05	0.0	0.0
10	4.544	0.220	0.313	2.63	0.7	0.06	1.79e-02	4.06e-03	1.15e-03	0.0	0.0
11	5.318	0.188	0.275	0.08	2.14e-02	8.96e-04	2.53e-04	7.13e-05	2.01e-05	0.0	0.0
12	5.435	0.184	0.272	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.461	0.183	0.272	6.91e-03	1.95e-03	28.83	8.1	3.64	1.0	0.0	0.0
14	5.627	0.178	0.268	6.71e-05	1.90e-05	22.81	6.4	7.72	2.2	0.0	0.0
15	6.249	0.160	0.256	6.69	1.9	8.01e-03	2.26e-03	1.12e-03	3.18e-04	0.0	0.0
16	7.103	0.141	0.240	4.73e-04	1.34e-04	1.02	0.3	1.09	0.3	0.0	0.0
17	7.811	0.128	0.227	1.36e-04	3.85e-05	3.24	0.9	1.96	0.6	0.0	0.0
18	9.055	0.110	0.236	0.16	4.46e-02	51.42	14.5	0.10	2.92e-02	0.0	0.0
19	9.624	0.104	0.247	0.12	3.34e-02	106.93	30.2	0.55	0.2	0.0	0.0
20	9.698	0.103	0.249	0.34	9.72e-02	19.17	5.4	1.46	0.4	0.0	0.0
21	10.156	0.098	0.251	0.44	0.1	34.67	9.8	0.02	5.41e-03	0.0	0.0
22	11.034	0.091	0.233	0.06	1.59e-02	0.29	8.10e-02	6.57	1.9	0.0	0.0
23	12.061	0.083	0.215	0.06	1.69e-02	0.54	0.2	6.63	1.9	0.0	0.0
24	12.491	0.080	0.209	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.202	0.57	0.2	2.36e-04	6.68e-05	0.10	2.87e-02	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
26	14.465	0.069	0.183	8.00	2.3	0.10	2.83e-02	1.81	0.5	0.0	0.0
27	15.872	0.063	0.169	17.65	5.0	1.62e-05	4.57e-06	0.29	8.12e-02	0.0	0.0
28	16.255	0.062	0.165	1.04	0.3	0.72	0.2	1.92	0.5	0.0	0.0
29	17.916	0.056	0.156	2.60e-03	7.35e-04	2.87	0.8	0.15	4.13e-02	0.0	0.0
30	18.450	0.054	0.154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	18.463	0.054	0.154	0.03	8.29e-03	4.26e-03	1.20e-03	0.02	6.58e-03	0.0	0.0
32	20.023	0.050	0.148	12.22	3.5	0.04	1.00e-02	0.43	0.1	0.0	0.0
33	21.760	0.046	0.143	1.64	0.5	0.78	0.2	0.05	1.38e-02	0.0	0.0
34	22.625	0.044	0.140	1.61	0.5	0.02	6.71e-03	3.70e-03	1.05e-03	0.0	0.0
35	23.926	0.042	0.137	0.01	3.45e-03	42.63	12.0	0.05	1.38e-02	0.0	0.0
36	29.686	0.034	0.133	1.04e-05	2.95e-06	1.35	0.4	0.71	0.2	0.0	0.0
37	30.990	0.032	0.133	0.04	1.12e-02	0.72	0.2	3.48	1.0	0.0	0.0
38	31.581	0.032	0.133	1.98	0.6	1.18e-03	3.33e-04	0.11	3.10e-02	0.0	0.0
39	34.534	0.029	0.132	0.03	7.19e-03	1.35	0.4	1.93	0.5	0.0	0.0
40	36.124	0.028	0.132	0.04	1.09e-02	1.72	0.5	3.51	1.0	0.0	0.0
41	36.827	0.027	0.132	0.23	6.48e-02	0.02	4.78e-03	0.21	5.90e-02	0.0	0.0
42	38.889	0.026	0.132	0.03	8.13e-03	1.21	0.3	5.64	1.6	0.0	0.0
43	42.313	0.024	0.131	2.50	0.7	5.42e-04	1.53e-04	1.25	0.4	0.0	0.0
44	45.637	0.022	0.131	1.54	0.4	0.10	2.92e-02	19.91	5.6	0.0	0.0
45	46.256	0.022	0.131	0.29	8.32e-02	0.15	4.28e-02	60.60	17.1	0.0	0.0
46	49.334	0.020	0.131	5.87e-03	1.66e-03	0.10	2.73e-02	50.01	14.1	0.0	0.0
47	52.637	0.019	0.131	1.44e-04	4.06e-05	0.21	5.93e-02	9.38	2.7	0.0	0.0
48	56.966	0.018	0.131	6.23e-04	1.76e-04	0.07	2.11e-02	82.27	23.2	0.0	0.0
49	60.841	0.016	0.131	3.20e-03	9.04e-04	16.60	4.7	0.98	0.3	0.0	0.0
50	65.436	0.015	0.131	0.71	0.2	0.02	6.30e-03	0.05	1.46e-02	0.0	0.0
51	70.366	0.014	0.131	7.31e-06	2.07e-06	0.68	0.2	27.87	7.9	0.0	0.0
52	72.710	0.014	0.131	1.17e-04	3.30e-05	10.13	2.9	9.95	2.8	0.0	0.0
53	96.665	0.010	0.131	7.48e-05	2.11e-05	1.62	0.5	3.55	1.0	0.0	0.0
54	103.789	0.010	0.131	0.35	9.90e-02	7.14e-04	2.02e-04	0.08	2.14e-02	0.0	0.0
55	105.361	0.009	0.131	9.35e-04	2.64e-04	0.20	5.58e-02	16.39	4.6	0.0	0.0
56	148.518	0.007	0.131	0.14	4.04e-02	2.76e-06	0.0	6.67e-03	1.89e-03	0.0	0.0
57	154.974	0.006	0.131	3.78e-04	1.07e-04	1.38	0.4	2.21	0.6	0.0	0.0
58	173.458	0.006	0.131	2.27e-05	6.40e-06	0.04	1.05e-02	17.48	4.9	0.0	0.0
Risulta				353.87		353.85		352.14			
In %				100.00		99.99		99.51			

CDC	Tipo	Sigla Id	Note
15	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.102 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.063	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.063	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.063	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.063	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.063	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.063	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
7	0.463	2.160	0.063	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.063	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.344	242.17	68.4	8.18e-05	2.31e-05	7.50e-05	2.12e-05	0.0	0.0
10	4.544	0.220	0.283	2.63	0.7	9.40e-04	2.66e-04	4.31e-03	1.22e-03	0.0	0.0
11	5.318	0.188	0.245	0.08	2.14e-02	2.98e-03	8.43e-04	7.56e-04	2.14e-04	0.0	0.0
12	5.381	0.186	0.244	0.0	0.0	37.38	10.6	4.74	1.3	0.0	0.0
13	5.435	0.184	0.242	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	5.704	0.175	0.236	2.95e-03	8.32e-04	14.79	4.2	6.55	1.9	0.0	0.0
15	6.250	0.160	0.227	6.69	1.9	1.19e-04	3.36e-05	1.58e-03	4.47e-04	0.0	0.0
16	6.835	0.146	0.218	3.94e-04	1.11e-04	1.60	0.5	1.00	0.3	0.0	0.0
17	8.105	0.123	0.199	4.21e-04	1.19e-04	2.35	0.7	2.03	0.6	0.0	0.0
18	9.196	0.109	0.215	0.17	4.73e-02	51.34	14.5	1.74	0.5	0.0	0.0
19	9.548	0.105	0.221	0.17	4.80e-02	51.31	14.5	0.06	1.72e-02	0.0	0.0
20	9.822	0.102	0.226	0.19	5.28e-02	83.91	23.7	0.02	6.79e-03	0.0	0.0
21	9.998	0.100	0.229	0.53	0.1	25.51	7.2	0.27	7.62e-02	0.0	0.0
22	11.473	0.087	0.205	0.02	4.27e-03	0.80	0.2	5.64	1.6	0.0	0.0
23	11.563	0.086	0.203	0.08	2.40e-02	0.31	8.71e-02	7.46	2.1	0.0	0.0
24	12.491	0.080	0.191	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.185	0.55	0.2	3.72e-03	1.05e-03	0.08	2.40e-02	0.0	0.0
26	14.382	0.070	0.167	7.65	2.2	7.12e-03	2.01e-03	2.23	0.6	0.0	0.0
27	15.846	0.063	0.153	16.45	4.6	0.01	3.29e-03	0.61	0.2	0.0	0.0
28	16.191	0.062	0.150	2.54	0.7	0.06	1.67e-02	1.52	0.4	0.0	0.0
29	18.454	0.054	0.138	1.72e-06	0.0	5.30e-06	1.50e-06	6.62e-06	1.87e-06	0.0	0.0
30	18.455	0.054	0.138	2.84e-03	8.02e-04	0.04	1.02e-02	0.04	1.07e-02	0.0	0.0
31	18.752	0.053	0.137	0.65	0.2	2.41	0.7	0.09	2.66e-02	0.0	0.0
32	19.757	0.051	0.134	6.84	1.9	0.39	0.1	0.34	9.70e-02	0.0	0.0
33	20.775	0.048	0.131	6.46	1.8	0.07	1.95e-02	0.01	2.86e-03	0.0	0.0
34	22.625	0.044	0.126	1.65	0.5	8.32e-06	2.35e-06	2.12e-03	6.00e-04	0.0	0.0
35	23.768	0.042	0.123	0.02	6.57e-03	43.31	12.2	0.04	1.02e-02	0.0	0.0
36	29.783	0.034	0.119	1.72e-03	4.86e-04	0.09	2.52e-02	4.74	1.3	0.0	0.0
37	31.538	0.032	0.119	1.87	0.5	0.06	1.71e-02	0.08	2.19e-02	0.0	0.0
38	32.133	0.031	0.119	0.15	4.25e-02	2.45	0.7	1.52	0.4	0.0	0.0
39	33.952	0.029	0.118	4.06e-03	1.15e-03	0.89	0.3	0.62	0.2	0.0	0.0
40	36.841	0.027	0.118	0.28	8.02e-02	0.03	9.76e-03	0.22	6.11e-02	0.0	0.0
41	37.008	0.027	0.118	1.42e-04	4.03e-05	0.26	7.38e-02	5.81	1.6	0.0	0.0
42	41.024	0.024	0.117	3.09e-05	8.75e-06	2.35	0.7	4.25	1.2	0.0	0.0
43	42.218	0.024	0.117	2.49	0.7	7.26e-04	2.05e-04	0.84	0.2	0.0	0.0
44	45.599	0.022	0.117	1.52	0.4	0.09	2.61e-02	19.62	5.5	0.0	0.0
45	46.604	0.021	0.117	0.34	9.71e-02	0.15	4.36e-02	50.95	14.4	0.0	0.0
46	48.117	0.021	0.116	6.89e-03	1.95e-03	0.02	5.98e-03	46.41	13.1	0.0	0.0
47	54.229	0.018	0.116	2.44e-04	6.89e-05	0.81	0.2	60.96	17.2	0.0	0.0
48	56.766	0.018	0.116	1.05e-06	0.0	6.81	1.9	17.56	5.0	0.0	0.0
49	62.189	0.016	0.116	0.02	5.11e-03	0.20	5.67e-02	35.18	9.9	0.0	0.0
50	64.978	0.015	0.116	0.48	0.1	4.63	1.3	1.19	0.3	0.0	0.0
51	66.273	0.015	0.116	0.21	5.80e-02	12.66	3.6	0.34	9.59e-02	0.0	0.0
52	73.905	0.014	0.116	7.58e-03	2.14e-03	3.81	1.1	30.02	8.5	0.0	0.0
53	92.702	0.011	0.116	0.03	7.67e-03	0.77	0.2	8.20	2.3	0.0	0.0
54	103.489	0.010	0.116	0.29	8.29e-02	0.21	5.87e-02	0.05	1.33e-02	0.0	0.0
55	119.497	0.008	0.116	0.03	8.97e-03	0.62	0.2	10.05	2.8	0.0	0.0
56	144.484	0.007	0.116	0.13	3.55e-02	0.04	1.15e-02	4.56	1.3	0.0	0.0
57	156.245	0.006	0.116	0.01	4.19e-03	1.15	0.3	1.60	0.5	0.0	0.0
58	182.902	0.005	0.116	2.94e-03	8.30e-04	0.12	3.40e-02	12.94	3.7	0.0	0.0
Risulta				353.87		353.85		352.19			
In %				100.00		99.99		99.52			

CDC	Tipo	Sigla Id	Note
16	Edk	CDC=Ed (dinamico SLO) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.104 sec.
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	-0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	-0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	-0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	-0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	-0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	-0.11	0.0	4.36	4.09	1.524	0.151	0.428

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
4.80	11.07	2.90	1.43	-0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	-0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	-0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	-0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	-0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X %	M efficace Y %	M efficace Z %	Energia	Energia x v
	Hz	sec	g	x g kN	x g kN	x g kN		
1	0.430	2.327	0.063	6.36	1.8	0.0	0.0	0.0
2	0.438	2.285	0.063	6.14	1.7	0.0	0.0	0.0
3	0.454	2.201	0.063	19.46	5.5	0.0	0.0	0.0
4	0.455	2.199	0.063	1.30	0.4	0.0	0.0	0.0
5	0.455	2.199	0.063	0.10	2.96e-02	0.0	0.0	0.0
6	0.463	2.161	0.063	15.75	4.4	0.0	0.0	0.0
7	0.463	2.160	0.063	1.24	0.3	0.0	0.0	0.0
8	0.463	2.159	0.063	0.10	2.85e-02	0.0	0.0	0.0
9	3.074	0.325	0.344	242.16	68.4	0.01	3.76e-03	9.30e-05
10	4.544	0.220	0.283	2.63	0.7	0.06	1.79e-02	4.06e-03
11	5.318	0.188	0.245	0.08	2.14e-02	8.96e-04	2.53e-04	7.13e-05
12	5.435	0.184	0.242	0.0	0.0	0.0	0.0	0.0
13	5.461	0.183	0.242	6.91e-03	1.95e-03	28.83	8.1	3.64
14	5.627	0.178	0.238	6.71e-05	1.90e-05	22.81	6.4	7.72
15	6.249	0.160	0.227	6.69	1.9	8.01e-03	2.26e-03	1.12e-03
16	7.103	0.141	0.214	4.73e-04	1.34e-04	1.02	0.3	1.09
17	7.811	0.128	0.203	1.36e-04	3.85e-05	3.24	0.9	1.96
18	9.055	0.110	0.212	0.16	4.46e-02	51.42	14.5	0.10
19	9.624	0.104	0.223	0.12	3.34e-02	106.93	30.2	0.55
20	9.698	0.103	0.224	0.34	9.72e-02	19.17	5.4	1.46
21	10.156	0.098	0.226	0.44	0.1	34.67	9.8	0.02
22	11.034	0.091	0.211	0.06	1.59e-02	0.29	8.10e-02	6.57
23	12.061	0.083	0.197	0.06	1.69e-02	0.54	0.2	6.63
24	12.491	0.080	0.191	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.185	0.57	0.2	2.36e-04	6.68e-05	0.10
26	14.465	0.069	0.167	8.00	2.3	0.10	2.83e-02	1.81
27	15.872	0.063	0.153	17.65	5.0	1.62e-05	4.57e-06	0.29
28	16.255	0.062	0.149	1.04	0.3	0.72	0.2	1.92
29	17.916	0.056	0.141	2.60e-03	7.35e-04	2.87	0.8	0.15
30	18.450	0.054	0.138	0.0	0.0	0.0	0.0	0.0
31	18.463	0.054	0.138	0.03	8.29e-03	4.26e-03	1.20e-03	0.02
32	20.023	0.050	0.133	12.22	3.5	0.04	1.00e-02	0.43
33	21.760	0.046	0.128	1.64	0.5	0.78	0.2	0.05
34	22.625	0.044	0.126	1.61	0.5	0.02	6.71e-03	3.70e-03
35	23.926	0.042	0.123	0.01	3.45e-03	42.63	12.0	0.05
36	29.686	0.034	0.119	1.04e-05	2.95e-06	1.35	0.4	0.71
37	30.990	0.032	0.119	0.04	1.12e-02	0.72	0.2	3.48
38	31.581	0.032	0.119	1.98	0.6	1.18e-03	3.33e-04	0.11
39	34.534	0.029	0.118	0.03	7.19e-03	1.35	0.4	1.93
40	36.124	0.028	0.118	0.04	1.09e-02	1.72	0.5	3.51
41	36.827	0.027	0.118	0.23	6.48e-02	0.02	4.78e-03	0.21
42	38.889	0.026	0.117	0.03	8.13e-03	1.21	0.3	5.64
43	42.313	0.024	0.117	2.50	0.7	5.42e-04	1.53e-04	1.25
44	45.637	0.022	0.117	1.54	0.4	0.10	2.92e-02	19.91
45	46.256	0.022	0.117	0.29	8.32e-02	0.15	4.28e-02	60.60
46	49.334	0.020	0.116	5.87e-03	1.66e-03	0.10	2.73e-02	50.01
47	52.637	0.019	0.116	1.44e-04	4.06e-05	0.21	5.93e-02	9.38
48	56.966	0.018	0.116	6.23e-04	1.76e-04	0.07	2.11e-02	82.27
49	60.841	0.016	0.116	3.20e-03	9.04e-04	16.60	4.7	0.98
50	65.436	0.015	0.116	0.71	0.2	0.02	6.30e-03	0.05
51	70.366	0.014	0.116	7.31e-06	2.07e-06	0.68	0.2	27.87
52	72.710	0.014	0.116	1.17e-04	3.30e-05	10.13	2.9	9.95
53	96.665	0.010	0.116	7.48e-05	2.11e-05	1.62	0.5	3.55
54	103.789	0.010	0.116	0.35	9.90e-02	7.14e-04	2.02e-04	0.08
55	105.361	0.009	0.116	9.35e-04	2.64e-04	0.20	5.58e-02	16.39
56	148.518	0.007	0.116	0.14	4.04e-02	2.76e-06	0.0	6.67e-03
57	154.974	0.006	0.116	3.78e-04	1.07e-04	1.38	0.4	2.21
58	173.458	0.006	0.116	2.27e-05	6.40e-06	0.04	1.05e-02	17.48
Risulta				353.87		353.85		352.14
In %				100.00		99.99		99.51

CDC	Tipo	Sigla Id	Note
17	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. +)	

CDC	Tipo	Sigla Id	Note
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.329 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	-0.23	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.0	-0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	-0.12	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.0	-0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	-0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	-0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	-0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	-0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	-0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	-0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	-0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	-0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.409	2.447	0.157	7.03	2.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.416	2.403	0.157	6.80	1.9	0.0	0.0	0.0	0.0	0.0	0.0
3	0.430	2.326	0.157	15.99	4.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.430	2.324	0.157	0.85	0.2	0.0	0.0	0.0	0.0	0.0	0.0
5	0.432	2.315	0.157	6.30	1.8	0.0	0.0	0.0	0.0	0.0	0.0
6	0.438	2.284	0.157	12.55	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	0.438	2.282	0.157	0.79	0.2	0.0	0.0	0.0	0.0	0.0	0.0
8	0.440	2.273	0.157	5.58	1.6	0.0	0.0	0.0	0.0	0.0	0.0
9	3.042	0.329	0.628	234.75	66.3	4.57e-03	1.29e-03	4.08e-05	1.15e-05	0.0	0.0
10	4.624	0.216	0.421	5.28	1.5	8.29e-03	2.34e-03	5.01e-03	1.41e-03	0.0	0.0
11	5.491	0.182	0.414	0.43	0.1	20.74	5.9	1.64	0.5	0.0	0.0
12	5.496	0.182	0.414	0.36	0.1	22.99	6.5	1.37	0.4	0.0	0.0
13	5.586	0.179	0.412	7.76e-03	2.19e-03	8.14	2.3	8.28	2.3	0.0	0.0
14	5.683	0.176	0.407	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	6.311	0.158	0.379	7.70	2.2	2.87e-03	8.10e-04	2.76e-03	7.81e-04	0.0	0.0
16	6.966	0.144	0.354	2.65e-04	7.50e-05	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.325	1.90e-04	5.37e-05	2.83	0.8	2.00	0.6	0.0	0.0
18	9.306	0.107	0.313	0.18	5.04e-02	48.18	13.6	0.09	2.55e-02	0.0	0.0
19	9.447	0.106	0.312	0.20	5.70e-02	51.93	14.7	1.86	0.5	0.0	0.0
20	9.807	0.102	0.312	0.22	6.15e-02	88.39	25.0	0.14	4.08e-02	0.0	0.0
21	10.015	0.100	0.311	0.82	0.2	23.48	6.6	0.01	3.94e-03	0.0	0.0
22	11.242	0.089	0.287	0.07	2.05e-02	0.42	0.1	6.86	1.9	0.0	0.0
23	11.789	0.085	0.278	0.13	3.77e-02	0.52	0.1	5.94	1.7	0.0	0.0
24	12.585	0.079	0.266	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	13.044	0.077	0.260	0.19	5.34e-02	2.14e-04	6.05e-05	0.38	0.1	0.0	0.0
26	13.954	0.072	0.250	7.66	2.2	0.03	9.60e-03	1.48	0.4	0.0	0.0
27	15.969	0.063	0.231	0.02	4.98e-03	0.25	7.20e-02	2.82	0.8	0.0	0.0
28	17.063	0.059	0.224	18.02	5.1	0.05	1.29e-02	6.14e-04	1.73e-04	0.0	0.0
29	18.562	0.054	0.219	0.14	4.07e-02	3.03	0.9	0.01	3.28e-03	0.0	0.0
30	19.242	0.052	0.217	0.03	9.57e-03	1.23e-03	3.46e-04	0.02	5.36e-03	0.0	0.0
31	19.296	0.052	0.217	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	20.187	0.050	0.215	4.17	1.2	8.97e-03	2.53e-03	0.40	0.1	0.0	0.0
33	21.071	0.047	0.213	9.01	2.5	0.02	6.51e-03	0.03	8.45e-03	0.0	0.0
34	23.771	0.042	0.207	1.96e-03	5.53e-04	43.42	12.3	0.05	1.44e-02	0.0	0.0
35	26.130	0.038	0.205	0.80	0.2	3.96e-04	1.12e-04	8.04e-04	2.27e-04	0.0	0.0
36	29.895	0.033	0.204	1.34	0.4	0.09	2.48e-02	1.24	0.4	0.0	0.0
37	30.070	0.033	0.204	0.79	0.2	0.25	7.04e-02	2.06	0.6	0.0	0.0
38	31.922	0.031	0.204	8.98e-05	2.54e-05	2.16	0.6	1.94	0.5	0.0	0.0
39	33.949	0.029	0.204	0.01	3.53e-03	0.84	0.2	1.99	0.6	0.0	0.0
40	35.975	0.028	0.203	0.01	4.07e-03	0.96	0.3	3.17	0.9	0.0	0.0
41	39.381	0.025	0.203	4.38e-03	1.24e-03	2.01	0.6	5.55	1.6	0.0	0.0
42	42.676	0.023	0.203	0.93	0.3	3.27e-03	9.23e-04	2.17	0.6	0.0	0.0
43	44.799	0.022	0.202	3.53	1.0	1.92e-03	5.44e-04	0.06	1.69e-02	0.0	0.0
44	46.101	0.022	0.202	0.02	5.73e-03	0.12	3.31e-02	49.35	13.9	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
45	47.077	0.021	0.202	3.95e-03	1.12e-03	0.08	2.19e-02	47.35	13.4	0.0	0.0
46	49.752	0.020	0.202	0.05	1.52e-02	0.18	5.09e-02	30.25	8.5	0.0	0.0
47	55.436	0.018	0.202	4.10e-04	1.16e-04	0.12	3.30e-02	69.57	19.7	0.0	0.0
48	59.605	0.017	0.202	0.02	5.37e-03	9.21	2.6	8.62	2.4	0.0	0.0
49	62.078	0.016	0.202	0.01	3.21e-03	6.19	1.7	25.15	7.1	0.0	0.0
50	66.261	0.015	0.202	0.49	0.1	7.36e-03	2.08e-03	1.77	0.5	0.0	0.0
51	70.333	0.014	0.202	5.19e-04	1.47e-04	12.88	3.6	12.24	3.5	0.0	0.0
52	78.948	0.013	0.202	0.01	3.90e-03	9.02e-03	2.55e-03	22.33	6.3	0.0	0.0
53	93.107	0.011	0.202	0.31	8.88e-02	0.02	4.34e-03	1.07	0.3	0.0	0.0
54	100.680	0.010	0.202	4.05e-03	1.14e-03	1.51	0.4	2.28e-03	6.43e-04	0.0	0.0
55	122.583	0.008	0.202	0.04	1.18e-02	3.15e-03	8.91e-04	17.07	4.8	0.0	0.0
56	137.542	0.007	0.202	0.20	5.53e-02	9.68e-05	2.74e-05	2.64	0.7	0.0	0.0
57	155.443	0.006	0.202	1.73e-04	4.89e-05	1.44	0.4	0.82	0.2	0.0	0.0
58	200.013	0.005	0.202	1.15e-03	3.25e-04	5.46e-03	1.54e-03	11.75	3.3	0.0	0.0
Risulta				353.87		353.85		352.63			
ln %				100.00		99.99		99.65			

CDC	Tipo	Sigla Id	Note
18	Edk	CDC=Ed (dinamico SL CO) alfa=0.0 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:0.0
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.324 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.0	0.23	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.0	0.12	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.0	0.12	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.0	0.23	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.0	0.10	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.0	0.10	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.0	0.12	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.0	0.23	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.0	0.12	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.0	0.10	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.0	0.10	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.0	0.12	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.455	2.199	0.157	5.68	1.6	0.0	0.0	0.0	0.0	0.0	0.0
2	0.463	2.159	0.157	5.49	1.6	0.0	0.0	0.0	0.0	0.0	0.0
3	0.481	2.078	0.157	6.92	2.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.483	2.069	0.157	10.20	2.9	0.0	0.0	0.0	0.0	0.0	0.0
5	0.484	2.067	0.157	1.51	0.4	0.0	0.0	0.0	0.0	0.0	0.0
6	0.490	2.040	0.157	5.86	1.7	0.0	0.0	0.0	0.0	0.0	0.0
7	0.492	2.031	0.157	7.98	2.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.493	2.029	0.157	1.35	0.4	0.0	0.0	0.0	0.0	0.0	0.0
9	3.085	0.324	0.644	248.31	70.2	2.95e-03	8.35e-04	1.43e-04	4.05e-05	0.0	0.0
10	4.489	0.223	0.433	0.46	0.1	0.01	4.08e-03	3.08e-03	8.69e-04	0.0	0.0
11	5.182	0.193	0.416	5.15e-03	1.45e-03	5.96e-03	1.68e-03	1.81e-03	5.11e-04	0.0	0.0
12	5.217	0.192	0.416	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.493	0.182	0.414	0.0	0.0	43.68	12.3	3.01	0.9	0.0	0.0
14	5.586	0.179	0.412	6.56e-03	1.85e-03	8.18	2.3	8.29	2.3	0.0	0.0
15	6.242	0.160	0.382	5.95	1.7	2.20e-03	6.22e-04	1.40e-04	3.96e-05	0.0	0.0
16	6.966	0.144	0.354	6.12e-04	1.73e-04	1.32	0.4	1.05	0.3	0.0	0.0
17	7.955	0.126	0.325	2.63e-04	7.42e-05	2.84	0.8	2.00	0.6	0.0	0.0
18	9.302	0.107	0.313	0.11	3.08e-02	47.90	13.5	0.10	2.72e-02	0.0	0.0
19	9.447	0.106	0.312	0.11	3.05e-02	52.23	14.8	1.86	0.5	0.0	0.0
20	9.808	0.102	0.312	0.09	2.47e-02	90.65	25.6	0.14	3.93e-02	0.0	0.0
21	10.042	0.100	0.310	0.37	0.1	21.21	6.0	8.05e-03	2.28e-03	0.0	0.0
22	11.250	0.089	0.287	0.02	4.48e-03	0.50	0.1	6.69	1.9	0.0	0.0
23	11.813	0.085	0.277	0.03	7.86e-03	0.45	0.1	6.62	1.9	0.0	0.0
24	12.388	0.081	0.269	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.804	0.078	0.263	0.81	0.2	1.81e-03	5.12e-04	1.99e-03	5.62e-04	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
26	14.858	0.067	0.241	11.52	3.3	0.09	2.49e-02	2.51	0.7	0.0	0.0
27	14.904	0.067	0.240	15.84	4.5	1.33e-03	3.77e-04	0.32	9.14e-02	0.0	0.0
28	16.548	0.060	0.226	0.13	3.73e-02	0.31	8.89e-02	1.15	0.3	0.0	0.0
29	17.796	0.056	0.222	1.36e-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	17.829	0.056	0.222	3.83e-04	1.08e-04	0.01	3.57e-03	0.06	1.57e-02	0.0	0.0
31	18.569	0.054	0.219	0.54	0.2	2.77	0.8	0.10	2.86e-02	0.0	0.0
32	19.275	0.052	0.217	9.74	2.8	0.19	5.29e-02	0.49	0.1	0.0	0.0
33	20.351	0.049	0.215	3.62	1.0	7.71e-04	2.18e-04	9.32e-03	2.63e-03	0.0	0.0
34	21.038	0.048	0.213	3.21	0.9	2.96e-03	8.37e-04	0.01	3.96e-03	0.0	0.0
35	23.769	0.042	0.207	3.21e-04	9.06e-05	43.44	12.3	0.05	1.48e-02	0.0	0.0
36	29.992	0.033	0.204	2.22e-04	6.27e-05	0.33	9.41e-02	3.25	0.9	0.0	0.0
37	31.922	0.031	0.204	2.28e-03	6.43e-04	2.17	0.6	1.91	0.5	0.0	0.0
38	32.920	0.030	0.204	0.51	0.1	1.73e-03	4.88e-04	3.45e-03	9.76e-04	0.0	0.0
39	33.421	0.030	0.204	1.72	0.5	0.03	8.91e-03	0.11	3.03e-02	0.0	0.0
40	33.971	0.029	0.204	0.16	4.55e-02	0.80	0.2	1.98	0.6	0.0	0.0
41	35.971	0.028	0.203	0.02	4.66e-03	0.98	0.3	3.13	0.9	0.0	0.0
42	39.412	0.025	0.203	0.02	4.59e-03	1.98	0.6	5.73	1.6	0.0	0.0
43	41.420	0.024	0.203	3.15	0.9	3.63e-03	1.03e-03	0.60	0.2	0.0	0.0
44	44.613	0.022	0.202	0.04	1.10e-02	0.12	3.26e-02	17.13	4.8	0.0	0.0
45	47.030	0.021	0.202	0.25	7.20e-02	0.09	2.67e-02	64.77	18.3	0.0	0.0
46	48.008	0.021	0.202	0.74	0.2	1.46e-03	4.12e-04	38.34	10.8	0.0	0.0
47	52.312	0.019	0.202	0.15	4.22e-02	0.29	8.07e-02	12.28	3.5	0.0	0.0
48	56.342	0.018	0.202	2.96e-03	8.37e-04	0.04	9.95e-03	86.53	24.5	0.0	0.0
49	59.693	0.017	0.202	0.02	6.93e-03	11.57	3.3	0.07	1.99e-02	0.0	0.0
50	63.274	0.016	0.202	0.68	0.2	1.61	0.5	0.02	5.40e-03	0.0	0.0
51	67.648	0.015	0.202	0.02	6.39e-03	8.81	2.5	4.28	1.2	0.0	0.0
52	70.956	0.014	0.202	5.23e-03	1.48e-03	5.75	1.6	38.47	10.9	0.0	0.0
53	89.637	0.011	0.202	0.07	1.97e-02	1.47	0.4	0.19	5.32e-02	0.0	0.0
54	101.796	0.010	0.202	0.06	1.79e-02	0.18	5.16e-02	12.56	3.5	0.0	0.0
55	104.243	0.010	0.202	0.19	5.50e-02	0.18	5.03e-02	5.65	1.6	0.0	0.0
56	138.196	0.007	0.202	0.16	4.58e-02	0.41	0.1	0.38	0.1	0.0	0.0
57	153.392	0.007	0.202	0.03	7.58e-03	1.25	0.4	0.30	8.39e-02	0.0	0.0
58	169.479	0.006	0.202	2.15e-04	6.06e-05	1.42e-03	4.01e-04	19.90	5.6	0.0	0.0
Risulta				353.87		353.84		352.06			
In %				100.00		99.99		99.49			

CDC	Tipo	Sigla Id	Note
19	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. +)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: positiva
			periodo proprio T1: 0.102 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
5.89	34.66	1.24	3.63	0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.157	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.157	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.157	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.157	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.157	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.157	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
7	0.463	2.160	0.157	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.157	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.640	242.17	68.4	8.18e-05	2.31e-05	7.50e-05	2.12e-05	0.0	0.0
10	4.544	0.220	0.422	2.63	0.7	9.40e-04	2.66e-04	4.31e-03	1.22e-03	0.0	0.0
11	5.318	0.188	0.415	0.08	2.14e-02	2.98e-03	8.43e-04	7.56e-04	2.14e-04	0.0	0.0
12	5.381	0.186	0.415	0.0	0.0	37.38	10.6	4.74	1.3	0.0	0.0
13	5.435	0.184	0.415	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	5.704	0.175	0.406	2.95e-03	8.32e-04	14.79	4.2	6.55	1.9	0.0	0.0
15	6.250	0.160	0.382	6.69	1.9	1.19e-04	3.36e-05	1.58e-03	4.47e-04	0.0	0.0
16	6.835	0.146	0.359	3.94e-04	1.11e-04	1.60	0.5	1.00	0.3	0.0	0.0
17	8.105	0.123	0.321	4.21e-04	1.19e-04	2.35	0.7	2.03	0.6	0.0	0.0
18	9.196	0.109	0.313	0.17	4.73e-02	51.34	14.5	1.74	0.5	0.0	0.0
19	9.548	0.105	0.312	0.17	4.80e-02	51.31	14.5	0.06	1.72e-02	0.0	0.0
20	9.822	0.102	0.312	0.19	5.28e-02	83.91	23.7	0.02	6.79e-03	0.0	0.0
21	9.998	0.100	0.311	0.53	0.1	25.51	7.2	0.27	7.62e-02	0.0	0.0
22	11.473	0.087	0.283	0.02	4.27e-03	0.80	0.2	5.64	1.6	0.0	0.0
23	11.563	0.086	0.281	0.08	2.40e-02	0.31	8.71e-02	7.46	2.1	0.0	0.0
24	12.491	0.080	0.267	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.262	0.55	0.2	3.72e-03	1.05e-03	0.08	2.40e-02	0.0	0.0
26	14.382	0.070	0.245	7.65	2.2	7.12e-03	2.01e-03	2.23	0.6	0.0	0.0
27	15.846	0.063	0.232	16.45	4.6	0.01	3.29e-03	0.61	0.2	0.0	0.0
28	16.191	0.062	0.229	2.54	0.7	0.06	1.67e-02	1.52	0.4	0.0	0.0
29	18.454	0.054	0.220	1.72e-06	0.0	5.30e-06	1.50e-06	6.62e-06	1.87e-06	0.0	0.0
30	18.455	0.054	0.220	2.84e-03	8.02e-04	0.04	1.02e-02	0.04	1.07e-02	0.0	0.0
31	18.752	0.053	0.219	0.65	0.2	2.41	0.7	0.09	2.66e-02	0.0	0.0
32	19.757	0.051	0.216	6.84	1.9	0.39	0.1	0.34	9.70e-02	0.0	0.0
33	20.775	0.048	0.214	6.46	1.8	0.07	1.95e-02	0.01	2.86e-03	0.0	0.0
34	22.625	0.044	0.210	1.65	0.5	8.32e-06	2.35e-06	2.12e-03	6.00e-04	0.0	0.0
35	23.768	0.042	0.207	0.02	6.57e-03	43.31	12.2	0.04	1.02e-02	0.0	0.0
36	29.783	0.034	0.204	1.72e-03	4.86e-04	0.09	2.52e-02	4.74	1.3	0.0	0.0
37	31.538	0.032	0.204	1.87	0.5	0.06	1.71e-02	0.08	2.19e-02	0.0	0.0
38	32.133	0.031	0.204	0.15	4.25e-02	2.45	0.7	1.52	0.4	0.0	0.0
39	33.952	0.029	0.204	4.06e-03	1.15e-03	0.89	0.3	0.62	0.2	0.0	0.0
40	36.841	0.027	0.203	0.28	8.02e-02	0.03	9.76e-03	0.22	6.11e-02	0.0	0.0
41	37.008	0.027	0.203	1.42e-04	4.03e-05	0.26	7.38e-02	5.81	1.6	0.0	0.0
42	41.024	0.024	0.203	3.09e-05	8.75e-06	2.35	0.7	4.25	1.2	0.0	0.0
43	42.218	0.024	0.203	2.49	0.7	7.26e-04	2.05e-04	0.84	0.2	0.0	0.0
44	45.599	0.022	0.202	1.52	0.4	0.09	2.61e-02	19.62	5.5	0.0	0.0
45	46.604	0.021	0.202	0.34	9.71e-02	0.15	4.36e-02	50.95	14.4	0.0	0.0
46	48.117	0.021	0.202	6.89e-03	1.95e-03	0.02	5.98e-03	46.41	13.1	0.0	0.0
47	54.229	0.018	0.202	2.44e-04	6.89e-05	0.81	0.2	60.96	17.2	0.0	0.0
48	56.766	0.018	0.202	1.05e-06	0.0	6.81	1.9	17.56	5.0	0.0	0.0
49	62.189	0.016	0.202	0.02	5.11e-03	0.20	5.67e-02	35.18	9.9	0.0	0.0
50	64.978	0.015	0.202	0.48	0.1	4.63	1.3	1.19	0.3	0.0	0.0
51	66.273	0.015	0.202	0.21	5.80e-02	12.66	3.6	0.34	9.59e-02	0.0	0.0
52	73.905	0.014	0.202	7.58e-03	2.14e-03	3.81	1.1	30.02	8.5	0.0	0.0
53	92.702	0.011	0.202	0.03	7.67e-03	0.77	0.2	8.20	2.3	0.0	0.0
54	103.489	0.010	0.202	0.29	8.29e-02	0.21	5.87e-02	0.05	1.33e-02	0.0	0.0
55	119.497	0.008	0.202	0.03	8.97e-03	0.62	0.2	10.05	2.8	0.0	0.0
56	144.484	0.007	0.202	0.13	3.55e-02	0.04	1.15e-02	4.56	1.3	0.0	0.0
57	156.245	0.006	0.202	0.01	4.19e-03	1.15	0.3	1.60	0.5	0.0	0.0
58	182.902	0.005	0.202	2.94e-03	8.30e-04	0.12	3.40e-02	12.94	3.7	0.0	0.0
Risulta				353.87		353.85		352.19			
In %				100.00		99.99		99.52			

CDC	Tipo	Sigla Id	Note
20	Edk	CDC=Ed (dinamico SL CO) alfa=90.00 (ecc. -)	
			categoria suolo: da R.S.L.
			angolo di ingresso:90.00
			eccentricità aggiuntiva: negativa
			periodo proprio T1: 0.104 sec.
			fattore q: 1.000
			classe di duttilità CD: B
			numero di modi considerati: 58
			combinaz. modale: CQC

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
m	kN	m	m	m	m	m	m			
10.80	55.93	2.92	2.35	-0.30	0.0	2.92	2.27	1.178	0.001	0.032
9.60	13.11	2.92	1.27	-0.08	0.0	2.92	0.82	2.387	0.0	0.342
8.40	11.42	2.92	1.46	-0.08	0.0	2.92	0.82	2.387	0.0	0.486
7.20	42.66	2.63	1.42	-0.30	0.0	2.92	1.77	1.144	0.081	0.153
6.00	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316

Quota	M Sismica x g	Pos. GX	Pos. GY	E agg. X-X	E agg. Y-Y	Pos. KX	Pos. KY	(r/Ls)^2	rapp. ex/rx	rapp. ey/ry
5.89	34.66	1.24	3.63	-0.11	0.0	1.48	4.09	1.524	0.156	0.435
4.91	34.96	4.60	3.63	-0.11	0.0	4.36	4.09	1.524	0.151	0.428
4.80	11.07	2.90	1.43	-0.08	0.0	2.92	0.82	2.387	0.012	0.461
3.60	48.52	2.92	1.15	-0.30	0.0	2.92	1.77	1.144	0.0	0.270
2.40	12.75	2.94	1.24	-0.08	0.0	2.92	0.82	2.387	0.010	0.316
2.29	32.08	1.24	3.56	-0.11	0.0	1.48	4.09	1.524	0.157	0.500
1.31	31.78	4.61	3.55	-0.11	0.0	4.36	4.09	1.524	0.163	0.509
1.20	12.18	2.90	1.41	-0.08	0.0	2.92	0.82	2.387	0.011	0.451
Risulta	353.87									

Modo	Frequenza	Periodo	Acc. Spettrale	M efficace X x g	%	M efficace Y x g	%	M efficace Z x g	%	Energia	Energia x v
	Hz	sec	g	kN		kN		kN			
1	0.430	2.327	0.157	6.36	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	0.438	2.285	0.157	6.14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.454	2.201	0.157	19.46	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	0.455	2.199	0.157	1.30	0.4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.455	2.199	0.157	0.10	2.96e-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.463	2.161	0.157	15.75	4.4	0.0	0.0	0.0	0.0	0.0	0.0
7	0.463	2.160	0.157	1.24	0.3	0.0	0.0	0.0	0.0	0.0	0.0
8	0.463	2.159	0.157	0.10	2.85e-02	0.0	0.0	0.0	0.0	0.0	0.0
9	3.074	0.325	0.640	242.16	68.4	0.01	3.76e-03	9.30e-05	2.63e-05	0.0	0.0
10	4.544	0.220	0.422	2.63	0.7	0.06	1.79e-02	4.06e-03	1.15e-03	0.0	0.0
11	5.318	0.188	0.415	0.08	2.14e-02	8.96e-04	2.53e-04	7.13e-05	2.01e-05	0.0	0.0
12	5.435	0.184	0.415	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.461	0.183	0.415	6.91e-03	1.95e-03	28.83	8.1	3.64	1.0	0.0	0.0
14	5.627	0.178	0.410	6.71e-05	1.90e-05	22.81	6.4	7.72	2.2	0.0	0.0
15	6.249	0.160	0.382	6.69	1.9	8.01e-03	2.26e-03	1.12e-03	3.18e-04	0.0	0.0
16	7.103	0.141	0.349	4.73e-04	1.34e-04	1.02	0.3	1.09	0.3	0.0	0.0
17	7.811	0.128	0.329	1.36e-04	3.85e-05	3.24	0.9	1.96	0.6	0.0	0.0
18	9.055	0.110	0.313	0.16	4.46e-02	51.42	14.5	0.10	2.92e-02	0.0	0.0
19	9.624	0.104	0.312	0.12	3.34e-02	106.93	30.2	0.55	0.2	0.0	0.0
20	9.698	0.103	0.312	0.34	9.72e-02	19.17	5.4	1.46	0.4	0.0	0.0
21	10.156	0.098	0.308	0.44	0.1	34.67	9.8	0.02	5.41e-03	0.0	0.0
22	11.034	0.091	0.291	0.06	1.59e-02	0.29	8.10e-02	6.57	1.9	0.0	0.0
23	12.061	0.083	0.274	0.06	1.69e-02	0.54	0.2	6.63	1.9	0.0	0.0
24	12.491	0.080	0.267	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	12.927	0.077	0.262	0.57	0.2	2.36e-04	6.68e-05	0.10	2.87e-02	0.0	0.0
26	14.465	0.069	0.245	8.00	2.3	0.10	2.83e-02	1.81	0.5	0.0	0.0
27	15.872	0.063	0.232	17.65	5.0	1.62e-05	4.57e-06	0.29	8.12e-02	0.0	0.0
28	16.255	0.062	0.229	1.04	0.3	0.72	0.2	1.92	0.5	0.0	0.0
29	17.916	0.056	0.221	2.60e-03	7.35e-04	2.87	0.8	0.15	4.13e-02	0.0	0.0
30	18.450	0.054	0.220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	18.463	0.054	0.220	0.03	8.29e-03	4.26e-03	1.20e-03	0.02	6.58e-03	0.0	0.0
32	20.023	0.050	0.215	12.22	3.5	0.04	1.00e-02	0.43	0.1	0.0	0.0
33	21.760	0.046	0.211	1.64	0.5	0.78	0.2	0.05	1.38e-02	0.0	0.0
34	22.625	0.044	0.210	1.61	0.5	0.02	6.71e-03	3.70e-03	1.05e-03	0.0	0.0
35	23.926	0.042	0.207	0.01	3.45e-03	42.63	12.0	0.05	1.38e-02	0.0	0.0
36	29.686	0.034	0.204	1.04e-05	2.95e-06	1.35	0.4	0.71	0.2	0.0	0.0
37	30.990	0.032	0.204	0.04	1.12e-02	0.72	0.2	3.48	1.0	0.0	0.0
38	31.581	0.032	0.204	1.98	0.6	1.18e-03	3.33e-04	0.11	3.10e-02	0.0	0.0
39	34.534	0.029	0.204	0.03	7.19e-03	1.35	0.4	1.93	0.5	0.0	0.0
40	36.124	0.028	0.203	0.04	1.09e-02	1.72	0.5	3.51	1.0	0.0	0.0
41	36.827	0.027	0.203	0.23	6.48e-02	0.02	4.78e-03	0.21	5.90e-02	0.0	0.0
42	38.889	0.026	0.203	0.03	8.13e-03	1.21	0.3	5.64	1.6	0.0	0.0
43	42.313	0.024	0.203	2.50	0.7	5.42e-04	1.53e-04	1.25	0.4	0.0	0.0
44	45.637	0.022	0.202	1.54	0.4	0.10	2.92e-02	19.91	5.6	0.0	0.0
45	46.256	0.022	0.202	0.29	8.32e-02	0.15	4.28e-02	60.60	17.1	0.0	0.0
46	49.334	0.020	0.202	5.87e-03	1.66e-03	0.10	2.73e-02	50.01	14.1	0.0	0.0
47	52.637	0.019	0.202	1.44e-04	4.06e-05	0.21	5.93e-02	9.38	2.7	0.0	0.0
48	56.966	0.018	0.202	6.23e-04	1.76e-04	0.07	2.11e-02	82.27	23.2	0.0	0.0
49	60.841	0.016	0.202	3.20e-03	9.04e-04	16.60	4.7	0.98	0.3	0.0	0.0
50	65.436	0.015	0.202	0.71	0.2	0.02	6.30e-03	0.05	1.46e-02	0.0	0.0
51	70.366	0.014	0.202	7.31e-06	2.07e-06	0.68	0.2	27.87	7.9	0.0	0.0
52	72.710	0.014	0.202	1.17e-04	3.30e-05	10.13	2.9	9.95	2.8	0.0	0.0
53	96.665	0.010	0.202	7.48e-05	2.11e-05	1.62	0.5	3.55	1.0	0.0	0.0
54	103.789	0.010	0.202	0.35	9.90e-02	7.14e-04	2.02e-04	0.08	2.14e-02	0.0	0.0
55	105.361	0.009	0.202	9.35e-04	2.64e-04	0.20	5.58e-02	16.39	4.6	0.0	0.0
56	148.518	0.007	0.202	0.14	4.04e-02	2.76e-06	0.0	6.67e-03	1.89e-03	0.0	0.0
57	154.974	0.006	0.202	3.78e-04	1.07e-04	1.38	0.4	2.21	0.6	0.0	0.0
58	173.458	0.006	0.202	2.27e-05	6.40e-06	0.04	1.05e-02	17.48	4.9	0.0	0.0
Risulta				353.87		353.85		352.14			
In %				100.00		99.99		99.51			

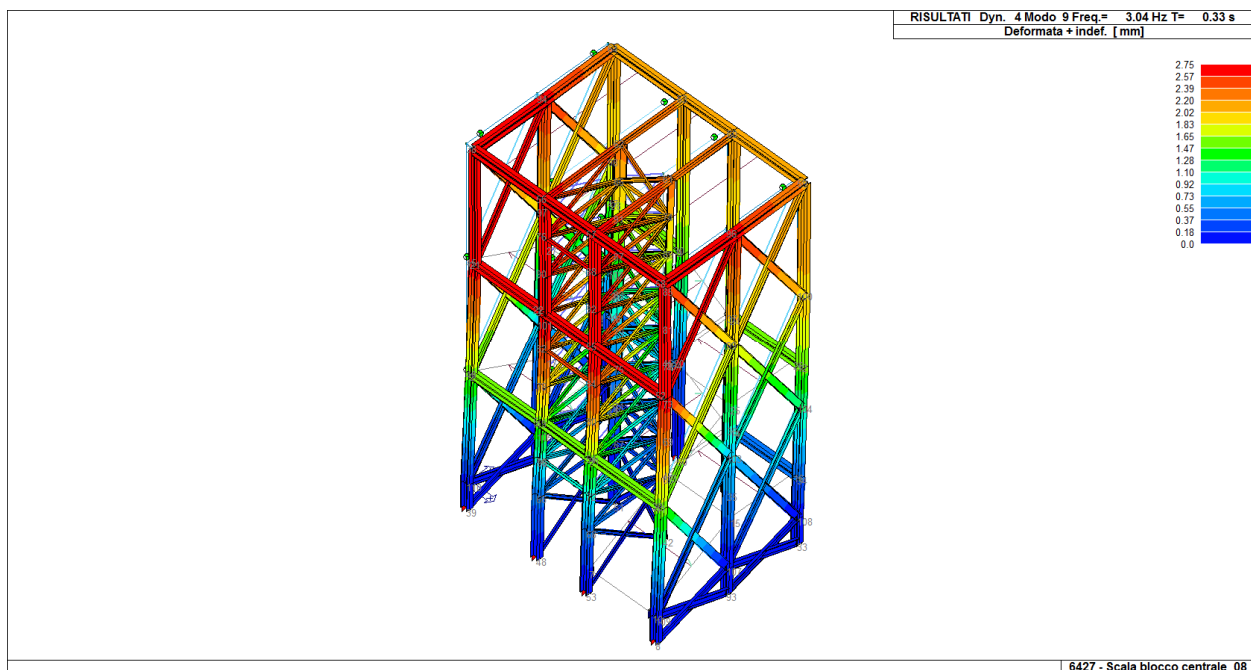


Figura 20: US03-S - modo di vibrare #9

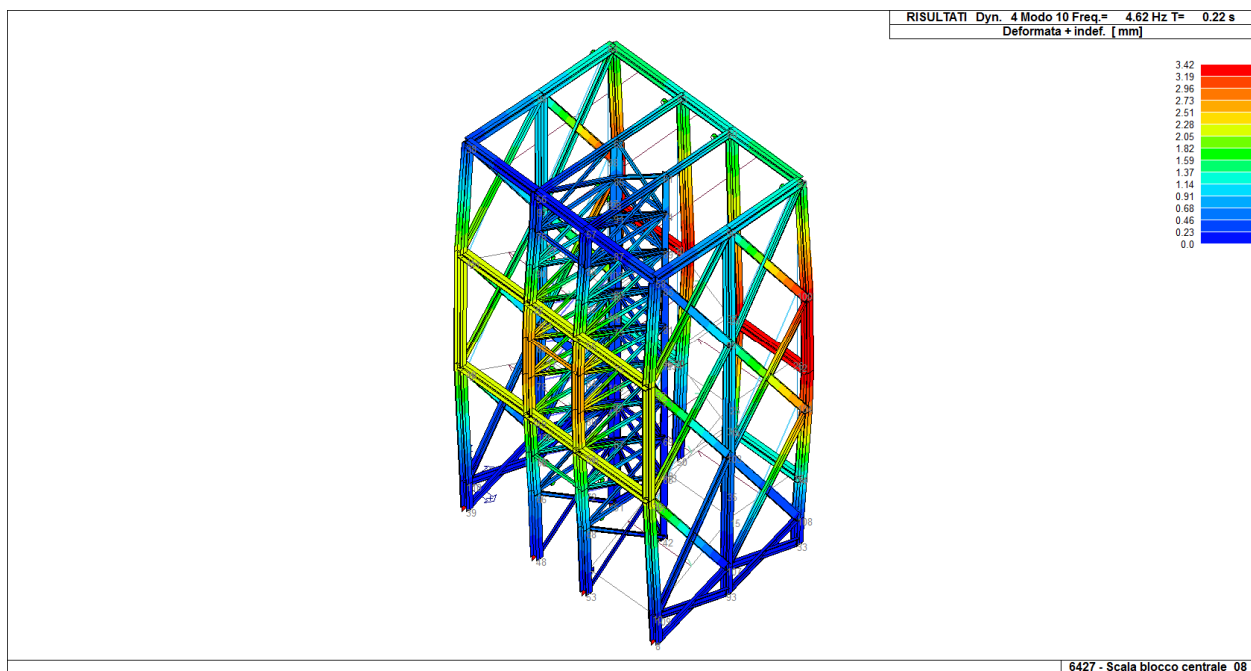


Figura 21: US03-S - modo di vibrare #10

12 CRITERI DI VERIFICA AGLI STATI LIMITE CONSIDERATI

12.1 US03-L

Per il dimensionamento delle strutture sono state eseguite analisi sia allo SLU sia allo SLE, sia di tipo statico che sismico, per controllare l'efficacia della progettazione.

Per quanto riguarda gli elementi trave le verifiche sono condotte in ottemperanza alle NTC 17 Gennaio 2018, oppure seguendo le indicazioni analitiche riportate nella norma tecnica UNI EN 1995-1-1:2005

“Eurocodice 5 - Progettazione delle strutture di legno - Parte 1-1: Regole generali - Regole comuni e regole per gli edifici” ; in particolare le verifiche effettuate sono riconducibili ai punti:

NTC 2018

- 4.4.8 Stati limite ultimi
- 4.4.8.1.7 Tensoflessione
- 4.4.8.1.8 Pressoflessione
- 4.4.8.1.11 Taglio e torsione
- 4.4.8.2.1 Elementi inflessi
- 4.4.8.2.2 Elementi compressi

EC5

- 2.2.2 Ultimate limit states
- 2.2.3 Serviceability limit states
- 2.4.1 Design value of material property
- 2.4.3 Design resistances
- 3.1.3 Strength modification (k_{mod})
- 3.1.4 Deformation modification (k_{def})
- 6. Ultimate limit states
- 6.2 Design of cross-sections subjected to combined stresses
- 6.3 Stability of members

Si sottolinea che le cinque verifiche sono espresse dal rapporto tra domanda e capacità, affinché la verifica sia positiva il rapporto deve essere inferiore o uguale a 1. La capacità è affetta dal termine **k_{mod}** , espressione della classe di servizio e della durata dei carichi (si considera a livello di combinazione il caso di carico di minor durata).

Le deformazioni dell' elemento espresse in rapporto ad un millesimo di lunghezza sono rappresentate dal valore istantaneo e dal valore a tempo infinito. Il valore della deformazione a tempo infinito per una combinazione di carichi è ottenuta sommando per ogni caso di carico sia il valore istantaneo che il valore ottenuto dall' aliquota quasi-permanente amplificata del fattore k_{def} (formula 2.2 e 2.3).

In termini analitici il contributo del caso di carico con coefficiente di combinazione **Ψ_i** (diverso da 0) è:

$$\Psi_i + k_{def} \times \Psi_{i2}$$

Per quanto riguarda le verifiche degli elementi in X-lam le verifiche sono condotte in ottemperanza alle NTC 17 Gennaio 2018 seguendo anche le indicazioni analitiche riportate nella norma tecnica UNI EN 1995-1-1:2005 “Eurocodice 5 - Progettazione delle strutture di legno - Parte 1-1: Regole generali - Regole comuni e regole per gli edifici” e nella norma tedesca DIN 1052 (D) - 2008.

Utilizzando il riferimento tecnico dell' Università di Monaco “Teilprojekt 15 - TP 15 Flächen aus Brettstapeln, Brettspertholz und Verbundkonstruktionen” che permette di valutare in modo esaustivo il comportamento del pannello in presenza di significative deformazioni a taglio si è valutata in fase di verifica la migrazione degli sforzi dal "Piano B" al "Piano A" come previsto nell' appendice D parte 3 della norma tedesca DIN 1052 (D) - 2008.

In particolare le verifiche effettuate sono riconducibili a quanto previsto nell' appendice D e al capitolo 10.7 della DIN:

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- 10.7.1 (127) tensoflessione
- 10.7.1 (128) pressoflessione
- 10.7.1 (129) taglio torsione
- 10.7.1 (130) trazione e taglio di rotolamento
- 10.7.1 (131) compressione e taglio di rotolamento
- App D. (26) momento torcente di incollaggio

Viene riportata un'ulteriore verifica (Mestek 5.4.5) in cui tutte le tensioni normali sono rapportate alla resistenza di progetto a flessione.

Il programma consente la modellazione di pannelli XLAM con un numero di strati dispari di ugual spessore.

Gli strati sono costituiti da tavole che possono o meno essere incollate lungo il lato lungo.

Gli strati sono caratterizzati dai moduli E0, G0, E90, G90 e Gori, rispettivamente in direzione 0 (parallela alle fibre), 90 (ortogonale alle fibre) e orizzontale.

Per convenzione la direzione 0 del pannello è quella parallela alle fibre del primo (e ultimo) strato. La direzione 0 pertanto ha caratteristiche di resistenza e rigidezza superiore alla direzione 1. Il programma ipotizza che la direzione 0 sia verticale per i setti e inclinata rispetto all' asse X per i gusci (inclinazione settabile da criterio di progetto). In fase di verifica non esiste interazione tra direzione 0 e 1.

La peculiarità del pannello XLAM è data dalla presenza di strati molto deformabili a taglio (G90 è di un ordine di grandezza inferiore a G0) così da invalidare l' ipotesi di conservazione delle sezioni piane. L' appendice D della DIN 1052 (D) - 2008 fornisce indicazioni per la valutazione delle rigidezze e delle tensioni sui pannelli XLAM, anche considerando la cedevolezza a taglio degli strati. In sostanza le azioni di piastra vengono ripartite su due piani ideali A e B mentre le azioni di lastra sono riportate sul piano ideale C. La deformabilità a taglio regola la ripartizione tra i piani A e B. Utilizzando il riferimento tecnico dell' Università di Monaco “Teilprojekt 15 - TP 15 Flächen aus Brettstapeln, Brettsperrholz und Verbundkonstruktionen” si è implementato l' algoritmo di ripartizione indicato al cap. 5.4.2.3 basato sull' analogia del taglio per carico sinusoidale. In base a questa analogia la quota di carico afferente al piano B viene ridotta in funzione delle caratteristiche statiche del pacchetto di strati e della luce del pannello nella direzione di studio.

Per entrambe le direzioni 0 e 1 si avranno 8 componenti di sollecitazione:

- Momento flettente ripartito su piano A e piano B
- Momento torcente ripartito su piano A e piano B
- Taglio ortogonale ripartito su piano A e piano B
- Sforzo normale su piano C
- Taglio membranale su piano C

Inoltre:

nel caso in cui le tavole siano incollate

- il momento di incollaggio è nullo
- il momento torcente viene ripartito sul piano A e B e verificato per la parte competente allo strato e al pannello (quota di Steiner)
- la resistenza al taglio di piano è offerta dall' intero spessore del pannello

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- la dimensione "a" di fig. 16 par. 8.9.3 DIN 1052 (D) è identica nelle due direzioni in caso contrario
- il momento di incollaggio viene computato secondo DIN D.26
- il momento torcente non viene verificato
- la resistenza al taglio di piano è offerta dallo spessore del pannello ridotto del 75%
- E90 DEVE ESSERE ASSUNTO PARI 0 (gli strati esterni si trascurano per tutti gli effetti in direzione debole)
- la dimensione "a" di fig. 16 par. 8.9.3 DIN 1052 (D) è minore in direzione (1)

Le verifiche V.127, V.128, V.545, V129 (ossia le verifiche per le tensioni normali e tangenziali) sono effettuate per gli strati pari in direzione 0 e per gli strati dispari in direzione 1 (ovvero gli strati con E0), le verifiche V130 e V131 sono effettuate per gli strati pari in direzione 1 e per gli strati dispari in direzione 0 (ovvero gli strati con G90).

Ai fini della verifica a taglio di piastra, è consentita una verifica semplificata che affida al piano B l'intero taglio e determina la tensione tangenziale dividendo il taglio per la dimensione "a" di fig. 16 par. 8.9.3.

Il programma prevede a scelta dell'utente questa possibilità.

Si sottolinea che le sei verifiche sono espresse dal rapporto tra domanda e capacità, affinché la verifica sia positiva il rapporto deve essere inferiore o uguale a 1. La capacità è affetta dal termine **kmod**, espressione della classe di servizio e della durata dei carichi (si considera a livello di combinazione il caso di carico di minor durata).

12.2 US03-S

Il programma consente la verifica dei seguenti tipi di elementi:

1. aste 2. travi 3. pilastri

L'esito delle verifiche è espresso con un codice come di seguito indicato

- Ok:** verifica con esito positivo
NV: verifica con esito negativo
Nr: verifica non richiesta.

Per comodità gli elementi vengono raggruppati in tabelle in relazione al tipo.

Ai fini delle verifiche (come da D.M. 17 Gennaio 2018 e circolare del 21 gennaio 2019) i tipi elementi differiscono per i seguenti aspetti:

Verifica		Aste	Travi	Pilastri
4.2.3.1	Classificazione	X	X	X
4.2.4.1.2.1	Trazione	X	X	X
4.2.4.1.2.2	Compressione	X	X	X
4.2.4.1.2.4	Taglio		X	X
4.2.4.1.2.5	Torsione		X	X
	Flessione, taglio e forza assiale		X	X
4.2.4.1.3.1	Aste compresse	X	X	X
4.2.4.1.3.2	Instabilità flessione-torsionale		X	X
4.2.4.1.3.3	Membrature inflesse e compresse		X	X

Ai fini delle verifiche per strutture dissipative (come da D.M. 17 Gennaio 2018 e circolare del 21 gennaio 2019) per strutture intelaiate e a controventi concentrici) si considerano le verifiche del capitolo 4 con azioni amplificate e le verifiche del capitolo 7:

Verifica		Travi	Pilastri
4.2.4.1.2.1	Trazione	X	X
4.2.4.1.2.2	Compressione	X	X
4.2.4.1.2.4	Taglio	X	X
4.2.4.1.2.5	Torsione	X	X
	Flessione, taglio e forza assiale	X	X
4.2.4.1.3.1	Aste compresse	X	X
4.2.4.1.3.2	Instabilità flessio-torsionale		X
7.5.3	Sfruttamento per momento	X	
7.5.4	Sfruttamento per sforzo normale	X	
7.5.5	Sfruttamento per taglio da capacità flessionale	X	
7.5.9	Sfruttamento per taglio amplificato		X

Viene inoltre riportata la verifica della “Gerarchia delle resistenze trave-colonna” per ogni colonna, considerando piede e testa in entrambe le direzioni globali X e Y.

L’insieme delle verifiche sopra riportate è condotto sugli elementi purché dotati di sezione idonea come da tabella seguente:

Azione	SEZIONI GENERICHE	PROFILI SEMPLICI	PROFILI ACCOPPIATI
4.2.3.1 Classificazione automatica	L, doppio T, C, rettangolare cava, circolare cava	Tutti	Da profilo semplice
4.2.3.1 Classificazione di default 2	Circolare		
4.2.3.1 Classificazione di default 3	restanti		
4.2.4.1.2.1 Trazione	si	si	si
4.2.4.1.2.2 Compressione	si	si	si
4.2.4.1.2.4 Taglio	si	si	si
4.2.4.1.2.5 Torsione	si	si	si
	Flessione, taglio e forza assiale	si	si
4.2.4.1.3.1 Aste compresse	si	si	per elementi ravvicinati e a croce o coppie calastrellate
4.2.4.1.3.2 Travi inflesse	doppio T simmetrica	doppio T	no

Le verifiche sono riportate in tabelle con il significato sotto indicato; le verifiche sono espresse dal rapporto tra l’ azione di progetto e la capacità ultima, pertanto la verifica ha esito positivo per rapporti non superiori all’ unità.

Asta	Trave	Pilastro	numero dell'elemento			
Stato			codice di verifica per resistenza, stabilità, svergolamento			
Note			sezione e materiali adottati per l'elemento			
V N			(ASTE) verifica come da par. 4.2.4.1.2 per punto (4.2.6) e (4.2.10)			
V V/T			(TRAVI E PILASTRI) verifica di resistenza come da par. 4.2.4.1.2 per azioni taglio-torsione (4.2.16 e 4.2.28)			
V N/M			(TRAVI E PILASTRI) verifica di resistenza come da par. 4.2.4.1.2 per azioni composte (4.2.33) con riduzione per taglio (4.2.40) ove richiesto			
N	M3	M2	V2	V3	T	sollecitazioni di interesse per la verifica
V stab			(ASTE) verifica come da par. 4.2.4.1.3.1 per punto (4.2.41)			
V stab			(TRAVI E PILASTRI) verifica come da par. 4.2.4.1.3 per punti (C4.2.32) o (C4.2.36) (membrature inflesse e compresse senza/con presenza di instabilità flessio-torsionale)			
BetaxL		B22xL	B33xL		lunghezze libere di inflessione (se indicato riferiti al piano di normale 22 o 33 rispettivamente)	
Snellezza			snellezza massima			
Classe			classe del profilo			

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Chi mn	coefficiente di riduzione (della capacità) per la modalità di instabilità pertinente
Rif. cmb	combinazioni in cui si sono rispettivamente attinti i valori di verifica più elevati
V flst	(TRAVI E PILASTRI) verifica di stabilità come da par. 4.2.4.1.3.2 per punto (4.2.48)
B1-1 x L	Beta1-1 x L: interasse tra i ritegni torsionali
Chi LT	coefficiente di riduzione (della capacità) per la modalità di instabilità flessio-torsionale
Snell adim	Valore della snellezza adimensionale, utilizzato per il controllo previsto al par. 7.5.5
v.Omeg	Valore del rapporto capacità/domanda per l'azione di interesse (momento per travi e azione assiale per aste) utilizzato per l'amplificazione delle azioni
f.Om. N	Fattore di amplificazione delle azioni assiali per travi e colonne (prodotto di $1.1 \times \Omega \times \gamma_{rd}$ materiale); utilizzato come specificato al par. 7.5.5
f.Om. T	Fattore di amplificazione delle azioni (assiali, flettenti e taglianti) per colonne (prodotto di $1.1 \times \Omega \times \gamma_{rd}$ materiale); utilizzato come specificato al par. 7.5.4
V.7.5.4 M Ed	Verifica come prevista al punto 7.5.4 e valore dell'azione flettente
V.7.5.5 N Ed	Verifica come prevista al punto 7.5.5 e valore dell'azione assiale
V.7.5.6 V Ed,G V Ed,M	Verifica come prevista al punto 7.5.6 e valore dei tagli dovuti ai carichi e alla capacità
V.7.5.10 V Ed	Verifica come prevista al punto 7.5.10 e valore dell'azione di taglio
sovr. Xi (Xf, Yi, Yf)	Valore della sovrarresistenza come prevista al par. 7.5.4.2 (i valori non sono normalizzati pertanto saranno maggiori uguali a γ_{rd} in base alla classe di duttilità)

13 PRINCIPALI RISULTATI E SINTESI DELLE VERIFICHE

13.1 RISULTATI ANALISI US03-L

Di seguito vengono riportati i principali risultati forniti dal programma in termini di configurazione deformata e delle caratteristiche di sollecitazione degli elementi più significativi.

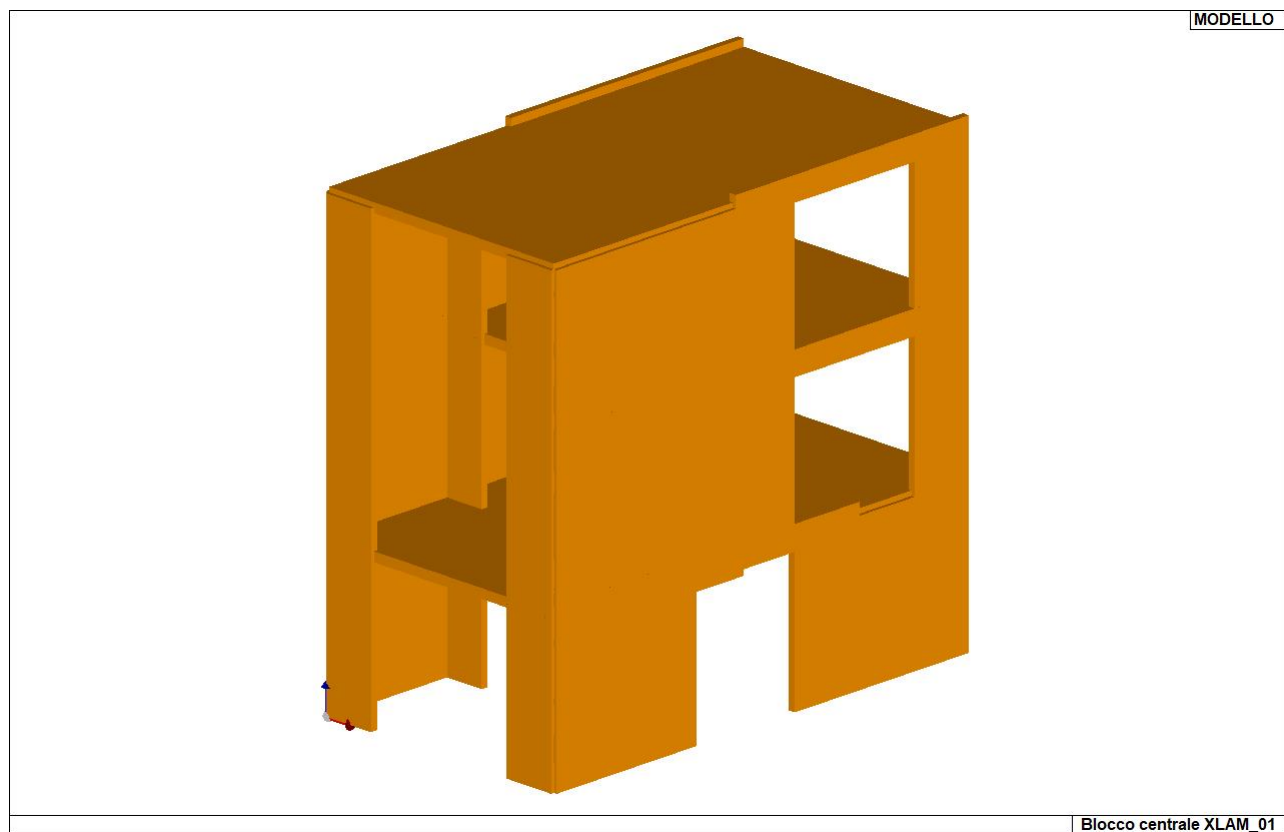


Figura 22: vista solida modello blocco servizi centrale - parte in legno

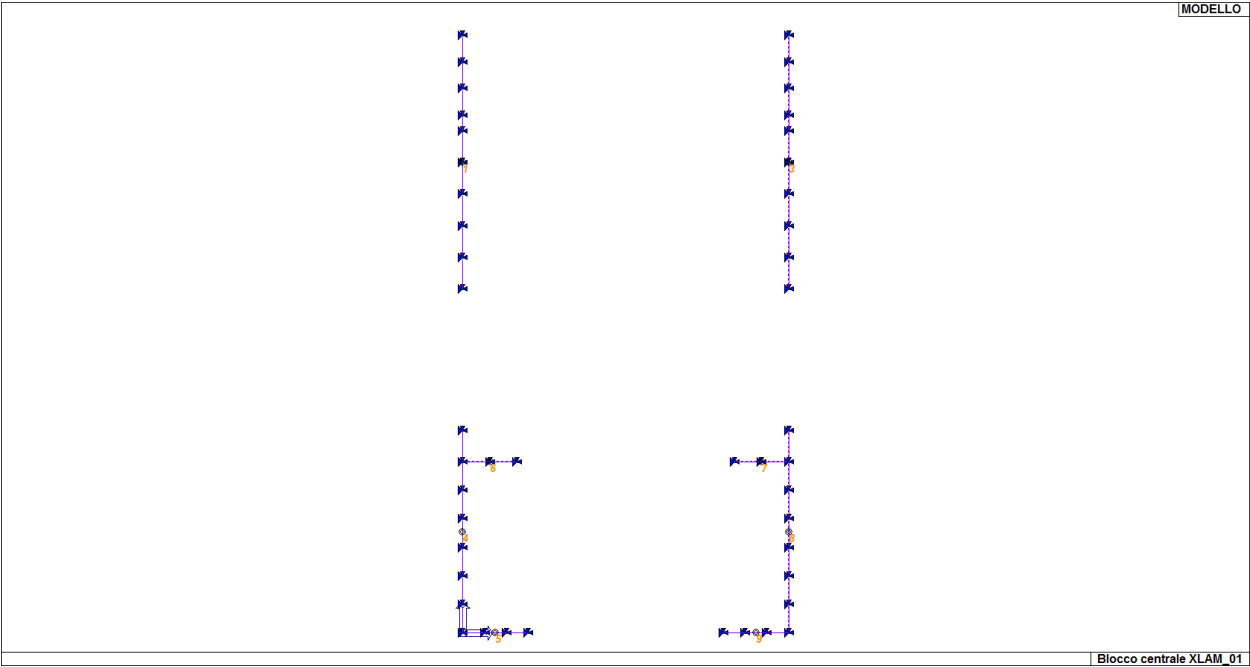
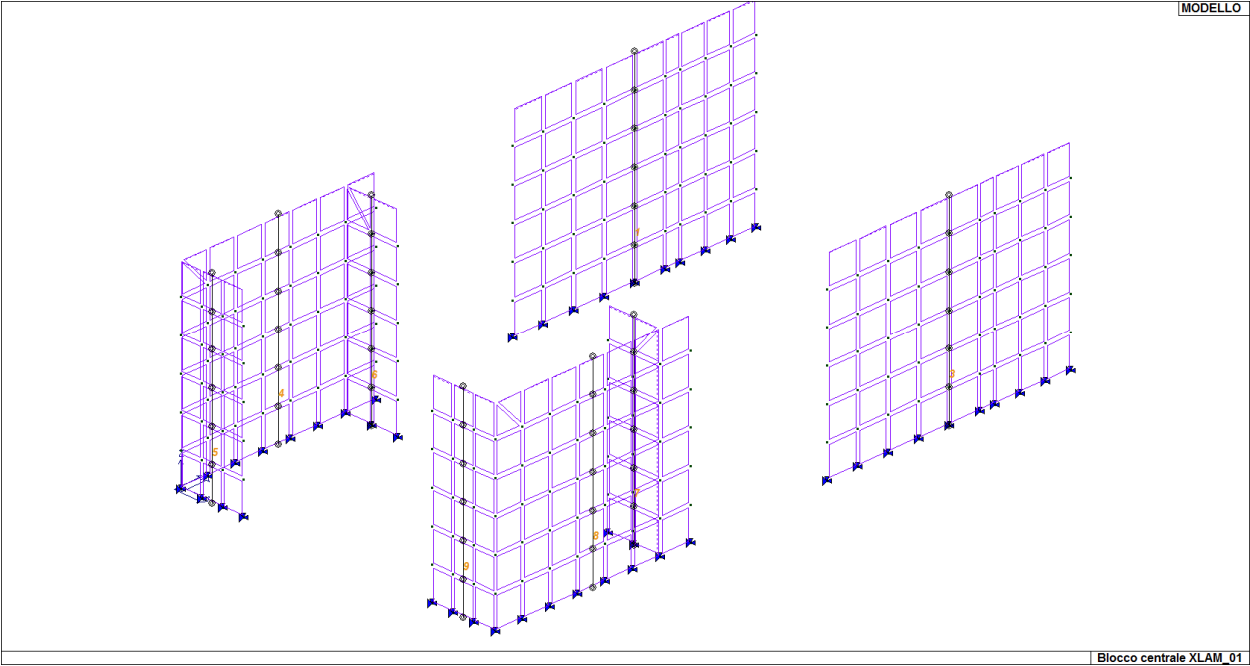


Figura 23: numerazione macro elementi piano terra

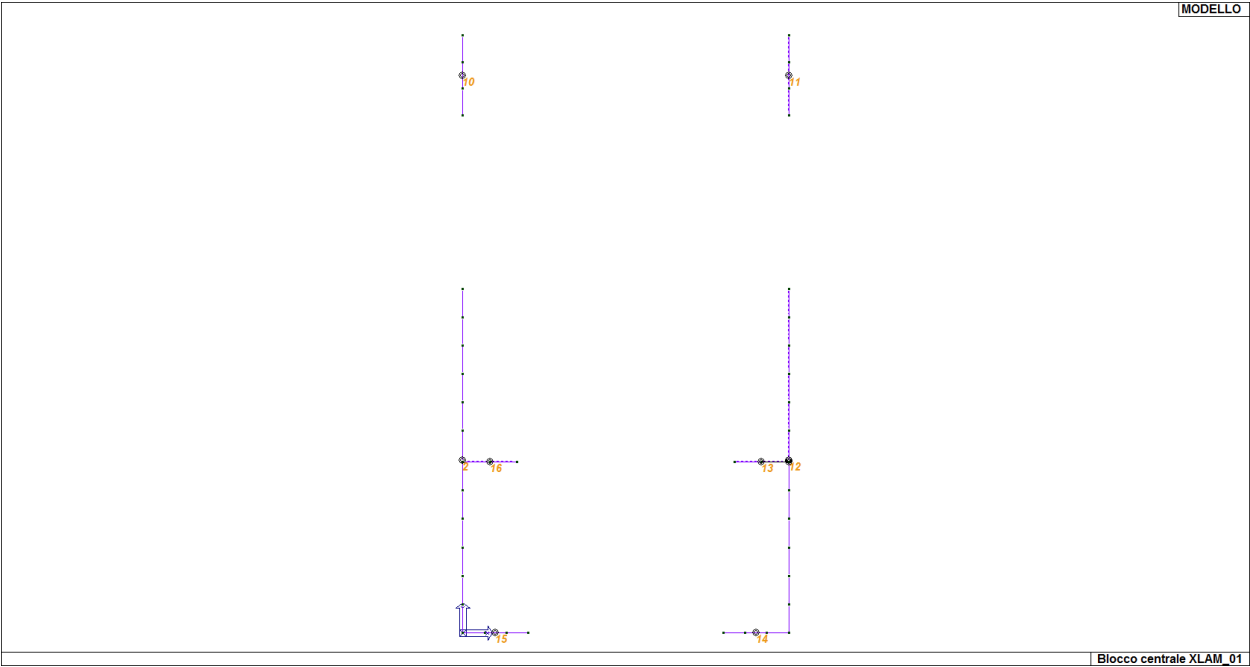
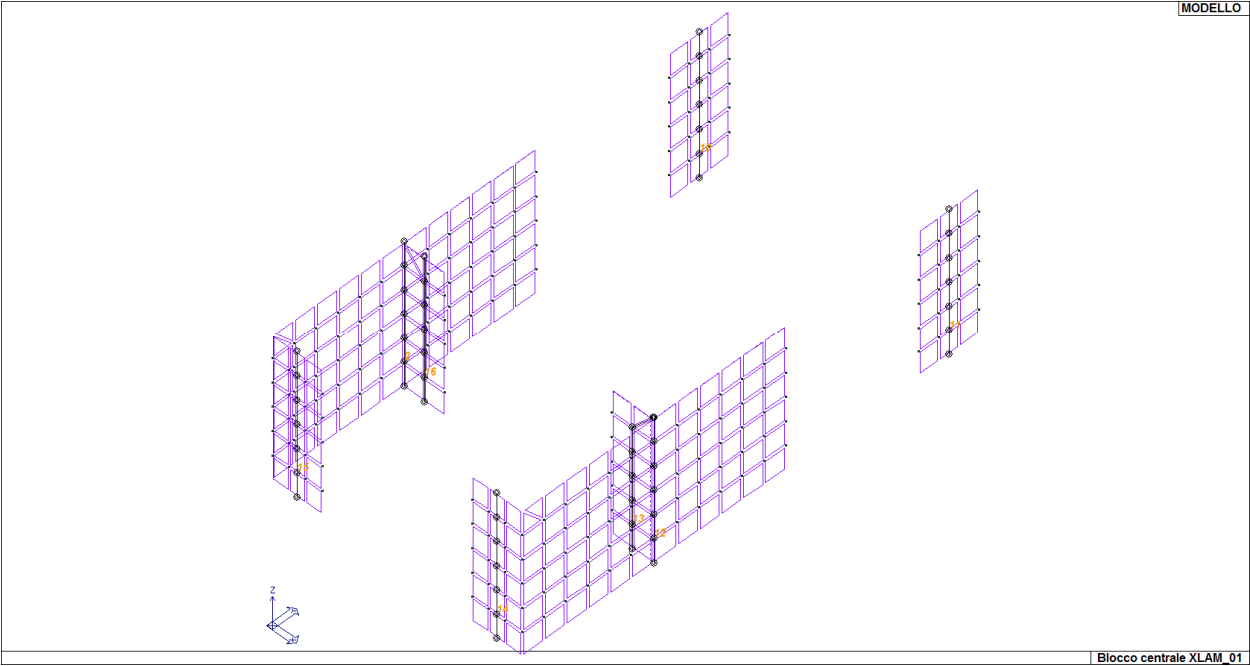


Figura 24: numerazione macro elementi piano primo

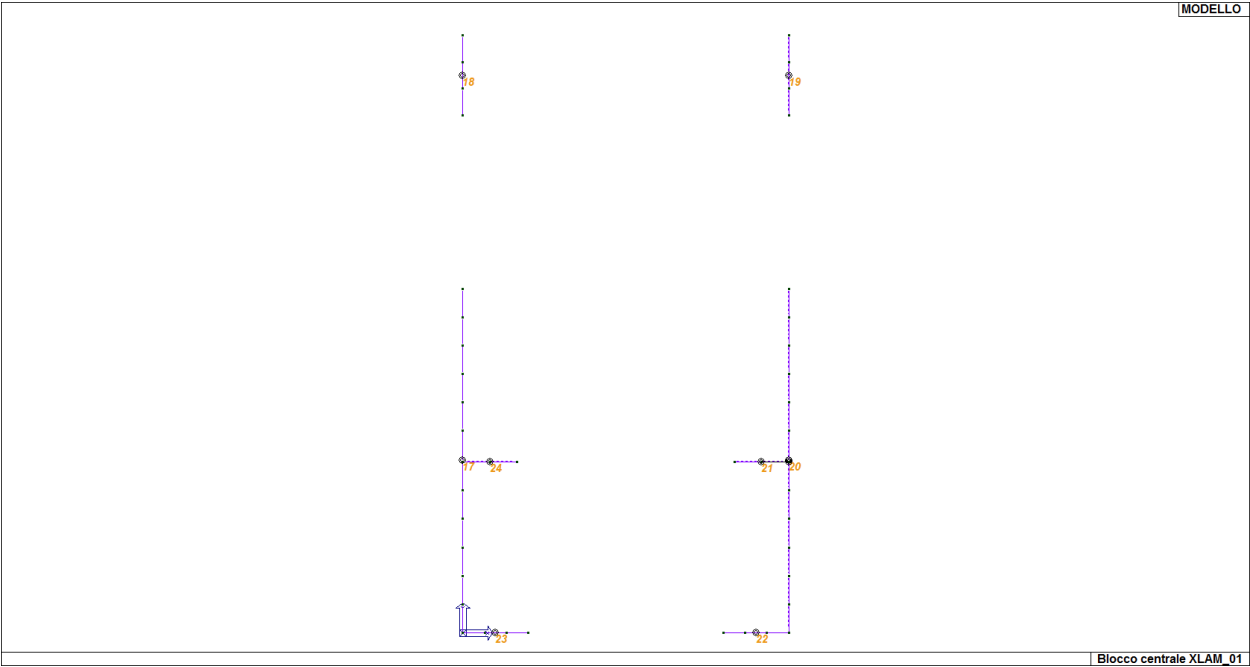
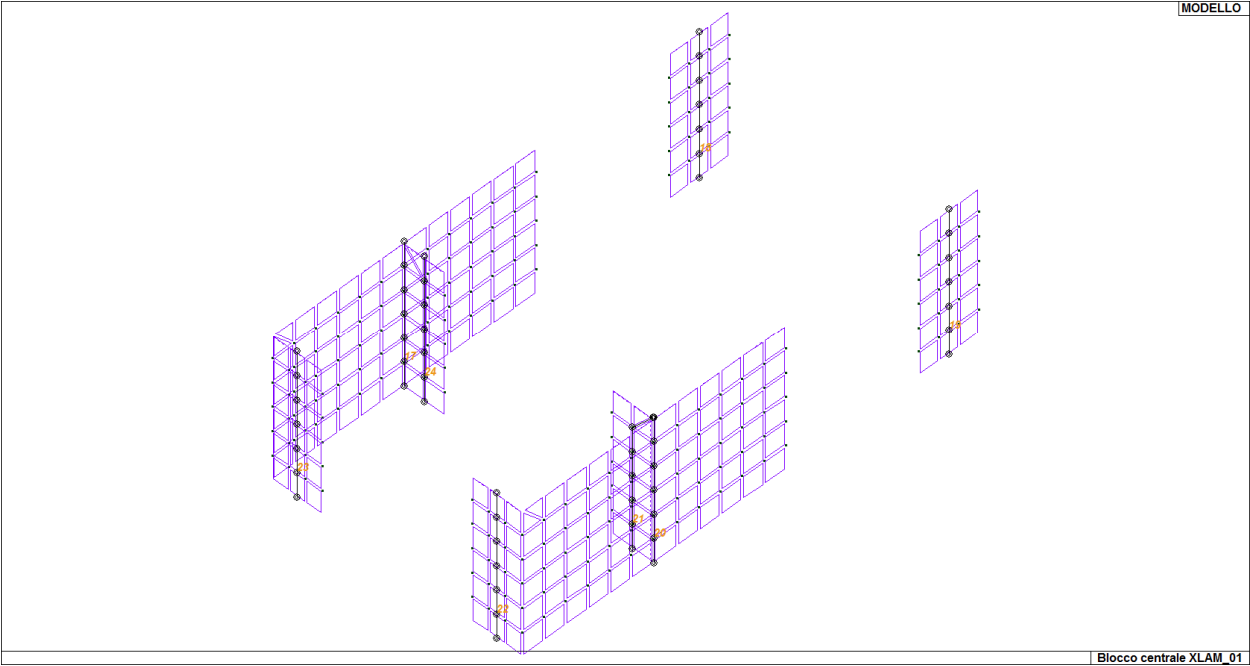


Figura 25: numerazione macro piano secondo

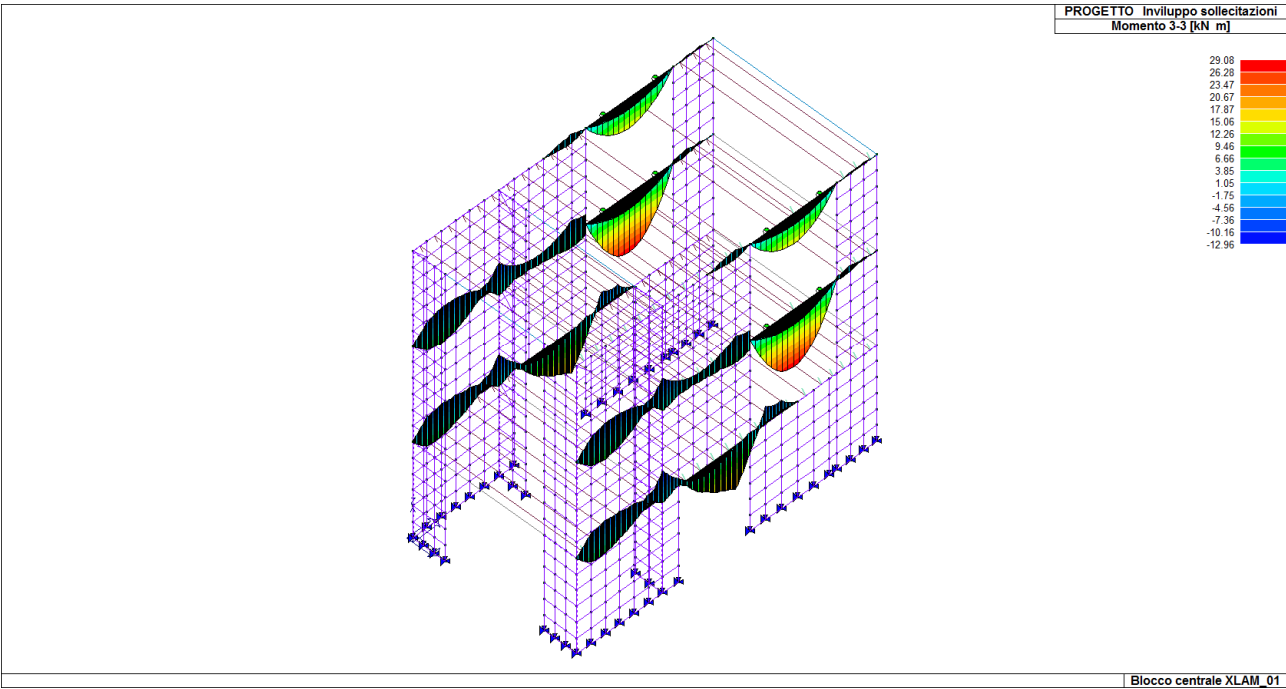


Figura 26: involucro del diagramma dei momenti flettenti M3 - elementi trave

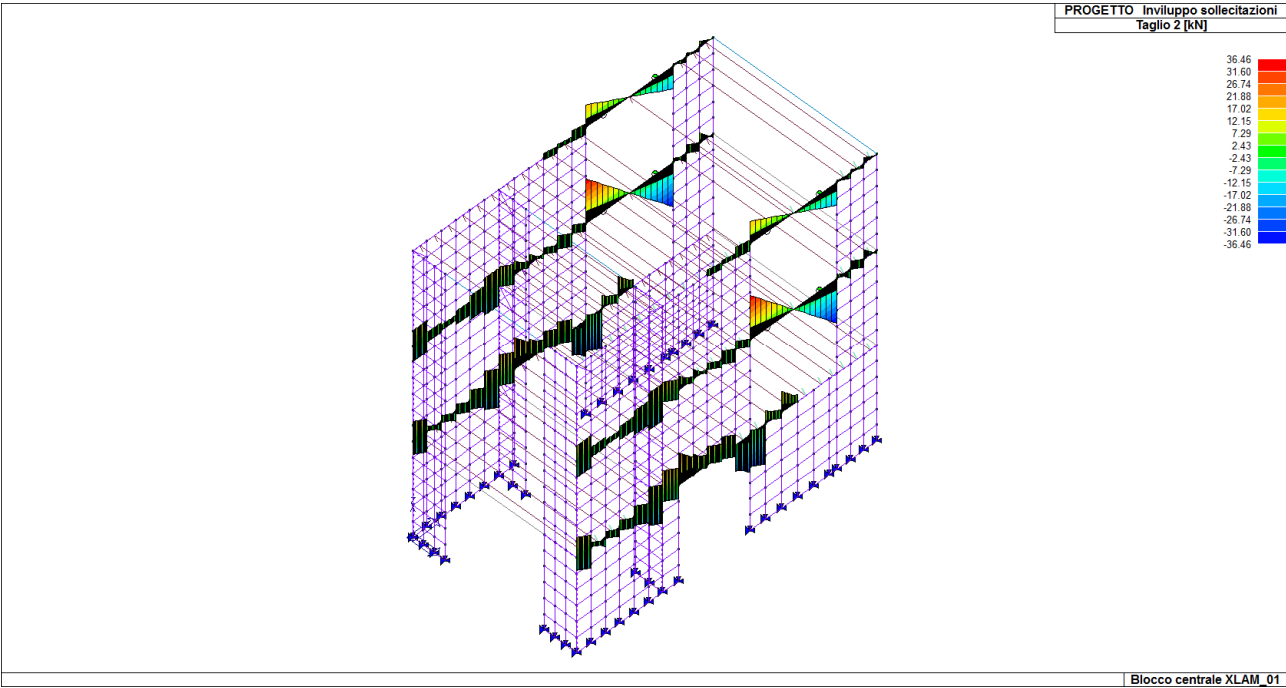


Figura 27: involucro del diagramma dei tagli V2 - elementi trave

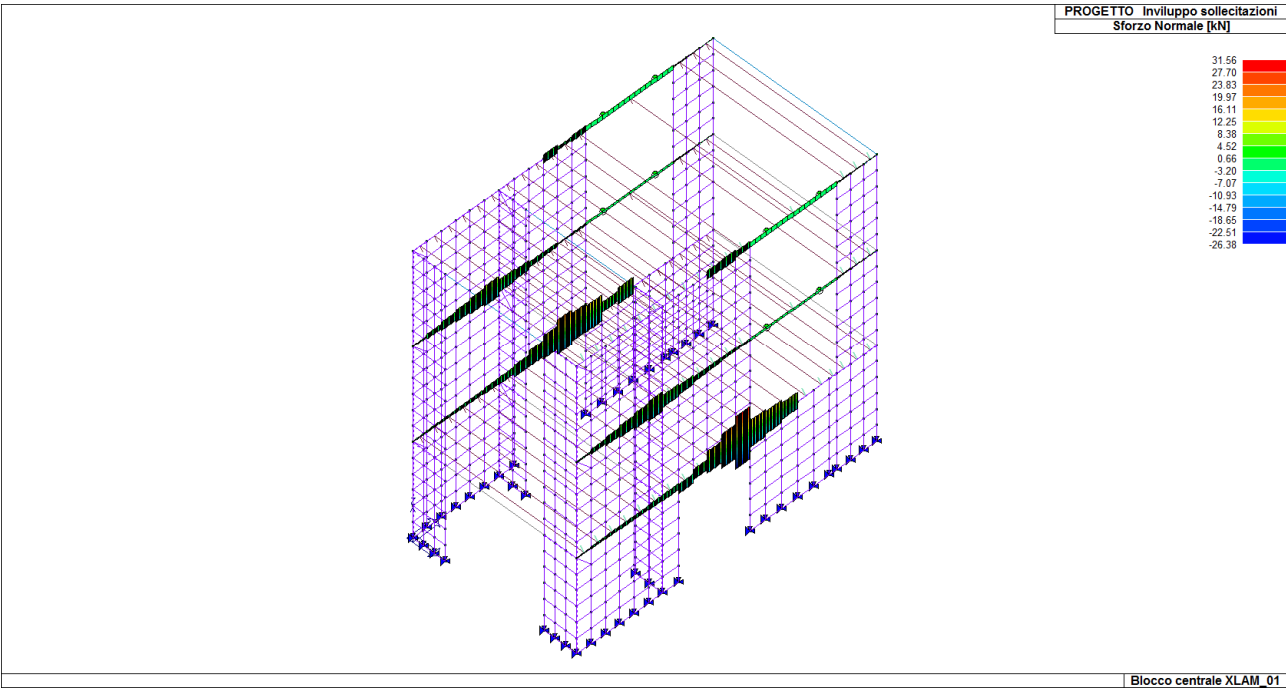


Figura 28: involucro del diagramma dello sforzo assiale N - elementi trave

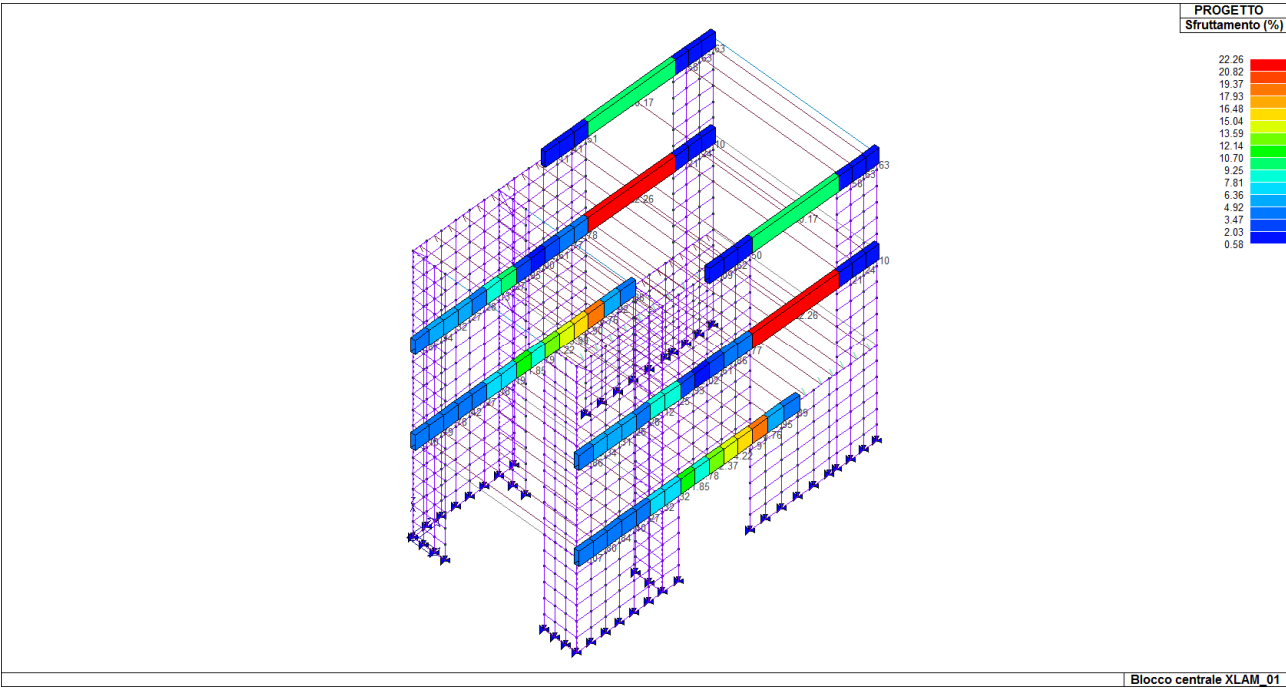


Figura 29: valori in % dello sfruttamento delle travi

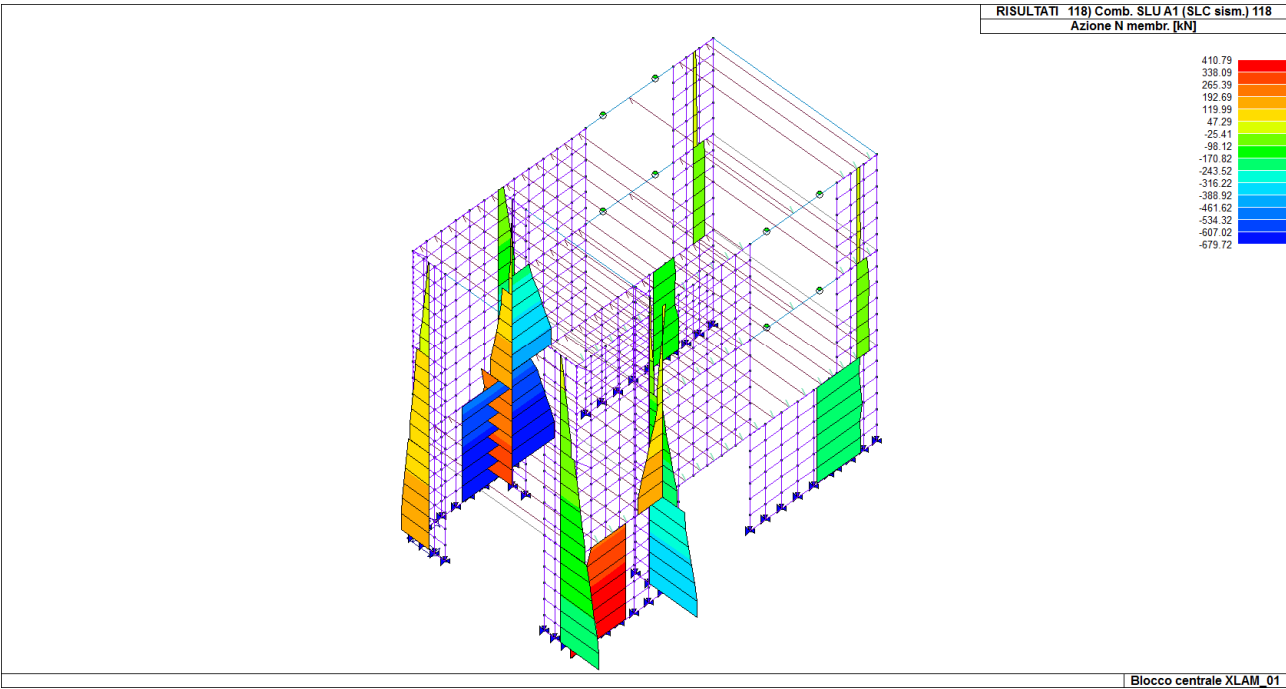


Figura 30: sollecitazione massima di sforzo normale di membrana sugli elementi parete allo SLC

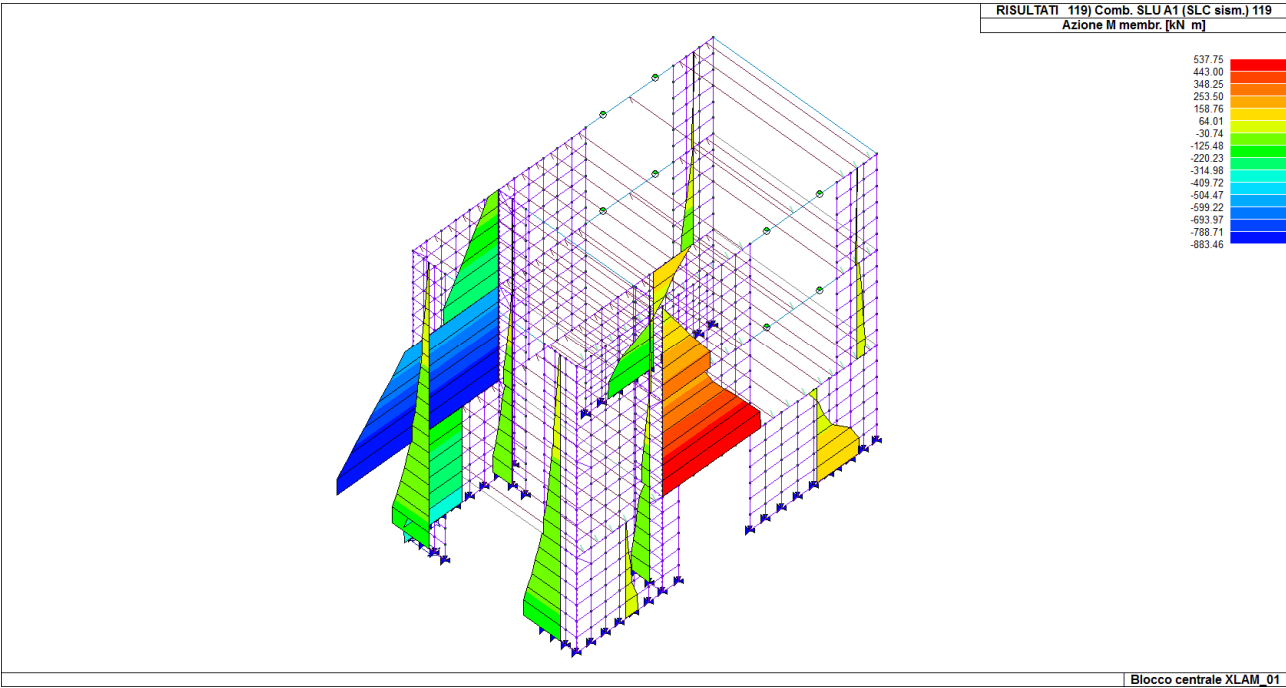


Figura 31: Sollecitazione massima di Momento flettente, nella direzione dei pannelli, sugli elementi parete allo SLC

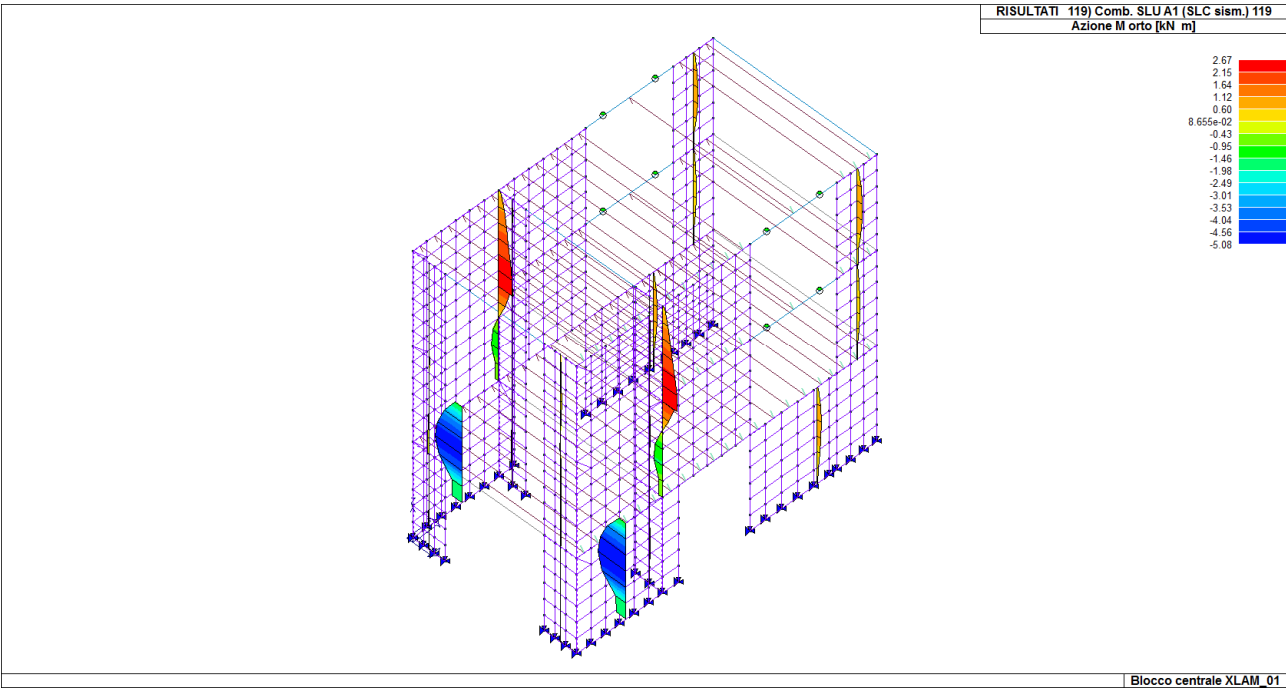


Figura 32 Sollecitazione massima di Momento flettente, nella direzione ortogonale ai pannelli, sugli elementi parete allo SLC

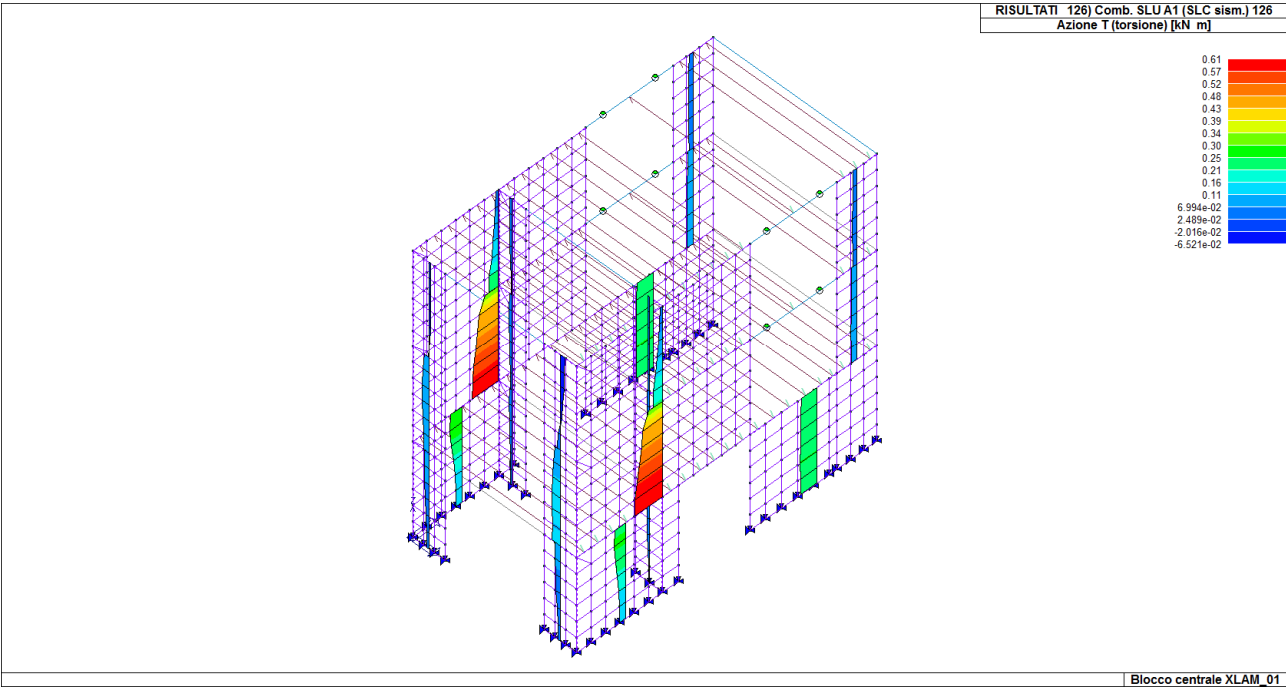


Figura 33: Sollecitazione massima azione torsionale sugli elementi parete allo SLC

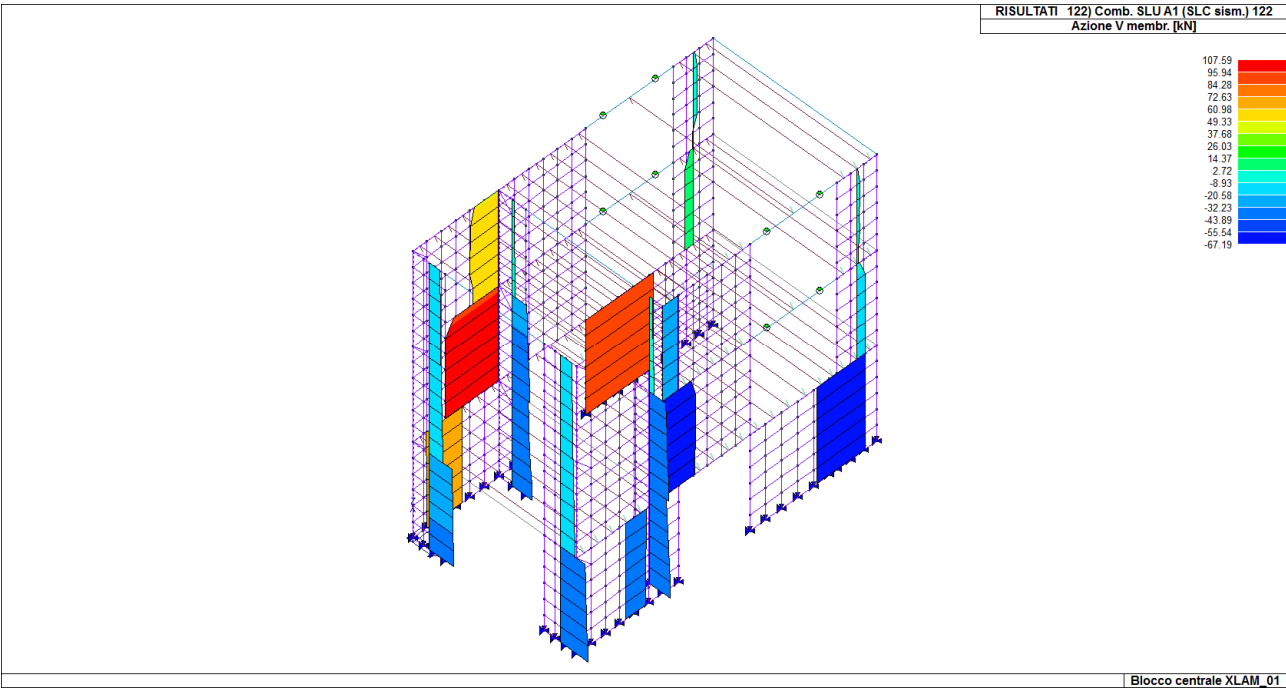


Figura 34: Sollecitazione massima azione di Taglio nel piano degli elementi parete allo SLC

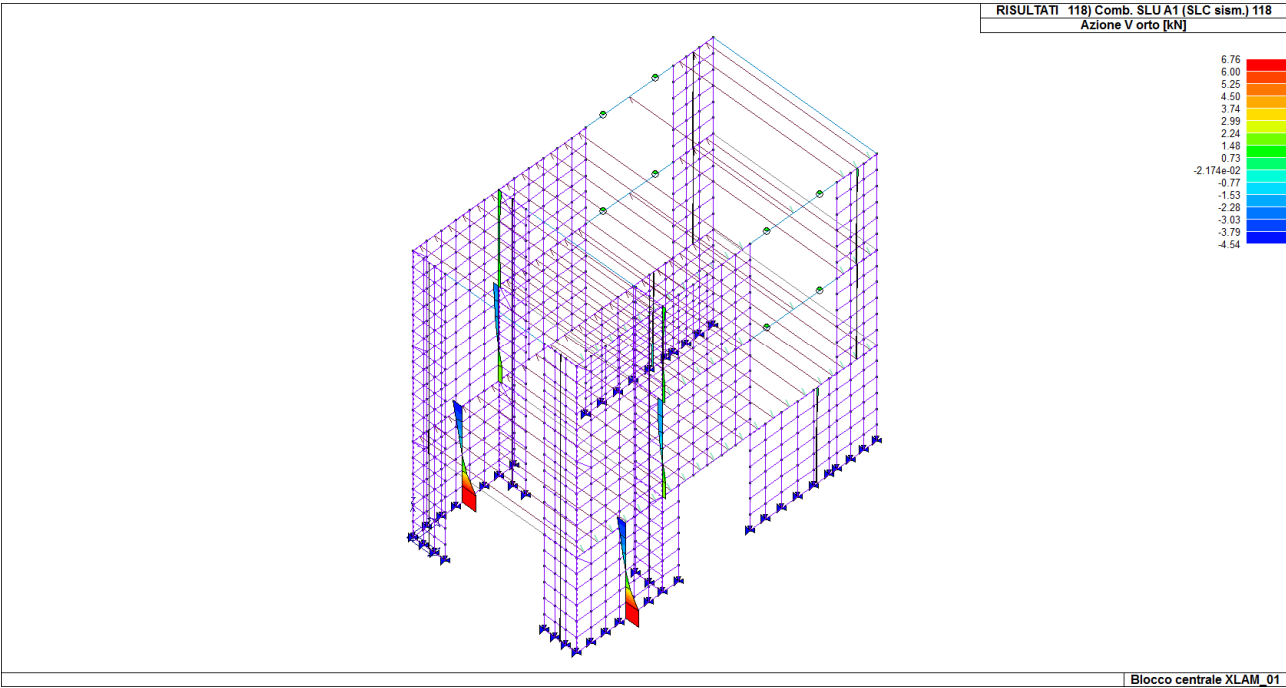


Figura 35: Sollecitazione massima azione di Taglio nel piano ortogonale elementi parete allo SLC

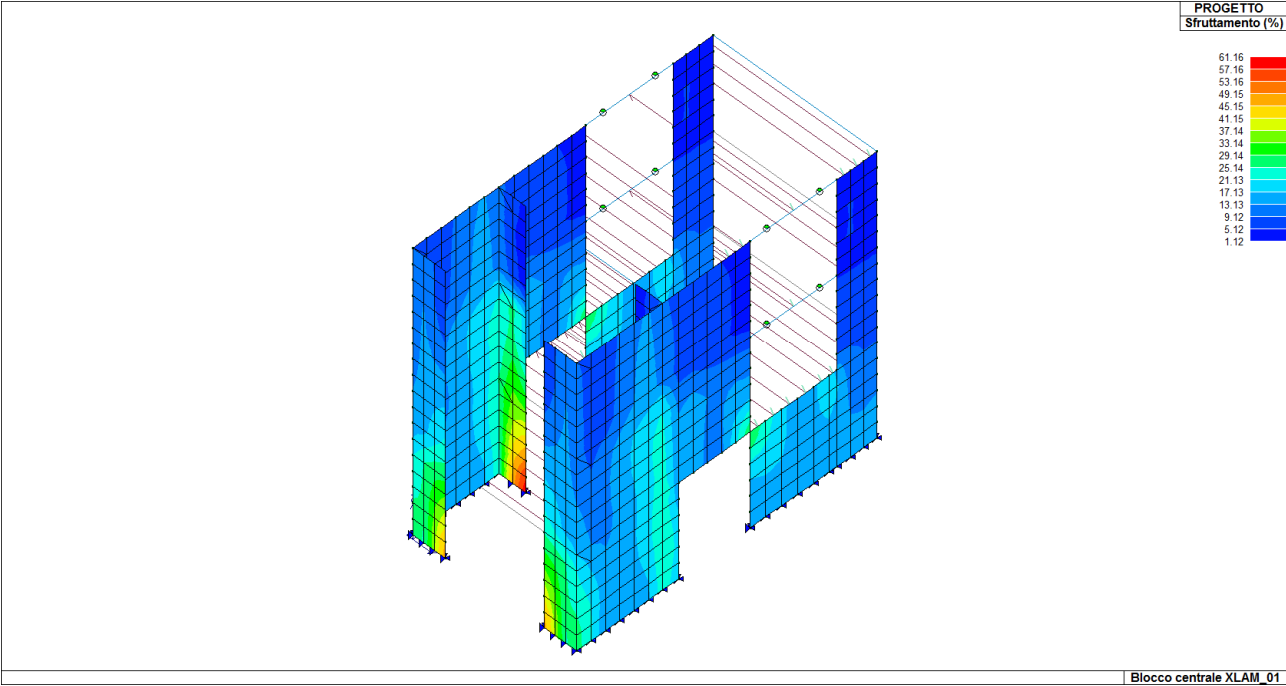


Figura 36: valore, in %, dello sfruttamento degli elementi pareti in X-lam

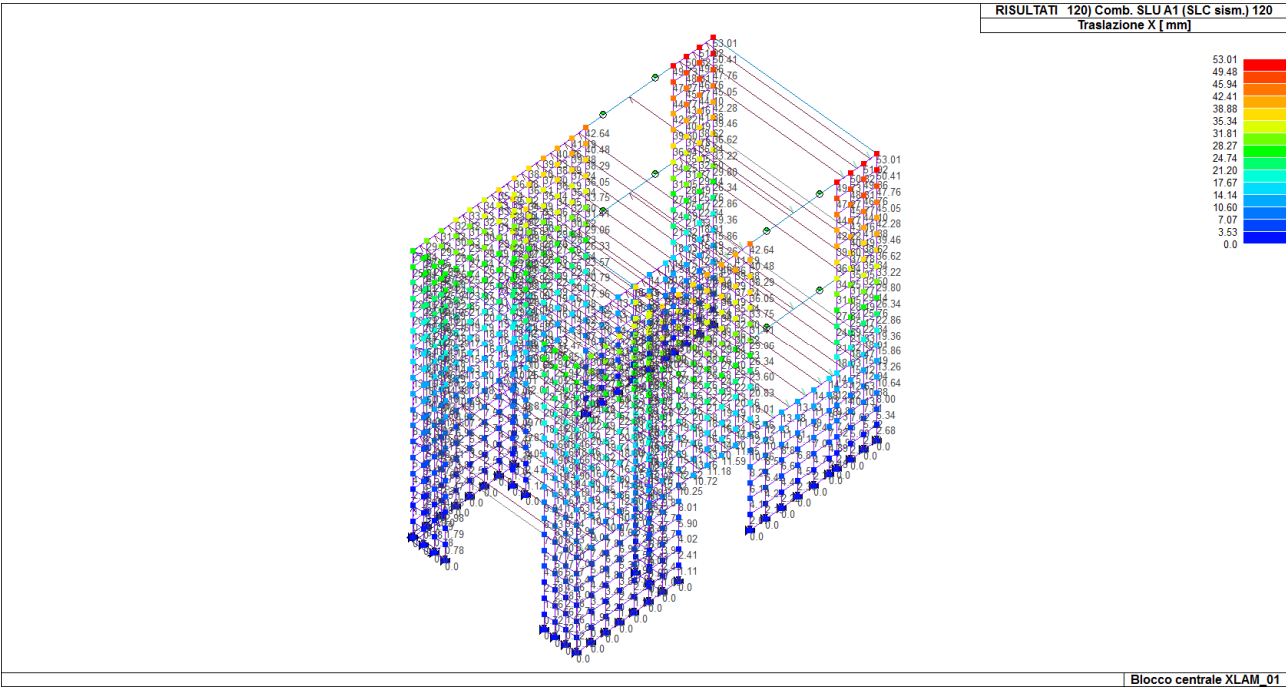


Figura 37: SLC - valore massimo di spostamento in direzione x

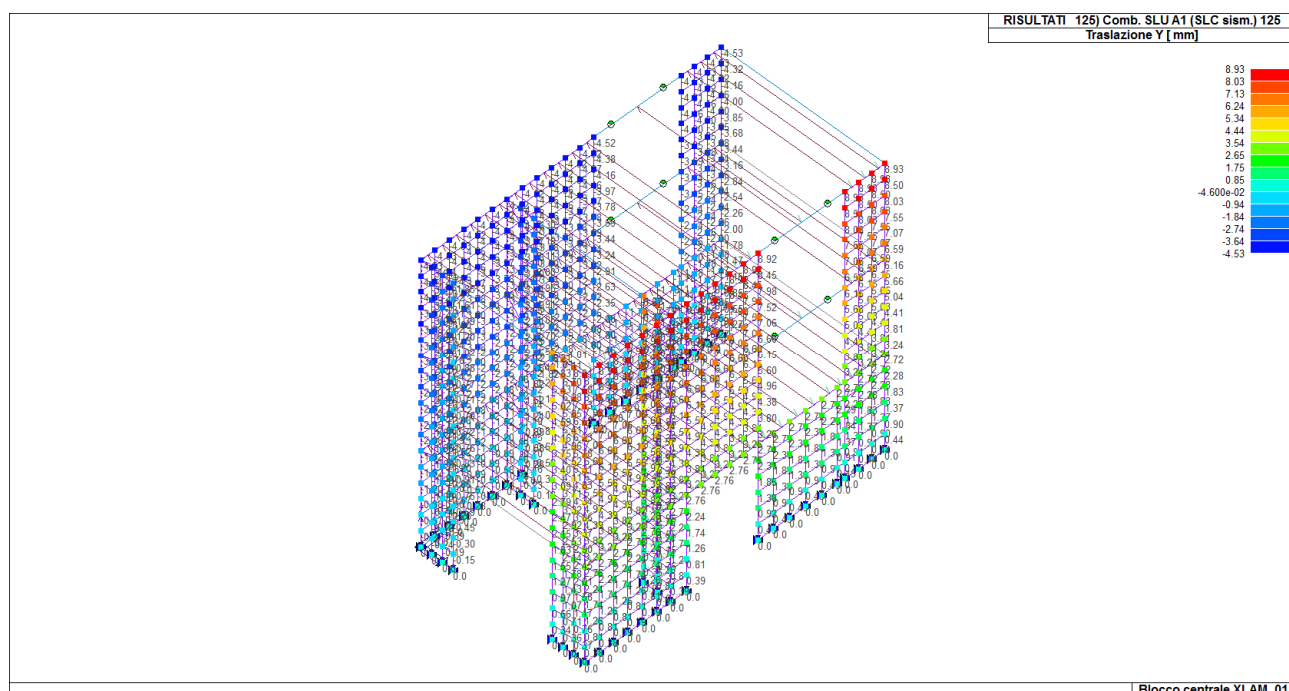


Figura 38: SLC - valore massimo di spostamento in direzione y

13.1.1 VERIFICHE

13.1.1.1 VERIFICA ELEMENTI TRAVE

Si riportano i risultati delle verifiche forniti dal Programma di calcolo utilizzato.

13.1.1.1.1 LEGENDA TABELLA VERIFICHE S.L. ELEMENTI IN LEGNO

Il programma consente la verifica dei seguenti tipi di elementi:

1. Aste
2. Travi
3. Pilastri

L'esito delle verifiche è espresso con un codice come di seguito indicato:

ok: verifica con esito positivo

NV: verifica con esito negativo

Le verifiche sono condotte in ottemperanza alle NTC 17 Gennaio 2018, oppure seguendo le indicazioni analitiche riportate nella norma tecnica UNI EN 1995-1-1:2005 "Eurocodice 5 - Progettazione delle strutture di legno - Parte 1-1: Regole generali - Regole comuni e regole per gli edifici"; in particolare le verifiche effettuate sono riconducibili ai punti:

NTC 2018

- 4.4.8 Stati limite ultimi
- 4.4.8.1.7 Tensoflessione
- 4.4.8.1.8 Pressoflessione
- 4.4.8.1.11 Taglio e torsione
- 4.4.8.2.1 Elementi inflessi
- 4.4.8.2.2 Elementi compressi

EC5

- 2.2.2 Ultimate limit states
- 2.2.3 Serviceability limit states

- 2.4.1 Design value of material property
- 2.4.3 Design resistances
- 3.1.3 Strength modification (k_{mod})
- 3.1.4 Deformation modification (k_{def})
- 6. Ultimate limit states
- 6.2 Design of cross-sections subjected to combined stresses
- 6.3 Stability of members

Simbologia adottata nelle tabelle di verifica

Le verifiche effettuate ai sensi delle NTC 2018 sono dettagliatamente riportate come da tabella seguente:

Elem.	Numero dell'elemento
Tipo	Codice di individuazione del tipo di elemento: Trave (T), Pilastro (P), Asta (A)
Stato	Codice della verifica: ok verificato, NV non verificato
Note	Numero della sezione (s) e del materiale (m) dell'archivio
Ver N+/M	Verifica come da formule 4.4.6a e 4.4.6b per tensoflessione, con i valori di k_{m} definiti nel par. 4.4.8.1.6
Ver N-/M	Verifica come da formule 4.4.7a e 4.4.7b per pressoflessione, con i valori di k_{m} definiti nel par. 4.4.8.1.6
Ver V/T	Verifica come da formula 4.4.10 (taglio torsione) con interazione ottenuta per quadratura del termine di taglio
Ver N(s)	Verifica instabilità a compressione come da par. 4.4.8.2.2
Kcy(z)	Fattore di instabilità $K_{crit,c}$ utilizzato nella formula 4.4.13, in funzione della snellezza relativa
Ver M(s)	Verifica instabilità laterale come da par. 4.4.8.2.1, effettuata in entrambi i piani principali y e z
Kcrit (y)/(z)	Fattore di instabilità laterale utilizzato nella formula 4.4.11 rispettivamente per la flessione y e z
w _{net R}	Massima deformazione in combinazione rara (F frequente, P quasi permanente)
w _{net Ri}	Massima deformazione in combinazione rara (F frequente, P quasi permanente) valutata a tempo infinito
kdef	Fattore di deformazione dell' elemento
Rif. cmb	Numero della combinazione in cui si è attinto il valore riportato per le verifiche

Le verifiche effettuate ai sensi dell'EC5 sono dettagliatamente riportate come da tabella seguente:

Elem.	Numero dell'elemento
Tipo	Codice di individuazione del tipo di elemento: Trave (T), Pilastro (P), Asta (A)
Stato	Codice della verifica ok verificato, NV non verificato
Note	Numero della sezione (s) e del materiale (m) dell'archivio
Ver N+/M	Verifica come da formula 6.17 e 6.18 per tensoflessione
Ver N-/M	Verifica come da formula 6.19 e 6.20 per pressoflessione
Ver V/T	Verifica come da formula 6.13 e 6.14 (taglio torsione) con interazione ottenuta per quadratura del termine di taglio
Ver N(s)	Verifica come da formula 6.23 e 6.24 per pressoflessione di elementi con snellezza relativa in un piano maggiore di 0.3
Kcy (z)	Fattore di instabilità utilizzato nella formula 6.23 (6.24)
Ver M(s)	Verifica come da formula 6.35 (effettuata in entrambi i piani principali) per instabilità laterale
Kcrit (y) (z)	Fattore di instabilità laterale utilizzato nella formula 6.35 rispettivamente per la flessione y e z
w _{net R}	Massima deformazione in combinazione rara (F frequente, P quasi permanente)
w _{net Ri}	Massima deformazione in combinazione rara (F frequente, P quasi permanente) valutata a tempo infinito
kdef	Fattore di deformazione dell' elemento
Rif. cmb	Numero della combinazione in cui si è attinto il valore riportato per le verifiche

Si sottolinea che le cinque verifiche sono espresse dal rapporto tra domanda e capacità, affinché la verifica sia positiva il rapporto deve essere inferiore o uguale a 1. La capacità è affetta dal termine k_{mod} , espressione della classe di servizio e della durata dei carichi (si considera a livello di combinazione il caso di carico di minor durata).

Le deformazioni dell' elemento espresse in rapporto ad un millesimo di lunghezza sono rappresentate dal valore istantaneo e dal valore a tempo infinito. Il valore della deformazione a tempo infinito per una combinazione di carichi è ottenuta sommando per ogni caso di carico sia il valore istantaneo che il valore ottenuto dall' aliquota quasi-permanente amplificata del fattore k_{def} (formula 2.2 e 2.3).

In termini analitici il contributo del caso di carico con coefficiente di combinazione Ψ_i (diverso da 0) è:

$$\Psi_i + k_{def} \times \Psi_{i2}$$

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 92 DI 151

Con riferimento al Documento di Affidabilità "Test di validazione del software di calcolo PRO_SAP e dei moduli aggiuntivi PRO_SAP Modulo Geotecnico, PRO_CAD nodi acciaio e PRO_MST" - versione Settembre 2014, disponibile per il download sul sito www.2si.it, si segnalano i seguenti esempi applicativi:

Test N°	Titolo
97	FATTORE DI STRUTTURA
98	VERIFICA ALLO SLU DI STRUTTURE IN LEGNO SECONDO EC5
99	VERIFICA ALLO SLE DI STRUTTURE IN LEGNO SECONDO EC5
101	VERIFICHE EC5
102	SNELLEZZE EC5

Elem.	Note	Pos. cm	Ver N+/M	Ver N-/M	Ver V/T	Rif. cmb	Ver N(s)	Kcy	Kcz	Ver M(s)	Kcrit(y)	Kcrit(z)	Rif. cmb
1 ok T,s=2,m=78		0.0	4.28e-02	2.80e-02	4.89e-02	4,141,4				4.74e-03	1.0	1.0	0,125
		58.1	6.45e-03	1.59e-05	3.06e-03	124,125,141				3.99e-03	1.0	1.0	0,125
2 ok T,s=2,m=78		0.0	5.95e-02	4.60e-02	1.97e-02	4,141,4				7.64e-03	1.0	1.0	0,125
		58.1	4.30e-02	2.80e-02	2.27e-03	4,141,140				6.45e-03	1.0	1.0	0,125
3 ok T,s=2,m=78		0.0	4.96e-02	6.20e-02	7.22e-02	4,125,125				9.32e-03	1.0	1.0	0,125
		58.1	5.92e-02	4.60e-02	0.2	4,141,4				8.85e-03	1.0	1.0	0,125
4 ok T,s=2,m=78		0.0	0.1	0.1	5.98e-02	4,125,4				2.74e-02	1.0	1.0	0,125
		52.2	5.19e-02	6.07e-02	0.2	4,125,4				1.58e-02	1.0	1.0	0,125
5 ok T,s=2,m=78		0.0	0.1	9.64e-02	3.62e-02	4,125,125				1.47e-02	1.0	1.0	0,125
		52.2	0.1	0.1	2.28e-02	4,125,120				2.14e-02	1.0	1.0	0,125
6 ok T,s=2,m=78		0.0	9.16e-02	6.16e-02	3.80e-02	4,125,4				7.53e-03	1.0	1.0	0,4
		52.2	0.1	9.61e-02	2.04e-02	4,125,121				1.41e-02	1.0	1.0	0,4
7 ok T,s=2,m=78		0.0	4.76e-02	2.54e-02	5.05e-02	4,141,4				2.76e-03	1.0	1.0	0,126
		52.2	8.78e-02	6.18e-02	2.04e-02	4,125,121				7.53e-03	1.0	1.0	0,4
8 ok T,s=2,m=78		0.0	1.82e-02	3.34e-02	0.1	137,114,4				5.02e-03	1.0	1.0	0,4
		52.2	2.96e-02	4.67e-02	3.61e-02	127,4,4				6.50e-03	1.0	1.0	0,4
9 ok T,s=2,m=78		0.0	7.32e-02	6.21e-02	6.17e-02	125,4,121				5.12e-03	1.0	1.0	0,4
		58.0	3.38e-02	2.64e-02	3.54e-02	114,4,121				2.54e-03	1.0	1.0	0,124
10 ok T,s=2,m=78		0.0	2.42e-02	4.27e-02	3.64e-02	127,4,112				2.65e-03	1.0	1.0	0,4
		52.5	7.32e-02	6.22e-02	6.06e-02	125,4,113				4.93e-03	1.0	1.0	0,125
11 ok T,s=2,m=78		0.0	2.18e-02	3.75e-02	1.84e-02	135,115,120				2.56e-03	1.0	1.0	0,120
		52.5	2.55e-02	4.27e-02	2.88e-02	135,4,121				2.56e-03	1.0	1.0	0,4
12 ok T,s=2,m=78		0.0	4.40e-02	4.17e-02	1.60e-02	112,120,120				3.00e-03	1.0	1.0	0,120
		52.5	3.85e-02	3.59e-02	2.15e-02	115,123,121				2.47e-03	1.0	1.0	0,120
13 ok T,s=2,m=78		0.0	4.84e-02	4.04e-02	1.76e-02	112,113,119				2.31e-03	1.0	1.0	0,113
		52.5	4.42e-02	2.85e-02	2.12e-02	112,113,125				1.86e-03	1.0	1.0	0,112
14 ok T,s=2,m=78		0.0	4.13e-02	3.92e-02	1.65e-02	112,113,114				1.96e-03	1.0	1.0	0,113
		52.5	4.80e-02	4.02e-02	1.84e-02	112,113,111				2.22e-03	1.0	1.0	0,112
15 ok T,s=2,m=78		0.0	2.89e-03	2.80e-03	2.87e-02	140,141,113				2.99e-04	1.0	1.0	0,125
		52.5	4.07e-02	3.89e-02	3.08e-02	112,113,112				1.75e-03	1.0	1.0	0,113
16 ok T,s=2,m=78		0.0	3.60e-02	3.77e-02	1.27e-02	124,125,121				1.63e-03	1.0	1.0	0,125
		52.2	2.82e-02	2.66e-02	1.10e-02	124,125,120				9.69e-04	1.0	1.0	0,117
17 ok T,s=2,m=78		0.0	2.43e-02	2.59e-02	1.24e-02	116,124,120				1.16e-03	1.0	1.0	0,124
		52.2	3.86e-02	3.55e-02	1.91e-02	125,124,121				1.78e-03	1.0	1.0	0,124
18 ok T,s=2,m=78		0.0	1.87e-02	2.01e-02	1.04e-02	112,124,120				1.55e-03	1.0	1.0	0,140
		52.2	2.33e-02	2.58e-02	1.21e-02	112,124,121				1.74e-03	1.0	1.0	0,140
19 ok T,s=2,m=78		0.0	1.09e-02	1.37e-02	1.20e-02	125,124,4				1.80e-03	1.0	1.0	0,124
		52.2	9.60e-03	2.00e-02	8.58e-03	125,124,121				2.00e-03	1.0	1.0	0,124
20 ok T,s=2,m=78		0.0	2.93e-02	1.44e-02	2.12e-02	125,4,4				2.97e-03	1.0	1.0	0,124
		52.2	1.23e-02	1.38e-02	9.51e-03	125,124,123				3.00e-03	1.0	1.0	0,124
21 ok T,s=2,m=78		0.0	9.25e-02	5.84e-02	3.59e-02	125,116,117				5.24e-03	1.0	1.0	0,124
		58.0	2.96e-02	1.44e-02	1.82e-02	125,4,117				3.80e-03	1.0	1.0	0,124
22 ok T,s=2,m=78		0.0	2.65e-02	3.45e-02	3.49e-02	125,4,117				5.98e-03	1.0	1.0	0,124
		52.5	9.12e-02	5.25e-02	3.57e-02	125,116,117				6.87e-03	1.0	1.0	0,124
23 ok T,s=2,m=78		0.0	2.70e-02	4.28e-02	2.22e-02	117,112,121				5.85e-03	1.0	1.0	0,124
		52.5	2.63e-02	3.45e-02	2.27e-02	117,4,121				4.78e-03	1.0	1.0	0,124
24 ok T,s=2,m=78		0.0	4.49e-02	5.26e-02	1.31e-02	113,112,121				5.64e-03	1.0	1.0	0,124
		52.5	2.63e-02	4.31e-02	1.35e-02	117,112,121				4.78e-03	1.0	1.0	0,124
25 ok T,s=2,m=78		0.0	5.19e-02	5.31e-02	9.02e-03	113,112,121				4.80e-03	1.0	1.0	0,124
		52.5	4.42e-02	5.28e-02	9.19e-03	113,112,121				4.59e-03	1.0	1.0	0,124
26 ok T,s=2,m=78		0.0	3.96e-02	3.77e-02	9.34e-03	117,112,123				2.69e-03	1.0	1.0	0,124
		52.5	5.12e-02	5.34e-02	9.56e-03	113,112,123				3.75e-03	1.0	1.0	0,124
27 ok T,s=2,m=78		0.0	9.91e-03	1.28e-02	2.08e-02	130,141,113				4.74e-04	1.0	1.0	0,119
		52.5	3.86e-02	3.81e-02	2.08e-02	113,112,112				1.76e-03	1.0	1.0	0,124

28 ok T,s=2,m=78	0.0	4.28e-02	2.80e-02	4.88e-02	4,131,4	4.75e-03	1.0	1.0	0,119
	58.1	6.46e-03	1.60e-05	3.07e-03	122,119,131	4.00e-03	1.0	1.0	0,119
29 ok T,s=2,m=78	0.0	5.92e-02	4.59e-02	1.97e-02	4,131,4	4.17e-03	1.0	1.0	0,119
	58.1	4.27e-02	2.80e-02	2.27e-03	4,131,134	2.98e-03	1.0	1.0	0,119
30 ok T,s=2,m=78	0.0	4.89e-02	4.99e-02	7.24e-02	4,119,119	9.42e-03	1.0	1.0	0,119
	58.1	5.85e-02	4.60e-02	0.2	4,131,4	8.94e-03	1.0	1.0	0,119
31 ok T,s=2,m=78	0.0	0.1	0.1	5.97e-02	4,119,4	2.06e-02	1.0	1.0	0,119
	52.2	5.17e-02	4.98e-02	0.2	4,119,4	9.01e-03	1.0	1.0	0,119
32 ok T,s=2,m=78	0.0	0.1	8.62e-02	3.42e-02	4,119,119	1.58e-02	1.0	1.0	0,119
	52.2	0.1	0.1	2.09e-02	4,119,126	2.25e-02	1.0	1.0	0,119
33 ok T,s=2,m=78	0.0	9.02e-02	5.35e-02	3.79e-02	4,131,4	8.16e-03	1.0	1.0	0,119
	52.2	0.1	8.61e-02	2.05e-02	4,119,123	1.41e-02	1.0	1.0	0,4
34 ok T,s=2,m=78	0.0	4.76e-02	2.78e-02	5.05e-02	4,129,4	4.53e-03	1.0	1.0	0,119
	52.2	8.79e-02	5.35e-02	2.08e-02	4,131,123	7.53e-03	1.0	1.0	0,4
35 ok T,s=2,m=78	0.0	1.44e-02	2.65e-02	0.1	134,4,4	4.42e-03	1.0	1.0	0,119
	52.2	2.93e-02	4.66e-02	3.62e-02	113,4,4	4.47e-03	1.0	1.0	0,119
36 ok T,s=2,m=78	0.0	2.60e-02	7.19e-02	6.14e-02	37,119,123	6.86e-03	1.0	1.0	0,119
	58.0	7.96e-03	2.65e-02	3.51e-02	30,4,123	2.66e-03	1.0	1.0	0,120
37 ok T,s=2,m=78	0.0	2.65e-02	4.27e-02	3.60e-02	113,4,118	2.30e-03	1.0	1.0	0,4
	52.5	2.60e-02	7.18e-02	6.02e-02	37,119,115	6.45e-03	1.0	1.0	0,119
38 ok T,s=2,m=78	0.0	3.86e-02	2.80e-02	1.84e-02	113,4,126	1.40e-03	1.0	1.0	0,113
	52.5	2.60e-02	4.27e-02	2.87e-02	129,4,123	2.19e-03	1.0	1.0	0,4
39 ok T,s=2,m=78	0.0	4.42e-02	2.85e-02	1.60e-02	118,115,126	1.86e-03	1.0	1.0	0,118
	52.5	3.86e-02	2.80e-02	2.15e-02	113,4,123	1.40e-03	1.0	1.0	0,113
40 ok T,s=2,m=78	0.0	4.78e-02	4.02e-02	1.76e-02	118,115,125	2.22e-03	1.0	1.0	0,118
	52.5	4.38e-02	2.85e-02	2.12e-02	118,115,119	1.86e-03	1.0	1.0	0,118
41 ok T,s=2,m=78	0.0	4.16e-02	3.95e-02	1.66e-02	118,115,116	1.99e-03	1.0	1.0	0,111
	52.5	4.79e-02	4.02e-02	1.85e-02	118,115,117	2.22e-03	1.0	1.0	0,118
42 ok T,s=2,m=78	0.0	2.93e-03	2.83e-03	2.87e-02	134,131,115	3.28e-04	1.0	1.0	0,119
	52.5	4.10e-02	3.92e-02	3.08e-02	118,115,118	1.79e-03	1.0	1.0	0,115
43 ok T,s=2,m=78	0.0	3.61e-02	3.78e-02	1.27e-02	122,119,123	1.63e-03	1.0	1.0	0,119
	52.2	2.82e-02	2.66e-02	1.10e-02	122,119,126	9.65e-04	1.0	1.0	0,111
44 ok T,s=2,m=78	0.0	2.61e-02	2.13e-02	1.24e-02	134,126	6.38e-04	1.0	1.0	0,122
	52.2	3.58e-02	3.77e-02	1.90e-02	122,119,123	1.42e-03	1.0	1.0	0,119
45 ok T,s=2,m=78	0.0	1.82e-02	1.97e-02	1.03e-02	118,122,126	1.49e-03	1.0	1.0	0,134
	52.2	2.35e-02	2.59e-02	1.20e-02	118,122,123	1.67e-03	1.0	1.0	0,134
46 ok T,s=2,m=78	0.0	1.10e-02	1.38e-02	1.20e-02	119,122,4	1.87e-03	1.0	1.0	0,122
	52.2	9.38e-03	1.97e-02	8.60e-03	119,122,123	2.07e-03	1.0	1.0	0,122
47 ok T,s=2,m=78	0.0	2.95e-02	1.44e-02	2.12e-02	119,4,4	3.03e-03	1.0	1.0	0,122
	52.2	1.25e-02	1.39e-02	9.55e-03	119,122,121	3.07e-03	1.0	1.0	0,122
48 ok T,s=2,m=78	0.0	9.27e-02	5.86e-02	3.59e-02	119,114,111	5.28e-03	1.0	1.0	0,122
	58.0	2.97e-02	1.44e-02	1.82e-02	119,4,111	3.82e-03	1.0	1.0	0,122
49 ok T,s=2,m=78	0.0	2.65e-02	3.45e-02	3.48e-02	119,4,111	5.98e-03	1.0	1.0	0,122
	52.5	9.13e-02	5.27e-02	3.56e-02	119,114,111	6.88e-03	1.0	1.0	0,122
50 ok T,s=2,m=78	0.0	2.70e-02	4.28e-02	2.22e-02	111,118,123	5.85e-03	1.0	1.0	0,122
	52.5	2.64e-02	3.45e-02	2.28e-02	111,4,123	4.79e-03	1.0	1.0	0,122
51 ok T,s=2,m=78	0.0	4.50e-02	5.27e-02	1.31e-02	115,118,123	5.64e-03	1.0	1.0	0,122
	52.5	2.64e-02	4.32e-02	1.35e-02	111,118,123	4.78e-03	1.0	1.0	0,122
52 ok T,s=2,m=78	0.0	5.19e-02	5.32e-02	9.02e-03	115,118,123	4.80e-03	1.0	1.0	0,122
	52.5	4.42e-02	5.28e-02	9.19e-03	115,118,123	4.59e-03	1.0	1.0	0,122
53 ok T,s=2,m=78	0.0	3.96e-02	3.77e-02	9.33e-03	111,118,121	2.69e-03	1.0	1.0	0,122
	52.5	5.13e-02	5.34e-02	9.55e-03	115,118,121	3.75e-03	1.0	1.0	0,122
54 ok T,s=2,m=78	0.0	9.92e-03	1.29e-02	2.08e-02	136,131,115	4.74e-04	1.0	1.0	0,125
	52.5	3.87e-02	3.81e-02	2.08e-02	115,118,118	1.76e-03	1.0	1.0	0,122
55 ok T,s=2,m=78	0.0	1.18e-03	5.51e-04	0.2	125,118,3	9.88e-04	1.0	1.0	124,140
	319.0	1.50e-03	6.93e-04	0.2	125,119,3	1.32e-03	1.0	1.0	124,140
56 ok T,s=2,m=78	0.0	6.04e-03	6.24e-03	7.53e-03	116,124,121	1.18e-04	1.0	1.0	0,140
	48.7	1.16e-02	1.21e-02	9.87e-03	116,124,4	1.92e-04	1.0	1.0	0,140
57 ok T,s=2,m=78	0.0	1.24e-02	5.72e-03	1.06e-02	124,138,120	1.37e-04	1.0	1.0	0,124
	48.7	8.80e-03	3.53e-03	1.07e-02	4,134,121	6.98e-05	1.0	1.0	0,4
58 ok T,s=2,m=78	0.0	8.54e-03		1.10e-02	4,0,4	6.98e-05	1.0	1.0	0,4
	48.7	2.41e-04		4.40e-03	9,0,120	0.0	1.0	1.0	0,120
59 ok T,s=2,m=78	0.0	1.57e-03	2.57e-04	5.86e-02	125,112,9	2.68e-03	1.0	1.0	124,124
	319.0	1.75e-03	4.14e-04	5.86e-02	125,119,9	2.86e-03	1.0	1.0	124,124
60 ok T,s=2,m=78	0.0	6.62e-04	4.12e-04	5.48e-04	125,119,4	3.39e-04	1.0	1.0	0,124
	48.7	5.81e-03	3.86e-03	3.54e-03	9,11,9	3.40e-04	1.0	1.0	0,124
61 ok T,s=2,m=78	0.0	5.85e-03	1.31e-03	1.26e-03	9,140,9	1.74e-04	1.0	1.0	0,140
	48.7	6.30e-03	4.96e-03	2.15e-03	11,4,11	1.78e-04	1.0	1.0	0,140
62 ok T,s=2,m=78	0.0	6.31e-03	2.40e-03	3.79e-03	11,124,11	4.58e-05	1.0	1.0	0,140
	48.7	7.29e-05	0.0	1.68e-04	141,140,9	4.14e-05	1.0	1.0	0,140
63 ok T,s=2,m=78	0.0	1.50e-02	1.23e-02	3.57e-03	125,124,125	1.88e-03	1.0	1.0	0,124
	52.2	2.23e-03	2.56e-04	3.30e-03	125,112,124	1.73e-03	1.0	1.0	0,124
64 ok T,s=2,m=78	0.0	1.14e-02	7.50e-03	1.61e-03	125,124,11	3.06e-03	1.0	1.0	0,124
	52.2	1.62e-02	1.24e-02	1.65e-03	125,124,9	3.16e-03	1.0	1.0	0,124
65 ok T,s=2,m=78	0.0	2.63e-03	6.61e-06	1.51e-03	125,124,124	2.57e-03	1.0	1.0	0,124
	52.2	1.09e-02	7.50e-03	2.99e-03	125,124,9	2.62e-03	1.0	1.0	0,124
66 ok T,s=2,m=78	0.0	1.51e-02	1.24e-02	3.55e-03	119,122,119	1.88e-03	1.0	1.0	0,122

	52.2	2.21e-03	2.27e-04	3.26e-03	119,118,122				1.73e-03	1.0	1.0	0,122
67 ok T,s=2,m=78	0.0	9.46e-03	7.46e-03	1.61e-03	119,122,11				9.43e-04	1.0	1.0	0,122
	52.2	1.41e-02	1.24e-02	1.65e-03	119,122,9				1.04e-03	1.0	1.0	0,122
68 ok T,s=2,m=78	0.0	2.71e-03	6.31e-06	1.50e-03	119,122,122				2.51e-03	1.0	1.0	0,122
	52.2	1.11e-02	7.46e-03	2.99e-03	119,122,9				2.56e-03	1.0	1.0	0,122
69 ok T,s=2,m=78	0.0	1.14e-03	4.92e-04	0.2	119,112,3	9.46e-04	1.0	0.6	6.94e-04	1.0	1.0	122,134
	319.0	1.52e-03	7.04e-04	0.2	119,125,3	1.33e-03	1.0	0.6	6.94e-04	1.0	1.0	122,134
70 ok T,s=2,m=78	0.0	6.04e-03	6.24e-03	7.52e-03	114,122,123				1.18e-04	1.0	1.0	0,134
	48.7	1.16e-02	1.21e-02	9.86e-03	114,122,4				1.92e-04	1.0	1.0	0,134
71 ok T,s=2,m=78	0.0	1.24e-02	5.72e-03	1.06e-02	122,128,126				1.37e-04	1.0	1.0	0,122
	48.7	8.80e-03	3.53e-03	1.07e-02	4,140,123				6.98e-05	1.0	1.0	0,4
72 ok T,s=2,m=78	0.0	8.54e-03		1.10e-02	4,0,4				6.98e-05	1.0	1.0	0,4
	48.7	2.41e-04		4.40e-03	9,0,126				0.0	1.0	1.0	0,121
73 ok T,s=2,m=78	0.0	6.31e-03	2.40e-03	3.79e-03	11,122,11				4.58e-05	1.0	1.0	0,134
	48.7	7.29e-05	0.0	1.68e-04	131,134,9				4.14e-05	1.0	1.0	0,134
74 ok T,s=2,m=78	0.0	5.85e-03	1.28e-03	1.26e-03	9,4,9				1.74e-04	1.0	1.0	0,134
	48.7	6.30e-03	4.96e-03	2.15e-03	11,4,11				1.77e-04	1.0	1.0	0,134
75 ok T,s=2,m=78	0.0	6.68e-04	4.19e-04	5.47e-04	119,125,4				3.39e-04	1.0	1.0	0,122
	48.7	5.81e-03	3.87e-03	3.54e-03	9,11,9				3.40e-04	1.0	1.0	0,122
76 ok T,s=2,m=78	0.0	1.55e-03	2.28e-04	5.86e-02	119,118,11	2.66e-03	1.0	0.6	2.50e-03	1.0	1.0	122,122
	319.0	1.75e-03	4.21e-04	5.86e-02	119,125,9	2.86e-03	1.0	0.6	2.50e-03	1.0	1.0	122,122

Elem.	Ver N+/M	Ver N-/M	Ver V/T	Ver N(s)	Kcy	Kcz	Ver M(s)	Kcrit(y)	Kcrit(z)
	0.14	0.12	0.22	2.86e-03	1.00	0.65	0.03	1.00	1.00

Elem.	w,net R	w,net F	w,net P	Rif. cmb	Kdef	w,net Ri	w,net Fi	w,net Pi	Rif. cmb
1	0.2	0.1	0.1	146,151,156	0.8	0.3	0.2	0.2	146,154,156
2	0.3	0.2	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156
3	0.8	0.7	0.6	146,151,156	0.8	1.5	1.3	1.2	146,154,156
4	0.7	0.6	0.5	146,151,156	0.8	1.3	1.1	1.1	146,154,156
5	4.79e-02	3.95e-02	3.72e-02	146,151,156	0.8	8.72e-02	7.71e-02	7.44e-02	146,154,156
6	0.2	0.2	0.2	146,151,156	0.8	0.4	0.3	0.3	146,154,156
7	0.4	0.3	0.3	146,151,156	0.8	0.7	0.6	0.6	146,154,156
8	0.6	0.5	0.5	146,151,156	0.8	1.1	1.0	0.9	146,154,156
9	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
10	0.1	0.1	0.1	146,151,156	0.8	0.2	0.2	0.2	146,154,156
11	9.36e-02	7.73e-02	7.33e-02	146,151,156	0.8	0.2	0.2	0.1	146,154,156
12	7.25e-02	5.97e-02	5.66e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
13	6.49e-02	5.32e-02	5.04e-02	146,151,156	0.8	0.1	0.1	9.95e-02	146,154,156
14	6.86e-02	5.62e-02	5.35e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
15	8.91e-02	7.32e-02	6.95e-02	146,151,156	0.8	0.2	0.1	0.1	146,154,156
16	0.3	0.2	0.2	146,151,156	0.8	0.5	0.4	0.4	146,154,156
17	0.2	0.2	0.2	146,151,156	0.8	0.4	0.4	0.3	146,154,156
18	0.3	0.2	0.2	146,151,156	0.8	0.5	0.4	0.4	146,154,156
19	0.3	0.3	0.3	146,151,156	0.8	0.6	0.6	0.5	146,154,156
20	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
21	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
22	0.2	0.2	0.2	146,151,156	0.8	0.4	0.4	0.3	146,154,156
23	0.1	0.1	0.1	146,151,156	0.8	0.3	0.2	0.2	146,154,156
24	0.1	9.24e-02	8.75e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
25	0.1	8.25e-02	7.82e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
26	0.1	8.99e-02	8.52e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
27	0.1	0.1	9.93e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
28	0.2	0.1	0.1	146,151,156	0.8	0.3	0.2	0.2	146,154,156
29	0.3	0.2	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156
30	0.8	0.7	0.6	146,151,156	0.8	1.5	1.3	1.2	146,154,156
31	0.7	0.6	0.5	146,151,156	0.8	1.3	1.1	1.1	146,154,156
32	4.79e-02	3.95e-02	3.72e-02	146,151,156	0.8	8.72e-02	7.71e-02	7.44e-02	146,154,156
33	0.2	0.2	0.2	146,151,156	0.8	0.4	0.3	0.3	146,154,156
34	0.4	0.3	0.3	146,151,156	0.8	0.7	0.6	0.6	146,154,156
35	0.6	0.5	0.5	146,151,156	0.8	1.1	1.0	0.9	146,154,156
36	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
37	0.1	0.1	0.1	146,151,156	0.8	0.2	0.2	0.2	146,154,156
38	9.36e-02	7.73e-02	7.33e-02	146,151,156	0.8	0.2	0.2	0.1	146,154,156
39	7.25e-02	5.97e-02	5.66e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
40	6.49e-02	5.32e-02	5.05e-02	146,151,156	0.8	0.1	0.1	9.96e-02	146,154,156
41	6.86e-02	5.62e-02	5.35e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
42	8.91e-02	7.32e-02	6.95e-02	146,151,156	0.8	0.2	0.1	0.1	146,154,156
43	0.3	0.2	0.2	146,151,156	0.8	0.5	0.4	0.4	146,154,156
44	0.2	0.2	0.2	146,151,156	0.8	0.4	0.4	0.3	146,154,156
45	0.3	0.2	0.2	146,151,156	0.8	0.5	0.4	0.4	146,154,156
46	0.3	0.3	0.3	146,151,156	0.8	0.6	0.6	0.5	146,154,156
47	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
48	0.4	0.3	0.3	146,151,156	0.8	0.7	0.7	0.6	146,154,156
49	0.2	0.2	0.2	146,151,156	0.8	0.4	0.4	0.3	146,154,156
50	0.1	0.1	0.1	146,151,156	0.8	0.3	0.2	0.2	146,154,156

51	0.1	9.24e-02	8.75e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
52	0.1	8.25e-02	7.82e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
53	0.1	9.00e-02	8.52e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
54	0.1	0.1	9.94e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
55	0.3	0.3	0.3	145,151,156	0.8	0.6	0.5	0.5	146,151,156
56	4.75e-02	3.38e-02	3.04e-02	147,152,155	0.8	8.54e-02	7.18e-02	5.47e-02	147,152,155
57	6.44e-02	5.40e-02	5.18e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
58	0.1	8.51e-02	8.12e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
59	0.3	0.3	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156
60	9.90e-02	7.46e-02	6.65e-02	145,151,156	0.8	0.2	0.2	0.1	145,151,156
61	8.01e-02	6.35e-02	5.79e-02	145,151,156	0.8	0.1	0.1	0.1	145,151,156
62	0.1	9.57e-02	8.89e-02	145,151,156	0.8	0.2	0.2	0.2	145,151,156
63	0.3	0.3	0.2	149,154,156	0.8	0.6	0.5	0.5	149,154,156
64	0.3	0.2	0.2	146,154,156	0.8	0.6	0.5	0.5	146,154,156
65	0.3	0.2	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156
66	0.3	0.3	0.2	149,154,156	0.8	0.6	0.5	0.5	149,154,156
67	0.3	0.2	0.2	146,154,156	0.8	0.6	0.5	0.5	146,154,156
68	0.3	0.2	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156
69	0.3	0.3	0.3	145,151,156	0.8	0.6	0.5	0.5	146,151,156
70	4.75e-02	3.38e-02	3.04e-02	147,152,155	0.8	8.55e-02	7.18e-02	5.48e-02	147,152,155
71	6.45e-02	5.41e-02	5.18e-02	146,151,156	0.8	0.1	0.1	0.1	146,154,156
72	0.1	8.52e-02	8.13e-02	146,151,156	0.8	0.2	0.2	0.2	146,154,156
73	0.1	9.57e-02	8.89e-02	145,151,156	0.8	0.2	0.2	0.2	145,151,156
74	8.01e-02	6.35e-02	5.80e-02	145,151,156	0.8	0.1	0.1	0.1	145,151,156
75	9.90e-02	7.46e-02	6.65e-02	145,151,156	0.8	0.2	0.2	0.1	145,151,156
76	0.3	0.3	0.2	146,151,156	0.8	0.6	0.5	0.5	146,154,156

Elem.	w,net R	w,net F	w,net P		w,net Ri	w,net Fi	w,net Pi
	0.81	0.67	0.63		1.49	1.33	1.24

13.1.1.2 VERIFICA ELEMENTI PARETI X-LAM

13.1.1.2.1 LEGENDA TABELLA VERIFICHE S.L. PANNELLI XLAM

Il programma consente la verifica dei seguenti tipi di elementi:

1. gusci2. setti

L'esito delle verifiche è espresso con un codice come di seguito indicato:

ok: verifica con esito positivo

NV: verifica con esito negativo

Le verifiche sono condotte in ottemperanza alle NTC 17 Gennaio 2018 seguendo anche le indicazioni analitiche riportate nella norma tecnica UNI EN 1995-1-1:2005 "Eurocodice 5 - Progettazione delle strutture di legno - Parte 1-1: Regole generali - Regole comuni e regole per gli edifici" e nella norma tedesca DIN 1052 (D) - 2008.

Utilizzando il riferimento tecnico dell' Università di Monaco "Teilprojekt 15 - TP 15 Flächen aus Brettstapeln, Brettsperrholz und Verbundkonstruktionen" che permette di valutare in modo esaustivo il comportamento del pannello in presenza di significative deformazioni a taglio si è valutata in fase di verifica la migrazione degli sforzi dal "Piano B" al "Piano A" come previsto nell' appendice D parte 3 della norma tedesca DIN 1052 (D) - 2008.

In particolare le verifiche effettuate sono riconducibili a quanto previsto nell' appendice D e al capitolo 10.7 della DIN:

- 10.7.1 (127) tensoflessione
- 10.7.1 (128) pressoflessione
- 10.7.1 (129) taglio torsione
- 10.7.1 (130) trazione e taglio di rotolamento
- 10.7.1 (131) compressione e taglio di rotolamento
- App D. (26) momento torcente di incollaggio

Viene riportata un'ulteriore verifica (Mestek 5.4.5) in cui tutte le tensioni normali sono rapportate alla resistenza di progetto a flessione.

Le verifiche sono riportate in due distinte tabelle. Nella prima sono riportate le sollecitazioni sulle connessioni e le verifiche delle stesse. Nella seconda invece sono riportate le verifiche dei pannelli (raccolte per macro elementi e riportate ai nodi). Di seguito si esplicita il significato dei dati riportati nelle tabelle:

Setto/Guscio	Numero del macroelemento
Mat.	Materiale degli strati
N. strati	Numero di strati
Spessore	Spessore degli strati
Incoll.	Tavole incollate lungo il lato (si/no)
Direz. fibre	Inclinazione della direzione (0) rispetto all' asse X (per gusci)
Stato	Codice della verifica: ok verificato, NV non verificato
V.connes.	Codice della verifica delle connessioni: ok verificato, NV non verificato
V.Piede	Verifica delle connessioni alla base del pannello
Azione V	Taglio agente al piede del pannello
Rif.cmb	Combinazione di riferimento per la verifica delle connessioni al piede
V.testa	Verifica delle connessioni in testa al pannello
Azione V	Taglio agente in testa al pannello
Rif. Cmb	Combinazione di riferimento per la verifica delle connessioni in testa
V h-d	Verifica degli hold down
Azione N	Sforzo normale al piede del pannello
Azione M	Momento al piede del pannello
Rif. cmb	Combinazione di riferimento per la verifica degli hold down
Nodo	Numero del nodo per il quale si riportano le verifiche; prima riga direzione (0) seconda riga direzione (1)
V.127	Verifica come da DIN 10.7.1 (127) per tensoflessione
V.128	Verifica come da DIN 10.7.1 (128) per pressoflessione
V.545	Verifica come da riferimento tecnico dell' Università di Monaco Tp 15. (tensioni normali rapportate alla resistenza di progetto a flessione)
V.129	Verifica come da DIN 10.7.1 (129) per taglio torsione
V.130	Verifica come da DIN 10.7.1 (130) trazione e taglio di rotolamento
V.131	Verifica come da DIN 10.7.1 (131) compressione e taglio di rotolamento
M. D26	Momento torcente di incollaggio come da DIN App D. (26)
Fac. B-A	Fattore di riduzione della quota afferente al piano B in relazione alla deformabilità a taglio
Qsup. A	Quota afferente al piano A
Qsup. B	Quota afferente al piano B

A chiarimento delle verifiche riportate si precisa quanto segue.

Il programma consente la modellazione di pannelli XLAM con un numero di strati dispari di ugual spessore.

Gli strati sono costituiti da tavole che possono o meno essere incollate lungo il lato lungo.

Gli strati sono caratterizzati dai moduli E0, G0, E90, G90 e Gori, rispettivamente in direzione 0 (parallela alle fibre), 90 (ortogonale alle fibre) e orizzontale.

Per convenzione la direzione 0 del pannello è quella parallela alle fibre del primo (e ultimo) strato. La direzione 0 pertanto ha caratteristiche di resistenza e rigidezza superiore alla direzione 1. Il programma ipotizza che la direzione 0 sia verticale per i setti e inclinata rispetto all' asse X per i gusci (inclinazione settabile da criterio di progetto). In fase di verifica non esiste interazione tra direzione 0 e 1.

La peculiarità del pannello XLAM è data dalla presenza di strati molto deformabili a taglio (G90 è di un ordine di grandezza inferiore a G0) così da invalidare l' ipotesi di conservazione delle sezioni piane. L' appendice D della DIN 1052 (D) - 2008 fornisce indicazioni per la valutazione delle rigidezze e delle tensioni sui pannelli XLAM, anche considerando la cedevolezza a taglio degli strati. In sostanza le azioni

di piastra vengono ripartite su due piani ideali A e B mentre le azioni di lastra sono riportate sul piano ideale C. La deformabilità a taglio regola la ripartizione tra i piani A e B. Utilizzando il riferimento tecnico dell' Università di Monaco “Teilprojekt 15 - TP 15 Flächen aus Brettstapeln, Brettsper Holz und Verbundkonstruktionen” si è implementato l' algoritmo di ripartizione indicato al cap. 5.4.2.3 basato sull' analogia del taglio per carico sinusoidale. In base a questa analogia la quota di carico afferente al piano B viene ridotta in funzione delle caratteristiche statiche del pacchetto di strati e della luce del pannello nella direzione di studio.

Per entrambe le direzioni 0 e 1 si avranno 8 componenti di sollecitazione:

- Momento flettente ripartito su piano A e piano B
- Momento torcente ripartito su piano A e piano B
- Taglio ortogonale ripartito su piano A e piano B
- Sforzo normale su piano C
- Taglio membranale su piano C

Inoltre:

nel caso in cui le tavole siano incollate

- il momento di incollaggio è nullo
- il momento torcente viene ripartito sul piano A e B e verificato per la parte competente allo strato e al pannello (quota di Steiner)
- la resistenza al taglio di piano è offerta dall' intero spessore del pannello
- la dimensione "a" di fig. 16 par. 8.9.3 DIN 1052 (D) è identica nelle due direzioni

in caso contrario

- il momento di incollaggio viene computato secondo DIN D.26
- il momento torcente non viene verificato
- la resistenza al taglio di piano è offerta dallo spessore del pannello ridotto del 75%
- E90 DEVE ESSERE ASSUNTO PARI 0 (gli strati esterni si trascurano per tutti gli effetti in direzione debole)
- la dimensione "a" di fig. 16 par. 8.9.3 DIN 1052 (D) è minore in direzione (1)

Le verifiche V.127, V.128, V.545, V129 (ossia le verifiche per le tensioni normali e tangenziali) sono effettuate per gli strati pari in direzione 0 e per gli strati dispari in direzione 1 (ovvero gli strati con E0), le verifiche V130 e V131 sono effettuate per gli strati pari in direzione 1 e per gli strati dispari in direzione 0 (ovvero gli strati con G90).

Ai fini della verifica a taglio di piastra, è consentita una verifica semplificata che affida al piano B l' intero taglio e

determina la tensione tangenziale dividendo il taglio per la dimensione "a" di fig. 16 par. 8.9.3.

Il programma prevede a scelta dell' utente questa possibilità.

Si sottolinea che le sei verifiche sono espresse dal rapporto tra domanda e capacità, affinché la verifica sia positiva il rapporto deve essere inferiore o uguale a 1. La capacità è affetta dal termine **kmod**, espressione della classe di servizio e della durata dei carichi (si considera a livello di combinazione il caso di carico di minor durata).

Con riferimento al Documento di Affidabilità “Test di validazione del software di calcolo PRO_SAP e dei moduli aggiuntivi PRO_SAP Modulo Geotecnico, PRO_CAD nodi acciaio e PRO_MST” - versione

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 98 DI 151

Settembre 2014, disponibile per il download sul sito www.2si.it, si segnalano i seguenti esempi applicativi:

Test N°	Titolo
126	PROGETTO E VERIFICA DI GUSCI IN MATERIALE XLAM
127	PROGETTO E VERIFICA DI PARETI IN MATERIALE XLAM E RELATIVI COLLEGAMENTI
128	PROGETTO E VERIFICA DI SOLAI IN MATERIALE XLAM
129	VERIFICA HOLD DOWN DI UN PANNELLO IN XLAM

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
1	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.55	kN -78.5	23	0.55	kN -79.0	23	0.39	kN -1.073e+04	kN m 2.063e+06	122

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
11	0.0	0.15	0.0	0,4,0	0.04	1.35e-03	0.02119,119,4	0.14	119	0.0	0.0	0.0	
	2.16e-04	1.18e-03	0.0123,126,0		0.04	1.10e-03	1.10e-03119,120,120			1.00	0.04	0.96	
13	0.10	0.17	0.0122,119,0		0.03	2.10e-03	0.02119,120,119	0.13	119	0.86	0.06	0.94	
	2.40e-03	1.95e-03	0.0122,119,0		0.03	1.09e-03	1.09e-03119,120,120			1.00	0.04	0.96	
15	0.0	0.15	0.0	0,4,0	0.04	1.35e-03	0.02119,119,4	0.15	119	0.0	0.0	0.0	
	2.16e-04	2.28e-03	0.0	123,4,0	0.04	1.10e-03	1.10e-03119,120,120			1.00	0.04	0.96	
16	0.0	0.15	0.0	0,4,0	0.05	1.35e-03	0.02119,119,4	0.17	119	0.0	0.0	0.0	
	2.16e-04	5.68e-03	0.0	123,4,0	0.05	1.13e-03	1.13e-03119,120,120			1.00	0.04	0.96	
17	0.0	0.15	0.0	0,4,0	0.04	1.35e-03	0.02119,119,4	0.15	119	0.0	0.0	0.0	
	2.16e-04	3.61e-03	0.0	123,4,0	0.04	1.13e-03	1.13e-03119,120,120			1.00	0.04	0.96	
18	0.0	0.16	0.0	0,4,0	0.04	1.18e-03	0.02119,119,4	0.16	119	0.0	0.0	0.0	
	0.0	3.77e-03	0.0	0,4,0	0.04	2.91e-04	2.91e-04119,121,121			0.0	0.0	0.0	
19	0.0	0.16	0.0	0,4,0	0.05	1.18e-03	0.02119,119,4	0.18	119	0.0	0.0	0.0	
	0.0	7.36e-03	0.0	0,4,0	0.05	2.91e-04	2.91e-04119,121,121			0.0	0.0	0.0	
20	0.0	0.16	0.0	0,4,0	0.06	9.15e-04	0.02119,121,4	0.18	119	0.0	0.0	0.0	
	0.0	7.04e-03	0.0	0,4,0	0.06	1.05e-04	1.05e-04119,126,126			0.0	0.0	0.0	
21	0.0	0.16	0.0	0,4,0	0.06	9.15e-04	0.02119,121,4	0.19	119	0.0	0.0	0.0	
	0.0	0.01	0.0	0,4,0	0.06	1.63e-04	1.63e-04119,120,120			0.0	0.0	0.0	
22	0.01	0.16	0.0	122,4,0	0.09	1.30e-03	0.02119,126,119	0.23	119	0.86	0.06	0.94	
	0.0	0.01	0.0	0,4,0	0.09	2.32e-04	2.32e-04119,121,121			0.0	0.0	0.0	
23	0.01	0.16	0.0	122,4,0	0.09	1.30e-03	0.02119,126,119	0.23	119	0.86	0.06	0.94	
	1.38e-04	0.02	0.0	122,4,0	0.09	2.32e-04	2.32e-04119,121,121			1.00	0.04	0.96	
24	0.04	0.18	0.0122,119,0		0.14	2.14e-03	0.02119,120,119	0.29	119	0.86	0.06	0.94	
	3.27e-03	0.02	0.0	122,4,0	0.14	1.52e-03	1.52e-03119,123,123			1.00	0.04	0.96	
25	0.04	0.18	0.0122,119,0		0.14	2.14e-03	0.02119,120,119	0.29	119	0.86	0.06	0.94	
	3.27e-03	0.02	0.0	122,4,0	0.14	1.52e-03	1.52e-03119,123,123			1.00	0.04	0.96	
26	0.04	0.18	0.0122,119,0		0.14	2.14e-03	0.02119,120,119	0.29	119	0.86	0.06	0.94	
	3.27e-03	0.02	0.0	122,4,0	0.14	1.52e-03	1.52e-03119,123,123			1.00	0.04	0.96	
27	0.04	0.18	0.0122,119,0		0.14	2.14e-03	0.02119,120,119	0.29	119	0.86	0.06	0.94	
	3.27e-03	0.02	0.0	122,4,0	0.14	1.52e-03	1.52e-03119,123,123			1.00	0.04	0.96	
28	0.0	0.07	0.0	0,4,0	0.05	1.28e-03	7.13e-03119,120,4	0.17	119	0.0	0.0	0.0	
	0.0	6.90e-03	0.0	0,4,0	0.05	1.13e-03	1.13e-03119,121,121			0.0	0.0	0.0	
29	0.0	0.07	0.0	0,4,0	0.04	1.28e-03	7.13e-03119,120,4	0.15	119	0.0	0.0	0.0	
	0.0	4.46e-03	0.0	0,4,0	0.04	1.13e-03	1.13e-03119,121,121			0.0	0.0	0.0	
30	0.0	0.07	0.0	0,4,0	0.05	1.05e-03	6.97e-03119,126,4	0.18	119	0.0	0.0	0.0	
	5.25e-04	8.41e-03	0.0	122,4,0	0.05	2.89e-04	2.89e-04119,120,120			1.00	0.04	0.96	
31	0.0	0.06	0.0	0,4,0	0.06	6.93e-04	6.73e-03119,126,4	0.19	119	0.0	0.0	0.0	
	7.19e-04	0.01	0.0	122,4,0	0.06	1.77e-04	1.77e-04119,120,120			1.00	0.04	0.96	
32	0.0	0.06	0.0	0,4,0	0.06	8.74e-04	6.44e-03119,126,4	0.19	119	0.0	0.0	0.0	
	7.19e-04	0.02	0.0	122,4,0	0.06	1.82e-04	1.82e-04119,123,123			1.00	0.04	0.96	
33	0.0	0.06	0.0	0,4,0	0.06	1.66e-03	6.30e-03119,125,4	0.19	119	0.0	0.0	0.0	
	8.41e-03	0.02	0.0	122,4,0	0.06	1.19e-03	1.19e-03119,121,121			1.00	0.04	0.96	
34	0.0	0.06	0.0	0,4,0	0.06	1.66e-03	6.30e-03119,125,4	0.19	119	0.0	0.0	0.0	
	8.41e-03	0.02	0.0	122,4,0	0.06	1.19e-03	1.19e-03119,121,121			1.00	0.04	0.96	
35	0.0	0.03	0.0	0,4,0	0.04	1.26e-03	3.21e-03119,125,124	0.16	119	0.0	0.0	0.0	
	1.43e-03	6.90e-03	0.0	122,4,0	0.04	1.13e-04	1.13e-04119,121,121			1.00	0.04	0.96	
36	0.0	0.03	0.0	0,4,0	0.04	1.26e-03	3.10e-03119,125,122	0.15	119	0.0	0.0	0.0	
	0.0	4.46e-03	0.0	0,4,0	0.04	1.13e-03	1.13e-03119,121,121			0.0	0.0	0.0	
37	0.0	0.03	0.0	0,4,0	0.04	1.02e-03	3.21e-03119,125,124	0.16	119	0.0	0.0	0.0	
	1.61e-03	8.41e-03	0.0	122,4,0	0.04	2.91e-04	2.91e-04119,120,120			1.00	0.04	0.96	
38	0.0	0.03	0.0	0,4,0	0.05	6.22e-04	3.12e-03119,122,122	0.16	119	0.0	0.0	0.0	
	1.61e-03	0.01	0.0	122,4,0	0.05	1.77e-04	1.77e-04119,120,120			1.00	0.04	0.96	

39	0.0	0.02	0.0	0,4,0	0.05	8.80e-04	3.10e-03	119,121,122	0.16	119	0.0	0.0	0.0
	1.55e-03	0.02	0.0	122,4,0	0.05	2.34e-04	2.34e-04	119,123,123			1.00	0.04	0.96
40	0.0	0.02	0.0	0,4,0	0.05	1.83e-03	3.35e-03	119,122,122	0.16	119	0.0	0.0	0.0
	9.55e-03	0.02	0.0	126,119,0	0.05	1.19e-03	1.19e-03	119,121,121			1.00	0.04	0.96
41	0.0	0.02	0.0	0,4,0	0.05	1.83e-03	3.35e-03	119,122,122	0.16	119	0.0	0.0	0.0
	9.55e-03	0.02	0.0	126,119,0	0.05	1.19e-03	1.19e-03	119,121,121			1.00	0.04	0.96
42	0.0	0.03	0.0	0,4,0	0.04	1.30e-03	4.40e-03	119,121,122	0.15	119	0.0	0.0	0.0
	4.22e-03	7.69e-03	0.0	122,119,0	0.04	1.13e-03	1.13e-03	119,121,121			1.00	0.04	0.96
43	0.0	0.03	0.0	0,4,0	0.04	1.30e-03	4.11e-03	119,121,122	0.15	119	0.0	0.0	0.0
	1.73e-03	4.26e-03	0.0	122,4,0	0.04	1.13e-03	1.13e-03	119,121,121			1.00	0.04	0.96
44	0.0	0.03	0.0	0,4,0	0.04	1.06e-03	4.40e-03	122,126,122	0.16	122	0.0	0.0	0.0
	4.22e-03	8.22e-03	0.0	122,119,0	0.04	2.91e-04	2.91e-04	122,120,120			1.00	0.04	0.96
45	0.0	0.03	0.0	0,4,0	0.05	6.43e-04	4.23e-03	122,123,122	0.16	122	0.0	0.0	0.0
	3.57e-03	0.01	0.0	122,4,0	0.05	1.30e-04	1.30e-04	122,120,120			1.00	0.04	0.96
46	0.0	0.03	0.0	0,4,0	0.05	9.23e-04	3.65e-03	122,125,122	0.17	122	0.0	0.0	0.0
	2.87e-03	0.02	0.0	122,4,0	0.05	2.85e-04	2.85e-04	122,120,120			1.00	0.04	0.96
47	0.0	0.02	0.0	0,4,0	0.05	1.92e-03	3.60e-03	122,119,119	0.17	122	0.0	0.0	0.0
	9.55e-03	0.02	0.0	126,123,0	0.05	1.09e-03	1.09e-03	122,121,121			1.00	0.04	0.96
48	0.0	0.02	0.0	0,4,0	0.05	1.92e-03	3.60e-03	122,119,119	0.17	122	0.0	0.0	0.0
	9.55e-03	0.02	0.0	126,123,0	0.05	1.09e-03	1.09e-03	122,121,121			1.00	0.04	0.96
49	3.39e-03	0.05	0.0	119,4,0	0.04	1.34e-03	6.84e-03	122,122,122	0.15	122	0.86	0.06	0.94
	7.38e-03	8.55e-03	0.0	122,119,0	0.04	1.13e-03	1.13e-03	122,121,121			1.00	0.04	0.96
50	3.68e-04	0.05	0.0	119,4,0	0.04	1.34e-03	6.38e-03	119,122,122	0.15	119	0.86	0.06	0.94
	3.82e-03	4.73e-03	0.0	122,119,0	0.04	1.13e-03	1.13e-03	119,121,121			1.00	0.04	0.96
51	6.63e-03	0.05	0.0	119,4,0	0.05	1.09e-03	7.01e-03	122,125,122	0.17	122	0.86	0.06	0.94
	7.38e-03	8.55e-03	0.0	122,119,0	0.05	2.87e-04	2.87e-04	122,120,120			1.00	0.04	0.96
52	9.20e-03	0.05	0.0	119,122,0	0.06	6.56e-04	7.01e-03	122,124,122	0.18	122	0.86	0.06	0.94
	6.27e-03	9.83e-03	0.0	122,119,0	0.06	1.13e-04	1.13e-04	122,120,120			1.00	0.04	0.96
53	0.01	0.06	0.0	119,122,0	0.07	9.65e-04	7.82e-03	122,126,126	0.21	122	0.86	0.06	0.94
	5.47e-03	0.01	0.0	122,4,0	0.07	3.21e-04	3.21e-04	122,120,120			1.00	0.04	0.96
54	0.02	0.06	0.0	119,122,0	0.10	1.92e-03	8.55e-03	122,119,122	0.24	122	0.86	0.06	0.94
	6.10e-03	0.01	0.0	126,123,0	0.10	1.05e-03	1.05e-03	122,121,121			1.00	0.04	0.96
55	0.02	0.06	0.0	119,122,0	0.10	1.92e-03	8.55e-03	122,119,122	0.24	122	0.86	0.06	0.94
	6.10e-03	0.01	0.0	126,123,0	0.10	1.05e-03	1.05e-03	122,121,121			1.00	0.04	0.96
56	3.39e-03	0.07	0.0	119,4,0	0.04	1.41e-03	7.18e-03	122,120,126	0.15	122	0.86	0.06	0.94
	8.93e-03	8.55e-03	0.0	122,119,0	0.04	1.13e-03	1.13e-03	122,120,120			1.00	0.04	0.96
57	3.68e-04	0.07	0.0	119,4,0	0.04	1.41e-03	7.12e-03	119,120,4	0.15	119	0.86	0.06	0.94
	4.97e-03	4.78e-03	0.0	122,119,0	0.04	1.13e-03	1.13e-03	119,120,120			1.00	0.04	0.96
58	6.63e-03	0.07	0.0	119,4,0	0.05	1.16e-03	7.50e-03	122,123,122	0.17	122	0.86	0.06	0.94
	8.93e-03	8.55e-03	0.0	122,119,0	0.05	2.84e-04	2.84e-04	122,121,121			1.00	0.04	0.96
59	9.20e-03	0.07	0.0	119,4,0	0.06	7.07e-04	7.61e-03	122,123,126	0.18	122	0.86	0.06	0.94
	7.30e-03	9.66e-03	0.0	122,119,0	0.06	1.13e-04	1.13e-04	122,120,120			1.00	0.04	0.96
60	0.01	0.07	0.0	119,4,0	0.07	9.93e-04	8.92e-03	122,119,126	0.21	122	0.86	0.06	0.94
	6.33e-03	0.01	0.0	122,119,0	0.07	4.57e-04	4.57e-04	122,120,120			1.00	0.04	0.96
61	0.02	0.07	0.0	119,122,0	0.10	1.88e-03	0.0	122,119,122	0.24	122	0.86	0.06	0.94
	6.33e-03	0.01	0.0	122,119,0	0.10	1.03e-03	1.03e-03	122,121,121			1.00	0.04	0.96
62	0.02	0.07	0.0	119,122,0	0.10	1.88e-03	0.0	122,119,122	0.24	122	0.86	0.06	0.94
	5.82e-03	0.01	0.0	126,123,0	0.10	1.03e-03	1.03e-03	122,121,121			1.00	0.04	0.96
70	0.10	0.17	0.0	122,119,0	0.03	2.10e-03	0.0	122,119,120,119	0.13	119	0.86	0.06	0.94
	3.71e-03	2.90e-03	0.0	122,119,0	0.03	1.09e-03	1.09e-03	119,120,120			1.00	0.04	0.96
71	0.08	0.15	0.0	122,119,0	0.02	1.85e-03	0.0	122,119,120,119	0.10	119	0.86	0.06	0.94
	3.71e-03	2.90e-03	0.0	122,119,0	0.02	2.89e-04	2.89e-04	119,121,121			1.00	0.04	0.96
72	0.06	0.14	0.0	122,119,0	0.01	1.43e-03	0.0	122,120,123	0.08	122	0.86	0.06	0.94
	2.11e-03	2.10e-03	0.0	122,119,0	0.01	8.94e-05	8.94e-05	122,120,120			1.00	0.04	0.96
73	0.05	0.12	0.0	122,119,0	7.34e-03	1.36e-03	0.0	122,123,123	0.07	122	0.86	0.06	0.94
	1.12e-03	4.26e-03	0.0	122,4,0	7.34e-03	3.05e-04	3.05e-04	122,120,120			1.00	0.04	0.96
74	0.03	0.11	0.0	122,119,0	5.94e-03	2.11e-03	0.0	122,123,119	0.06	122	0.86	0.06	0.94
	0.0	0.01	0.0	0,4,0	5.94e-03	7.32e-04	7.32e-04	122,121,121			0.0	0.0	0.0
75	0.02	0.10	0.0	122,119,0	5.16e-03	2.11e-03	0.0	122,123,119	0.06	122	0.86	0.06	0.94
	0.0	0.01	0.0	0,4,0	5.16e-03	7.32e-04	7.32e-04	122,121,121			0.0	0.0	0.0
124	0.02	0.08	0.0	119,4,0	0.03	2.09e-03	0.0	122,120,122	0.14	122	0.86	0.06	0.94
	6.33e-03	0.01	0.0	122,119,0	0.03	1.02e-03	1.02e-03	122,121,121			1.00	0.04	0.96
125	0.10	0.17	0.0	122,119,0	0.03	2.10e-03	0.0	122,119,120,119	0.14	119	0.86	0.06	0.94
	8.35e-03	6.89e-03	0.0	122,119,0	0.03	1.12e-03	1.12e-03	119,120,120			1.00	0.04	0.96
126	0.10	0.17	0.0	122,119,0	0.03	2.10e-03	0.0	122,119,120,119	0.14	119	0.86	0.06	0.94
	5.14e-03	4.21e-03	0.0	122,119,0	0.03	1.12e-03	1.12e-03	119,120,120			1.00	0.04	0.96
127	0.08	0.15	0.0	122,119,0	0.03	1.85e-03	0.0	122,119,120,119	0.13	119	0.86	0.06	0.94
	8.35e-03	6.89e-03	0.0	122,119,0	0.03	2.89e-04	2.89e-04	119,121,121			1.00	0.04	0.96
128	0.06	0.14	0.0	122,119,0	0.03	1.43e-03	0.0	122,120,123	0.12	122	0.86	0.06	0.94
	5.74e-03	5.67e-03	0.0	122,119,0	0.03	9.33e-05	9.33e-05	122,120,120			1.00	0.04	0.96
129	0.05	0.12	0.0	122,119,0	0.02	1.36e-03	0.0	122,123,123	0.11	122	0.86	0.06	0.94
	4.29e-03	7.58e-03	0.0	122,119,0	0.02	3.96e-04	3.96e-04	122,120,120			1.00	0.04	0.96
130	0.03	0.11	0.0	122,119,0	0.02	2.11e-03	0.0	122,123,119	0.11	122	0.86	0.06	0.94
	2.81e-03	0.01	0.0	122,4,0	0.02	8.93e-04	8.93e-04	122,121,121			1.00	0.04	0.96
418	0.02	0.08	0.0	119,4,0	0.03	2.09e-03	0.0	122,120,122	0.13	122	0.86	0.06	0.94
	5.18e-03	0.01	0.0	126,123,0	0.03	1.02e-03	1.02e-03	122,121,121			1.00	0.04	0.96
425	0.02	0.10	0.0	122,119,0	0.02	2.11e-03	0.0	122,123,119	0.10	122	0.86	0.06	0.94

	7.41e-04	0.01	0.0	122,4,0	0.02	8.93e-04	8.93e-04	122,121,121		1.00	0.04	0.96
431	0.0	0.09	0.0	0,4,0	0.03	1.41e-03	9.05e-03	119,120,4	0.14	119	0.0	0.0
	8.93e-03	8.48e-03	0.0122,119,0		0.03	1.13e-03	1.13e-03	119,120,120		1.00	0.04	0.96
432	0.0	0.09	0.0	0,4,0	0.03	1.41e-03	9.05e-03	119,120,4	0.14	119	0.0	0.0
	5.14e-03	4.78e-03	0.0122,119,0		0.03	1.13e-03	1.13e-03	119,120,120		1.00	0.04	0.96
433	0.0	0.08	0.0	0,4,0	0.03	1.16e-03	9.00e-03	122,123,4	0.14	122	0.0	0.0
	8.93e-03	8.48e-03	0.0122,119,0		0.03	2.85e-04	2.85e-04	122,121,121		1.00	0.04	0.96
434	0.0	0.08	0.0	0,4,0	0.03	7.07e-04	8.98e-03	122,123,4	0.14	122	0.0	0.0
	7.30e-03	8.75e-03	0.0122,119,0		0.03	1.09e-04	1.09e-04	122,120,120		1.00	0.04	0.96
435	8.06e-03	0.08	0.0	119,4,0	0.03	1.18e-03	8.98e-03	122,120,4	0.14	122	0.86	0.06
	6.33e-03	0.01	0.0122,119,0		0.03	4.57e-04	4.57e-04	122,120,120		1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.10	0.18	0.0	0.14	2.14e-03	0.02	0.29

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
2	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes.	V. piede Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.89	86.6	26	0.74	72.5	26	0.74	1.645e+04	-8.706e+06
		kN		kN			kN	kN m	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
26	0.07	0.20	0.0122,119,0		0.13	5.92e-03	0.03119,124,119		0.28	119	0.86	0.06	0.94
	0.01	0.02	0.0122,119,0		0.13	4.77e-04	4.77e-04	119,123,123		1.00	0.04	0.04	0.96
147	0.04	0.09	0.0112,113,0		0.05	0.01	0.02122,115,118		0.17	122	0.86	0.06	0.94
	0.02	0.02	0.0126,123,0		0.05	0.01	0.01122,112,112			1.00	0.04	0.04	0.96
148	0.05	0.09	0.0112,113,0		0.07	0.01	0.02122,115,113		0.21	122	0.86	0.06	0.94
	0.02	0.02	0.0126,123,0		0.07	0.01	0.01122,112,112			1.00	0.04	0.04	0.96
155	0.05	0.09	0.0112,113,0		0.07	0.01	0.02122,115,113		0.21	122	0.86	0.06	0.94
	0.02	0.02	0.0126,123,0		0.07	0.01	0.01122,112,112			1.00	0.04	0.04	0.96
162	0.05	0.06	0.0115,118,0		0.05	5.49e-03	0.01119,112,113		0.17	119	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.05	3.65e-03	3.65e-03	119,120,120		1.00	0.04	0.04	0.96
169	0.07	0.07	0.0115,118,0		0.04	3.07e-03	0.01119,124,118		0.15	119	0.86	0.06	0.94
	0.02	0.02	0.0117,116,0		0.04	1.62e-03	1.62e-03	119,118,118		1.00	0.04	0.04	0.96
176	0.09	0.09	0.0115,118,0		0.03	4.70e-03	0.01119,124,118		0.13	119	0.86	0.06	0.94
	0.02	0.02	0.0117,116,0		0.03	1.20e-03	1.20e-03	119,115,115		1.00	0.04	0.04	0.96
183	0.15	0.13	0.0111,114,0		0.02	0.01	0.03131,112,118		0.10	131	0.86	0.06	0.94
	0.02	0.02	0.0117,116,0		0.02	6.89e-03	6.89e-03	131,112,112		1.00	0.04	0.04	0.96
189	0.15	0.13	0.0111,114,0		0.01	0.01	0.03129,112,118		0.08	129	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.01	6.89e-03	6.89e-03	129,112,112		1.00	0.04	0.04	0.96
309	0.15	0.13	0.0111,114,0		0.01	0.01	0.03129,112,118		0.08	129	0.86	0.06	0.94
	0.02	0.02	0.0113,112,0		0.01	0.02	0.02129,112,112			1.00	0.04	0.04	0.96
310	0.15	0.13	0.0111,114,0		0.02	0.01	0.03131,112,118		0.10	131	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0		0.02	0.02	0.02131,112,112			1.00	0.04	0.04	0.96
311	0.14	0.12	0.0115,114,0		0.01	3.60e-03	0.02129,116,118		0.08	129	0.86	0.06	0.94
	0.02	0.02	0.0113,112,0		0.01	0.02	0.02129,112,112			1.00	0.04	0.04	0.96
312	0.14	0.12	0.0115,114,0		0.02	3.60e-03	0.02131,116,118		0.11	131	0.86	0.06	0.94
	0.05	0.04	0.0113,112,0		0.02	0.02	0.02131,112,112			1.00	0.04	0.04	0.96
313	0.13	0.11	0.0111,114,0		0.01	8.53e-04	0.02129,115,114		0.08	129	0.86	0.06	0.94
	0.02	0.01	0.0112,112,0		0.01	0.01	0.01129,112,112			1.00	0.04	0.04	0.96
314	0.13	0.11	0.0111,114,0		0.02	2.14e-03	0.02131,111,114		0.11	131	0.86	0.06	0.94
	0.05	0.04	0.0113,112,0		0.02	0.01	0.01131,112,112			1.00	0.04	0.04	0.96
315	0.11	0.09	0.0111,114,0		0.01	8.53e-04	0.01129,115,114		0.08	129	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.01	0.01	0.01129,112,112			1.00	0.04	0.04	0.96
316	0.11	0.09	0.0111,114,0		0.02	2.14e-03	0.01131,111,114		0.11	131	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0		0.02	0.01	0.01131,112,112			1.00	0.04	0.04	0.96
317	0.09	0.08	0.0115,118,0		0.01	8.29e-03	0.01129,111,114		0.08	129	0.86	0.06	0.94
	0.01	7.84e-03	0.0112,113,0		0.01	9.44e-03	9.44e-03	129,112,112		1.00	0.04	0.04	0.96
318	0.09	0.08	0.0115,118,0		0.02	9.01e-03	0.02131,124,122		0.10	131	0.86	0.06	0.94
	0.04	0.03	0.0131,131,0		0.02	9.44e-03	9.44e-03	131,112,112		1.00	0.04	0.04	0.96
319	0.08	0.07	0.0111,114,0	9.90e-03	9.01e-03		0.02129,124,122		0.08	129	0.86	0.06	0.94
	0.04	0.03	0.0131,131,0	9.90e-03	9.28e-03	9.28e-03	129,138,138			1.00	0.04	0.04	0.96
320	0.08	0.07	0.0111,114,0		0.01	9.01e-03	0.02131,124,122		0.09	131	0.86	0.06	0.94
	0.04	0.03	0.0131,131,0		0.01	9.28e-03	9.28e-03	131,138,138		1.00	0.04	0.04	0.96
321	0.09	0.09	0.0111,118,0		0.03	4.70e-03	0.01119,124,114		0.14	119	0.86	0.06	0.94
	0.05	0.04	0.0117,116,0		0.03	4.48e-03	4.48e-03	119,116,116		1.00	0.04	0.04	0.96
322	0.09	0.09	0.0111,114,0		0.03	3.18e-03	0.01119,116,114		0.14	119	0.86	0.06	0.94
	0.06	0.05	0.0112,112,0		0.03	8.69e-03	8.69e-03	119,116,116		1.00	0.04	0.04	0.96
323	0.09	0.08	0.0111,114,0		0.03	2.80e-03	0.01119,116,114		0.14	119	0.86	0.06	0.94
	0.06	0.05	0.0112,112,0		0.03	9.18e-03	9.18e-03	119,116,116		1.00	0.04	0.04	0.96
324	0.08	0.08	0.0111,114,0		0.03	3.11e-03	0.01119,116,114		0.14	119	0.86	0.06	0.94
	0.06	0.05	0.0112,113,0		0.03	9.18e-03	9.18e-03	119,116,116		1.00	0.04	0.04	0.96
325	0.07	0.06	0.0111,114,0		0.03	3.11e-03	0.01119,116,114		0.14	119	0.86	0.06	0.94

	0.05	0.04	0.0112,113,0	0.03	7.75e-03	7.75e-03119,112,112			1.00	0.04	0.96
326	0.06	0.06	0.0111,114,0	0.03	2.25e-03	9.94e-03119,137,117	0.13	119	0.86	0.06	0.94
	0.04	0.03	0.0112,113,0	0.03	5.74e-03	5.74e-03119,115,115			1.00	0.04	0.96
327	0.07	0.07	0.0115,118,0	0.04	3.07e-03	0.01119,124,118	0.16	119	0.86	0.06	0.94
	0.05	0.04	0.0117,116,0	0.04	4.15e-03	4.15e-03119,115,115			1.00	0.04	0.96
328	0.06	0.07	0.0115,118,0	0.05	2.13e-03	0.01119,120,121	0.17	119	0.86	0.06	0.94
	0.06	0.05	0.0112,112,0	0.05	4.32e-03	4.32e-03119,112,112			1.00	0.04	0.96
329	0.06	0.06	0.0115,118,0	0.05	5.08e-03	0.01119,116,114	0.17	119	0.86	0.06	0.94
	0.07	0.05	0.0116,117,0	0.05	6.15e-03	6.15e-03119,116,116			1.00	0.04	0.96
330	0.05	0.06	0.0111,114,0	0.05	6.38e-03	0.01119,116,117	0.17	119	0.86	0.06	0.94
	0.07	0.05	0.0116,117,0	0.05	7.88e-03	7.88e-03119,119,119			1.00	0.04	0.96
331	0.05	0.06	0.0111,114,0	0.05	6.38e-03	0.01119,116,117	0.17	119	0.86	0.06	0.94
	0.07	0.05	0.0116,117,0	0.05	7.88e-03	7.88e-03119,119,119			1.00	0.04	0.96
332	0.05	0.05	0.0111,113,0	0.04	4.27e-03	0.01119,117,117	0.16	119	0.86	0.06	0.94
	0.06	0.04	0.0116,117,0	0.04	6.62e-03	6.62e-03119,119,119			1.00	0.04	0.96
333	0.05	0.06	0.0115,113,0	0.05	5.49e-03	0.01119,112,113	0.18	119	0.86	0.06	0.94
	0.04	0.03	0.0116,116,0	0.06	0.01	0.01119,112,112			1.00	0.04	0.96
334	0.05	0.06	0.0115,113,0	0.06	2.61e-03	0.01119,113,113	0.19	119	0.86	0.06	0.94
	0.06	0.05	0.0116,116,0	0.06	0.01	0.01119,112,112			1.00	0.04	0.96
335	0.05	0.06	0.0115,113,0	0.06	6.34e-03	0.01119,116,114	0.19	119	0.86	0.06	0.94
	0.07	0.05	0.0116,117,0	0.06	0.01	0.01119,112,112			1.00	0.04	0.96
336	0.04	0.05	0.0115,118,0	0.06	0.01	0.02119,116,117	0.19	119	0.86	0.06	0.94
	0.08	0.06	0.0116,117,0	0.06	9.22e-03	9.22e-03119,113,113			1.00	0.04	0.96
337	0.05	0.06	0.0116,117,0	0.06	0.01	0.03119,116,117	0.19	119	0.86	0.06	0.94
	0.08	0.06	0.0116,117,0	0.06	0.01	0.01119,119,119			1.00	0.04	0.96
338	0.05	0.06	0.0116,117,0	0.06	0.01	0.03119,114,117	0.18	119	0.86	0.06	0.94
	0.08	0.06	0.0111,114,0	0.06	0.01	0.01119,119,119			1.00	0.04	0.96
339	0.05	0.09	0.0112,113,0	0.08	0.01	0.02122,115,113	0.22	122	0.86	0.06	0.94
	0.02	0.02	0.0117,115,0	0.08	0.02	0.02122,112,112			1.00	0.04	0.96
340	0.05	0.08	0.0112,113,0	0.09	2.93e-03	0.01122,116,113	0.23	122	0.86	0.06	0.94
	0.04	0.03	0.0117,116,0	0.09	0.02	0.02122,112,112			1.00	0.04	0.96
341	0.04	0.07	0.0112,113,0	0.09	6.34e-03	0.01122,116,113	0.23	122	0.86	0.06	0.94
	0.06	0.04	0.0116,117,0	0.09	0.02	0.02122,112,112			1.00	0.04	0.96
342	0.03	0.05	0.0116,117,0	0.09	0.01	0.02122,111,117	0.23	122	0.86	0.06	0.94
	0.08	0.06	0.0116,117,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
343	0.05	0.06	0.0116,111,0	0.08	0.04	0.07122,114,111	0.22	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.08	0.02	0.02122,113,113			1.00	0.04	0.96
344	0.05	0.06	0.0116,111,0	0.07	0.04	0.07122,114,111	0.20	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.07	0.01	0.01122,119,119			1.00	0.04	0.96
345	0.05	0.09	0.0112,113,0	0.08	0.01	0.02122,115,113	0.22	122	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.08	0.02	0.02122,112,112			1.00	0.04	0.96
346	0.05	0.08	0.0112,113,0	0.09	2.93e-03	0.01122,116,113	0.23	122	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.09	0.02	0.02122,112,112			1.00	0.04	0.96
347	0.03	0.07	0.0112,113,0	0.09	5.22e-03	0.01122,116,113	0.23	122	0.86	0.06	0.94
	0.03	0.02	0.0116,116,0	0.09	0.02	0.02122,112,112			1.00	0.04	0.96
348	0.02	0.05	0.0112,113,0	0.09	0.01	0.02122,111,117	0.23	122	0.86	0.06	0.94
	0.07	0.05	0.0111,114,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
349	0.03	0.06	0.0114,111,0	0.08	0.04	0.07122,114,111	0.22	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.08	0.02	0.02122,113,113			1.00	0.04	0.96
350	0.03	0.06	0.0114,111,0	0.07	0.04	0.07122,114,111	0.20	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.07	7.12e-03	7.12e-03122,119,119			1.00	0.04	0.96
351	0.04	0.09	0.0112,113,0	0.05	0.01	0.02122,115,118	0.17	122	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.05	0.02	0.02122,115,115			1.00	0.04	0.96
352	0.04	0.07	0.0112,113,0	0.05	2.92e-03	0.01122,116,118	0.17	122	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.05	0.02	0.02122,115,115			1.00	0.04	0.96
353	0.03	0.06	0.0112,113,0	0.04	3.94e-03	0.01122,111,114	0.16	122	0.86	0.06	0.94
	0.02	0.02	0.0118,115,0	0.04	0.01	0.01122,115,115			1.00	0.04	0.96
354	0.01	0.04	0.0112,113,0	0.04	5.42e-03	0.01122,111,118	0.16	122	0.86	0.06	0.94
	0.05	0.04	0.0119,122,0	0.04	0.01	0.01122,119,119			1.00	0.04	0.96
355	0.01	0.03	0.0 111,4,0	0.04	5.42e-03	9.05e-03122,111,117	0.15	122	0.86	0.06	0.94
	0.05	0.04	0.0119,122,0	0.04	0.01	0.01122,119,119			1.00	0.04	0.96
356	9.51e-03	0.03	0.0111,114,0	0.03	3.42e-03	6.90e-03122,111,114	0.12	122	0.86	0.06	0.94
	0.04	0.03	0.0119,122,0	0.03	4.11e-03	4.11e-03122,111,111			1.00	0.04	0.96
357	0.01	0.03	0.0115,118,0	0.05	4.37e-03	8.16e-03122,112,118	0.17	122	0.86	0.06	0.94
	0.02	0.02	0.0122,119,0	0.05	5.44e-03	5.44e-03122,115,115			1.00	0.04	0.96
358	0.01	0.03	0.0 3,118,0	0.05	4.37e-03	8.16e-03122,112,118	0.17	122	0.86	0.06	0.94
	0.02	0.02	0.0122,119,0	0.05	1.56e-03	1.56e-03122,115,115			1.00	0.04	0.96
359	0.02	0.03	0.0115,118,0	0.05	1.99e-03	7.65e-03122,118,118	0.17	122	0.86	0.06	0.94
	0.01	0.02	0.0122,119,0	0.05	5.82e-03	5.82e-03122,115,115			1.00	0.04	0.96
360	0.02	0.03	0.0115,118,0	0.04	3.16e-03	7.51e-03122,111,118	0.16	122	0.86	0.06	0.94
	0.01	0.02	0.0122,119,0	0.04	5.82e-03	5.82e-03122,115,115			1.00	0.04	0.96
361	0.01	0.03	0.0111,114,0	0.04	3.16e-03	6.52e-03122,111,114	0.16	122	0.86	0.06	0.94
	0.03	0.03	0.0119,122,0	0.04	4.47e-03	4.47e-03122,119,119			1.00	0.04	0.96
362	0.01	0.03	0.0111,114,0	0.04	3.42e-03	6.90e-03122,111,114	0.15	122	0.86	0.06	0.94
	0.03	0.03	0.0119,122,0	0.04	4.47e-03	4.47e-03122,119,119			1.00	0.04	0.96
363	9.51e-03	0.03	0.0111,114,0	0.03	3.42e-03	6.90e-03122,111,114	0.12	122	0.86	0.06	0.94
	0.03	0.03	0.0119,122,0	0.03	4.11e-03	4.11e-03122,111,111			1.00	0.04	0.96

364	0.02	2.26e-03	0.0	3,126,0	0.03	1.99e-03	1.99e-03	122,119,119	0.14	122	0.86	0.06	0.94
	0.02	0.02		0.0122,119,0	0.03	1.37e-03	1.37e-03	122,111,111			1.00	0.04	0.96
365	0.02	0.0	0.0	3,0,0	0.03	1.99e-03	1.99e-03	122,119,119	0.14	122	0.86	0.06	0.94
	0.02	0.02		0.0122,119,0	0.03	6.63e-04	6.63e-04	122,117,117			1.00	0.04	0.96
366	0.01	8.49e-03	0.0119,122,0		0.03	1.39e-03	3.42e-03	122,122,122	0.14	122	0.86	0.06	0.94
	0.01	0.02		0.0122,119,0	0.03	1.71e-03	1.71e-03	122,111,111			1.00	0.04	0.96
367	0.01	0.01	0.0119,122,0		0.03	1.68e-03	4.20e-03	122,111,114	0.14	122	0.86	0.06	0.94
	0.01	0.02		0.0122,119,0	0.03	1.71e-03	1.71e-03	122,111,111			1.00	0.04	0.96
368	8.73e-03	0.01	0.0	119,11,0	0.03	1.68e-03	4.20e-03	122,111,114	0.14	122	0.86	0.06	0.94
	0.02	0.03		0.0119,122,0	0.03	1.64e-03	1.64e-03	122,119,119			1.00	0.04	0.96
369	5.43e-03	0.02	0.0	119,11,0	0.03	2.44e-03	4.13e-03	122,111,122	0.14	122	0.86	0.06	0.94
	0.03	0.03		0.0119,122,0	0.03	1.64e-03	1.64e-03	122,119,119			1.00	0.04	0.96
370	0.0	0.02	0.0	0,11,0	0.02	2.44e-03	4.13e-03	122,111,122	0.12	122	0.0	0.0	0.0
	0.03	0.03		0.0119,122,0	0.02	1.59e-03	1.59e-03	122,118,118			1.00	0.04	0.96
371	0.02	0.01	0.0	3,11,0	0.03	2.41e-03	4.22e-03	119,119,119	0.14	119	0.86	0.06	0.94
	0.03	0.03		0.0122,119,0	0.03	2.04e-03	2.04e-03	119,111,111			1.00	0.04	0.96
372	0.02	0.01	0.0	3,122,0	0.03	2.41e-03	4.00e-03	119,119,122	0.13	119	0.86	0.06	0.94
	0.03	0.03		0.0122,119,0	0.03	1.41e-03	1.41e-03	119,112,112			1.00	0.04	0.96
373	0.01	0.02	0.0119,119,0		0.03	1.65e-03	4.94e-03	119,119,119	0.14	119	0.86	0.06	0.94
	0.01	0.02		0.0122,119,0	0.03	2.19e-03	2.19e-03	119,111,111			1.00	0.04	0.96
374	8.46e-03	0.03	0.0119,119,0		0.03	7.66e-04	5.63e-03	119,119,119	0.14	119	0.86	0.06	0.94
	0.01	0.02		0.0122,119,0	0.03	2.19e-03	2.19e-03	119,111,111			1.00	0.04	0.96
375	5.89e-03	0.04	0.0	122,4,0	0.03	1.75e-03	6.65e-03	119,119,119	0.14	119	0.86	0.06	0.94
	0.02	0.03		0.0119,122,0	0.03	1.35e-03	1.35e-03	119,111,111			1.00	0.04	0.96
376	1.99e-03	0.04	0.0	122,4,0	0.03	2.64e-03	6.65e-03	119,119,119	0.13	119	0.86	0.06	0.94
	0.03	0.03		0.0119,122,0	0.03	1.59e-03	1.59e-03	119,118,118			1.00	0.04	0.96
377	0.0	0.04	0.0	0,4,0	0.02	2.64e-03	6.28e-03	122,119,119	0.10	122	0.0	0.0	0.0
	0.03	0.03		0.0119,122,0	0.02	1.59e-03	1.59e-03	122,118,118			1.00	0.04	0.96
378	0.07	0.20	0.0122,119,0		0.13	5.92e-03		124,119	0.28	119	0.86	0.06	0.94
	0.03	0.03		0.0122,119,0	0.13	2.04e-03	2.04e-03	119,111,111			1.00	0.04	0.96
379	0.07	0.20	0.0122,119,0		0.13	5.92e-03		124,119	0.28	119	0.86	0.06	0.94
	0.03	0.03		0.0122,119,0	0.13	1.41e-03	1.41e-03	119,112,112			1.00	0.04	0.96
380	0.05	0.18	0.0122,119,0		0.07	3.86e-03		124,119	0.20	119	0.86	0.06	0.94
	8.06e-03	0.02		0.0122,119,0	0.07	2.19e-03	2.19e-03	119,111,111			1.00	0.04	0.96
381	0.04	0.15	0.0122,119,0		0.04	1.95e-03		126,119	0.15	119	0.86	0.06	0.94
	8.66e-03	0.01		0.0122,119,0	0.04	2.19e-03	2.19e-03	119,111,111			1.00	0.04	0.96
382	0.03	0.13	0.0122,119,0		0.03	1.83e-03		124,119	0.14	119	0.86	0.06	0.94
	0.02	0.03		0.0119,122,0	0.03	1.35e-03	1.35e-03	119,111,111			1.00	0.04	0.96
383	0.01	0.11	0.0	122,4,0	0.03	3.12e-03		119,119	0.13	119	0.86	0.06	0.94
	0.03	0.04		0.0119,122,0	0.03	1.01e-03	1.01e-03	114,114			1.00	0.04	0.96
384	4.03e-03	0.09	0.0	122,4,0	0.02	3.12e-03		119,119	0.10	119	0.86	0.06	0.94
	0.03	0.04		0.0119,122,0	0.02	1.01e-03	1.01e-03	114,114			1.00	0.04	0.96
385	0.07	0.20	0.0122,119,0		0.13	5.92e-03		124,119	0.28	119	0.86	0.06	0.94
	0.01	0.02		0.0122,119,0	0.13	1.66e-03	1.66e-03	119,112,112			1.00	0.04	0.96
386	0.05	0.18	0.0122,119,0		0.07	3.86e-03		124,119	0.20	119	0.86	0.06	0.94
	1.07e-03	8.25e-03	0.0	122,4,0	0.07	1.66e-03	1.66e-03	119,112,112			1.00	0.04	0.96
387	0.04	0.15	0.0122,119,0		0.04	1.95e-03		126,119	0.15	119	0.86	0.06	0.94
	6.45e-03	9.70e-03		0.0122,119,0	0.04	1.16e-03	1.16e-03	119,112,112			1.00	0.04	0.96
388	0.03	0.13	0.0122,119,0		0.02	1.83e-03		124,119	0.11	119	0.86	0.06	0.94
	0.02	0.03		0.0119,122,0	0.02	6.62e-04	6.62e-04	119,116,116			1.00	0.04	0.96
389	0.01	0.11	0.0	122,4,0	0.02	3.12e-03		119,119	0.10	119	0.86	0.06	0.94
	0.03	0.04		0.0119,122,0	0.02	9.73e-04	9.73e-04	114,114			1.00	0.04	0.96
390	4.03e-03	0.09	0.0	122,4,0	3.13e-03	3.12e-03		119,119	0.04	119	0.86	0.06	0.94
	0.03	0.04		0.0119,122,0	3.11e-03	9.73e-04	9.73e-04	119,114,114			1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.15	0.20	0.0	0.13	0.04	0.07	0.28

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
3	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
		kN			kN			kN	kN m	
ok	0.55	-78.5	29	0.55	-78.9	29	0.39	-1.074e+04	2.064e+06	124

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
12	0.0	0.15	0.0	0,4,0	0.04	1.35e-03		0.02125,122,4	0.14	125	0.0	0.0	0.0
	2.15e-04	1.18e-03		0.0121,120,0	0.04	1.10e-03		1.10e-03	125,121,121		1.00	0.04	0.96
14	0.10	0.17		0.0124,125,0	0.03	2.10e-03		0.02125,121,125	0.13	125	0.86	0.06	0.94
	2.40e-03	1.95e-03		0.0124,125,0	0.03	1.09e-03		1.09e-03	125,121,121		1.00	0.04	0.96
63	0.10	0.17		0.0124,125,0	0.03	2.10e-03		0.02125,121,125	0.14	125	0.86	0.06	0.94
	5.14e-03	4.20e-03		0.0124,125,0	0.03	1.12e-03		1.12e-03	125,121,121		1.00	0.04	0.96
65	0.08	0.15		0.0124,125,0	0.03	1.85e-03		0.02125,121,125	0.13	125	0.86	0.06	0.94
	8.35e-03	6.90e-03		0.0124,125,0	0.03	2.89e-04		2.89e-04	125,120,120		1.00	0.04	0.96

PROGETTO PER LA REALIZZAZIONE DEL POLO DINAMICO	PROGETTO STRUTTURE
US 03-RELAZIONE DI CALCOLO STRUTTURALE	PAG. 103 DI 151

66	0.06	0.14	0.0124,125,0	0.03	1.43e-03	0.02124,121,121	0.12	124	0.86	0.06	0.94
	5.74e-03	5.66e-03	0.0124,125,0	0.03	9.12e-05	9.12e-05124,126,126			1.00	0.04	0.96
67	0.05	0.12	0.0124,125,0	0.02	1.36e-03	0.02124,121,121	0.11	124	0.86	0.06	0.94
	4.29e-03	7.62e-03	0.0124,125,0	0.02	3.95e-04	3.95e-04124,121,121			1.00	0.04	0.96
68	0.03	0.11	0.0124,125,0	0.02	2.11e-03	0.01124,126,125	0.11	124	0.86	0.06	0.94
	2.86e-03	0.01	0.0 124,4,0	0.02	8.94e-04	8.94e-04124,120,120			1.00	0.04	0.96
69	0.02	0.10	0.0124,125,0	0.02	2.11e-03	0.01124,126,125	0.10	124	0.86	0.06	0.94
	8.04e-04	0.01	0.0 124,4,0	0.02	8.94e-04	8.94e-04124,120,120			1.00	0.04	0.96
76	0.0	0.15	0.0 0,4,0	0.04	1.35e-03	0.02125,122,4	0.15	125	0.0	0.0	0.0
	2.15e-04	2.28e-03	0.0 121,4,0	0.04	1.10e-03	1.10e-03125,121,121			1.00	0.04	0.96
77	0.0	0.15	0.0 0,4,0	0.05	1.35e-03	0.02125,122,4	0.17	125	0.0	0.0	0.0
	2.15e-04	5.68e-03	0.0 121,4,0	0.05	1.13e-03	1.13e-03125,121,121			1.00	0.04	0.96
78	0.0	0.15	0.0 0,4,0	0.04	1.35e-03	0.02125,122,4	0.15	125	0.0	0.0	0.0
	2.15e-04	3.61e-03	0.0 121,4,0	0.04	1.13e-03	1.13e-03125,121,121			1.00	0.04	0.96
79	0.0	0.16	0.0 0,4,0	0.04	1.18e-03	0.02125,122,4	0.16	125	0.0	0.0	0.0
	0.0	3.77e-03	0.0 0,4,0	0.04	2.92e-04	2.92e-04125,120,120			0.0	0.0	0.0
80	0.0	0.16	0.0 0,4,0	0.05	1.18e-03	0.02125,122,4	0.18	125	0.0	0.0	0.0
	0.0	7.36e-03	0.0 0,4,0	0.05	2.92e-04	2.92e-04125,120,120			0.0	0.0	0.0
81	0.0	0.16	0.0 0,4,0	0.06	9.29e-04	0.02125,120,4	0.18	125	0.0	0.0	0.0
	0.0	7.04e-03	0.0 0,4,0	0.06	1.20e-04	1.20e-04125,120,120			0.0	0.0	0.0
82	0.0	0.16	0.0 0,4,0	0.06	9.29e-04	0.02125,120,4	0.19	125	0.0	0.0	0.0
	3.97e-04	0.01	0.0 124,4,0	0.06	1.48e-04	1.48e-04125,121,121			1.00	0.04	0.96
83	0.01	0.16	0.0 124,4,0	0.09	1.33e-03	0.02125,121,125	0.23	125	0.86	0.06	0.94
	0.0	0.01	0.0 0,4,0	0.09	2.15e-04	2.15e-04125,123,123			0.0	0.0	0.0
84	0.01	0.16	0.0 124,4,0	0.09	1.33e-03	0.02125,121,125	0.23	125	0.86	0.06	0.94
	3.97e-04	0.02	0.0 124,4,0	0.09	2.15e-04	2.15e-04125,123,123			1.00	0.04	0.96
85	0.04	0.18	0.0124,125,0	0.15	2.09e-03	0.02125,126,125	0.29	125	0.86	0.06	0.94
	3.48e-03	0.02	0.0 124,4,0	0.15	1.19e-03	1.19e-03125,121,121			1.00	0.04	0.96
86	0.04	0.18	0.0124,125,0	0.15	2.09e-03	0.02125,126,125	0.29	125	0.86	0.06	0.94
	9.84e-03	0.02	0.0 124,4,0	0.15	1.42e-03	1.42e-03125,120,120			1.00	0.04	0.96
87	0.04	0.18	0.0124,125,0	0.15	2.09e-03	0.02125,126,125	0.29	125	0.86	0.06	0.94
	3.48e-03	0.02	0.0 124,4,0	0.15	1.19e-03	1.19e-03125,121,121			1.00	0.04	0.96
88	0.04	0.18	0.0124,125,0	0.15	2.09e-03	0.02125,126,125	0.29	125	0.86	0.06	0.94
	9.84e-03	0.02	0.0 124,4,0	0.15	1.42e-03	1.42e-03125,120,120			1.00	0.04	0.96
89	0.0	0.07	0.0 0,4,0	0.05	1.28e-03	7.13e-03125,121,4	0.17	125	0.0	0.0	0.0
	0.0	6.90e-03	0.0 0,4,0	0.05	1.13e-03	1.13e-03125,121,121			0.0	0.0	0.0
90	0.0	0.07	0.0 0,4,0	0.04	1.28e-03	7.13e-03125,121,4	0.15	125	0.0	0.0	0.0
	0.0	4.46e-03	0.0 0,4,0	0.04	1.13e-03	1.13e-03125,121,121			0.0	0.0	0.0
91	0.0	0.07	0.0 0,4,0	0.05	1.05e-03	6.97e-03125,123,4	0.18	125	0.0	0.0	0.0
	5.50e-04	8.41e-03	0.0 124,4,0	0.05	2.88e-04	2.88e-04125,121,121			1.00	0.04	0.96
92	0.0	0.06	0.0 0,4,0	0.06	6.95e-04	6.73e-03125,123,4	0.19	125	0.0	0.0	0.0
	5.81e-04	0.01	0.0 124,4,0	0.06	1.57e-04	1.57e-04125,126,126			1.00	0.04	0.96
93	0.0	0.06	0.0 0,4,0	0.06	8.89e-04	6.44e-03125,123,4	0.19	125	0.0	0.0	0.0
	5.81e-04	0.02	0.0 124,4,0	0.06	1.71e-04	1.71e-04125,120,120			1.00	0.04	0.96
94	0.0	0.06	0.0 0,4,0	0.06	1.65e-03	6.30e-03125,120,4	0.19	125	0.0	0.0	0.0
	9.84e-03	0.02	0.0124,125,0	0.06	1.42e-03	1.42e-03125,120,120			1.00	0.04	0.96
95	0.0	0.06	0.0 0,4,0	0.06	1.65e-03	6.30e-03125,120,4	0.19	125	0.0	0.0	0.0
	9.84e-03	0.02	0.0124,125,0	0.06	1.42e-03	1.42e-03125,120,120			1.00	0.04	0.96
96	0.0	0.03	0.0 0,4,0	0.04	1.26e-03	3.19e-03125,124,125	0.16	125	0.0	0.0	0.0
	1.42e-03	6.90e-03	0.0 124,4,0	0.04	1.13e-03	1.13e-03125,121,121			1.00	0.04	0.96
97	0.0	0.03	0.0 0,4,0	0.04	1.26e-03	3.10e-03125,124,124	0.15	125	0.0	0.0	0.0
	0.0	4.46e-03	0.0 0,4,0	0.04	1.13e-03	1.13e-03125,121,121			0.0	0.0	0.0
98	0.0	0.03	0.0 0,4,0	0.04	1.02e-03	3.19e-03125,124,125	0.16	125	0.0	0.0	0.0
	1.60e-03	8.41e-03	0.0 124,4,0	0.04	2.88e-04	2.88e-04125,121,121			1.00	0.04	0.96
99	0.0	0.03	0.0 0,4,0	0.05	6.22e-04	3.13e-03125,124,124	0.16	125	0.0	0.0	0.0
	1.60e-03	0.01	0.0 124,4,0	0.05	1.57e-04	1.57e-04125,126,126			1.00	0.04	0.96
100	0.0	0.02	0.0 0,4,0	0.05	9.50e-04	3.12e-03125,124,124	0.16	125	0.0	0.0	0.0
	1.43e-03	0.02	0.0 124,4,0	0.05	2.21e-04	2.21e-04125,121,121			1.00	0.04	0.96
101	0.0	0.02	0.0 0,4,0	0.05	1.82e-03	3.20e-03125,119,124	0.16	125	0.0	0.0	0.0
	9.81e-03	0.02	0.0120,125,0	0.05	1.23e-03	1.23e-03125,123,123			1.00	0.04	0.96
102	0.0	0.02	0.0 0,4,0	0.05	1.82e-03	3.20e-03125,119,124	0.16	125	0.0	0.0	0.0
	9.81e-03	0.02	0.0120,125,0	0.05	1.23e-03	1.23e-03125,123,123			1.00	0.04	0.96
103	0.0	0.03	0.0 0,4,0	0.04	1.30e-03	4.40e-03125,120,124	0.15	125	0.0	0.0	0.0
	4.20e-03	7.68e-03	0.0124,125,0	0.04	1.13e-03	1.13e-03125,121,121			1.00	0.04	0.96
104	0.0	0.03	0.0 0,4,0	0.04	1.30e-03	4.11e-03125,120,124	0.15	125	0.0	0.0	0.0
	1.73e-03	4.26e-03	0.0 124,4,0	0.04	1.13e-03	1.13e-03125,121,121			1.00	0.04	0.96
105	0.0	0.03	0.0 0,4,0	0.04	1.06e-03	4.40e-03124,123,124	0.16	124	0.0	0.0	0.0
	4.20e-03	8.20e-03	0.0124,125,0	0.04	2.88e-04	2.88e-04124,121,121			1.00	0.04	0.96
106	0.0	0.03	0.0 0,4,0	0.05	6.41e-04	4.23e-03124,123,124	0.16	124	0.0	0.0	0.0
	3.54e-03	0.01	0.0 124,4,0	0.05	1.34e-04	1.34e-04124,126,126			1.00	0.04	0.96
107	0.0	0.03	0.0 0,4,0	0.05	9.87e-04	3.66e-03124,124,124	0.17	124	0.0	0.0	0.0
	2.80e-03	0.02	0.0 124,4,0	0.05	2.79e-04	2.79e-04124,121,121			1.00	0.04	0.96
108	0.0	0.02	0.0 0,4,0	0.05	1.91e-03	3.54e-03124,122,122	0.17	124	0.0	0.0	0.0
	9.81e-03	0.02	0.0120,121,0	0.05	1.11e-03	1.11e-03124,123,123			1.00	0.04	0.96
109	0.0	0.02	0.0 0,4,0	0.05	1.91e-03	3.54e-03124,122,122	0.17	124	0.0	0.0	0.0
	9.81e-03	0.02	0.0120,121,0	0.05	1.11e-03	1.11e-03124,123,123			1.00	0.04	0.96
110	3.42e-03	0.05	0.0 125,4,0	0.04	1.34e-03	6.84e-03124,119,124	0.15	124	0.86	0.06	0.94

	7.35e-03	8.53e-03	0.0124,125,0	0.04	1.13e-03	1.13e-03124,121,121		1.00	0.04	0.96	
111	3.93e-04	0.05	0.0 125,4,0	0.04	1.34e-03	6.38e-03125,119,124	0.15	125	0.86	0.06	0.94
	3.82e-03	4.73e-03	0.0124,125,0	0.04	1.13e-03	1.13e-03125,121,121		1.00	0.04	0.96	
112	6.65e-03	0.05	0.0 125,4,0	0.05	1.09e-03	7.01e-03124,124,124	0.17	124	0.86	0.06	0.94
	7.35e-03	8.53e-03	0.0124,125,0	0.05	2.86e-04	2.86e-04124,121,121		1.00	0.04	0.96	
113	9.22e-03	0.05	0.0125,124,0	0.06	6.54e-04	7.01e-03124,122,124	0.18	124	0.86	0.06	0.94
	6.25e-03	9.78e-03	0.0124,125,0	0.06	1.08e-04	1.08e-04124,126,126		1.00	0.04	0.96	
114	0.01	0.06	0.0125,124,0	0.07	9.87e-04	7.82e-03124,124,120	0.21	124	0.86	0.06	0.94
	5.43e-03	0.01	0.0 124,4,0	0.07	3.19e-04	3.19e-04124,121,121		1.00	0.04	0.96	
115	0.02	0.06	0.0125,124,0	0.10	1.91e-03	8.55e-03124,122,124	0.24	124	0.86	0.06	0.94
	6.29e-03	0.01	0.0120,121,0	0.10	1.05e-03	1.05e-03124,120,120		1.00	0.04	0.96	
116	0.02	0.06	0.0125,124,0	0.10	1.91e-03	8.55e-03124,122,124	0.24	124	0.86	0.06	0.94
	6.29e-03	0.01	0.0120,121,0	0.10	1.05e-03	1.05e-03124,120,120		1.00	0.04	0.96	
117	3.42e-03	0.07	0.0 125,4,0	0.04	1.41e-03	7.22e-03124,121,124	0.15	124	0.86	0.06	0.94
	8.91e-03	8.53e-03	0.0124,125,0	0.04	1.13e-03	1.13e-03124,121,121		1.00	0.04	0.96	
118	3.93e-04	0.07	0.0 125,4,0	0.04	1.41e-03	7.12e-03125,121,4	0.15	125	0.86	0.06	0.94
	4.98e-03	4.78e-03	0.0124,125,0	0.04	1.13e-03	1.13e-03125,121,121		1.00	0.04	0.96	
119	6.65e-03	0.07	0.0 125,4,0	0.05	1.16e-03	7.50e-03124,126,124	0.17	124	0.86	0.06	0.94
	8.91e-03	8.53e-03	0.0124,125,0	0.05	2.85e-04	2.85e-04124,120,120		1.00	0.04	0.96	
120	9.22e-03	0.07	0.0 125,4,0	0.06	7.07e-04	7.61e-03124,126,120	0.18	124	0.86	0.06	0.94
	7.29e-03	9.64e-03	0.0124,125,0	0.06	1.08e-04	1.08e-04124,126,126		1.00	0.04	0.96	
121	0.01	0.07	0.0 125,4,0	0.07	9.92e-04	8.93e-03124,122,120	0.21	124	0.86	0.06	0.94
	6.42e-03	0.01	0.0124,125,0	0.07	4.57e-04	4.57e-04124,121,121		1.00	0.04	0.96	
122	0.02	0.07	0.0125,124,0	0.10	1.88e-03	0.01124,122,124	0.24	124	0.86	0.06	0.94
	6.42e-03	0.01	0.0124,125,0	0.10	1.03e-03	1.03e-03124,120,120		1.00	0.04	0.96	
123	0.02	0.07	0.0125,124,0	0.10	1.88e-03	0.01124,122,124	0.24	124	0.86	0.06	0.94
	5.97e-03	0.01	0.0120,121,0	0.10	1.03e-03	1.03e-03124,120,120		1.00	0.04	0.96	
131	0.10	0.17	0.0124,125,0	0.03	2.10e-03	0.02125,121,125	0.13	125	0.86	0.06	0.94
	3.71e-03	2.90e-03	0.0124,125,0	0.03	1.09e-03	1.09e-03125,121,121		1.00	0.04	0.96	
132	0.08	0.15	0.0124,125,0	0.02	1.85e-03	0.02125,121,125	0.10	125	0.86	0.06	0.94
	3.71e-03	2.90e-03	0.0124,125,0	0.02	2.89e-04	2.89e-04125,120,120		1.00	0.04	0.96	
133	0.06	0.14	0.0124,125,0	0.01	1.43e-03	0.02124,121,121	0.08	124	0.86	0.06	0.94
	2.11e-03	2.10e-03	0.0124,125,0	0.01	8.88e-05	8.88e-05124,121,121		1.00	0.04	0.96	
134	0.05	0.12	0.0124,125,0	7.34e-03	1.36e-03	0.02124,121,121	0.07	124	0.86	0.06	0.94
	1.12e-03	4.26e-03	0.0 124,4,0	7.34e-03	3.05e-04	3.05e-04124,121,121		1.00	0.04	0.96	
135	0.03	0.11	0.0124,125,0	5.93e-03	2.11e-03	0.01124,126,125	0.06	124	0.86	0.06	0.94
	0.0	0.01	0.0 0,4,0	5.93e-03	7.32e-04	7.32e-04124,120,120		0.0	0.0	0.0	
136	0.02	0.10	0.0124,125,0	5.13e-03	2.11e-03	0.01124,126,125	0.05	124	0.86	0.06	0.94
	0.0	0.01	0.0 0,4,0	5.13e-03	7.32e-04	7.32e-04124,120,120		0.0	0.0	0.0	
436	0.0	0.09	0.0 0,4,0	0.03	1.41e-03	9.05e-03125,121,4	0.14	125	0.0	0.0	0.0
	8.91e-03	8.46e-03	0.0124,125,0	0.03	1.13e-03	1.13e-03125,121,121		1.00	0.04	0.96	
437	0.0	0.09	0.0 0,4,0	0.03	1.41e-03	9.05e-03125,121,4	0.14	125	0.0	0.0	0.0
	5.14e-03	4.78e-03	0.0124,125,0	0.03	1.13e-03	1.13e-03125,121,121		1.00	0.04	0.96	
438	0.0	0.08	0.0 0,4,0	0.03	1.16e-03	9.00e-03124,126,4	0.14	124	0.0	0.0	0.0
	8.91e-03	8.46e-03	0.0124,125,0	0.03	2.86e-04	2.86e-04124,120,120		1.00	0.04	0.96	
439	0.0	0.08	0.0 0,4,0	0.03	7.07e-04	8.98e-03124,126,4	0.14	124	0.0	0.0	0.0
	7.29e-03	8.73e-03	0.0124,125,0	0.03	1.05e-04	1.05e-04124,126,126		1.00	0.04	0.96	
440	8.10e-03	0.08	0.0 125,4,0	0.03	1.18e-03	8.98e-03124,121,4	0.14	124	0.86	0.06	0.94
	6.42e-03	0.01	0.0124,125,0	0.03	4.57e-04	4.57e-04124,121,121		1.00	0.04	0.96	
441	0.02	0.08	0.0 125,4,0	0.03	2.09e-03	0.01124,121,124	0.14	124	0.86	0.06	0.94
	6.42e-03	0.01	0.0124,125,0	0.03	1.02e-03	1.02e-03124,120,120		1.00	0.04	0.96	
442	0.02	0.08	0.0 125,4,0	0.03	2.09e-03	0.01124,121,124	0.13	124	0.86	0.06	0.94
	5.30e-03	0.01	0.0120,121,0	0.03	1.02e-03	1.02e-03124,120,120		1.00	0.04	0.96	
443	0.10	0.17	0.0124,125,0	0.03	2.10e-03	0.02125,121,125	0.14	125	0.86	0.06	0.94
	8.35e-03	6.90e-03	0.0124,125,0	0.03	1.12e-03	1.12e-03125,121,121		1.00	0.04	0.96	

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.10 0.18 0.0 0.15 2.11e-03 0.02 0.29

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
4	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.34 57.9 26 0.34 58.6 26 1.00 4.115e+04 -2.937e+06 115

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
1	0.30	0.28	0.0115,118,0		0.02	0.02	0.07122,118,118		0.11	122	0.86	0.06	0.94
	0.02	0.01	0.0115,118,0		0.02	0.01	0.01122,118,118				1.00	0.04	0.96
6	0.13	0.19	0.0112,113,0		0.04	0.03	0.06122,113,113		0.15	122	0.86	0.06	0.94
	0.02	0.02	0.0118,115,0		0.04	0.02	0.02122,113,113				1.00	0.04	0.96
9	0.08	0.18	0.0112,113,0		0.02	0.03	0.06122,113,113		0.12	122	0.86	0.06	0.94
	0.02	0.02	0.0118,115,0		0.02	0.01	0.01122,118,118				1.00	0.04	0.96
137	0.10	0.20	0.0112,113,0		0.02	0.03	0.06122,113,113		0.12	122	0.86	0.06	0.94

	0.03	0.02	0.0118,115,0	0.02	0.02	0.02122,113,113			1.00	0.04	0.96
138	0.13	0.20	0.0112,113,0	0.06	0.03	0.06122,113,113	0.19	122	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.06	0.04	0.04122,118,118			1.00	0.04	0.96
139	0.10	0.20	0.0112,113,0	0.01	7.61e-03	0.05134,121,113	0.09	134	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.01	0.02	0.02134,113,113			1.00	0.04	0.96
140	0.13	0.20	0.0112,113,0	0.07	7.61e-03	0.05122,121,113	0.21	122	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.07	0.04	0.04122,118,118			1.00	0.04	0.96
141	0.10	0.20	0.0112,113,0	0.01	7.26e-03	0.04134,115,113	0.09	134	0.86	0.06	0.94
	0.01	0.01	0.0118,115,0	0.01	8.07e-03	8.07e-03134,113,113			1.00	0.04	0.96
142	0.12	0.20	0.0112,113,0	0.08	7.26e-03	0.04122,115,113	0.22	122	0.86	0.06	0.94
	0.01	0.01	0.0118,118,0	0.08	0.03	0.04134,118,118			1.00	0.04	0.96
143	0.09	0.19	0.0112,113,0	0.02	0.01	0.04134,113,113	0.09	134	0.86	0.06	0.94
	6.24e-03	0.01	0.0116,117,0	0.02	7.27e-03	7.27e-03134,117,117			1.00	0.04	0.96
144	0.10	0.19	0.0112,113,0	0.09	0.01	0.04122,113,113	0.23	122	0.86	0.06	0.94
	0.01	0.01	0.0115,117,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
145	0.07	0.17	0.0116,117,0	0.02	0.02	0.04134,113,113	0.11	134	0.86	0.06	0.94
	6.24e-03	0.02	0.0 116,4,0	0.02	7.61e-03	7.61e-03134,121,121			1.00	0.04	0.96
146	0.08	0.17	0.0112,117,0	0.09	0.02	0.04122,113,113	0.23	122	0.86	0.06	0.94
	6.24e-03	0.02	0.0 116,4,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
147	0.04	0.14	0.0112,113,0	0.02	0.02	0.04134,113,113	0.11	134	0.86	0.06	0.94
	2.11e-03	0.02	0.0 121,4,0	0.02	7.61e-03	7.61e-03134,121,121			1.00	0.04	0.96
148	0.04	0.14	0.0112,113,0	0.08	0.02	0.04122,113,113	0.22	122	0.86	0.06	0.94
	2.11e-03	0.02	0.0 121,4,0	0.08	7.61e-03	7.61e-03122,121,121			1.00	0.04	0.96
149	0.13	0.19	0.0112,113,0	0.06	0.02	0.06122,113,113	0.19	122	0.86	0.06	0.94
	0.06	0.04	0.0115,118,0	0.06	0.04	0.04122,118,118			1.00	0.04	0.96
150	0.13	0.19	0.0112,113,0	0.04	0.02	0.06122,113,113	0.15	122	0.86	0.06	0.94
	0.03	0.02	0.0115,118,0	0.04	0.02	0.02122,113,113			1.00	0.04	0.96
151	0.13	0.19	0.0112,113,0	0.07	7.51e-03	0.04122,113,113	0.21	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.07	0.04	0.04122,118,118			1.00	0.04	0.96
152	0.12	0.18	0.0112,113,0	0.08	4.39e-03	0.03122,115,113	0.22	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.08	0.03	0.03122,118,118			1.00	0.04	0.96
153	0.10	0.16	0.0112,113,0	0.09	7.79e-03	0.03122,113,113	0.23	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
154	0.08	0.14	0.0112,113,0	0.09	0.02	0.03122,117,113	0.23	122	0.86	0.06	0.94
	0.04	0.04	0.0115,118,0	0.09	0.02	0.02122,113,113			1.00	0.04	0.96
155	0.05	0.10	0.0112,113,0	0.08	0.02	0.03122,117,113	0.22	122	0.86	0.06	0.94
	0.01	0.02	0.0113,114,0	0.08	7.48e-03	7.48e-03122,117,117			1.00	0.04	0.96
156	0.07	0.12	0.0112,113,0	0.04	0.01	0.03122,113,113	0.15	122	0.86	0.06	0.94
	0.08	0.06	0.0115,118,0	0.04	0.01	0.01122,118,118			1.00	0.04	0.96
157	0.05	0.10	0.0112,113,0	0.03	0.01	0.03122,113,113	0.14	122	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.03	4.72e-03	4.72e-03122,118,118			1.00	0.04	0.96
158	0.08	0.12	0.0112,113,0	0.04	7.51e-03	0.03122,113,113	0.16	122	0.86	0.06	0.94
	0.10	0.07	0.0115,118,0	0.04	0.02	0.02122,118,118			1.00	0.04	0.96
159	0.08	0.12	0.0112,113,0	0.05	3.75e-03	0.03122,112,113	0.17	122	0.86	0.06	0.94
	0.10	0.07	0.0115,118,0	0.05	0.02	0.02122,118,118			1.00	0.04	0.96
160	0.07	0.12	0.0112,113,0	0.05	7.79e-03	0.03122,113,113	0.18	122	0.86	0.06	0.94
	0.09	0.07	0.0115,118,0	0.05	0.01	0.01122,118,118			1.00	0.04	0.96
161	0.06	0.11	0.0112,113,0	0.05	0.01	0.03122,113,113	0.18	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.05	0.01	0.01122,118,118			1.00	0.04	0.96
162	0.05	0.10	0.0112,113,0	0.05	0.01	0.02122,113,113	0.18	122	0.86	0.06	0.94
	0.02	0.02	0.0111,114,0	0.05	1.36e-03	1.36e-03122,113,113			1.00	0.04	0.96
163	0.08	0.11	0.0115,118,0	0.04	9.04e-03	0.02122,118,118	0.15	122	0.86	0.06	0.94
	0.09	0.07	0.0115,118,0	0.04	4.48e-03	4.48e-03122,118,118			1.00	0.04	0.96
164	0.07	0.10	0.0115,118,0	0.03	9.04e-03	0.02122,118,118	0.14	122	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.03	1.86e-03	1.86e-03122,115,115			1.00	0.04	0.96
165	0.09	0.11	0.0115,118,0	0.04	7.05e-03	0.02122,118,118	0.15	122	0.86	0.06	0.94
	0.10	0.08	0.0115,118,0	0.04	6.89e-03	6.89e-03122,118,118			1.00	0.04	0.96
166	0.09	0.11	0.0115,118,0	0.04	2.99e-03	0.02122,118,118	0.16	122	0.86	0.06	0.94
	0.10	0.08	0.0115,118,0	0.04	6.89e-03	6.89e-03122,118,118			1.00	0.04	0.96
167	0.09	0.11	0.0115,118,0	0.04	6.99e-03	0.02122,118,118	0.16	122	0.86	0.06	0.94
	0.09	0.07	0.0115,118,0	0.04	5.98e-03	5.98e-03122,118,118			1.00	0.04	0.96
168	0.08	0.10	0.0115,118,0	0.04	8.63e-03	0.02122,118,118	0.16	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.04	3.83e-03	3.83e-03122,115,115			1.00	0.04	0.96
169	0.06	0.09	0.0115,118,0	0.04	8.63e-03	0.02119,118,118	0.16	119	0.86	0.06	0.94
	0.02	0.02	0.0111,114,0	0.04	1.68e-03	1.68e-03119,126,126			1.00	0.04	0.96
170	0.14	0.15	0.0115,118,0	0.03	0.01	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.09	0.07	0.0115,118,0	0.03	8.21e-03	8.21e-03122,118,118			1.00	0.04	0.96
171	0.12	0.14	0.0115,118,0	0.03	0.01	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.03	1.86e-03	1.86e-03122,115,115			1.00	0.04	0.96
172	0.15	0.15	0.0115,118,0	0.03	7.09e-03	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.10	0.08	0.0115,118,0	0.03	0.01	0.01122,118,118			1.00	0.04	0.96
173	0.15	0.15	0.0115,118,0	0.03	3.52e-03	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.10	0.08	0.0115,118,0	0.03	0.01	0.01122,118,118			1.00	0.04	0.96
174	0.14	0.15	0.0115,118,0	0.03	7.07e-03	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.09	0.07	0.0115,118,0	0.03	0.01	0.01122,118,118			1.00	0.04	0.96
175	0.13	0.14	0.0115,118,0	0.03	9.91e-03	0.03122,118,118	0.14	122	0.86	0.06	0.94
	0.06	0.05	0.0115,118,0	0.03	7.87e-03	7.87e-03122,118,118			1.00	0.04	0.96

176	0.12	0.12	0.0115,118,0	0.03	9.91e-03	0.03119,118,118	0.14	119	0.86	0.06	0.94
	0.02	0.02	0.0111,114,0	0.03	1.82e-03	1.82e-03119,118,118			1.00	0.04	0.96
177	0.30	0.28	0.0115,118,0	0.03	0.02	0.07122,118,118	0.13	122	0.86	0.06	0.94
	0.08	0.06	0.0115,118,0	0.03	0.03	0.03122,118,118			1.00	0.04	0.96
178	0.30	0.28	0.0115,118,0	0.03	0.02	0.07122,118,118	0.13	122	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.03	0.01	0.01122,118,118			1.00	0.04	0.96
179	0.29	0.27	0.0115,118,0	0.03	7.09e-03	0.05122,118,118	0.13	122	0.86	0.06	0.94
	0.08	0.06	0.0115,118,0	0.03	0.03	0.03122,118,118			1.00	0.04	0.96
180	0.26	0.25	0.0115,118,0	0.03	3.81e-03	0.04122,118,118	0.13	122	0.86	0.06	0.94
	0.08	0.06	0.0115,118,0	0.03	0.02	0.02122,118,118			1.00	0.04	0.96
181	0.23	0.22	0.0115,118,0	0.03	7.07e-03	0.04122,118,118	0.12	122	0.86	0.06	0.94
	0.07	0.05	0.0115,118,0	0.03	0.02	0.02122,118,118			1.00	0.04	0.96
182	0.20	0.19	0.0111,114,0	0.02	0.01	0.04122,118,114	0.11	122	0.86	0.06	0.94
	0.05	0.04	0.0115,118,0	0.02	0.01	0.01122,118,118			1.00	0.04	0.96
183	0.15	0.15	0.0111,114,0	0.02	9.91e-03	0.03131,118,118	0.11	131	0.86	0.06	0.94
	0.02	0.02	0.0114,118,0	0.02	2.08e-03	2.08e-03131,121,121			1.00	0.04	0.96
184	0.30	0.28	0.0115,118,0	0.02	0.02	0.07122,118,118	0.11	122	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.02	0.03	0.03122,118,118			1.00	0.04	0.96
185	0.29	0.27	0.0115,118,0	0.02	4.27e-03	0.05134,115,118	0.10	134	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.02	0.03	0.03134,118,118			1.00	0.04	0.96
186	0.26	0.25	0.0115,118,0	0.01	3.81e-03	0.04134,118,118	0.09	134	0.86	0.06	0.94
	0.03	0.02	0.0115,118,0	0.01	0.02	0.02134,118,118			1.00	0.04	0.96
187	0.23	0.22	0.0115,118,0	0.01	6.25e-03	0.04134,118,118	0.08	134	0.86	0.06	0.94
	0.03	0.02	0.0115,118,0	0.01	0.02	0.02134,118,118			1.00	0.04	0.96
188	0.20	0.19	0.0111,114,0	0.01	0.01	0.04134,118,114	0.08	134	0.86	0.06	0.94
	0.02	0.02	0.0115,118,0	0.01	0.01	0.01134,118,118			1.00	0.04	0.96
189	0.17	0.16	0.0111,114,0	0.01	0.01	0.04134,118,114	0.08	134	0.86	0.06	0.94
	0.02	0.01	0.0118,115,0	0.01	9.84e-03	9.84e-03134,118,118			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.30 0.28 0.0 0.09 0.04 0.07 0.23

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
5	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.60 33.5 16 0.54 30.1 20 0.76 1.762e+04 1.455e+06 113

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
1	0.22	0.21	0.0115,118,0		0.10	3.13e-03	0.03112,115,118		0.24	112	0.86	0.06	0.94
	3.93e-03	3.17e-03	0.0113,115,0		0.10	1.89e-03	1.89e-03112,122,122				1.00	0.04	0.96
2	0.48	0.47	0.0113,112,0		0.08	1.65e-03	0.07112,135,112		0.22	112	0.86	0.06	0.94
	3.39e-03	2.49e-03	0.0113,112,0		0.08	8.54e-04	8.54e-04112,141,141				1.00	0.04	0.96
184	0.22	0.21	0.0115,118,0		0.10	3.13e-03	0.03112,115,118		0.24	112	0.86	0.06	0.94
	5.76e-03	4.09e-03	0.0118,115,0		0.10	1.89e-03	1.89e-03112,122,122				1.00	0.04	0.96
185	0.20	0.18	0.0115,118,0		0.09	1.81e-03	0.02112,126,122		0.23	112	0.86	0.06	0.94
	5.76e-03	4.09e-03	0.0118,115,0		0.09	1.78e-03	1.78e-03112,123,123				1.00	0.04	0.96
186	0.17	0.16	0.0119,122,0		0.09	1.81e-03	0.02112,126,126		0.24	112	0.86	0.06	0.94
	3.27e-03	2.22e-03	0.0118,115,0		0.09	7.28e-04	7.28e-04112,139,139				1.00	0.04	0.96
187	0.14	0.13	0.0119,122,0		0.10	1.69e-03	0.02112,122,122		0.24	112	0.86	0.06	0.94
	4.32e-03	2.70e-03	0.0113,115,0		0.10	1.16e-03	1.16e-03112,131,131				1.00	0.04	0.96
188	0.12	0.11	0.0119,122,0		0.10	2.55e-03	0.01112,124,122		0.24	112	0.86	0.06	0.94
	4.32e-03	2.70e-03	0.0113,115,0		0.10	1.49e-03	1.49e-03112,122,122				1.00	0.04	0.96
189	0.10	0.09	0.0119,122,0		0.10	2.55e-03	9.75e-03112,124,122		0.24	112	0.86	0.06	0.94
	8.19e-04	6.64e-04	0.0113,141,0		0.10	1.49e-03	1.49e-03112,122,122				1.00	0.04	0.96
190	0.22	0.21	0.0115,118,0		0.13	3.13e-03	0.03112,115,118		0.28	112	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0113,112,0		0.13	1.89e-03	1.89e-03112,122,122				1.00	0.04	0.96
191	0.22	0.21	0.0115,118,0		0.11	3.13e-03	0.03112,115,118		0.26	112	0.86	0.06	0.94
	5.55e-03	4.27e-03	0.0113,112,0		0.11	1.89e-03	1.89e-03112,122,122				1.00	0.04	0.96
192	0.20	0.18	0.0115,118,0		0.13	1.81e-03	0.02112,126,122		0.28	112	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0113,112,0		0.13	1.78e-03	1.78e-03112,123,123				1.00	0.04	0.96
193	0.17	0.16	0.0119,122,0		0.13	1.81e-03	0.02112,126,126		0.28	112	0.86	0.06	0.94
	3.55e-03	2.57e-03	0.0118,115,0		0.13	7.28e-04	7.28e-04112,139,139				1.00	0.04	0.96
194	0.14	0.13	0.0119,122,0		0.13	1.69e-03	0.02112,122,122		0.28	112	0.86	0.06	0.94
	4.37e-03	2.70e-03	0.0113,115,0		0.13	1.16e-03	1.16e-03112,131,131				1.00	0.04	0.96
195	0.12	0.11	0.0119,122,0		0.13	2.55e-03	0.01112,124,122		0.27	112	0.86	0.06	0.94
	4.37e-03	3.25e-03	0.0113,118,0		0.13	1.72e-03	1.72e-03112,119,119				1.00	0.04	0.96
196	0.10	0.09	0.0119,122,0		0.12	2.55e-03	9.75e-03112,124,122		0.26	112	0.86	0.06	0.94
	3.87e-03	3.25e-03	0.0115,118,0		0.12	1.72e-03	1.72e-03112,119,119				1.00	0.04	0.96
197	0.48	0.47	0.0113,112,0		0.13	1.65e-03	0.07112,135,112		0.28	112	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0113,112,0		0.13	8.54e-04	8.54e-04112,141,141				1.00	0.04	0.96
198	0.48	0.47	0.0113,112,0		0.11	1.65e-03	0.07112,135,112		0.26	112	0.86	0.06	0.94
	5.55e-03	4.27e-03	0.0113,112,0		0.11	8.54e-04	8.54e-04112,141,141				1.00	0.04	0.96

199	0.43	0.41	0.0113,112,0	0.13	1.33e-03	0.06112,133,112	0.28	112	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0113,112,0	0.13	8.14e-04	8.14e-04112,123,123			1.00	0.04	0.96
200	0.39	0.37	0.0113,112,0	0.13	1.12e-03	0.05112,125,112	0.28	112	0.86	0.06	0.94
	3.55e-03	2.57e-03	0.0118,115,0	0.13	2.95e-04	2.95e-04112,119,119			1.00	0.04	0.96
201	0.35	0.32	0.0113,112,0	0.13	1.36e-03	0.04112,131,112	0.28	112	0.86	0.06	0.94
	4.37e-03	2.58e-03	0.0113,115,0	0.13	5.19e-04	5.19e-04112,122,122			1.00	0.04	0.96
202	0.30	0.28	0.0113,112,0	0.13	2.30e-03	0.03112,131,112	0.27	112	0.86	0.06	0.94
	0.01	7.54e-03	0.0115,118,0	0.13	1.72e-03	1.72e-03112,119,119			1.00	0.04	0.96
203	0.27	0.24	0.0113,112,0	0.12	2.30e-03	0.03112,131,112	0.26	112	0.86	0.06	0.94
	0.01	7.54e-03	0.0115,118,0	0.12	1.72e-03	1.72e-03112,119,119			1.00	0.04	0.96
204	0.48	0.47	0.0113,112,0	0.08	1.65e-03	0.07112,135,112	0.22	112	0.86	0.06	0.94
	4.48e-03	3.14e-03	0.0113,112,0	0.08	8.54e-04	8.54e-04112,141,141			1.00	0.04	0.96
205	0.43	0.41	0.0113,112,0	0.06	1.33e-03	0.06112,133,112	0.19	112	0.86	0.06	0.94
	4.48e-03	3.14e-03	0.0113,112,0	0.06	8.14e-04	8.14e-04112,123,123			1.00	0.04	0.96
206	0.39	0.37	0.0113,112,0	0.05	1.12e-03	0.05116,125,112	0.17	116	0.86	0.06	0.94
	1.90e-03	1.37e-03	0.0118,115,0	0.05	2.40e-04	2.40e-04116,139,139			1.00	0.04	0.96
207	0.35	0.32	0.0113,112,0	0.04	1.36e-03	0.04111,131,112	0.16	111	0.86	0.06	0.94
	3.10e-03	2.03e-03	0.0118,115,0	0.04	5.02e-04	5.02e-04111,122,122			1.00	0.04	0.96
208	0.30	0.28	0.0113,112,0	0.04	2.30e-03	0.03111,131,112	0.15	111	0.86	0.06	0.94
	0.01	7.54e-03	0.0115,118,0	0.04	1.65e-03	1.65e-03111,119,119			1.00	0.04	0.96
209	0.27	0.24	0.0113,112,0	0.04	2.30e-03	0.03111,131,112	0.15	111	0.86	0.06	0.94
	0.01	7.54e-03	0.0115,118,0	0.04	1.65e-03	1.65e-03111,119,119			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.48 0.47 0.0 0.13 3.13e-03 0.07 0.28

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
6	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.83 38.2 19 0.69 31.6 19 0.97 2.966e+04 1.081e+06 118

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
6	0.0	0.04	0.0	0,4,0	0.20	2.31e-03	4.98e-03115,123,131	0.34	115	0.0	0.0	0.0	
	7.99e-03	7.96e-03	0.0118,115,0		0.20	1.29e-03	1.29e-03115,125,125			1.00	0.04	0.96	
7	0.53	0.61	0.0118,115,0		0.17	1.55e-03	0.10115,140,112	0.31	115	0.86	0.06	0.94	
	5.11e-03	3.84e-03	0.0118,115,0		0.17	7.34e-04	7.34e-04115,141,141			1.00	0.04	0.96	
138	1.17e-03	0.05	0.0	122,4,0	0.20	2.31e-03	6.47e-03115,123,119	0.34	115	0.86	0.06	0.94	
	0.01	9.61e-03	0.0118,115,0		0.20	1.29e-03	1.29e-03115,125,125			1.00	0.04	0.96	
140	0.01	0.07	0.0122,119,0		0.20	1.57e-03	9.17e-03115,122,119	0.35	115	0.86	0.06	0.94	
	0.01	9.61e-03	0.0118,115,0		0.20	1.00e-03	1.00e-03115,123,123			1.00	0.04	0.96	
142	0.02	0.08	0.0122,119,0		0.21	1.69e-03	0.01115,122,119	0.35	115	0.86	0.06	0.94	
	5.02e-03	4.42e-03	0.0118,115,0		0.21	6.02e-04	6.02e-04115,139,139			1.00	0.04	0.96	
144	0.02	0.08	0.0122,119,0		0.21	1.79e-03	0.01115,122,119	0.35	115	0.86	0.06	0.94	
	4.08e-03	6.10e-03	0.0117,112,0		0.21	8.66e-04	8.66e-04 115,4,4			1.00	0.04	0.96	
146	0.02	0.13	0.0	122,4,0	0.27	3.48e-03	0.02 115,4,4	0.40	115	0.86	0.06	0.94	
	6.97e-03	9.62e-03	0.0117,112,0		0.27	1.25e-03	1.25e-03 115,4,4			1.00	0.04	0.96	
148	0.10	0.14	0.0118,115,0		0.27	3.48e-03	0.02 115,4,4	0.40	115	0.86	0.06	0.94	
	6.97e-03	9.62e-03	0.0117,112,0		0.27	3.47e-03	3.47e-03115,119,119			1.00	0.04	0.96	
210	0.53	0.61	0.0118,115,0		0.20	2.31e-03	0.10115,123,112	0.34	115	0.86	0.06	0.94	
	0.01	9.61e-03	0.0118,115,0		0.20	1.29e-03	1.29e-03115,125,125			1.00	0.04	0.96	
211	0.53	0.61	0.0118,115,0		0.20	2.31e-03	0.10115,123,112	0.34	115	0.86	0.06	0.94	
	7.99e-03	7.96e-03	0.0118,115,0		0.20	1.29e-03	1.29e-03115,125,125			1.00	0.04	0.96	
212	0.48	0.54	0.0118,115,0		0.20	1.57e-03	0.08115,122,112	0.35	115	0.86	0.06	0.94	
	0.01	9.61e-03	0.0118,115,0		0.20	1.00e-03	1.00e-03115,123,123			1.00	0.04	0.96	
213	0.43	0.47	0.0118,115,0		0.21	1.69e-03	0.07115,122,112	0.35	115	0.86	0.06	0.94	
	5.02e-03	4.42e-03	0.0118,115,0		0.21	6.02e-04	6.02e-04115,139,139			1.00	0.04	0.96	
214	0.39	0.42	0.0118,115,0		0.21	1.79e-03	0.06115,122,115	0.35	115	0.86	0.06	0.94	
	4.08e-03	6.10e-03	0.0117,112,0		0.21	8.66e-04	8.66e-04 115,4,4			1.00	0.04	0.96	
215	0.34	0.37	0.0118,115,0		0.27	3.48e-03	0.05115,4,111	0.40	115	0.86	0.06	0.94	
	6.97e-03	9.62e-03	0.0117,112,0		0.27	3.47e-03	3.47e-03115,119,119			1.00	0.04	0.96	
216	0.29	0.31	0.0118,115,0		0.20	1.82e-03	0.04118,4,115	0.34	118	0.86	0.06	0.94	
	8.67e-04	6.28e-03	0.0	120,4,0	0.20	3.47e-03	3.47e-03118,119,119			1.00	0.04	0.96	
217	0.53	0.61	0.0118,115,0		0.17	1.55e-03	0.10115,140,112	0.31	115	0.86	0.06	0.94	
	7.15e-03	4.93e-03	0.0118,115,0		0.17	7.34e-04	7.34e-04115,141,141			1.00	0.04	0.96	
218	0.48	0.54	0.0118,115,0		0.13	1.21e-03	0.08115,132,112	0.27	115	0.86	0.06	0.94	
	7.15e-03	4.93e-03	0.0118,115,0		0.13	6.31e-04	6.31e-04115,120,120			1.00	0.04	0.96	
219	0.43	0.47	0.0118,115,0		0.10	9.18e-04	0.07115,124,112	0.25	115	0.86	0.06	0.94	
	3.12e-03	2.31e-03	0.0118,115,0		0.10	1.90e-04	1.90e-04115,142,142			1.00	0.04	0.96	
220	0.39	0.42	0.0118,115,0		0.09	1.24e-03	0.06115,134,115	0.23	115	0.86	0.06	0.94	
	1.92e-03	3.25e-03	0.0113,115,0		0.09	6.17e-04	6.17e-04115,122,122			1.00	0.04	0.96	
221	0.34	0.37	0.0118,115,0		0.08	1.77e-03	0.05115,131,111	0.22	112	0.86	0.06	0.94	
	1.92e-03	6.28e-03	0.0	113,4,0	0.08	1.47e-03	1.47e-03112,119,119			1.00	0.04	0.96	

222	0.29	0.31	0.0118,115,0	0.06	1.77e-03	0.04112,131,115	0.19	112	0.86	0.06	0.94
	0.0	6.28e-03	0.0	0,4,0	0.06	1.47e-03	1.47e-03112,119,119		0.0	0.0	0.0

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.53	0.61	0.0	0.27	3.48e-03	0.10	0.40

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
7	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.83	kN	17	0.69	kN	17	0.97	kN	kN m	112
		-38.2			-31.6			2.967e+04	-1.081e+06	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
5	0.0	0.04	0.0	0,4,0	0.20	2.31e-03	4.98e-03	113,121,141	0.34	113	0.0	0.0	0.0
	7.99e-03	7.96e-03	0.0112,113,0		0.20	1.29e-03	1.29e-03	113,119,119			1.00	0.04	0.96
8	0.53	0.61	0.0112,113,0		0.17	1.54e-03	0.10	113,134,118	0.31	113	0.86	0.06	0.94
	5.11e-03	3.84e-03	0.0112,113,0		0.17	7.28e-04	7.28e-04	113,131,131			1.00	0.04	0.96
223	0.53	0.61	0.0112,113,0		0.17	1.54e-03	0.10	113,134,118	0.31	113	0.86	0.06	0.94
	7.15e-03	4.92e-03	0.0112,113,0		0.17	7.28e-04	7.28e-04	113,131,131			1.00	0.04	0.96
224	0.53	0.61	0.0112,113,0		0.20	2.31e-03	0.10	113,121,118	0.34	113	0.86	0.06	0.94
	0.01	9.61e-03	0.0112,113,0		0.20	1.29e-03	1.29e-03	113,119,119			1.00	0.04	0.96
225	0.53	0.61	0.0112,113,0		0.20	2.31e-03	0.10	113,121,118	0.34	113	0.86	0.06	0.94
	7.99e-03	7.96e-03	0.0112,113,0		0.20	1.29e-03	1.29e-03	113,119,119			1.00	0.04	0.96
226	0.48	0.54	0.0112,113,0		0.13	1.21e-03	0.08	113,142,118	0.27	113	0.86	0.06	0.94
	7.15e-03	4.92e-03	0.0112,113,0		0.13	6.32e-04	6.32e-04	113,126,126			1.00	0.04	0.96
227	0.48	0.54	0.0112,113,0		0.20	1.58e-03	0.08	113,124,118	0.35	113	0.86	0.06	0.94
	0.01	9.61e-03	0.0112,113,0		0.20	1.00e-03	1.00e-03	113,121,121			1.00	0.04	0.96
228	0.43	0.47	0.0112,113,0		0.10	9.25e-04	0.07	113,124,118	0.25	113	0.86	0.06	0.94
	3.13e-03	2.32e-03	0.0112,113,0		0.10	1.91e-04	1.91e-04	113,132,132			1.00	0.04	0.96
229	0.43	0.47	0.0112,113,0		0.21	1.71e-03	0.07	113,124,118	0.35	113	0.86	0.06	0.94
	5.02e-03	4.42e-03	0.0112,113,0		0.21	6.24e-04	6.24e-04	113,133,133			1.00	0.04	0.96
230	0.39	0.42	0.0112,113,0		0.09	1.27e-03	0.06	113,140,113	0.23	113	0.86	0.06	0.94
	1.80e-03	3.36e-03	0.0116,113,0		0.09	5.09e-04	5.09e-04	113,119,119			1.00	0.04	0.96
231	0.39	0.42	0.0112,113,0		0.21	1.78e-03	0.06	113,124,113	0.35	113	0.86	0.06	0.94
	4.00e-03	6.13e-03	0.0111,118,0		0.21	8.55e-04	8.55e-04	113,4,4			1.00	0.04	0.96
232	0.34	0.37	0.0112,113,0		0.08	1.73e-03	0.05	113,141,117	0.22	113	0.86	0.06	0.94
	1.80e-03	6.57e-03	0.0	116,4,0	0.08	1.09e-03	1.09e-03	113,4,4			1.00	0.04	0.96
233	0.34	0.37	0.0112,113,0		0.27	3.45e-03	0.05	113,4,117	0.40	113	0.86	0.06	0.94
	7.00e-03	9.56e-03	0.0111,114,0		0.27	4.78e-03	4.78e-03	113,125,125			1.00	0.04	0.96
234	0.29	0.31	0.0112,113,0		0.06	1.73e-03	0.04	113,141,113	0.19	118	0.86	0.06	0.94
	0.0	6.57e-03	0.0	0,4,0	0.06	1.09e-03	1.09e-03	118,4,4			0.0	0.0	0.0
235	0.29	0.31	0.0112,113,0		0.20	1.83e-03	0.04	113,4,113	0.34	112	0.86	0.06	0.94
	4.00e-03	6.57e-03	0.0	122,4,0	0.20	4.78e-03	4.78e-03	113,125,125			1.00	0.04	0.96
236	1.18e-03	0.05	0.0	124,4,0	0.20	2.31e-03	6.47e-03	113,121,125	0.34	113	0.86	0.06	0.94
	0.01	9.61e-03	0.0112,113,0		0.20	1.29e-03	1.29e-03	113,119,119			1.00	0.04	0.96
237	0.01	0.07	0.0124,125,0		0.20	1.58e-03	9.18e-03	113,124,125	0.35	113	0.86	0.06	0.94
	0.01	9.61e-03	0.0112,113,0		0.20	1.00e-03	1.00e-03	113,121,121			1.00	0.04	0.96
238	0.02	0.08	0.0124,125,0		0.21	1.71e-03	0.01	113,124,125	0.35	113	0.86	0.06	0.94
	5.02e-03	4.42e-03	0.0112,113,0		0.21	6.24e-04	6.24e-04	113,133,133			1.00	0.04	0.96
239	0.02	0.08	0.0120,125,0		0.21	1.78e-03	0.01	113,124,125	0.35	113	0.86	0.06	0.94
	4.00e-03	6.13e-03	0.0111,118,0		0.21	8.55e-04	8.55e-04	113,4,4			1.00	0.04	0.96
240	0.02	0.13	0.0	120,4,0	0.27	3.45e-03	0.02	113,4,4	0.40	113	0.86	0.06	0.94
	7.00e-03	9.56e-03	0.0111,114,0		0.27	1.33e-03	1.33e-03	113,4,4			1.00	0.04	0.96
241	0.10	0.14	0.0112,113,0		0.27	3.45e-03	0.02	113,4,4	0.40	113	0.86	0.06	0.94
	7.00e-03	9.56e-03	0.0111,114,0		0.27	4.78e-03	4.78e-03	113,125,125			1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.53	0.61	0.0	0.27	4.78e-03	0.10	0.40

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
8	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.34	kN	28	0.34	kN	28	1.00	kN	kN m	113
		58.0			58.6			4.115e+04	-2.937e+06	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
4	0.30	0.28	0.0113,112,0		0.02	0.02	0.07	113,112,112	0.11	124	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.02	0.01	0.01	113,112,112			1.00	0.04	0.96
5	0.13	0.19	0.0118,115,0		0.04	0.03	0.06	113,115,115	0.15	124	0.86	0.06	0.94

	0.02	0.02	0.0112,113,0	0.04	0.02	0.02124,115,115			1.00	0.04	0.96
10	0.08	0.18	0.0118,115,0	0.02	0.03	0.06124,115,115	0.12	124	0.86	0.06	0.94
	0.02	0.02	0.0112,113,0	0.02	0.01	0.01124,112,112			1.00	0.04	0.96
236	0.13	0.20	0.0118,115,0	0.06	0.03	0.06124,115,115	0.19	124	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.06	0.04	0.04124,112,112			1.00	0.04	0.96
237	0.13	0.20	0.0118,115,0	0.07	7.61e-03	0.05124,123,115	0.21	124	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.07	0.04	0.04124,112,112			1.00	0.04	0.96
238	0.12	0.20	0.0118,115,0	0.08	7.27e-03	0.04124,113,115	0.22	124	0.86	0.06	0.94
	0.01	0.01	0.0112,112,0	0.08	0.03	0.03124,112,112			1.00	0.04	0.96
239	0.10	0.19	0.0118,115,0	0.09	0.01	0.04124,115,115	0.23	124	0.86	0.06	0.94
	0.01	0.01	0.0113,115,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
240	0.08	0.17	0.0118,111,0	0.09	0.02	0.04124,115,115	0.23	124	0.86	0.06	0.94
	6.82e-03	0.02	0.0118,120,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
241	0.04	0.14	0.0118,115,0	0.08	0.02	0.04124,115,115	0.22	124	0.86	0.06	0.94
	3.43e-03	0.02	0.0121,120,0	0.08	7.54e-03	7.54e-03124,111,111			1.00	0.04	0.96
242	0.10	0.20	0.0118,115,0	0.02	0.03	0.06124,115,115	0.12	124	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.02	0.02	0.02124,115,115			1.00	0.04	0.96
243	0.10	0.20	0.0118,115,0	0.01	7.61e-03	0.05140,123,115	0.09	140	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.01	0.02	0.02140,115,115			1.00	0.04	0.96
244	0.10	0.20	0.0118,115,0	0.01	7.27e-03	0.04140,113,115	0.09	140	0.86	0.06	0.94
	0.01	0.01	0.0112,113,0	0.01	8.08e-03	8.08e-03140,115,115			1.00	0.04	0.96
245	0.09	0.19	0.0118,115,0	0.02	0.01	0.04140,115,115	0.09	140	0.86	0.06	0.94
	6.82e-03	0.01	0.0118,115,0	0.02	7.26e-03	7.26e-03140,111,111			1.00	0.04	0.96
246	0.07	0.17	0.0114,111,0	0.02	0.02	0.04140,115,115	0.11	140	0.86	0.06	0.94
	6.82e-03	0.02	0.0118,120,0	0.02	7.50e-03	7.50e-03140,123,123			1.00	0.04	0.96
247	0.04	0.14	0.0118,115,0	0.02	0.02	0.04140,115,115	0.11	140	0.86	0.06	0.94
	3.43e-03	0.02	0.0121,120,0	0.02	7.50e-03	7.50e-03140,123,123			1.00	0.04	0.96
248	0.13	0.19	0.0118,115,0	0.06	0.02	0.06124,115,115	0.19	124	0.86	0.06	0.94
	0.06	0.04	0.0113,112,0	0.06	0.04	0.04124,112,112			1.00	0.04	0.96
249	0.13	0.19	0.0118,115,0	0.04	0.02	0.06124,115,115	0.15	124	0.86	0.06	0.94
	0.03	0.02	0.0113,112,0	0.04	0.02	0.02124,115,115			1.00	0.04	0.96
250	0.13	0.19	0.0118,115,0	0.07	7.51e-03	0.04124,115,115	0.21	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.07	0.04	0.04124,112,112			1.00	0.04	0.96
251	0.12	0.18	0.0118,115,0	0.08	4.39e-03	0.03124,113,115	0.22	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.08	0.03	0.03124,112,112			1.00	0.04	0.96
252	0.10	0.16	0.0118,115,0	0.09	7.79e-03	0.03124,115,115	0.23	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
253	0.08	0.14	0.0118,115,0	0.09	0.02	0.03124,111,115	0.23	124	0.86	0.06	0.94
	0.04	0.04	0.0113,112,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
254	0.05	0.10	0.0118,115,0	0.08	0.02	0.03124,111,115	0.22	124	0.86	0.06	0.94
	0.02	0.02	0.0117,116,0	0.08	7.54e-03	7.54e-03124,111,111			1.00	0.04	0.96
255	0.07	0.12	0.0118,115,0	0.04	0.01	0.03124,115,115	0.15	124	0.86	0.06	0.94
	0.08	0.06	0.0113,112,0	0.04	0.01	0.01124,112,112			1.00	0.04	0.96
256	0.05	0.10	0.0118,115,0	0.03	0.01	0.03124,115,115	0.14	124	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.03	4.72e-03	4.72e-03124,112,112			1.00	0.04	0.96
257	0.08	0.12	0.0118,115,0	0.04	7.51e-03	0.03124,115,115	0.16	124	0.86	0.06	0.94
	0.10	0.07	0.0113,112,0	0.04	0.02	0.02124,112,112			1.00	0.04	0.96
258	0.08	0.12	0.0118,115,0	0.05	3.76e-03	0.03124,118,115	0.17	124	0.86	0.06	0.94
	0.10	0.07	0.0113,112,0	0.05	0.02	0.02124,112,112			1.00	0.04	0.96
259	0.07	0.12	0.0118,115,0	0.05	7.79e-03	0.03124,115,115	0.18	124	0.86	0.06	0.94
	0.09	0.07	0.0113,112,0	0.05	0.01	0.01124,112,112			1.00	0.04	0.96
260	0.06	0.11	0.0118,115,0	0.05	0.01	0.03124,115,115	0.18	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.05	0.01	0.01124,112,112			1.00	0.04	0.96
261	0.05	0.10	0.0118,115,0	0.05	0.01	0.02124,115,115	0.18	124	0.86	0.06	0.94
	0.02	0.02	0.0121,120,0	0.05	1.29e-03	1.29e-03124,115,115			1.00	0.04	0.96
262	0.08	0.11	0.0113,112,0	0.04	9.04e-03	0.02124,112,112	0.15	124	0.86	0.06	0.94
	0.09	0.07	0.0113,112,0	0.04	4.48e-03	4.48e-03124,112,112			1.00	0.04	0.96
263	0.07	0.10	0.0113,112,0	0.03	9.04e-03	0.02124,112,112	0.14	124	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.03	1.86e-03	1.86e-03124,113,113			1.00	0.04	0.96
264	0.09	0.11	0.0113,112,0	0.04	7.05e-03	0.02124,112,112	0.15	124	0.86	0.06	0.94
	0.10	0.08	0.0113,112,0	0.04	6.89e-03	6.89e-03124,112,112			1.00	0.04	0.96
265	0.09	0.11	0.0113,112,0	0.04	2.99e-03	0.02124,112,112	0.16	124	0.86	0.06	0.94
	0.10	0.08	0.0113,112,0	0.04	6.89e-03	6.89e-03124,112,112			1.00	0.04	0.96
266	0.09	0.11	0.0113,112,0	0.04	7.00e-03	0.02124,112,112	0.16	124	0.86	0.06	0.94
	0.09	0.07	0.0113,112,0	0.04	5.97e-03	5.97e-03124,112,112			1.00	0.04	0.96
267	0.08	0.10	0.0113,112,0	0.04	8.62e-03	0.02124,112,112	0.16	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.04	3.84e-03	3.84e-03124,113,113			1.00	0.04	0.96
268	0.06	0.09	0.0113,112,0	0.04	8.62e-03	0.02125,112,112	0.16	125	0.86	0.06	0.94
	0.02	0.02	0.0121,120,0	0.04	1.52e-03	1.52e-03125,120,120			1.00	0.04	0.96
269	0.14	0.15	0.0113,112,0	0.03	0.01	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.09	0.07	0.0113,112,0	0.03	8.21e-03	8.21e-03124,112,112			1.00	0.04	0.96
270	0.12	0.14	0.0113,112,0	0.03	0.01	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.03	1.86e-03	1.86e-03124,113,113			1.00	0.04	0.96
271	0.15	0.15	0.0113,112,0	0.03	7.09e-03	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.10	0.08	0.0113,112,0	0.03	0.01	0.01124,112,112			1.00	0.04	0.96
272	0.15	0.15	0.0113,112,0	0.03	3.53e-03	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.10	0.08	0.0113,112,0	0.03	0.01	0.01124,112,112			1.00	0.04	0.96

273	0.14	0.15	0.0113,112,0	0.03	7.07e-03	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.09	0.07	0.0113,112,0	0.03	0.01	0.01124,112,112			1.00	0.04	0.96
274	0.13	0.14	0.0113,112,0	0.03	9.92e-03	0.03124,112,112	0.14	124	0.86	0.06	0.94
	0.06	0.05	0.0113,112,0	0.03	7.81e-03	7.81e-03124,112,112			1.00	0.04	0.96
275	0.12	0.12	0.0113,112,0	0.03	9.92e-03	0.03125,112,112	0.14	125	0.86	0.06	0.94
	0.02	0.02	0.0117,116,0	0.03	2.78e-03	2.78e-03125,120,120			1.00	0.04	0.96
276	0.30	0.28	0.0113,112,0	0.03	0.02	0.07124,112,112	0.13	124	0.86	0.06	0.94
	0.08	0.06	0.0113,112,0	0.03	0.03	0.03124,112,112			1.00	0.04	0.96
277	0.30	0.28	0.0113,112,0	0.03	0.02	0.07124,112,112	0.13	124	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.03	0.01	0.01124,112,112			1.00	0.04	0.96
278	0.29	0.27	0.0113,112,0	0.03	7.09e-03	0.05124,112,112	0.13	124	0.86	0.06	0.94
	0.08	0.06	0.0113,112,0	0.03	0.03	0.03124,112,112			1.00	0.04	0.96
279	0.26	0.25	0.0113,112,0	0.03	3.82e-03	0.04124,112,112	0.13	124	0.86	0.06	0.94
	0.08	0.06	0.0113,112,0	0.03	0.02	0.02124,112,112			1.00	0.04	0.96
280	0.23	0.22	0.0113,112,0	0.03	7.07e-03	0.04124,112,112	0.12	124	0.86	0.06	0.94
	0.07	0.05	0.0113,112,0	0.03	0.02	0.02124,112,112			1.00	0.04	0.96
281	0.20	0.19	0.0117,116,0	0.02	0.01	0.04124,112,116	0.11	124	0.86	0.06	0.94
	0.05	0.04	0.0113,112,0	0.02	0.01	0.01124,112,112			1.00	0.04	0.96
282	0.15	0.15	0.0117,116,0	0.02	9.92e-03	0.03141,112,112	0.11	141	0.86	0.06	0.94
	0.02	0.02	0.0112,116,0	0.02	2.78e-03	2.78e-03141,120,120			1.00	0.04	0.96
283	0.30	0.28	0.0113,112,0	0.02	0.02	0.07124,112,112	0.11	124	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.02	0.03	0.03124,112,112			1.00	0.04	0.96
284	0.29	0.27	0.0113,112,0	0.02	4.27e-03	0.05140,113,112	0.10	140	0.86	0.06	0.94
	0.04	0.03	0.0113,112,0	0.02	0.03	0.03140,112,112			1.00	0.04	0.96
285	0.26	0.25	0.0113,112,0	0.01	3.82e-03	0.04140,112,112	0.09	140	0.86	0.06	0.94
	0.03	0.02	0.0113,112,0	0.01	0.02	0.02140,112,112			1.00	0.04	0.96
286	0.23	0.22	0.0113,112,0	0.01	6.28e-03	0.04140,112,112	0.08	140	0.86	0.06	0.94
	0.03	0.02	0.0113,112,0	0.01	0.02	0.02140,112,112			1.00	0.04	0.96
287	0.20	0.19	0.0117,116,0	0.01	0.01	0.04140,112,116	0.08	140	0.86	0.06	0.94
	0.02	0.02	0.0113,112,0	0.01	0.01	0.01140,112,112			1.00	0.04	0.96
288	0.17	0.16	0.0117,116,0	0.01	0.01	0.04140,112,116	0.08	140	0.86	0.06	0.94
	0.02	0.01	0.0112,112,0	0.01	9.79e-03	9.79e-03140,112,112			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.30 0.28 0.0 0.09 0.04 0.07 0.23

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
9	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.60 -33.5 kN 22 0.54 -30.1 kN 18 0.76 1.761e+04 -1.455e+06 kN kN m 115

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
3	0.48	0.47	0.0115,118,0		0.08	1.65e-03	0.07118,129,118		0.22	118	0.86	0.06	0.94
	3.39e-03	2.48e-03	0.0115,118,0		0.08	8.53e-04	8.53e-04118,131,131				1.00	0.04	0.96
4	0.22	0.21	0.0113,112,0		0.10	3.13e-03	0.03118,113,112		0.24	118	0.86	0.06	0.94
	3.93e-03	3.17e-03	0.0115,113,0		0.10	1.90e-03	1.90e-03118,124,124				1.00	0.04	0.96
283	0.22	0.21	0.0113,112,0		0.10	3.13e-03	0.03118,113,112		0.24	118	0.86	0.06	0.94
	5.76e-03	4.09e-03	0.0112,113,0		0.10	1.90e-03	1.90e-03118,124,124				1.00	0.04	0.96
284	0.20	0.18	0.0113,112,0		0.09	1.82e-03	0.02118,120,124		0.23	118	0.86	0.06	0.94
	5.76e-03	4.09e-03	0.0112,113,0		0.09	1.78e-03	1.78e-03118,121,121				1.00	0.04	0.96
285	0.17	0.16	0.0125,124,0		0.09	1.82e-03	0.02118,120,120		0.23	118	0.86	0.06	0.94
	3.27e-03	2.22e-03	0.0112,113,0		0.09	7.30e-04	7.30e-04118,133,133				1.00	0.04	0.96
286	0.14	0.13	0.0125,124,0		0.10	1.70e-03	0.02118,124,124		0.24	118	0.86	0.06	0.94
	4.34e-03	2.72e-03	0.0115,113,0		0.10	1.14e-03	1.14e-03118,141,141				1.00	0.04	0.96
287	0.12	0.11	0.0125,124,0		0.10	2.54e-03	0.01118,122,124		0.24	118	0.86	0.06	0.94
	4.34e-03	2.72e-03	0.0115,113,0		0.10	1.61e-03	1.61e-03118,124,124				1.00	0.04	0.96
288	0.10	0.09	0.0125,124,0		0.10	2.54e-03	9.73e-03118,122,124		0.24	118	0.86	0.06	0.94
	8.07e-04	5.71e-04	0.0115,118,0		0.10	1.61e-03	1.61e-03118,124,124				1.00	0.04	0.96
289	0.22	0.21	0.0113,112,0		0.13	3.13e-03	0.03118,113,112		0.28	118	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0115,118,0		0.13	1.90e-03	1.90e-03118,124,124				1.00	0.04	0.96
290	0.22	0.21	0.0113,112,0		0.11	3.13e-03	0.03118,113,112		0.26	118	0.86	0.06	0.94
	5.55e-03	4.27e-03	0.0115,118,0		0.11	1.90e-03	1.90e-03118,124,124				1.00	0.04	0.96
291	0.20	0.18	0.0113,112,0		0.13	1.82e-03	0.02118,120,124		0.28	118	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0115,118,0		0.13	1.78e-03	1.78e-03118,121,121				1.00	0.04	0.96
292	0.17	0.16	0.0125,124,0		0.13	1.82e-03	0.02118,120,120		0.28	118	0.86	0.06	0.94
	3.58e-03	2.58e-03	0.0112,113,0		0.13	7.30e-04	7.30e-04118,133,133				1.00	0.04	0.96
293	0.14	0.13	0.0125,124,0		0.13	1.70e-03	0.02118,124,124		0.28	118	0.86	0.06	0.94
	4.64e-03	2.79e-03	0.0115,113,0		0.13	1.14e-03	1.14e-03118,141,141				1.00	0.04	0.96
294	0.12	0.11	0.0125,124,0		0.13	2.54e-03	0.01118,122,124		0.27	118	0.86	0.06	0.94
	5.29e-03	4.26e-03	0.0113,112,0		0.13	1.66e-03	1.66e-03118,125,125				1.00	0.04	0.96
295	0.10	0.09	0.0125,124,0		0.12	2.54e-03	9.73e-03118,122,124		0.26	118	0.86	0.06	0.94
	5.29e-03	4.26e-03	0.0113,112,0		0.12	1.66e-03	1.66e-03118,125,125				1.00	0.04	0.96

296	0.48	0.47	0.0115,118,0	0.13	1.65e-03	0.07118,129,118	0.28	118	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0115,118,0	0.13	8.53e-04	8.53e-04118,131,131			1.00	0.04	0.96
297	0.48	0.47	0.0115,118,0	0.11	1.65e-03	0.07118,129,118	0.26	118	0.86	0.06	0.94
	5.55e-03	4.27e-03	0.0115,118,0	0.11	8.53e-04	8.53e-04118,131,131			1.00	0.04	0.96
298	0.43	0.41	0.0115,118,0	0.13	1.33e-03	0.06118,139,118	0.28	118	0.86	0.06	0.94
	7.60e-03	5.46e-03	0.0115,118,0	0.13	8.15e-04	8.15e-04118,121,121			1.00	0.04	0.96
299	0.39	0.37	0.0115,118,0	0.13	1.12e-03	0.05118,119,118	0.28	118	0.86	0.06	0.94
	3.58e-03	2.58e-03	0.0112,113,0	0.13	2.94e-04	2.94e-04118,125,125			1.00	0.04	0.96
300	0.35	0.32	0.0115,118,0	0.13	1.37e-03	0.04118,141,118	0.28	118	0.86	0.06	0.94
	4.64e-03	2.79e-03	0.0115,113,0	0.13	5.17e-04	5.17e-04118,124,124			1.00	0.04	0.96
301	0.30	0.28	0.0115,118,0	0.13	2.30e-03	0.04118,141,118	0.27	118	0.86	0.06	0.94
	8.03e-03	5.75e-03	0.0113,112,0	0.13	1.66e-03	1.66e-03118,125,125			1.00	0.04	0.96
302	0.26	0.24	0.0115,118,0	0.12	2.30e-03	0.03118,141,118	0.26	118	0.86	0.06	0.94
	8.03e-03	5.75e-03	0.0113,112,0	0.12	1.66e-03	1.66e-03118,125,125			1.00	0.04	0.96
303	0.48	0.47	0.0115,118,0	0.08	1.65e-03	0.07118,129,118	0.22	118	0.86	0.06	0.94
	4.49e-03	3.14e-03	0.0115,118,0	0.08	8.53e-04	8.53e-04118,131,131			1.00	0.04	0.96
304	0.43	0.41	0.0115,118,0	0.06	1.33e-03	0.06118,139,118	0.19	118	0.86	0.06	0.94
	4.49e-03	3.14e-03	0.0115,118,0	0.06	8.15e-04	8.15e-04118,121,121			1.00	0.04	0.96
305	0.39	0.37	0.0115,118,0	0.05	1.12e-03	0.05114,119,118	0.17	114	0.86	0.06	0.94
	1.87e-03	1.35e-03	0.0112,113,0	0.05	2.43e-04	2.43e-04114,133,133			1.00	0.04	0.96
306	0.35	0.32	0.0115,118,0	0.04	1.37e-03	0.04117,141,118	0.16	117	0.86	0.06	0.94
	2.39e-03	1.56e-03	0.0112,113,0	0.04	5.08e-04	5.08e-04117,124,124			1.00	0.04	0.96
307	0.30	0.28	0.0115,118,0	0.04	2.30e-03	0.04117,141,118	0.15	117	0.86	0.06	0.94
	8.03e-03	5.75e-03	0.0113,112,0	0.04	1.59e-03	1.59e-03117,125,125			1.00	0.04	0.96
308	0.26	0.24	0.0115,118,0	0.04	2.30e-03	0.03114,141,118	0.15	114	0.86	0.06	0.94
	8.03e-03	5.75e-03	0.0113,112,0	0.04	1.59e-03	1.59e-03114,125,125			1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.48	0.47	0.0	0.13	3.13e-03	0.07	0.28

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
10	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm 16.0	NO	ok

V. connes.	V. piede Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.46	-12.9	23	0.16	-4.6	23	0.49	-6056.4 -4.388e+05	119

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
62	0.04	0.10	0.0119,122,0	0.01	2.97e-03	0.01119,126,122	0.09	119	0.86	0.06	0.94		
	0.0	6.97e-03	0.0	0,4,0	0.01	1.16e-03	1.16e-03119,120,120			0.0	0.0	0.0	0.0
64	0.0	0.07	0.0	0,4,0	5.57e-04	4.25e-03	9.93e-03119,123,121	0.02	119	0.0	0.0	0.0	0.0
	5.24e-03	0.02	0.0122,119,0	5.52e-04	1.79e-03	1.79e-03119,121,121				1.00	0.04	0.96	
75	0.02	0.08	0.0122,119,0	3.59e-03	4.15e-03	0.01119,120,123	0.05	119	0.86	0.06	0.94		
	0.0	8.30e-03	0.0	0,4,0	3.57e-03	1.50e-03	1.50e-03119,120,120			0.0	0.0	0.0	0.0
406	0.02	0.08	0.0122,119,0	4.13e-03	4.15e-03	0.01119,120,123	0.05	119	0.86	0.06	0.94		
	0.0	8.30e-03	0.0	0,4,0	4.11e-03	1.50e-03	1.50e-03119,120,120			0.0	0.0	0.0	0.0
407	0.04	0.10	0.0119,122,0	0.01	2.97e-03	0.01119,126,122	0.09	119	0.86	0.06	0.94		
	5.46e-04	6.97e-03	0.0	119,4,0	0.01	1.16e-03	1.16e-03119,120,120			1.00	0.04	0.96	
408	0.02	0.08	0.0122,119,0	4.67e-03	2.88e-03	0.01119,120,123	0.05	119	0.86	0.06	0.94		
	0.0	2.83e-03	0.0	0,4,0	4.65e-03	3.54e-04	3.54e-04119,121,121			0.0	0.0	0.0	0.0
409	0.03	0.09	0.0119,122,0	0.01	1.86e-03	0.01119,126,122	0.08	119	0.86	0.06	0.94		
	5.46e-04	2.55e-03	0.0119,122,0	0.01	3.32e-04	3.32e-04119,121,121				1.00	0.04	0.96	
410	0.01	0.07	0.0126,123,0	5.31e-03	1.66e-03	0.01119,120,123	0.06	119	0.86	0.06	0.94		
	9.42e-04	1.33e-03	0.0119,122,0	5.30e-03	1.52e-04	1.52e-04119,121,121				1.00	0.04	0.96	
411	0.02	0.08	0.0119,122,0	8.34e-03	1.41e-03	0.01119,120,126	0.07	119	0.86	0.06	0.94		
	2.03e-03	3.95e-03	0.0119,122,0	8.34e-03	1.10e-04	1.10e-04119,121,121				1.00	0.04	0.96	
412	3.24e-03	0.06	0.0	125,4,0	5.57e-03	1.95e-03	8.95e-03119,126,124	0.06	119	0.86	0.06	0.94	
	9.42e-04	3.01e-03	0.0	119,4,0	5.56e-03	2.54e-04	2.54e-04119,113,113			1.00	0.04	0.96	
413	5.52e-03	0.08	0.0	123,4,0	7.66e-03	2.57e-03	0.01119,120,126	0.07	119	0.86	0.06	0.94	
	2.93e-03	0.02	0.0	122,4,0	7.65e-03	3.26e-04	3.26e-04119,121,121			1.00	0.04	0.96	
414	0.0	0.06	0.0	0,4,0	5.57e-03	3.35e-03	8.93e-03119,126,119	0.06	119	0.0	0.0	0.0	0.0
	4.13e-04	7.24e-03	0.0	122,4,0	5.56e-03	7.02e-04	7.02e-04119,112,112			1.00	0.04	0.96	
415	0.0	0.08	0.0	0,4,0	7.66e-03	4.25e-03	0.01119,123,126	0.07	119	0.0	0.0	0.0	0.0
	5.24e-03	0.02	0.0122,119,0	7.65e-03	1.79e-03	1.79e-03119,121,121				1.00	0.04	0.96	
416	0.0	0.06	0.0	0,4,0	9.95e-04	3.35e-03	7.31e-03122,126,124	0.02	122	0.0	0.0	0.0	0.0
	0.0	7.24e-03	0.0	0,4,0	9.90e-04	7.02e-04	7.02e-04122,112,112			0.0	0.0	0.0	0.0
417	0.04	0.10	0.0119,122,0	0.01	3.27e-03	0.01119,123,122	0.09	119	0.86	0.06	0.94		
	1.09e-03	7.32e-03	0.0	119,4,0	0.01	1.30e-03	1.30e-03119,120,120			1.00	0.04	0.96	
418	0.04	0.10	0.0119,122,0	0.01	3.27e-03	0.01119,123,122	0.09	119	0.86	0.06	0.94		
	0.0	7.32e-03	0.0	0,4,0	0.01	1.30e-03	1.30e-03119,120,120			0.0	0.0	0.0	0.0
419	0.03	0.09	0.0119,122,0	0.02	2.20e-03	0.01119,126,122	0.10	119	0.86	0.06	0.94		
	1.09e-03	3.31e-03	0.0119,122,0	0.02	3.39e-04	3.39e-04119,121,121				1.00	0.04	0.96	
420	0.02	0.08	0.0119,122,0	0.02	1.41e-03	0.01119,120,126	0.10	119	0.86	0.06	0.94		
	2.78e-03	3.95e-03	0.0119,122,0	0.02	1.29e-04	1.29e-04119,120,120				1.00	0.04	0.96	

421	5.52e-03	0.08	0.0	123,4,0	0.02	2.57e-03	0.01119,120,126	0.10	119	0.86	0.06	0.94
	4.73e-03	0.02	0.0	122,4,0	0.02	3.26e-04	3.26e-04119,121,121			1.00	0.04	0.96
422	0.0	0.08	0.0	0,4,0	0.01	4.25e-03	0.01119,123,126	0.09	119	0.0	0.0	0.0
	7.05e-03	0.02	0.0122,119,0		0.01	1.79e-03	1.79e-03119,121,121			1.00	0.04	0.96
423	0.0	0.07	0.0	0,4,0	3.08e-03	4.25e-03	9.93e-03119,123,121	0.04	119	0.0	0.0	0.0
	7.05e-03	0.02	0.0122,119,0		3.07e-03	1.79e-03	1.79e-03119,121,121			1.00	0.04	0.96
424	0.02	0.08	0.0122,119,0		0.01	4.15e-03	0.01119,120,123	0.09	119	0.86	0.06	0.94
	1.09e-03	8.30e-03	0.0	119,4,0	0.01	1.50e-03	1.50e-03119,120,120			1.00	0.04	0.96
425	0.02	0.08	0.0122,119,0		0.01	4.15e-03	0.01119,120,123	0.09	119	0.86	0.06	0.94
	0.0	8.30e-03	0.0	0,4,0	0.01	1.50e-03	1.50e-03119,120,120			0.0	0.0	0.0
426	0.02	0.08	0.0122,119,0		0.02	2.88e-03	0.01119,120,123	0.10	119	0.86	0.06	0.94
	1.09e-03	3.31e-03	0.0119,122,0		0.02	3.54e-04	3.54e-04119,121,121			1.00	0.04	0.96
427	0.01	0.07	0.0126,123,0		0.02	1.66e-03	0.01119,120,123	0.10	119	0.86	0.06	0.94
	2.78e-03	3.03e-03	0.0119,122,0		0.02	1.52e-04	1.52e-04119,121,121			1.00	0.04	0.96
428	3.24e-03	0.06	0.0	125,4,0	0.02	2.17e-03	8.95e-03119,121,124	0.10	119	0.86	0.06	0.94
	4.73e-03	8.35e-03	0.0122,119,0		0.02	2.68e-04	2.68e-04119,113,113			1.00	0.04	0.96
429	0.0	0.06	0.0	0,4,0	0.01	3.57e-03	8.93e-03119,120,119	0.09	119	0.0	0.0	0.0
	7.05e-03	0.01	0.0122,119,0		0.01	1.21e-03	1.21e-03119,120,120			1.00	0.04	0.96
430	0.0	0.06	0.0	0,4,0	3.08e-03	3.57e-03	7.86e-03119,120,123	0.04	119	0.0	0.0	0.0
	7.05e-03	0.01	0.0122,119,0		3.07e-03	1.21e-03	1.21e-03119,120,120			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.04 0.10 0.0 0.02 4.25e-03 0.01 0.10

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
11	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.46 -12.9 29 0.16 -4.6 29 0.49 -6056.0 -4.393e+05 125

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
69	0.02	0.08	0.0124,125,0		0.01	4.15e-03	0.01125,120,121		0.09	125	0.86	0.06	0.94
	0.0	8.30e-03	0.0	0,4,0	0.01	1.50e-03	1.50e-03125,120,120				0.0	0.0	0.0
123	0.04	0.10	0.0125,124,0		0.01	2.97e-03	0.01125,126,124		0.09	125	0.86	0.06	0.94
	0.0	6.97e-03	0.0	0,4,0	0.01	1.16e-03	1.16e-03125,120,120				0.0	0.0	0.0
136	0.02	0.08	0.0124,125,0		3.60e-03	4.15e-03	0.01125,120,121		0.05	125	0.86	0.06	0.94
	0.0	8.30e-03	0.0	0,4,0	3.58e-03	1.50e-03	1.50e-03125,120,120				0.0	0.0	0.0
442	0.04	0.10	0.0125,124,0		0.01	3.27e-03	0.01125,123,124		0.09	125	0.86	0.06	0.94
	0.0	7.32e-03	0.0	0,4,0	0.01	1.30e-03	1.30e-03125,120,120				0.0	0.0	0.0
444	0.04	0.10	0.0125,124,0		0.01	2.97e-03	0.01125,126,124		0.09	125	0.86	0.06	0.94
	5.45e-04	6.97e-03	0.0	125,4,0	0.01	1.16e-03	1.16e-03125,120,120				1.00	0.04	0.96
445	0.04	0.10	0.0125,124,0		0.01	3.27e-03	0.01125,123,124		0.09	125	0.86	0.06	0.94
	1.09e-03	7.32e-03	0.0	125,4,0	0.01	1.30e-03	1.30e-03125,120,120				1.00	0.04	0.96
446	0.03	0.09	0.0125,124,0		0.01	1.86e-03	0.01125,126,124		0.08	125	0.86	0.06	0.94
	5.45e-04	2.55e-03	0.0125,124,0		0.01	3.32e-04	3.32e-04125,121,121				1.00	0.04	0.96
447	0.03	0.09	0.0125,124,0		0.02	2.20e-03	0.01125,126,124		0.10	125	0.86	0.06	0.94
	1.09e-03	3.31e-03	0.0125,124,0		0.02	3.39e-04	3.39e-04125,121,121				1.00	0.04	0.96
448	0.02	0.08	0.0125,124,0		8.36e-03	1.41e-03	0.01125,120,120		0.07	125	0.86	0.06	0.94
	2.04e-03	3.96e-03	0.0125,124,0		8.36e-03	1.10e-04	1.10e-04125,120,120				1.00	0.04	0.96
449	0.02	0.08	0.0125,124,0		0.02	1.41e-03	0.01125,120,120		0.10	125	0.86	0.06	0.94
	2.79e-03	3.96e-03	0.0125,124,0		0.02	1.29e-04	1.29e-04125,120,120				1.00	0.04	0.96
450	5.53e-03	0.08	0.0	121,4,0	7.68e-03	2.57e-03	0.01125,123,120		0.07	125	0.86	0.06	0.94
	2.96e-03	0.02	0.0	124,4,0	7.67e-03	3.26e-04	3.26e-04125,121,121				1.00	0.04	0.96
451	5.53e-03	0.08	0.0	121,4,0	0.02	2.57e-03	0.01125,123,120		0.10	125	0.86	0.06	0.94
	4.75e-03	0.02	0.0	124,4,0	0.02	3.26e-04	3.26e-04125,121,121				1.00	0.04	0.96
452	0.0	0.08	0.0	0,4,0	7.68e-03	4.25e-03	0.01125,120,120		0.07	125	0.0	0.0	0.0
	5.28e-03	0.02	0.0124,125,0		7.67e-03	1.79e-03	1.79e-03125,120,120				1.00	0.04	0.96
453	0.0	0.08	0.0	0,4,0	0.01	4.25e-03	0.01125,120,120		0.09	125	0.0	0.0	0.0
	7.07e-03	0.02	0.0124,125,0		0.01	1.79e-03	1.79e-03125,120,120				1.00	0.04	0.96
454	0.0	0.07	0.0	0,4,0	5.59e-04	4.25e-03	9.93e-03125,120,123		0.02	125	0.0	0.0	0.0
	5.28e-03	0.02	0.0124,125,0		5.53e-04	1.79e-03	1.79e-03125,120,120				1.00	0.04	0.96
455	0.0	0.07	0.0	0,4,0	3.09e-03	4.25e-03	9.93e-03125,120,123		0.04	125	0.0	0.0	0.0
	7.07e-03	0.02	0.0124,125,0		3.08e-03	1.79e-03	1.79e-03125,120,120				1.00	0.04	0.96
456	0.02	0.08	0.0124,125,0		0.01	4.15e-03	0.01125,120,121		0.09	125	0.86	0.06	0.94
	1.09e-03	8.30e-03	0.0	125,4,0	0.01	1.50e-03	1.50e-03125,120,120				1.00	0.04	0.96
457	0.02	0.08	0.0124,125,0		0.02	2.88e-03	0.01125,120,121		0.10	125	0.86	0.06	0.94
	1.09e-03	3.31e-03	0.0125,124,0		0.02	3.54e-04	3.54e-04125,121,121				1.00	0.04	0.96
458	0.01	0.07	0.0120,121,0		0.02	1.66e-03	0.01125,120,121		0.10	125	0.86	0.06	0.94
	2.79e-03	3.03e-03	0.0125,124,0		0.02	1.51e-04	1.51e-04125,120,120				1.00	0.04	0.96
459	3.26e-03	0.06	0.0	119,4,0	0.02	2.17e-03	8.96e-03125,120,122		0.10	125	0.86	0.06	0.94
	4.75e-03	8.36e-03	0.0124,125,0		0.02	2.68e-04	2.68e-04125,113,113				1.00	0.04	0.96
460	0.0	0.06	0.0	0,4,0	0.01	3.57e-03	8.93e-03125,121,125		0.09	125	0.0	0.0	0.0
	7.07e-03	0.01	0.0124,125,0		0.01	1.21e-03	1.21e-03125,120,120				1.00	0.04	0.96

461	0.0	0.06	0.0	0,4,0	3.09e-03	3.57e-03	7.86e-03	125,121,121	0.04	125	0.0	0.0	0.0
	7.07e-03	0.01	0.0124,125,0	3.08e-03	1.21e-03	1.21e-03	1.21e-03	125,120,120			1.00	0.04	0.96
462	0.02	0.08	0.0124,125,0	4.14e-03	4.15e-03	0.01125,120,121			0.05	125	0.86	0.06	0.94
	0.0	8.30e-03	0.0	0,4,0	4.12e-03	1.50e-03	1.50e-03	125,120,120			0.0	0.0	0.0
463	0.02	0.08	0.0124,125,0	4.68e-03	2.88e-03	0.01125,120,121			0.05	125	0.86	0.06	0.94
	0.0	2.83e-03	0.0	0,4,0	4.67e-03	3.54e-04	3.54e-04	125,121,121			0.0	0.0	0.0
464	0.01	0.07	0.0120,121,0	5.33e-03	1.66e-03	0.01125,120,121			0.06	125	0.86	0.06	0.94
	9.43e-04	1.33e-03	0.0125,124,0	5.32e-03	1.51e-04	1.51e-04	1.51e-04	125,120,120			1.00	0.04	0.96
465	3.26e-03	0.06	0.0	119,4,0	5.59e-03	1.95e-03	8.96e-03	125,126,122	0.06	125	0.86	0.06	0.94
	9.43e-04	3.01e-03	0.0	125,4,0	5.58e-03	2.54e-04	2.54e-04	125,113,113			1.00	0.04	0.96
466	0.0	0.06	0.0	0,4,0	5.59e-03	3.35e-03	8.93e-03	125,126,125	0.06	125	0.0	0.0	0.0
	4.19e-04	7.24e-03	0.0	124,4,0	5.58e-03	7.04e-04	7.04e-04	125,112,112			1.00	0.04	0.96
467	0.0	0.06	0.0	0,4,0	9.99e-04	3.35e-03	7.31e-03	124,126,122	0.02	124	0.0	0.0	0.0
	0.0	7.24e-03	0.0	0,4,0	9.93e-04	7.04e-04	7.04e-04	124,112,112			0.0	0.0	0.0
Nodo	V. 127	V. 128	V. 545		V. 129	V. 130	V. 131		V. D.26				
	0.04	0.10	0.0		0.02	4.25e-03	0.01		0.10				

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
12	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm 16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.89	kN 86.6	28	0.74	kN 72.5	28	0.74	kN 1.645e+04	kN m -8.705e+06	117

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
87	0.07	0.20	0.0124,125,0		0.13	9.48e-03	0.03125,113,121	0.28	125	0.86	0.06	0.94	
	0.03	0.03	0.0124,125,0		0.13	0.02	0.02125,114,114			1.00	0.04	0.96	
241	0.05	0.09	0.0118,115,0		0.07	0.01	0.02124,113,115	0.21	124	0.86	0.06	0.94	
	0.04	0.03	0.0113,118,0		0.07	0.01	0.01124,118,118			1.00	0.04	0.96	
247	0.04	0.09	0.0118,115,0		0.05	3.82e-03	0.01124,121,115	0.17	124	0.86	0.06	0.94	
	0.04	0.03	0.0113,118,0		0.05	0.02	0.02124,114,114			1.00	0.04	0.96	
254	0.05	0.09	0.0118,115,0		0.07	0.01	0.02124,113,115	0.21	124	0.86	0.06	0.94	
	0.02	0.01	0.0113,112,0		0.07	0.01	0.01124,118,118			1.00	0.04	0.96	
261	0.05	0.06	0.0113,112,0		0.05	5.55e-03	0.01125,118,115	0.17	125	0.86	0.06	0.94	
	0.02	0.01	0.0111,114,0		0.05	4.17e-03	4.17e-03	125,126,126		1.00	0.04	0.96	
268	0.07	0.07	0.0113,112,0		0.04	3.03e-03	0.01125,122,112	0.15	125	0.86	0.06	0.94	
	0.02	0.02	0.0115,118,0		0.04	1.80e-03	1.80e-03	125,112,112		1.00	0.04	0.96	
275	0.09	0.09	0.0113,112,0		0.03	6.40e-03	0.02125,122,120	0.13	125	0.86	0.06	0.94	
	0.02	0.02	0.0117,118,0		0.03	1.52e-03	1.52e-03	125,113,113		1.00	0.04	0.96	
282	0.15	0.13	0.0117,116,0		0.02	0.01	0.03141,118,112	0.10	141	0.86	0.06	0.94	
	0.02	0.02	0.0117,118,0		0.02	6.76e-03	6.76e-03	141,118,118		1.00	0.04	0.96	
288	0.15	0.13	0.0117,116,0		0.01	0.01	0.03135,118,112	0.08	135	0.86	0.06	0.94	
	0.01	0.01	0.0115,118,0		0.01	6.76e-03	6.76e-03	135,118,118		1.00	0.04	0.96	
468	0.04	0.09	0.0118,115,0		0.05	3.82e-03	0.01124,121,115	0.17	124	0.86	0.06	0.94	
	0.04	0.03	0.0113,118,0		0.05	0.02	0.02124,114,114			1.00	0.04	0.96	
469	0.02	0.03	0.0113,112,0		0.05	3.77e-03	7.66e-03	124,111,116	0.17	124	0.86	0.06	0.94
	0.05	0.04	0.0116,117,0		0.05	0.02	0.02124,114,114			1.00	0.04	0.96	
470	0.01	0.03	0.0	3,112,0	0.05	3.77e-03	7.66e-03	124,111,116	0.17	124	0.86	0.06	0.94
	0.05	0.04	0.0116,117,0		0.05	0.02	0.02124,114,114			1.00	0.04	0.96	
471	0.04	0.07	0.0118,115,0		0.05	2.70e-03	0.01124,114,112	0.17	124	0.86	0.06	0.94	
	0.03	0.03	0.0112,113,0		0.05	0.02	0.02124,113,113			1.00	0.04	0.96	
472	0.02	0.03	0.0113,112,0		0.05	1.59e-03	7.10e-03	124,117,112	0.17	124	0.86	0.06	0.94
	0.02	0.03	0.0116,117,0		0.05	8.82e-03	8.82e-03	124,113,113		1.00	0.04	0.96	
473	0.03	0.06	0.0118,115,0		0.04	3.86e-03	0.01124,117,116	0.16	124	0.86	0.06	0.94	
	0.02	0.02	0.0112,113,0		0.04	0.01	0.01124,113,113			1.00	0.04	0.96	
474	0.02	0.03	0.0113,112,0		0.04	3.12e-03	7.10e-03	124,117,112	0.16	124	0.86	0.06	0.94
	0.01	0.02	0.0116,117,0		0.04	6.02e-03	6.02e-03	124,113,113		1.00	0.04	0.96	
475	0.01	0.04	0.0118,115,0		0.04	5.39e-03	0.01124,117,112	0.16	124	0.86	0.06	0.94	
	0.05	0.04	0.0125,124,0		0.04	0.01	0.01124,125,125			1.00	0.04	0.96	
476	9.85e-03	0.03	0.0117,116,0		0.04	3.12e-03	6.32e-03	124,117,116	0.16	124	0.86	0.06	0.94
	0.03	0.03	0.0125,124,0		0.04	4.55e-03	4.55e-03	124,125,125		1.00	0.04	0.96	
477	9.85e-03	0.03	0.0	117,4,0	0.04	5.39e-03	8.97e-03	124,117,111	0.15	124	0.86	0.06	0.94
	0.05	0.04	0.0125,124,0		0.04	0.01	0.01124,125,125			1.00	0.04	0.96	
478	9.85e-03	0.03	0.0117,116,0		0.04	3.13e-03	6.54e-03	124,117,116	0.15	124	0.86	0.06	0.94
	0.03	0.03	0.0125,124,0		0.04	4.55e-03	4.55e-03	124,125,125		1.00	0.04	0.96	
479	9.30e-03	0.03	0.0117,116,0		0.03	3.13e-03	6.54e-03	124,117,116	0.12	124	0.86	0.06	0.94
	0.04	0.03	0.0125,124,0		0.03	4.06e-03	4.06e-03	124,125,125		1.00	0.04	0.96	
480	9.30e-03	0.03	0.0117,116,0		0.03	3.13e-03	6.54e-03	124,117,116	0.12	124	0.86	0.06	0.94
	0.03	0.03	0.0125,124,0		0.03	4.06e-03	4.06e-03	124,125,125		1.00	0.04	0.96	
481	0.02	4.29e-03	0.0	3,112,0	0.03	3.52e-03	3.52e-03	124,113,113	0.14	124	0.86	0.06	0.94
	0.07	0.06	0.0116,117,0		0.03	0.01	0.01124,116,116			1.00	0.04	0.96	
482	0.02	3.93e-04	0.0	3,120,0	0.03	3.52e-03	3.52e-03	124,113,113	0.14	124	0.86	0.06	0.94
	0.07	0.06	0.0116,117,0		0.03	0.01	0.01124,116,116			1.00	0.04	0.96	

483	0.01	7.52e-03	0.0113,112,0	0.03	1.80e-03	3.25e-03124,117,112	0.14	124	0.86	0.06	0.94
	0.03	0.03	0.0112,113,0	0.03	6.25e-03	6.25e-03124,112,112			1.00	0.04	0.96
484	9.83e-03	9.97e-03	0.0113,124,0	0.03	1.80e-03	3.91e-03124,117,116	0.14	124	0.86	0.06	0.94
	0.01	0.02	0.0116,117,0	0.03	1.81e-03	1.81e-03124,117,117			1.00	0.04	0.96
485	7.72e-03	0.01	0.0 125,11,0	0.03	1.79e-03	3.91e-03124,117,116	0.14	124	0.86	0.06	0.94
	0.02	0.03	0.0125,124,0	0.03	1.91e-03	1.91e-03124,125,125			1.00	0.04	0.96
486	4.73e-03	0.02	0.0 125,11,0	0.03	2.08e-03	3.69e-03124,125,124	0.14	124	0.86	0.06	0.94
	0.03	0.03	0.0125,124,0	0.03	1.91e-03	1.91e-03124,125,125			1.00	0.04	0.96
487	0.0	0.02	0.0 0,11,0	0.02	2.08e-03	3.69e-03124,125,124	0.12	124	0.0	0.0	0.0
	0.03	0.03	0.0125,124,0	0.02	9.95e-04	9.95e-04124,123,123			1.00	0.04	0.96
488	0.02	0.01	0.0 3,11,0	0.03	3.52e-03	3.70e-03125,113,125	0.14	125	0.86	0.06	0.94
	0.07	0.06	0.0116,117,0	0.03	0.01	0.01125,114,114			1.00	0.04	0.96
489	0.02	0.01	0.0 3,124,0	0.03	3.52e-03	3.52e-03125,113,113	0.13	125	0.86	0.06	0.94
	0.07	0.06	0.0116,117,0	0.03	0.01	0.01125,114,114			1.00	0.04	0.96
490	0.01	0.02	0.0 3,125,0	0.03	1.80e-03	5.01e-03125,117,125	0.14	125	0.86	0.06	0.94
	0.03	0.03	0.0112,113,0	0.03	5.53e-03	5.53e-03125,117,117			1.00	0.04	0.96
491	6.16e-03	0.03	0.0125,125,0	0.03	1.80e-03	5.01e-03125,117,125	0.14	125	0.86	0.06	0.94
	0.01	0.02	0.0124,125,0	0.03	2.32e-03	2.32e-03125,117,117			1.00	0.04	0.96
492	5.47e-03	0.04	0.0 124,4,0	0.03	1.58e-03	6.36e-03125,122,125	0.14	125	0.86	0.06	0.94
	0.02	0.03	0.0125,124,0	0.03	1.37e-03	1.37e-03125,117,117			1.00	0.04	0.96
493	1.93e-03	0.04	0.0 124,4,0	0.03	2.66e-03	6.36e-03125,122,125	0.14	125	0.86	0.06	0.94
	0.03	0.03	0.0125,124,0	0.03	1.10e-03	1.10e-03125,111,111			1.00	0.04	0.96
494	0.0	0.04	0.0 0,4,0	0.02	2.66e-03	6.31e-03124,122,125	0.10	124	0.0	0.0	0.0
	0.03	0.03	0.0125,124,0	0.02	1.10e-03	1.10e-03124,111,111			1.00	0.04	0.96
495	0.07	0.20	0.0124,125,0	0.13	9.48e-03	0.03125,113,121	0.28	125	0.86	0.06	0.94
	0.06	0.05	0.0112,113,0	0.13	0.02	0.02125,114,114			1.00	0.04	0.96
496	0.07	0.20	0.0124,125,0	0.13	9.48e-03	0.03125,113,121	0.28	125	0.86	0.06	0.94
	0.06	0.05	0.0112,113,0	0.13	0.02	0.02125,114,114			1.00	0.04	0.96
497	0.06	0.18	0.0124,125,0	0.07	3.91e-03	0.03125,121,125	0.20	125	0.86	0.06	0.94
	0.02	0.02	0.0112,113,0	0.07	5.53e-03	5.53e-03125,117,117			1.00	0.04	0.96
498	0.04	0.15	0.0124,125,0	0.04	1.85e-03	0.02125,120,125	0.15	125	0.86	0.06	0.94
	8.56e-03	0.01	0.0120,121,0	0.04	2.32e-03	2.32e-03125,117,117			1.00	0.04	0.96
499	0.03	0.13	0.0124,125,0	0.03	2.15e-03	0.02125,122,125	0.14	125	0.86	0.06	0.94
	0.02	0.03	0.0125,124,0	0.03	6.71e-04	6.71e-04125,116,116			1.00	0.04	0.96
500	0.01	0.11	0.0 124,4,0	0.03	3.28e-03	0.02125,122,125	0.14	125	0.86	0.06	0.94
	0.03	0.04	0.0125,124,0	0.03	1.10e-03	1.10e-03125,111,111			1.00	0.04	0.96
501	4.15e-03	0.09	0.0 124,4,0	0.02	3.28e-03	0.01125,122,125	0.10	125	0.86	0.06	0.94
	0.03	0.04	0.0125,124,0	0.02	1.10e-03	1.10e-03125,111,111			1.00	0.04	0.96
502	0.07	0.20	0.0124,125,0	0.13	9.48e-03	0.03125,113,121	0.28	125	0.86	0.06	0.94
	0.03	0.03	0.0124,125,0	0.13	0.02	0.02125,114,114			1.00	0.04	0.96
503	0.06	0.18	0.0124,125,0	0.07	3.91e-03	0.03125,121,125	0.20	125	0.86	0.06	0.94
	4.40e-03	0.01	0.0118,118,0	0.07	2.51e-03	2.51e-03125,113,113			1.00	0.04	0.96
504	0.04	0.15	0.0124,125,0	0.04	1.85e-03	0.02125,120,125	0.15	125	0.86	0.06	0.94
	5.59e-03	9.09e-03	0.0124,125,0	0.04	9.88e-04	9.88e-04125,113,113			1.00	0.04	0.96
505	0.03	0.13	0.0124,125,0	0.02	2.15e-03	0.02125,122,125	0.11	125	0.86	0.06	0.94
	0.02	0.03	0.0125,124,0	0.02	6.71e-04	6.71e-04125,116,116			1.00	0.04	0.96
506	0.01	0.11	0.0 124,4,0	0.02	3.28e-03	0.02125,122,125	0.10	125	0.86	0.06	0.94
	0.03	0.04	0.0125,124,0	0.02	6.50e-04	6.50e-04125,126,126			1.00	0.04	0.96
507	4.15e-03	0.09	0.0 124,4,0	3.14e-03	3.28e-03	0.01125,122,125	0.04	125	0.86	0.06	0.94
	0.03	0.04	0.0125,124,0	3.12e-03	6.50e-04	6.50e-04125,126,126			1.00	0.04	0.96
508	0.05	0.09	0.0118,115,0	0.08	0.01	0.02124,113,115	0.22	124	0.86	0.06	0.94
	0.04	0.03	0.0113,118,0	0.08	0.02	0.02124,118,118			1.00	0.04	0.96
509	0.05	0.08	0.0118,115,0	0.09	3.02e-03	0.01124,114,115	0.23	124	0.86	0.06	0.94
	0.03	0.03	0.0112,113,0	0.09	0.02	0.02124,118,118			1.00	0.04	0.96
510	0.03	0.07	0.0118,115,0	0.09	5.21e-03	0.01124,114,115	0.23	124	0.86	0.06	0.94
	0.03	0.02	0.0114,114,0	0.09	0.02	0.02124,118,118			1.00	0.04	0.96
511	0.02	0.05	0.0118,115,0	0.09	0.01	0.02124,117,111	0.23	124	0.86	0.06	0.94
	0.06	0.05	0.0117,116,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
512	0.03	0.06	0.0116,117,0	0.08	0.04	0.07124,116,117	0.22	124	0.86	0.06	0.94
	0.12	0.08	0.0125,116,0	0.08	0.02	0.02124,115,115			1.00	0.04	0.96
513	0.03	0.06	0.0116,117,0	0.07	0.04	0.07124,116,117	0.20	124	0.86	0.06	0.94
	0.12	0.08	0.0125,116,0	0.07	7.13e-03	7.13e-03124,125,125			1.00	0.04	0.96
526	0.05	0.09	0.0118,115,0	0.08	0.01	0.02124,113,115	0.22	124	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.08	0.02	0.02124,118,118			1.00	0.04	0.96
527	0.05	0.08	0.0118,115,0	0.09	3.02e-03	0.01124,114,115	0.23	124	0.86	0.06	0.94
	0.03	0.03	0.0111,114,0	0.09	0.02	0.02124,118,118			1.00	0.04	0.96
528	0.04	0.07	0.0118,115,0	0.09	6.41e-03	0.01124,114,115	0.23	124	0.86	0.06	0.94
	0.06	0.04	0.0114,111,0	0.09	0.02	0.02124,118,118			1.00	0.04	0.96
529	0.04	0.05	0.0114,111,0	0.09	0.01	0.02124,114,111	0.23	124	0.86	0.06	0.94
	0.08	0.06	0.0114,111,0	0.09	0.02	0.02124,115,115			1.00	0.04	0.96
530	0.05	0.06	0.0114,117,0	0.08	0.04	0.07124,116,117	0.22	124	0.86	0.06	0.94
	0.12	0.08	0.0125,116,0	0.08	0.02	0.02124,115,115			1.00	0.04	0.96
531	0.05	0.06	0.0114,117,0	0.07	0.04	0.07124,116,117	0.20	124	0.86	0.06	0.94
	0.12	0.08	0.0125,116,0	0.07	0.01	0.01124,125,125			1.00	0.04	0.96
532	0.05	0.06	0.0113,115,0	0.05	5.55e-03	0.01125,118,115	0.18	125	0.86	0.06	0.94
	0.04	0.03	0.0111,114,0	0.05	0.01	0.01125,118,118			1.00	0.04	0.96
533	0.05	0.06	0.0113,115,0	0.06	2.61e-03	0.01125,115,115	0.19	125	0.86	0.06	0.94

	0.06	0.04	0.0114,114,0	0.06	0.01	0.01125,118,118			1.00	0.04	0.96
534	0.05	0.06	0.0113,115,0	0.06	6.41e-03	0.01125,114,116	0.19	125	0.86	0.06	0.94
	0.07	0.05	0.0114,111,0	0.06	0.01	0.01125,118,118			1.00	0.04	0.96
535	0.04	0.05	0.0113,111,0	0.06	0.01	0.02125,114,111	0.19	125	0.86	0.06	0.94
	0.08	0.06	0.0114,111,0	0.06	9.25e-03	9.25e-03125,115,115			1.00	0.04	0.96
536	0.05	0.06	0.0114,111,0	0.06	0.01	0.03125,114,111	0.19	125	0.86	0.06	0.94
	0.08	0.06	0.0114,111,0	0.06	0.01	0.01125,125,125			1.00	0.04	0.96
537	0.05	0.06	0.0114,111,0	0.06	0.01	0.03125,116,111	0.18	125	0.86	0.06	0.94
	0.08	0.06	0.0117,116,0	0.06	0.01	0.01125,125,125			1.00	0.04	0.96
538	0.07	0.07	0.0113,112,0	0.04	3.03e-03	0.01125,122,115	0.16	125	0.86	0.06	0.94
	0.05	0.04	0.0114,111,0	0.04	4.59e-03	4.59e-03125,113,113			1.00	0.04	0.96
539	0.06	0.07	0.0113,112,0	0.05	2.28e-03	0.01125,118,115	0.17	125	0.86	0.06	0.94
	0.06	0.05	0.0118,118,0	0.05	4.62e-03	4.62e-03125,118,118			1.00	0.04	0.96
540	0.06	0.06	0.0113,112,0	0.05	5.18e-03	0.01125,114,116	0.17	125	0.86	0.06	0.94
	0.07	0.05	0.0114,111,0	0.05	5.94e-03	5.94e-03125,114,114			1.00	0.04	0.96
541	0.05	0.06	0.0117,116,0	0.05	6.41e-03	0.01125,114,111	0.17	125	0.86	0.06	0.94
	0.07	0.05	0.0114,111,0	0.05	7.84e-03	7.84e-03125,125,125			1.00	0.04	0.96
542	0.05	0.06	0.0117,116,0	0.05	6.41e-03	0.01125,114,111	0.17	125	0.86	0.06	0.94
	0.07	0.05	0.0114,111,0	0.05	7.84e-03	7.84e-03125,125,125			1.00	0.04	0.96
543	0.05	0.05	0.0117,115,0	0.04	4.27e-03	0.01125,111,111	0.16	125	0.86	0.06	0.94
	0.06	0.04	0.0114,111,0	0.04	6.61e-03	6.61e-03125,125,125			1.00	0.04	0.96
544	0.09	0.09	0.0117,112,0	0.03	6.40e-03	0.02125,122,120	0.14	125	0.86	0.06	0.94
	0.05	0.04	0.0114,111,0	0.03	4.37e-03	4.37e-03125,114,114			1.00	0.04	0.96
545	0.09	0.09	0.0117,116,0	0.03	3.18e-03	0.01125,114,116	0.14	125	0.86	0.06	0.94
	0.06	0.05	0.0118,118,0	0.03	8.52e-03	8.52e-03125,114,114			1.00	0.04	0.96
546	0.09	0.08	0.0117,116,0	0.03	2.87e-03	0.01125,114,116	0.14	125	0.86	0.06	0.94
	0.06	0.05	0.0118,118,0	0.03	9.00e-03	9.00e-03125,114,114			1.00	0.04	0.96
547	0.08	0.08	0.0117,116,0	0.03	3.15e-03	0.01125,114,116	0.14	125	0.86	0.06	0.94
	0.06	0.04	0.0118,115,0	0.03	9.00e-03	9.00e-03125,114,114			1.00	0.04	0.96
548	0.07	0.06	0.0117,116,0	0.03	3.15e-03	0.01125,114,116	0.14	125	0.86	0.06	0.94
	0.05	0.04	0.0118,115,0	0.03	7.60e-03	7.60e-03125,118,118			1.00	0.04	0.96
549	0.06	0.06	0.0117,116,0	0.03	2.24e-03	9.97e-03125,127,111	0.13	125	0.86	0.06	0.94
	0.04	0.03	0.0118,115,0	0.03	5.66e-03	5.66e-03125,113,113			1.00	0.04	0.96
550	0.15	0.13	0.0117,116,0	0.02	0.01	0.03141,118,112	0.10	141	0.86	0.06	0.94
	0.04	0.03	0.0114,111,0	0.02	0.02	0.02141,118,118			1.00	0.04	0.96
551	0.14	0.12	0.0117,116,0	0.02	3.62e-03	0.02141,114,116	0.11	141	0.86	0.06	0.94
	0.05	0.04	0.0115,118,0	0.02	0.02	0.02141,118,118			1.00	0.04	0.96
552	0.13	0.11	0.0117,116,0	0.02	2.18e-03	0.02141,117,116	0.11	141	0.86	0.06	0.94
	0.05	0.04	0.0115,118,0	0.02	0.01	0.01141,118,118			1.00	0.04	0.96
553	0.11	0.09	0.0117,116,0	0.02	2.18e-03	0.01141,117,116	0.11	141	0.86	0.06	0.94
	0.04	0.03	0.0115,118,0	0.02	0.01	0.01141,118,118			1.00	0.04	0.96
554	0.09	0.08	0.0113,112,0	0.02	9.02e-03	0.02141,122,124	0.10	141	0.86	0.06	0.94
	0.04	0.03	0.0141,141,0	0.02	9.24e-03	9.24e-03141,118,118			1.00	0.04	0.96
555	0.08	0.07	0.0117,116,0	0.01	9.02e-03	0.02141,122,124	0.09	141	0.86	0.06	0.94
	0.04	0.03	0.0141,141,0	0.01	9.24e-03	9.24e-03141,128,128			1.00	0.04	0.96
556	0.15	0.13	0.0117,116,0	0.01	0.01	0.03135,118,112	0.08	135	0.86	0.06	0.94
	0.02	0.02	0.0115,118,0	0.01	0.02	0.02135,118,118			1.00	0.04	0.96
557	0.14	0.12	0.0117,116,0	0.01	3.62e-03	0.02135,114,116	0.08	135	0.86	0.06	0.94
	0.02	0.02	0.0115,118,0	0.01	0.02	0.02135,118,118			1.00	0.04	0.96
558	0.13	0.11	0.0117,116,0	0.01	8.57e-04	0.02135,113,116	0.08	135	0.86	0.06	0.94
	0.02	0.01	0.0118,118,0	0.01	0.01	0.01135,118,118			1.00	0.04	0.96
559	0.11	0.09	0.0117,116,0	0.01	8.57e-04	0.01135,113,116	0.08	135	0.86	0.06	0.94
	0.02	0.01	0.0115,118,0	0.01	0.01	0.01135,118,118			1.00	0.04	0.96
560	0.09	0.08	0.0113,112,0	0.01	8.29e-03	0.01135,117,116	0.08	135	0.86	0.06	0.94
	0.01	7.66e-03	0.0118,115,0	0.01	9.24e-03	9.24e-03135,118,118			1.00	0.04	0.96
561	0.08	0.07	0.0117,116,0	9.88e-03	9.02e-03	0.02135,122,124	0.08	135	0.86	0.06	0.94
	0.04	0.03	0.0141,141,0	9.88e-03	9.24e-03	9.24e-03135,128,128			1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.15	0.20	0.0	0.13	0.04	0.07	0.28

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
13	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm 16.0	NO	NV

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
NV	0.90	kN -34.1	21	0.77	kN -29.1	21	1.00	kN 1.658e+04	kN m -4.587e+05	112

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
234	0.27	0.29	0.0112,113,0		0.07	3.17e-03	0.04117,134,113		0.20	117	0.86	0.06	0.94
	7.88e-04	4.97e-03	0.0113,112,0		0.07	1.67e-03	1.67e-03117,119,119				1.00	0.04	0.96
235	0.27	0.29	0.0112,113,0		0.25	3.17e-03	0.04117,134,113		0.38	117	0.86	0.06	0.94
	7.88e-04	4.97e-03	0.0113,112,0		0.25	1.67e-03	1.67e-03117,119,119				1.00	0.04	0.96
241	0.02	0.05	0.0120,121,0		0.25	1.32e-03	7.34e-03117,4,125		0.38	117	0.86	0.06	0.94

	0.0	3.47e-03	0.0	0,4,0	0.25	1.14e-03	1.14e-03	117,134,134		0.0	0.0	0.0	
508	0.02	0.06	0.0112,113,0		0.25	1.32e-03	7.34e-03	117,4,125	0.38	117	0.86	0.06	0.94
	4.33e-03	4.48e-03	0.0116,117,0		0.25	1.30e-03	1.30e-03	117,133,133			1.00	0.04	0.96
509	0.03	0.06	0.0112,117,0		0.22	1.30e-03	7.94e-03	117,121,121	0.36	117	0.86	0.06	0.94
	4.33e-03	4.48e-03	0.0116,117,0		0.22	1.30e-03	1.30e-03	117,133,133			1.00	0.04	0.96
510	0.03	0.06	0.0116,117,0		0.21	2.06e-03	8.30e-03	117,124,125	0.35	117	0.86	0.06	0.94
	2.76e-03	2.49e-03	0.0112,113,0		0.21	1.08e-03	1.08e-03	117,141,141			1.00	0.04	0.96
511	0.04	0.06	0.0116,117,0		0.19	2.54e-03	9.73e-03	117,125,125	0.34	117	0.86	0.06	0.94
	2.07e-03	2.13e-03	0.0111,114,0		0.19	9.98e-04	9.98e-04	117,133,133			1.00	0.04	0.96
512	0.04	0.06	0.0116,117,0		0.18	2.65e-03	9.73e-03	117,140,125	0.33	117	0.86	0.06	0.94
	3.10e-03	2.96e-03	0.0116,125,0		0.18	8.78e-04	8.78e-04	117,124,124			1.00	0.04	0.96
513	0.06	0.07	0.0116,117,0		0.18	2.89e-03	8.59e-03	117,140,125	0.33	117	0.86	0.06	0.94
	0.03	0.02	0.0125,124,0		0.18	1.82e-03	1.82e-03	117,113,113			1.00	0.04	0.96
514	0.27	0.29	0.0112,113,0		0.25	3.17e-03	0.04117,134,113		0.38	117	0.86	0.06	0.94
	4.33e-03	4.97e-03	0.0116,112,0		0.25	1.67e-03	1.67e-03	117,119,119			1.00	0.04	0.96
515	0.22	0.24	0.0112,113,0		0.22	2.16e-03	0.03117,134,117		0.36	117	0.86	0.06	0.94
	4.33e-03	4.48e-03	0.0116,117,0		0.22	1.30e-03	1.30e-03	117,133,133			1.00	0.04	0.96
516	0.18	0.20	0.0112,113,0		0.21	2.06e-03	0.02117,124,113		0.35	117	0.86	0.06	0.94
	2.76e-03	2.49e-03	0.0112,113,0		0.21	1.08e-03	1.08e-03	117,141,141			1.00	0.04	0.96
517	0.14	0.15	0.0112,113,0		0.19	2.54e-03	0.02117,125,113		0.34	117	0.86	0.06	0.94
	5.52e-03	4.18e-03	0.0123,126,0		0.19	9.98e-04	9.98e-04	117,133,133			1.00	0.04	0.96
518	0.10	0.12	0.0112,113,0		0.18	3.38e-03	0.01117,133,113		0.33	117	0.86	0.06	0.94
	0.03	0.02	0.0125,124,0		0.18	1.82e-03	1.82e-03	117,113,113			1.00	0.04	0.96
519	0.07	0.08	0.0112,113,0		0.15	3.38e-03	0.01117,133,113		0.30	117	0.86	0.06	0.94
	0.03	0.02	0.0125,124,0		0.15	1.82e-03	1.82e-03	117,113,113			1.00	0.04	0.96
520	0.27	0.29	0.0112,113,0		0.07	3.17e-03	0.04117,134,113		0.20	117	0.86	0.06	0.94
	7.88e-04	4.97e-03	0.0113,112,0		0.07	1.67e-03	1.67e-03	117,119,119			1.00	0.04	0.96
521	0.22	0.24	0.0112,113,0		0.06	2.16e-03	0.03117,134,117		0.19	117	0.86	0.06	0.94
	6.90e-04	1.71e-03	0.0 141,4,0		0.06	6.96e-04	6.96e-04	117,125,125			1.00	0.04	0.96
522	0.18	0.20	0.0112,113,0		0.06	1.18e-03	0.02117,124,113		0.19	117	0.86	0.06	0.94
	1.75e-03	1.43e-03	0.0125,124,0		0.06	4.69e-04	4.69e-04	117,140,140			1.00	0.04	0.96
523	0.14	0.15	0.0112,113,0		0.06	2.27e-03	0.02117,140,113		0.19	117	0.86	0.06	0.94
	5.52e-03	4.18e-03	0.0123,126,0		0.06	9.72e-04	9.72e-04	117,124,124			1.00	0.04	0.96
524	0.10	0.12	0.0112,113,0		0.06	3.38e-03	0.01117,133,113		0.19	117	0.86	0.06	0.94
	0.02	0.01	0.0114,111,0		0.06	1.60e-03	1.60e-03	117,125,125			1.00	0.04	0.96
525	0.07	0.08	0.0112,113,0		0.06	3.38e-03	0.01117,133,113		0.19	117	0.86	0.06	0.94
	0.02	0.01	0.0114,111,0		0.06	1.60e-03	1.60e-03	117,125,125			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.27 0.29 0.0 0.25 3.38e-03 0.04 0.38

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
14	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.82 18.7 19 0.73 16.5 19 0.80 1.181e+04 -6.315e+05 115

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
288	0.12	0.10	0.0125,124,0		0.04	0.02	0.03115,140,124		0.16	115	0.86	0.06	0.94
	6.10e-03	3.99e-03	0.0121,120,0		0.04	4.53e-03	4.53e-03	115,118,118			1.00	0.04	0.96
295	0.12	0.10	0.0125,124,0		0.05	0.02	0.03115,140,124		0.17	115	0.86	0.06	0.94
	6.84e-03	4.66e-03	0.0113,112,0		0.05	4.53e-03	4.53e-03	115,118,118			1.00	0.04	0.96
302	0.24	0.21	0.0115,118,0		0.05	4.93e-03	0.03115,127,118		0.17	115	0.86	0.06	0.94
	8.43e-03	5.65e-03	0.0113,112,0		0.05	2.73e-03	2.73e-03	115,111,111			1.00	0.04	0.96
308	0.24	0.21	0.0115,118,0		8.88e-03	4.93e-03	0.03115,127,118		0.07	115	0.86	0.06	0.94
	8.43e-03	5.65e-03	0.0113,112,0		8.88e-03	2.47e-03	2.47e-03	115,111,111			1.00	0.04	0.96
556	0.12	0.10	0.0125,124,0		0.04	0.02	0.03115,140,124		0.16	115	0.86	0.06	0.94
	6.10e-03	3.99e-03	0.0121,120,0		0.04	4.53e-03	4.53e-03	115,118,118			1.00	0.04	0.96
557	0.08	0.06	0.0117,116,0		0.04	3.14e-03	0.01115,124,124		0.15	115	0.86	0.06	0.94
	4.43e-03	3.11e-03	0.0112,113,0		0.04	2.22e-03	2.22e-03	115,139,139			1.00	0.04	0.96
558	0.06	0.05	0.0117,116,0		0.04	2.79e-03	7.32e-03	115,124,116	0.15	115	0.86	0.06	0.94
	2.84e-03	1.79e-03	0.0112,113,0		0.04	3.85e-03	3.85e-03	115,141,141			1.00	0.04	0.96
559	0.05	0.04	0.0117,116,0		0.04	5.00e-03	9.43e-03	115,125,124	0.15	115	0.86	0.06	0.94
	0.01	0.01	0.0141,129,0		0.04	6.10e-03	6.10e-03	115,128,128			1.00	0.04	0.96
560	0.04	0.03	0.0125,124,0		0.04	0.02	0.02115,141,140		0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0		0.04	0.02	0.02115,128,128				1.00	0.04	0.96
561	0.04	0.03	0.0125,124,0		0.04	0.02	0.02115,141,140		0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0		0.04	0.02	0.02115,128,128				1.00	0.04	0.96
562	0.12	0.10	0.0125,124,0		0.05	0.02	0.03115,140,124		0.17	115	0.86	0.06	0.94
	6.84e-03	4.66e-03	0.0113,112,0		0.05	4.53e-03	4.53e-03	115,118,118			1.00	0.04	0.96
563	0.08	0.08	0.0115,118,0		0.05	3.14e-03	0.01115,124,124		0.16	115	0.86	0.06	0.94
	4.43e-03	3.11e-03	0.0112,113,0		0.05	2.22e-03	2.22e-03	115,139,139			1.00	0.04	0.96
564	0.08	0.07	0.0115,118,0		0.04	2.79e-03	9.09e-03	115,124,118	0.16	115	0.86	0.06	0.94

	2.84e-03	1.86e-03	0.0112,141,0	0.04	3.85e-03	3.85e-03115,141,141			1.00	0.04	0.96
565	0.07	0.06	0.0115,118,0	0.04	5.00e-03	9.43e-03115,125,124	0.15	115	0.86	0.06	0.94
	0.01	0.01	0.0141,129,0	0.04	6.10e-03	6.10e-03115,128,128			1.00	0.04	0.96
566	0.06	0.05	0.0115,118,0	0.04	0.02	0.02115,141,140	0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0	0.04	0.02	0.02115,128,128			1.00	0.04	0.96
567	0.05	0.05	0.0115,118,0	0.04	0.02	0.02115,141,140	0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0	0.04	0.02	0.02115,128,128			1.00	0.04	0.96
568	0.24	0.21	0.0115,118,0	0.05	4.93e-03	0.03115,127,118	0.17	115	0.86	0.06	0.94
	8.43e-03	5.65e-03	0.0113,112,0	0.05	2.73e-03	2.73e-03115,111,111			1.00	0.04	0.96
569	0.21	0.19	0.0115,118,0	0.05	3.56e-03	0.03115,130,118	0.16	115	0.86	0.06	0.94
	3.01e-03	2.31e-03	0.0112,113,0	0.05	9.40e-04	9.40e-04115,118,118			1.00	0.04	0.96
570	0.19	0.17	0.0115,118,0	0.04	2.74e-03	0.02115,114,118	0.16	115	0.86	0.06	0.94
	2.57e-03	1.86e-03	0.0140,141,0	0.04	7.58e-04	7.58e-04115,141,141			1.00	0.04	0.96
571	0.17	0.15	0.0115,118,0	0.04	4.01e-03	0.02115,125,118	0.15	115	0.86	0.06	0.94
	4.96e-03	3.62e-03	0.0141,141,0	0.04	3.32e-03	3.32e-03115,141,141			1.00	0.04	0.96
572	0.15	0.13	0.0115,118,0	0.04	7.41e-03	0.02115,140,118	0.15	115	0.86	0.06	0.94
	0.03	0.02	0.0136,137,0	0.04	0.01	0.01115,129,129			1.00	0.04	0.96
573	0.13	0.12	0.0115,118,0	0.03	7.41e-03	0.02115,140,118	0.14	115	0.86	0.06	0.94
	0.03	0.02	0.0136,137,0	0.03	0.01	0.01115,129,129			1.00	0.04	0.96
574	0.24	0.21	0.0115,118,0	8.88e-03	4.93e-03	0.03115,127,118	0.07	115	0.86	0.06	0.94
	8.43e-03	5.65e-03	0.0113,112,0	8.88e-03	2.47e-03	2.47e-03115,111,111			1.00	0.04	0.96
575	0.21	0.19	0.0115,118,0	8.76e-03	3.56e-03	0.03115,130,118	0.07	115	0.86	0.06	0.94
	2.22e-03	1.64e-03	0.0112,113,0	8.75e-03	9.11e-04	9.11e-04115,114,114			1.00	0.04	0.96
576	0.19	0.17	0.0115,118,0	8.34e-03	2.74e-03	0.02115,114,118	0.07	115	0.86	0.06	0.94
	1.18e-03	8.00e-04	0.0129,141,0	8.34e-03	7.58e-04	7.58e-04115,141,141			1.00	0.04	0.96
577	0.17	0.15	0.0115,118,0	7.91e-03	4.01e-03	0.02115,125,118	0.07	115	0.86	0.06	0.94
	1.06e-03	8.00e-04	0.0140,141,0	7.91e-03	7.58e-04	7.58e-04115,141,141			1.00	0.04	0.96
578	0.15	0.13	0.0115,118,0	7.41e-03	4.01e-03	0.02115,125,118	0.07	115	0.86	0.06	0.94
	5.81e-03	4.21e-03	0.0136,137,0	7.41e-03	5.14e-03	5.14e-03115,141,141			1.00	0.04	0.96
579	0.13	0.12	0.0115,118,0	6.84e-03	3.56e-03	0.02115,125,118	0.06	115	0.86	0.06	0.94
	5.81e-03	4.21e-03	0.0136,137,0	6.84e-03	5.14e-03	5.14e-03115,141,141			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.24 0.21 0.0 0.05 0.02 0.03 0.17

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
15	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.82 -18.7 17 0.73 -16.5 17 0.80 1.181e+04 6.315e+05 113

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
189	0.12	0.10	0.0119,122,0		0.04	0.02	0.03113,134,122		0.16	113	0.86	0.06	0.94
	6.25e-03	4.12e-03	0.0119,122,0		0.04	4.86e-03	4.86e-03113,112,112				1.00	0.04	0.96
196	0.12	0.10	0.0119,122,0		0.05	0.02	0.03113,134,122		0.17	113	0.86	0.06	0.94
	6.25e-03	4.12e-03	0.0119,122,0		0.05	4.86e-03	4.86e-03113,112,112				1.00	0.04	0.96
203	0.24	0.21	0.0113,112,0		0.05	4.94e-03	0.03113,137,112		0.17	113	0.86	0.06	0.94
	0.01	7.49e-03	0.0115,118,0		0.05	2.74e-03	2.74e-03113,117,117				1.00	0.04	0.96
209	0.24	0.21	0.0113,112,0	8.89e-03	4.94e-03	0.03113,137,112		0.07	113	0.86	0.06	0.94	
	0.01	7.49e-03	0.0115,118,0	8.89e-03	2.43e-03	2.43e-03113,117,117					1.00	0.04	0.96
309	0.12	0.10	0.0119,122,0		0.04	0.02	0.03113,134,122		0.16	113	0.86	0.06	0.94
	6.25e-03	4.12e-03	0.0119,122,0		0.04	4.86e-03	4.86e-03113,112,112				1.00	0.04	0.96
311	0.08	0.06	0.0111,114,0		0.04	3.20e-03	0.01113,122,122		0.15	113	0.86	0.06	0.94
	4.61e-03	3.23e-03	0.0118,115,0		0.04	2.23e-03	2.23e-03113,133,133				1.00	0.04	0.96
313	0.06	0.05	0.0111,114,0		0.04	2.80e-03	7.39e-03113,122,114		0.15	113	0.86	0.06	0.94
	2.87e-03	1.80e-03	0.0118,115,0		0.04	3.84e-03	3.84e-03113,131,131				1.00	0.04	0.96
315	0.05	0.04	0.0111,114,0		0.04	5.01e-03	9.44e-03113,119,122		0.15	113	0.86	0.06	0.94
	0.01	0.01	0.0131,135,0		0.04	6.11e-03	6.11e-03113,138,138				1.00	0.04	0.96
317	0.04	0.03	0.0119,122,0		0.04	0.02	0.02113,131,134		0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0		0.04	0.02	0.02113,138,138				1.00	0.04	0.96
319	0.04	0.03	0.0119,122,0		0.04	0.02	0.02113,131,134		0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0		0.04	0.02	0.02113,138,138				1.00	0.04	0.96
580	0.24	0.21	0.0113,112,0	8.89e-03	4.94e-03	0.03113,137,112		0.07	113	0.86	0.06	0.94	
	0.01	7.49e-03	0.0115,118,0	8.89e-03	2.43e-03	2.43e-03113,117,117					1.00	0.04	0.96
581	0.24	0.21	0.0113,112,0		0.05	4.94e-03	0.03113,137,112		0.17	113	0.86	0.06	0.94
	0.01	7.49e-03	0.0115,118,0		0.05	2.74e-03	2.74e-03113,117,117				1.00	0.04	0.96
582	0.21	0.19	0.0113,112,0	8.77e-03	3.55e-03	0.03113,136,112		0.07	113	0.86	0.06	0.94	
	3.14e-03	2.24e-03	0.0118,115,0	8.77e-03	9.20e-04	9.20e-04113,116,116					1.00	0.04	0.96
583	0.21	0.19	0.0113,112,0		0.05	3.55e-03	0.03113,136,112		0.16	113	0.86	0.06	0.94
	3.14e-03	2.24e-03	0.0118,115,0		0.05	9.48e-04	9.48e-04113,112,112				1.00	0.04	0.96
584	0.19	0.17	0.0113,112,0	8.35e-03	2.75e-03	0.02113,116,112		0.07	113	0.86	0.06	0.94	
	1.26e-03	8.32e-04	0.0127,137,0	8.35e-03	7.50e-04	7.50e-04113,131,131					1.00	0.04	0.96
585	0.19	0.17	0.0113,112,0		0.04	2.75e-03	0.02113,116,112		0.16	113	0.86	0.06	0.94

586	2.54e-03	1.84e-03	0.0134,131,0	0.04	7.50e-04	7.50e-04	0.02113,119,112	0.07	113	1.00	0.04	0.96
	0.17	0.15	0.0113,112,0	7.92e-03	4.00e-03	0.02113,119,112				0.86	0.06	0.94
587	1.08e-03	8.10e-04	0.0134,131,0	7.92e-03	7.50e-04	7.50e-04	0.02113,119,112	0.15	113	1.00	0.04	0.96
	0.17	0.15	0.0113,112,0	0.04	4.00e-03	0.02113,119,112				0.86	0.06	0.94
588	4.96e-03	3.63e-03	0.0131,131,0	0.04	3.32e-03	3.32e-03	0.02113,119,112	0.07	113	1.00	0.04	0.96
	0.15	0.13	0.0113,112,0	7.42e-03	4.00e-03	0.02113,119,112				0.86	0.06	0.94
589	5.82e-03	4.21e-03	0.0130,127,0	7.42e-03	5.15e-03	5.15e-03	0.02113,131,131	0.15	113	1.00	0.04	0.96
	0.15	0.13	0.0113,112,0	0.04	7.41e-03	0.02113,134,112				0.86	0.06	0.94
	0.03	0.02	0.0130,127,0	0.04	0.01	0.01113,135,135				1.00	0.04	0.96
590	0.13	0.12	0.0113,112,0	6.85e-03	3.55e-03	0.02113,119,112	0.06	113	0.86	0.06	0.94	0.96
	5.82e-03	4.21e-03	0.0130,127,0	6.85e-03	5.15e-03	5.15e-03	0.02113,131,131	0.14	113	1.00	0.04	0.96
591	0.13	0.12	0.0113,112,0	0.03	7.41e-03	0.02113,134,112	0.17	113	0.86	0.06	0.94	0.96
	0.03	0.02	0.0130,127,0	0.03	0.01	0.01113,135,135				1.00	0.04	0.96
592	0.12	0.10	0.0119,122,0	0.05	0.02	0.03113,134,122	0.16	113	0.86	0.06	0.94	0.96
	6.25e-03	4.12e-03	0.0119,122,0	0.05	4.86e-03	4.86e-03	0.01113,122,122			1.00	0.04	0.96
593	0.08	0.08	0.0113,112,0	0.05	3.20e-03	0.01113,122,122	0.16	113	0.86	0.06	0.94	0.96
	4.61e-03	3.23e-03	0.0118,115,0	0.05	2.23e-03	2.23e-03	0.01113,133,133			1.00	0.04	0.96
594	0.08	0.07	0.0113,112,0	0.04	2.80e-03	9.09e-03	0.01113,122,112	0.15	113	0.86	0.06	0.94
	2.87e-03	1.84e-03	0.0118,131,0	0.04	3.84e-03	3.84e-03	0.01113,131,131			1.00	0.04	0.96
595	0.07	0.06	0.0113,112,0	0.04	5.01e-03	9.44e-03	0.01113,119,122	0.15	113	0.86	0.06	0.94
	0.01	0.01	0.0131,135,0	0.04	6.11e-03	6.11e-03	0.01113,138,138			1.00	0.04	0.96
596	0.06	0.05	0.0113,112,0	0.04	0.02	0.02113,131,134	0.15	113	0.86	0.06	0.94	0.96
	0.06	0.04	0.0138,135,0	0.04	0.02	0.02113,138,138				1.00	0.04	0.96
597	0.05	0.05	0.0113,112,0	0.04	0.02	0.02113,131,134	0.15	113	0.86	0.06	0.94	0.96
	0.06	0.04	0.0138,135,0	0.04	0.02	0.02113,138,138				1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.24	0.21	0.0	0.05	0.02	0.03	0.17

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
16	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	NV

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
NV	0.90	kN	15	0.77	kN	15	1.00	kN	kN m	118
		34.1			29.1			1.657e+04	4.588e+05	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
148	0.02	0.05	0.0126,123,0		0.25	1.42e-03	7.52e-03	0.04111,119,119	0.38	111	0.86	0.06	0.94
	8.28e-04	3.60e-03	0.0114,111,0		0.25	1.31e-03	1.31e-03	0.04111,124,124			1.00	0.04	0.96
216	0.27	0.29	0.0114,111,0		0.25	3.18e-03	0.04111,140,115	0.38	111	0.86	0.06	0.94	0.96
	2.27e-03	5.32e-03	0.0115,118,0		0.25	1.35e-03	1.35e-03	0.04111,141,141			1.00	0.04	0.96
222	0.27	0.29	0.0114,111,0		0.07	3.18e-03	0.04111,140,115	0.20	111	0.86	0.06	0.94	0.96
	2.27e-03	5.32e-03	0.0115,118,0		0.07	1.35e-03	1.35e-03	0.04111,141,141			1.00	0.04	0.96
345	0.02	0.06	0.0118,115,0		0.25	1.42e-03	7.53e-03	0.04111,119,119	0.38	111	0.86	0.06	0.94
	4.13e-03	4.34e-03	0.0114,111,0		0.25	1.31e-03	1.31e-03	0.04111,124,124			1.00	0.04	0.96
346	0.03	0.06	0.0118,111,0		0.22	1.32e-03	7.95e-03	0.04111,126,123	0.36	111	0.86	0.06	0.94
	4.13e-03	4.34e-03	0.0114,111,0		0.22	1.27e-03	1.27e-03	0.04111,139,139			1.00	0.04	0.96
347	0.03	0.06	0.0114,111,0		0.21	2.07e-03	8.30e-03	0.04111,122,119	0.35	111	0.86	0.06	0.94
	2.55e-03	2.35e-03	0.0118,115,0		0.21	1.03e-03	1.03e-03	0.04111,131,131			1.00	0.04	0.96
348	0.04	0.06	0.0114,111,0		0.19	2.54e-03	9.72e-03	0.04111,119,119	0.34	111	0.86	0.06	0.94
	2.07e-03	2.13e-03	0.0117,116,0		0.19	1.00e-03	1.00e-03	0.04111,139,139			1.00	0.04	0.96
349	0.04	0.06	0.0114,111,0		0.18	3.27e-03	9.72e-03	0.04111,134,119	0.33	111	0.86	0.06	0.94
	3.09e-03	2.95e-03	0.0114,111,0		0.18	8.75e-04	8.75e-04	0.04111,122,122			1.00	0.04	0.96
350	0.06	0.07	0.0114,111,0		0.18	3.27e-03	8.46e-03	0.04111,134,119	0.33	111	0.86	0.06	0.94
	0.03	0.02	0.0119,122,0		0.18	1.80e-03	1.80e-03	0.04111,115,115			1.00	0.04	0.96
598	0.27	0.29	0.0114,111,0		0.25	3.18e-03	0.04111,140,115	0.38	111	0.86	0.06	0.94	0.96
	4.13e-03	5.32e-03	0.0114,118,0		0.25	1.35e-03	1.35e-03	0.04111,141,141			1.00	0.04	0.96
599	0.22	0.24	0.0118,115,0		0.22	2.15e-03	0.03111,140,111	0.36	111	0.86	0.06	0.94	0.96
	4.13e-03	4.34e-03	0.0114,111,0		0.22	1.27e-03	1.27e-03	0.04111,139,139			1.00	0.04	0.96
600	0.18	0.20	0.0118,115,0		0.21	2.07e-03	0.02111,122,115	0.35	111	0.86	0.06	0.94	0.96
	2.55e-03	2.35e-03	0.0118,115,0		0.21	1.03e-03	1.03e-03	0.04111,131,131			1.00	0.04	0.96
601	0.14	0.15	0.0118,115,0		0.19	2.54e-03	0.02111,119,115	0.34	111	0.86	0.06	0.94	0.96
	5.63e-03	4.25e-03	0.0113,112,0		0.19	1.00e-03	1.00e-03	0.04111,139,139			1.00	0.04	0.96
602	0.10	0.12	0.0118,115,0		0.18	3.38e-03	0.01111,139,115	0.33	111	0.86	0.06	0.94	0.96
	0.03	0.02	0.0119,122,0		0.18	1.80e-03	1.80e-03	0.04111,115,115			1.00	0.04	0.96
603	0.07	0.08	0.0118,115,0		0.15	3.38e-03	0.01111,139,115	0.30	111	0.86	0.06	0.94	0.96
	0.03	0.02	0.0119,122,0		0.15	1.80e-03	1.80e-03	0.04111,115,115			1.00	0.04	0.96
604	0.27	0.29	0.0114,111,0		0.07	3.18e-03	0.04111,140,115	0.20	111	0.86	0.06	0.94	0.96
	2.27e-03	5.32e-03	0.0115,118,0		0.07	1.35e-03	1.35e-03	0.04111,141,141			1.00	0.04	0.96
605	0.22	0.24	0.0118,115,0		0.06	2.15e-03	0.03111,140,111	0.19	111	0.86	0.06	0.94	0.96
	7.28e-04	1.69e-03	0.0	139,4,0	0.06	6.30e-04	6.30e-04	0.04111,119,119			1.00	0.04	0.96
606	0.18	0.20	0.0118,115,0		0.06	1.19e-03	0.02111,122,115	0.19	111	0.86	0.06	0.94	0.96
	1.80e-03	1.46e-03	0.0119,122,0		0.06	4.69e-04	4.69e-04	0.04111,134,134			1.00	0.04	0.96
607	0.14	0.15	0.0118,115,0		0.06	2.27e-03	0.02111,134,115	0.19	111	0.86	0.06	0.94	0.96

	5.63e-03	4.25e-03	0.0113,112,0	0.06	9.74e-04	9.74e-04	111,122,122			1.00	0.04	0.96
608	0.10	0.12	0.0118,115,0	0.06	3.38e-03	0.01111,139,115	0.19	111	0.86	0.06	0.94	
	0.02	0.01	0.0116,117,0	0.06	1.62e-03	1.62e-03	111,119,119			1.00	0.04	0.96
609	0.07	0.08	0.0118,115,0	0.06	3.38e-03	0.01111,139,115	0.19	111	0.86	0.06	0.94	
	0.02	0.01	0.0116,117,0	0.06	1.62e-03	1.62e-03	111,119,119			1.00	0.04	0.96
Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26					
	0.27	0.29	0.0	0.25	3.38e-03	0.04	0.38					

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
17	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.35	kN	26	0.33	kN	26	0.52	kN	kN m	111
		42.1			39.3			2977.2	-2.976e+06	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
319	0.06	0.05	0.0116,117,0		0.01	2.41e-03	8.51e-03	0.0113,124,125	0.08	113	0.86	0.06	0.94
	0.01	6.82e-03	0.0129,128,0		0.01	7.05e-03	7.05e-03	0.0113,129,129			1.00	0.04	0.96
320	0.06	0.05	0.0116,117,0		0.01	3.17e-03	8.80e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0		0.01	7.05e-03	7.05e-03	0.0113,129,129			1.00	0.04	0.96
326	0.04	0.04	0.0111,114,0		0.01	3.17e-03	8.80e-03	0.0119,115,118	0.09	119	0.86	0.06	0.94
	0.04	0.03	0.0112,113,0		0.01	5.35e-03	5.35e-03	0.0119,111,111			1.00	0.04	0.96
332	0.04	0.04	0.0111,117,0		0.03	2.14e-03	0.0119,115,117		0.12	119	0.86	0.06	0.94
	0.06	0.04	0.0116,113,0		0.03	7.35e-03	7.35e-03	0.0119,119,119			1.00	0.04	0.96
338	0.04	0.05	0.0116,117,0		0.03	0.01	0.02119,111,114		0.14	119	0.86	0.06	0.94
	0.08	0.05	0.0116,117,0		0.03	0.01	0.0119,119,119				1.00	0.04	0.96
344	0.04	0.05	0.0116,117,0		0.04	0.02	0.04122,111,111		0.15	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0		0.04	0.01	0.0112,119,119				1.00	0.04	0.96
350	0.03	0.04	0.0114,111,0		0.04	0.02	0.04122,111,111		0.15	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0		0.04	0.03	0.03122,114,114				1.00	0.04	0.96
356	0.02	0.03	0.0114,111,0		0.01	0.01	0.02122,115,115		0.08	122	0.86	0.06	0.94
	0.09	0.06	0.0119,122,0		0.01	0.03	0.03122,114,114				1.00	0.04	0.96
363	6.38e-03	0.01	0.0 111,9,0		0.01	7.23e-03	9.42e-03	0.0122,114,114	0.08	122	0.86	0.06	0.94
	0.02	0.01	0.0119,122,0		0.01	8.78e-03	8.78e-03	0.0122,111,111			1.00	0.04	0.96
370	6.38e-03	8.84e-03	0.0 111,9,0		9.18e-03	5.16e-03	6.68e-03	0.0122,114,114	0.07	122	0.86	0.06	0.94
	0.01	4.56e-03	0.0118,115,0		9.18e-03	1.65e-03	1.65e-03	0.0122,119,119			1.00	0.04	0.96
377	0.02	0.03	0.0122,119,0		6.27e-03	4.12e-03	7.51e-03	0.0122,122,119	0.06	122	0.86	0.06	0.94
	0.02	5.29e-03	0.0118,115,0		6.27e-03	8.83e-04	8.83e-04	0.0122,116,116			1.00	0.04	0.96
384	0.02	0.03	0.0122,119,0		4.05e-03	5.00e-03	9.46e-03	0.0119,123,123	0.05	119	0.86	0.06	0.94
	0.02	6.19e-03	0.0118,115,0		4.04e-03	8.83e-04	8.83e-04	0.0119,116,116			1.00	0.04	0.96
390	0.02	0.03	0.0122,119,0		1.83e-04	5.00e-03	9.46e-03	0.0123,123,123	0.01	4	0.86	0.06	0.94
	0.02	6.19e-03	0.0118,115,0		1.82e-04	5.27e-04	5.27e-04	0.0111,111,111			1.00	0.04	0.96
611	0.06	0.05	0.0116,117,0		0.01	2.41e-03	8.51e-03	0.0113,124,125	0.08	113	0.86	0.06	0.94
	0.01	8.41e-03	0.0113,112,0		0.01	8.96e-03	8.96e-03	0.0113,113,113			1.00	0.04	0.96
612	0.06	0.05	0.0116,117,0		0.01	3.17e-03	8.80e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0		0.01	8.96e-03	8.96e-03	0.0113,113,113			1.00	0.04	0.96
613	0.05	0.04	0.0116,117,0		0.01	8.43e-04	5.53e-03	0.0113,112,113	0.08	113	0.86	0.06	0.94
	0.01	8.96e-03	0.0112,113,0		0.01	9.54e-03	9.54e-03	0.0113,113,113			1.00	0.04	0.96
614	0.05	0.04	0.0116,117,0		0.01	1.07e-03	6.34e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.04	0.03	0.0112,113,0		0.01	9.54e-03	9.54e-03	0.0113,113,113			1.00	0.04	0.96
615	0.03	0.03	0.0116,117,0		0.01	6.21e-04	4.04e-03	0.0113,112,117	0.08	113	0.86	0.06	0.94
	0.01	9.01e-03	0.0112,113,0		0.01	9.54e-03	9.54e-03	0.0113,113,113			1.00	0.04	0.96
616	0.03	0.03	0.0116,117,0		0.01	1.12e-03	5.43e-03	0.0113,114,114	0.08	113	0.86	0.06	0.94
	0.04	0.03	0.0112,113,0		0.01	9.54e-03	9.54e-03	0.0113,113,113			1.00	0.04	0.96
617	0.02	0.02	0.0116,117,0		0.01	6.67e-04	3.06e-03	0.0113,116,117	0.08	113	0.86	0.06	0.94
	0.01	9.01e-03	0.0112,113,0		0.01	9.12e-03	9.12e-03	0.0113,113,113			1.00	0.04	0.96
618	0.02	0.02	0.0116,117,0		0.01	1.12e-03	4.46e-03	0.0113,114,118	0.08	113	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0		0.01	9.12e-03	9.12e-03	0.0113,113,113			1.00	0.04	0.96
619	0.01	0.01	0.0115,118,0		0.01	7.52e-04	2.13e-03	0.0113,125,125	0.08	113	0.86	0.06	0.94
	8.07e-03	6.12e-03	0.0113,113,0		0.01	6.57e-03	6.57e-03	0.0113,113,113			1.00	0.04	0.96
620	0.01	0.01	0.0115,118,0		0.01	1.32e-03	3.32e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.02	0.02	0.0112,113,0		0.01	6.57e-03	6.57e-03	0.0113,113,113			1.00	0.04	0.96
621	3.32e-03	0.01	0.0 112,9,0		0.01	1.09e-03	1.91e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.01	4.70e-03	4.70e-03	0.0113,113,113			1.00	0.04	0.96
622	1.55e-03	0.01	0.0 115,9,0		0.01	1.32e-03	2.23e-03	0.0113,115,118	0.08	113	0.86	0.06	0.94
	0.02	0.01	0.0113,112,0		0.01	2.21e-03	2.21e-03	0.0113,113,113			1.00	0.04	0.96
623	0.04	0.04	0.0111,114,0		0.01	3.17e-03	8.80e-03	0.0119,115,118	0.09	119	0.86	0.06	0.94
	0.05	0.03	0.0113,112,0		0.01	7.11e-03	7.11e-03	0.0119,111,111			1.00	0.04	0.96
624	0.04	0.04	0.0111,114,0		0.01	1.98e-03	6.98e-03	0.0119,117,114	0.09	119	0.86	0.06	0.94
	0.05	0.04	0.0112,113,0		0.01	7.56e-03	7.56e-03	0.0119,113,113			1.00	0.04	0.96
625	0.03	0.03	0.0115,118,0		0.01	1.98e-03	6.98e-03	0.0119,117,114	0.09	119	0.86	0.06	0.94
	0.05	0.04	0.0112,113,0		0.01	7.56e-03	7.56e-03	0.0119,113,113			1.00	0.04	0.96
626	0.02	0.02	0.0115,118,0		0.01	1.76e-03	5.41e-03	0.0119,114,118	0.09	119	0.86	0.06	0.94

	0.05	0.03	0.0112,113,0	0.01	6.66e-03	6.66e-03119,113,113		1.00	0.04	0.96	
627	0.01	0.01	0.0115,118,0	0.01	1.87e-03	3.65e-03119,118,118	0.08	119	0.86	0.06	0.94
	0.03	0.03	0.0112,113,0	0.01	4.63e-03	4.63e-03119,113,113			1.00	0.04	0.96
628	1.55e-03	0.01	0.0 115,9,0	0.01	1.87e-03	2.91e-03119,118,118	0.08	119	0.86	0.06	0.94
	0.03	0.02	0.0113,112,0	0.01	4.86e-04	4.86e-04119,130,130			1.00	0.04	0.96
629	0.04	0.04	0.0111,117,0	0.03	3.95e-03	0.01119,116,117	0.12	119	0.86	0.06	0.94
	0.07	0.05	0.0113,112,0	0.03	9.32e-03	9.32e-03119,119,119			1.00	0.04	0.96
630	0.03	0.04	0.0111,114,0	0.02	3.95e-03	0.01119,116,117	0.12	119	0.86	0.06	0.94
	0.07	0.05	0.0113,112,0	0.02	9.32e-03	9.32e-03119,119,119			1.00	0.04	0.96
631	0.02	0.03	0.0115,118,0	0.02	3.62e-03	8.65e-03119,117,117	0.12	119	0.86	0.06	0.94
	0.06	0.05	0.0116,117,0	0.02	6.20e-03	6.20e-03119,116,116			1.00	0.04	0.96
632	0.02	0.02	0.0115,118,0	0.02	1.92e-03	5.41e-03119,114,118	0.12	119	0.86	0.06	0.94
	0.05	0.04	0.0112,113,0	0.02	3.88e-03	3.88e-03119,117,117			1.00	0.04	0.96
633	7.94e-03	0.01	0.0115,118,0	0.02	1.87e-03	3.65e-03119,118,118	0.12	119	0.86	0.06	0.94
	0.03	0.03	0.0112,113,0	0.02	1.83e-03	1.83e-03119,117,117			1.00	0.04	0.96
634	4.17e-04	0.01	0.0 115,11,0	0.02	1.87e-03	2.91e-03119,118,118	0.11	119	0.86	0.06	0.94
	0.03	0.02	0.0113,112,0	0.02	1.34e-03	1.34e-03119,114,114			1.00	0.04	0.96
635	0.04	0.05	0.0116,117,0	0.03	0.01	0.02119,111,114	0.14	119	0.86	0.06	0.94
	0.08	0.06	0.0117,116,0	0.03	0.01	0.01119,119,119			1.00	0.04	0.96
636	0.03	0.04	0.0111,114,0	0.03	8.89e-03	0.02119,116,117	0.14	119	0.86	0.06	0.94
	0.08	0.06	0.0117,116,0	0.03	9.32e-03	9.32e-03119,119,119			1.00	0.04	0.96
637	0.02	0.03	0.0115,118,0	0.03	3.91e-03	8.65e-03119,117,117	0.14	119	0.86	0.06	0.94
	0.06	0.05	0.0116,117,0	0.03	6.14e-03	6.14e-03119,113,113			1.00	0.04	0.96
638	0.01	0.02	0.0115,118,0	0.03	1.92e-03	5.39e-03119,114,118	0.14	119	0.86	0.06	0.94
	0.05	0.04	0.0112,113,0	0.03	6.14e-03	6.14e-03119,113,113			1.00	0.04	0.96
639	5.31e-03	0.01	0.0 115,11,0	0.03	1.78e-03	3.48e-03119,118,118	0.14	119	0.86	0.06	0.94
	0.03	0.02	0.0112,113,0	0.03	4.55e-03	4.55e-03119,113,113			1.00	0.04	0.96
640	0.0	0.01	0.0 0,11,0	0.03	1.78e-03	2.77e-03119,118,118	0.13	119	0.0	0.0	0.0
	0.02	0.01	0.0113,112,0	0.03	1.34e-03	1.34e-03119,114,114			1.00	0.04	0.96
641	0.04	0.05	0.0116,117,0	0.04	0.02	0.04122,111,111	0.15	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.04	0.02	0.02122,112,112			1.00	0.04	0.96
642	0.02	0.03	0.0112,113,0	0.04	8.89e-03	0.02122,116,117	0.15	122	0.86	0.06	0.94
	0.08	0.06	0.0117,116,0	0.04	0.02	0.02122,112,112			1.00	0.04	0.96
643	0.01	0.02	0.0112,113,0	0.04	3.91e-03	8.41e-03122,117,117	0.15	122	0.86	0.06	0.94
	0.06	0.04	0.0116,117,0	0.04	0.01	0.01122,112,112			1.00	0.04	0.96
644	5.27e-03	0.02	0.0115,118,0	0.04	1.56e-03	4.24e-03122,117,117	0.15	122	0.86	0.06	0.94
	0.04	0.03	0.0116,117,0	0.04	0.01	0.01122,113,113			1.00	0.04	0.96
645	1.89e-03	0.01	0.0 115,11,0	0.04	1.50e-03	2.84e-03122,115,118	0.15	122	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	0.04	7.04e-03	7.04e-03122,113,113			1.00	0.04	0.96
646	0.0	0.01	0.0 0,11,0	0.03	1.50e-03	2.37e-03119,115,118	0.14	119	0.0	0.0	0.0
	0.02	0.01	0.0119,122,0	0.03	1.64e-03	1.64e-03119,112,112			1.00	0.04	0.96
647	0.03	0.04	0.0114,111,0	0.04	0.02	0.04122,111,111	0.15	122	0.86	0.06	0.94
	0.12	0.08	0.0111,114,0	0.04	0.03	0.03122,114,114			1.00	0.04	0.96
648	8.90e-03	0.02	0.0 114,11,0	0.04	8.09e-03	0.01122,114,117	0.15	122	0.86	0.06	0.94
	0.07	0.05	0.0114,111,0	0.04	0.02	0.02122,112,112			1.00	0.04	0.96
649	5.06e-03	0.02	0.0 114,11,0	0.04	2.33e-03	5.14e-03122,117,117	0.15	122	0.86	0.06	0.94
	0.04	0.03	0.0116,117,0	0.04	0.01	0.01122,112,112			1.00	0.04	0.96
650	3.02e-03	0.02	0.0 114,11,0	0.04	1.11e-03	3.05e-03122,117,116	0.15	122	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	0.04	0.01	0.01122,113,113			1.00	0.04	0.96
651	1.02e-03	0.01	0.0 114,11,0	0.04	1.68e-03	2.60e-03122,112,116	0.15	122	0.86	0.06	0.94
	0.02	0.01	0.0119,122,0	0.04	7.04e-03	7.04e-03122,113,113			1.00	0.04	0.96
652	0.0 9.71e-03	0.0 0,11,0	0.03	1.68e-03	2.44e-03119,112,112	0.14	119	0.0	0.0	0.0	
	0.02	0.01	0.0119,122,0	0.03	3.24e-03	3.24e-03119,123,123			1.00	0.04	0.96
653	0.02	0.03	0.0114,111,0	0.01	0.01	0.02122,115,115	0.08	122	0.86	0.06	0.94
	0.09	0.06	0.0119,122,0	0.01	0.03	0.03122,114,114			1.00	0.04	0.96
654	0.01	0.02	0.0111,111,0	0.01	3.36e-03	7.21e-03122,114,111	0.08	122	0.86	0.06	0.94
	0.05	0.03	0.0114,111,0	0.01	8.32e-03	8.32e-03122,114,114			1.00	0.04	0.96
655	7.92e-03	0.01	0.0111,111,0	0.01	1.24e-03	4.55e-03122,117,114	0.08	122	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	0.01	3.91e-03	3.91e-03122,118,118			1.00	0.04	0.96
656	5.20e-03	0.01	0.0 116,11,0	0.01	1.50e-03	3.96e-03122,117,117	0.08	122	0.86	0.06	0.94
	0.02	0.01	0.0116,117,0	0.01	3.91e-03	3.91e-03122,118,118			1.00	0.04	0.96
657	2.28e-03	0.01	0.0 116,9,0	0.01	2.35e-03	3.48e-03122,112,117	0.08	122	0.86	0.06	0.94
	0.02	0.02	0.0119,122,0	0.01	3.28e-03	3.28e-03122,118,118			1.00	0.04	0.96
658	0.0	0.01	0.0 0,9,0	8.95e-03	2.35e-03	3.27e-03122,112,113	0.07	122	0.0	0.0	0.0
	0.02	0.02	0.0119,122,0	8.95e-03	3.24e-03	3.24e-03122,123,123			1.00	0.04	0.96
659	0.01	0.01	0.0111,114,0	0.01	7.23e-03	9.42e-03122,114,114	0.08	122	0.86	0.06	0.94
	0.03	0.02	0.0114,111,0	0.01	8.78e-03	8.78e-03122,111,111			1.00	0.04	0.96
660	0.01	0.01	0.0119,114,0	0.01	1.80e-03	5.09e-03122,125,117	0.08	122	0.86	0.06	0.94
	0.03	0.02	0.0114,111,0	0.01	8.32e-03	8.32e-03122,114,114			1.00	0.04	0.96
661	0.01	0.01	0.0119,114,0	0.01	1.32e-03	4.61e-03122,114,117	0.08	122	0.86	0.06	0.94
	0.02	0.02	0.0114,111,0	0.01	3.17e-03	3.17e-03122,114,114			1.00	0.04	0.96
662	8.82e-03	0.01	0.0 119,9,0	0.01	1.99e-03	4.61e-03122,125,117	0.08	122	0.86	0.06	0.94
	0.02	0.01	0.0116,114,0	0.01	1.73e-03	1.73e-03122,117,117			1.00	0.04	0.96
663	5.89e-03	0.01	0.0 119,9,0	0.01	3.13e-03	4.50e-03122,113,125	0.08	122	0.86	0.06	0.94
	0.02	0.02	0.0119,122,0	0.01	1.47e-03	1.47e-03122,118,118			1.00	0.04	0.96
664	1.69e-03	0.01	0.0 119,9,0	9.25e-03	3.13e-03	4.39e-03122,113,117	0.07	122	0.86	0.06	0.94
	0.02	0.02	0.0119,122,0	9.25e-03	1.18e-03	1.18e-03122,126,126			1.00	0.04	0.96

665	0.01	9.54e-03	0.0111,114,0	0.01	5.16e-03	6.68e-03122,114,114	0.08	122	0.86	0.06	0.94
	0.02	9.33e-03	0.0114,111,0	0.01	3.51e-03	3.51e-03122,111,111			1.00	0.04	0.96
666	0.01	0.01	0.0119,119,0	0.01	2.55e-03	5.67e-03122,125,119	0.08	122	0.86	0.06	0.94
	0.02	0.01	0.0114,111,0	0.01	3.51e-03	3.51e-03122,111,111			1.00	0.04	0.96
667	0.01	0.01	0.0119,119,0	0.01	1.32e-03	4.89e-03122,114,119	0.08	122	0.86	0.06	0.94
	0.01	0.01	0.0116,111,0	0.01	3.17e-03	3.17e-03122,114,114			1.00	0.04	0.96
668	8.82e-03	0.01	0.0 119,9,0	0.01	2.39e-03	5.30e-03122,125,125	0.08	122	0.86	0.06	0.94
	0.01	0.01	0.0116,114,0	0.01	2.04e-03	2.04e-03122,114,114			1.00	0.04	0.96
669	5.89e-03	0.01	0.0 119,9,0	0.01	3.74e-03	5.30e-03122,125,125	0.08	122	0.86	0.06	0.94
	0.02	0.02	0.0119,122,0	0.01	1.42e-03	1.42e-03122,117,117			1.00	0.04	0.96
670	1.69e-03	0.01	0.0 119,9,0	9.25e-03	3.74e-03	5.17e-03122,125,125	0.07	122	0.86	0.06	0.94
	0.02	0.02	0.0119,122,0	9.25e-03	6.78e-04	6.78e-04122,115,115			1.00	0.04	0.96
671	0.02	0.03	0.0122,119,0	9.16e-03	4.12e-03	7.73e-03122,122,119	0.07	122	0.86	0.06	0.94
	0.02	5.29e-03	0.0118,115,0	9.16e-03	1.43e-03	1.43e-03122,111,111			1.00	0.04	0.96
672	0.02	0.03	0.0122,119,0	9.16e-03	2.69e-03	7.73e-03122,124,119	0.07	122	0.86	0.06	0.94
	0.01	5.81e-03	0.0114,117,0	9.16e-03	2.36e-03	2.36e-03122,111,111			1.00	0.04	0.96
673	0.02	0.03	0.0122,119,0	8.72e-03	1.11e-03	6.61e-03122,122,119	0.07	122	0.86	0.06	0.94
	8.07e-03	7.31e-03	0.0114,111,0	8.72e-03	2.36e-03	2.36e-03122,111,111			1.00	0.04	0.96
674	0.01	0.02	0.0122,119,0	8.45e-03	2.78e-03	6.98e-03122,124,119	0.07	122	0.86	0.06	0.94
	8.15e-03	0.01	0.0119,122,0	8.45e-03	2.04e-03	2.04e-03122,114,114			1.00	0.04	0.96
675	8.28e-03	0.02	0.0 122,9,0	8.39e-03	4.43e-03	6.98e-03122,122,119	0.07	122	0.86	0.06	0.94
	0.01	0.02	0.0119,122,0	8.39e-03	1.42e-03	1.42e-03122,117,117			1.00	0.04	0.96
676	0.0	0.02	0.0 0,9,0	5.52e-03	4.43e-03	6.49e-03122,122,119	0.06	122	0.0	0.0	0.0
	0.01	0.02	0.0119,122,0	5.52e-03	6.78e-04	6.78e-04122,115,115			1.00	0.04	0.96
677	0.02	0.04	0.0122,119,0	6.29e-03	5.00e-03	9.50e-03122,123,119	0.06	122	0.86	0.06	0.94
	0.02	6.19e-03	0.0118,115,0	6.29e-03	8.83e-04	8.83e-04122,116,116			1.00	0.04	0.96
678	0.02	0.04	0.0122,119,0	6.29e-03	3.44e-03	9.50e-03122,120,119	0.06	122	0.86	0.06	0.94
	0.01	3.01e-03	0.0114,111,0	6.29e-03	1.31e-03	1.31e-03122,116,116			1.00	0.04	0.96
679	0.02	0.03	0.0 122,9,0	5.48e-03	1.78e-03	8.54e-03122,121,119	0.06	122	0.86	0.06	0.94
	4.67e-03	4.13e-03	0.0111,111,0	5.48e-03	1.50e-03	1.50e-03122,111,111			1.00	0.04	0.96
680	0.01	0.04	0.0 122,9,0	5.97e-03	2.78e-03	7.74e-03122,124,119	0.06	122	0.86	0.06	0.94
	6.68e-03	0.01	0.0 119,11,0	5.97e-03	1.50e-03	1.50e-03122,111,111			1.00	0.04	0.96
681	8.28e-03	0.04	0.0 122,9,0	5.97e-03	4.64e-03	7.74e-03122,124,119	0.06	122	0.86	0.06	0.94
	9.61e-03	0.02	0.0119,122,0	5.97e-03	1.36e-03	1.36e-03122,117,117			1.00	0.04	0.96
682	0.0	0.03	0.0 0,9,0	3.58e-03	4.64e-03	7.38e-03122,124,124	0.05	122	0.0	0.0	0.0
	9.61e-03	0.02	0.0119,122,0	3.58e-03	2.91e-04	2.91e-04122,126,126			1.00	0.04	0.96
683	0.02	0.04	0.0122,119,0	1.20e-03	5.00e-03	9.50e-03126,123,119	0.03	126	0.86	0.06	0.94
	0.02	6.19e-03	0.0118,115,0	1.20e-03	5.27e-04	5.27e-04126,111,111			1.00	0.04	0.96
684	0.02	0.04	0.0122,119,0	1.20e-03	3.44e-03	9.50e-03126,120,119	0.03	126	0.86	0.06	0.94
	0.01	3.00e-03	0.0118,115,0	1.20e-03	4.40e-04	4.40e-04126,111,111			1.00	0.04	0.96
685	0.02	0.03	0.0 122,9,0	8.87e-04	1.78e-03	8.54e-03122,121,119	0.02	122	0.86	0.06	0.94
	3.25e-03	2.57e-03	0.0115,119,0	8.87e-04	5.57e-04	5.57e-04122,111,111			1.00	0.04	0.96
686	0.01	0.04	0.0 122,9,0	1.84e-03	2.47e-03	7.74e-0311,124,119	0.03	11	0.86	0.06	0.94
	2.79e-03	0.01	0.0 119,11,0	1.84e-03	7.20e-04	7.20e-0411,116,116			1.00	0.04	0.96
687	5.65e-03	0.04	0.0 122,9,0	1.84e-03	4.64e-03	7.74e-0311,124,119	0.03	11	0.86	0.06	0.94
	9.06e-03	0.02	0.0119,122,0	1.84e-03	7.20e-04	7.20e-0411,116,116			1.00	0.04	0.96
688	0.0	0.03	0.0 0,9,0	3.05e-04	4.64e-03	7.38e-03122,124,124	0.01	122	0.0	0.0	0.0
	9.06e-03	0.02	0.0119,122,0	3.00e-04	2.91e-04	2.91e-04122,126,126			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.12 0.08 0.0 0.04 0.03 0.04 0.15

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
18	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.05 -1.4 23 0.08 -2.3 3 0.25 -2290.4 -1.370e+05 3

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
64	0.01	0.02	0.0	7,9,0	1.79e-04	5.38e-03	6.95e-03	11,122,119	0.01	11	0.86	0.06	0.94
	0.01	6.52e-04	0.0	4,119,0	1.79e-04	4.82e-04	4.82e-04	11,121,121			1.00	0.04	0.96
416	0.0	0.04	0.0	0,11,0	8.09e-05	7.29e-03	9.80e-03	122,121,1266.53e-03	3	0.0	0.0	0.0	0.0
	2.57e-03	1.01e-03	0.0	122,119,0	7.23e-05	9.47e-04	9.47e-04	3,121,121			1.00	0.04	0.96
423	0.01	0.03	0.0	7,11,0	5.77e-04	5.38e-03	7.84e-03	119,122,122	0.02	119	0.86	0.06	0.94
	0.01	1.26e-03	0.0	4,119,0	5.71e-04	4.82e-04	4.82e-04	119,121,121			1.00	0.04	0.96
430	0.0	0.04	0.0	0,11,0	5.77e-04	7.29e-03	9.80e-03	119,121,126	0.02	119	0.0	0.0	0.0
	8.96e-03	1.26e-03	0.0	122,119,0	5.71e-04	9.47e-04	9.47e-04	119,121,121			1.00	0.04	0.96
610	0.0	0.04	0.0	0,9,0	1.84e-04	6.49e-03	9.32e-03	4,120,119	0.01	4	0.0	0.0	0.0
	0.0	0.01	0.0	0,11,0	1.83e-04	1.28e-03	1.28e-03	4,121,121			0.0	0.0	0.0
689	0.0	0.04	0.0	0,11,0	2.11e-03	7.29e-03	0.0	11,121,122	0.04	11	0.0	0.0	0.0
	2.57e-03	1.01e-03	0.0	122,119,0	2.10e-03	9.47e-04	9.47e-04	11,121,121			1.00	0.04	0.96
690	0.01	0.02	0.0	122,9,0	4.60e-03	5.38e-03	7.21e-03	4,122,119	0.05	4	0.86	0.06	0.94
	0.01	6.52e-04	0.0	4,119,0	4.60e-03	4.82e-04	4.82e-04	4,121,121			1.00	0.04	0.96

691	4.40e-03	0.03	0.0	119,11,0	2.29e-03	4.78e-03	0.0111,121,122	0.04	11	0.86	0.06	0.94
	2.21e-03	1.50e-04	0.0	4,134,0	2.29e-03	3.40e-04	3.40e-0411,121,121			1.00	0.04	0.96
692	0.01	0.03	0.0	122,9,0	4.60e-03	3.01e-03	7.21e-034,121,119	0.05	4	0.86	0.06	0.94
	0.01	3.97e-05	0.0	4,134,0	4.60e-03	4.05e-04	4.05e-044,126,126			1.00	0.04	0.96
693	7.93e-03	0.03	0.0	119,11,0	2.34e-03	2.93e-03	8.16e-034,120,122	0.04	4	0.86	0.06	0.94
	2.14e-04	1.50e-04	0.0131,134,0	2.34e-03	9.12e-05	9.12e-054,121,121				1.00	0.04	0.96
694	0.01	0.03	0.0	122,9,0	3.61e-03	1.42e-03	7.66e-034,120,119	0.05	4	0.86	0.06	0.94
	1.48e-03	1.82e-03	0.0	3,9,0	3.61e-03	5.18e-05	5.18e-054,116,116			1.00	0.04	0.96
695	8.35e-03	0.02	0.0119,122,0	2.34e-03	2.93e-03	8.16e-034,120,122	0.04	4	0.86	0.06	0.94	
	1.35e-04	1.86e-03	0.0	122,11,0	2.34e-03	2.21e-04	2.21e-044,113,113			1.00	0.04	0.96
696	0.01	0.04	0.0	122,9,0	4.14e-03	3.78e-03	9.11e-0311,120,119	0.05	11	0.86	0.06	0.94
	2.46e-05	0.01	0.0	134,11,0	4.14e-03	2.64e-04	2.64e-0411,113,113			1.00	0.04	0.96
697	8.35e-03	0.02	0.0119,122,0	2.23e-03	5.91e-03	8.19e-034,120,122	0.04	4	0.86	0.06	0.94	
	0.0	2.75e-03	0.0	0,11,0	2.23e-03	6.43e-04	6.43e-044,115,115			0.0	0.0	0.0
698	2.93e-03	0.04	0.0	122,9,0	4.14e-03	6.49e-03	9.32e-0311,120,119	0.05	11	0.86	0.06	0.94
	0.0	0.01	0.0	0,11,0	4.14e-03	1.28e-03	1.28e-0311,121,121			0.0	0.0	0.0
699	1.22e-03	0.01	0.0	119,11,0	1.43e-04	5.91e-03	8.19e-033,120,122	9.18e-03	3	0.86	0.06	0.94
	0.0	2.75e-03	0.0	0,11,0	1.43e-04	6.43e-04	6.43e-043,115,115			0.0	0.0	0.0
700	0.01	0.03	0.0	122,11,0	5.02e-03	5.38e-03	8.63e-0311,122,122	0.05	11	0.86	0.06	0.94
	0.01	1.26e-03	0.0	4,119,0	5.02e-03	4.82e-04	4.82e-0411,121,121			1.00	0.04	0.96
701	0.01	0.03	0.0	122,9,0	5.72e-03	3.69e-03	8.63e-034,121,122	0.06	4	0.86	0.06	0.94
	0.01	3.97e-05	0.0	4,134,0	5.72e-03	4.05e-04	4.05e-044,126,126			1.00	0.04	0.96
702	0.01	0.03	0.0	122,9,0	5.89e-03	1.68e-03	7.93e-034,121,122	0.06	4	0.86	0.06	0.94
	1.48e-03	1.82e-03	0.0	3,9,0	5.89e-03	8.85e-05	8.85e-054,112,112			1.00	0.04	0.96
703	0.01	0.04	0.0	122,9,0	5.89e-03	3.78e-03	9.11e-034,120,119	0.06	4	0.86	0.06	0.94
	3.50e-04	0.01	0.0	134,11,0	5.89e-03	2.64e-04	2.64e-044,113,113			1.00	0.04	0.96
704	5.13e-03	0.04	0.0	119,9,0	5.50e-03	6.49e-03	9.32e-034,120,119	0.06	4	0.86	0.06	0.94
	0.0	0.01	0.0	0,11,0	5.50e-03	1.28e-03	1.28e-034,121,121			0.0	0.0	0.0
705	0.0	0.04	0.0	0,9,0	8.06e-04	6.49e-03	9.32e-033,120,119	0.02	3	0.0	0.0	0.0
	0.0	0.01	0.0	0,11,0	8.06e-04	1.28e-03	1.28e-033,121,121			0.0	0.0	0.0
706	0.0	0.04	0.0	0,11,0	5.02e-03	7.29e-03	0.0111,121,122	0.05	11	0.0	0.0	0.0
	9.40e-03	1.26e-03	0.0	4,119,0	5.02e-03	9.47e-04	9.47e-0411,121,121			1.00	0.04	0.96
707	5.59e-03	0.03	0.0	119,11,0	5.72e-03	4.78e-03	0.014,121,122	0.06	4	0.86	0.06	0.94
	9.40e-03	1.50e-04	0.0	4,134,0	5.72e-03	3.40e-04	3.40e-044,121,121			1.00	0.04	0.96
708	7.93e-03	0.03	0.0	119,11,0	5.89e-03	2.40e-03	9.16e-034,120,122	0.06	4	0.86	0.06	0.94
	1.11e-03	6.87e-04	0.0	3,9,0	5.89e-03	9.12e-05	9.12e-054,121,121			1.00	0.04	0.96
709	8.35e-03	0.02	0.0	119,11,0	5.89e-03	3.42e-03	8.67e-034,120,122	0.06	4	0.86	0.06	0.94
	3.50e-04	6.40e-03	0.0	134,11,0	5.89e-03	2.46e-04	2.46e-044,112,112			1.00	0.04	0.96
710	8.35e-03	0.02	0.0	119,11,0	5.50e-03	6.07e-03	8.67e-034,120,122	0.06	4	0.86	0.06	0.94
	0.0	7.63e-03	0.0	0,11,0	5.50e-03	9.27e-04	9.27e-044,112,112			0.0	0.0	0.0
711	1.22e-03	0.02	0.0	119,11,0	8.06e-04	6.07e-03	8.59e-033,120,122	0.02	3	0.86	0.06	0.94
	0.0	7.63e-03	0.0	0,11,0	8.06e-04	9.27e-04	9.27e-043,112,112			0.0	0.0	0.0

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.01 0.04 0.0 5.89e-03 7.29e-03 0.01 0.06

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
19	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.05 -1.4 29 0.08 -2.3 3 0.25 -2290.3 -1.370e+05 3

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
454	0.01	0.02	0.0	7,9,0	1.79e-04	5.38e-03	6.95e-03	11,119,125	0.01	11	0.86	0.06	0.94
	0.01	6.51e-04	0.0	4,125,0	1.79e-04	4.80e-04	4.80e-04	11,120,120			1.00	0.04	0.96
455	0.01	0.03	0.0	7,11,0	5.77e-04	5.38e-03	7.83e-03	125,119,124	0.02	125	0.86	0.06	0.94
	0.01	1.26e-03	0.0	4,125,0	5.71e-04	4.80e-04	4.80e-04	125,120,120			1.00	0.04	0.96
461	0.0	0.04	0.0	0,11,0	5.77e-04	7.29e-03	9.80e-03	125,120,120	0.02	125	0.0	0.0	0.0
	8.97e-03	1.26e-03	0.0	124,125,0	5.71e-04	9.46e-04	9.46e-04	125,120,120			1.00	0.04	0.96
467	0.0	0.04	0.0	0,11,0	8.09e-05	7.29e-03	9.80e-03	124,120,120	6.53e-03	3	0.0	0.0	0.0
	2.57e-03	1.01e-03	0.0	124,125,0	7.23e-05	9.46e-04	9.46e-04	3,120,120			1.00	0.04	0.96
712	0.01	0.02	0.0	124,9,0	4.61e-03	5.38e-03	7.22e-03	4,119,125	0.05	4	0.86	0.06	0.94
	0.01	6.51e-04	0.0	4,125,0	4.61e-03	4.80e-04	4.80e-04	120,120			1.00	0.04	0.96
713	0.01	0.03	0.0	124,11,0	5.03e-03	5.38e-03	8.63e-03	11,119,124	0.05	11	0.86	0.06	0.94
	0.01	1.26e-03	0.0	4,125,0	5.02e-03	4.80e-04	4.80e-04	11,120,120			1.00	0.04	0.96
714	0.01	0.03	0.0	124,9,0	4.61e-03	3.01e-03	7.22e-03	4,120,125	0.05	4	0.86	0.06	0.94
	0.01	4.14e-05	0.0	4,140,0	4.61e-03	4.04e-04	4.04e-04	120,120			1.00	0.04	0.96
715	0.01	0.03	0.0	124,9,0	5.73e-03	3.69e-03	8.63e-03	4,120,124	0.06	4	0.86	0.06	0.94
	0.01	4.14e-05	0.0	4,140,0	5.73e-03	4.04e-04	4.04e-04	120,120			1.00	0.04	0.96
716	0.01	0.03	0.0	124,9,0	3.61e-03	1.42e-03	7.66e-03	4,121,125	0.05	4	0.86	0.06	0.94
	1.48e-03	1.82e-03	0.0	3,9,0	3.61e-03	5.11e-05	5.11e-05	4,114,114			1.00	0.04	0.96
717	0.01	0.03	0.0	124,9,0	5.89e-03	1.68e-03	7.93e-03	4,120,124	0.06	4	0.86	0.06	0.94
	1.48e-03	1.82e-03	0.0	3,9,0	5.89e-03	8.85e-05	8.85e-05	4,113,113			1.00	0.04	0.96

718	0.01	0.04	0.0	124,9,0	4.14e-03	3.78e-03	9.11e-0311,121,125	0.05	11	0.86	0.06	0.94
	2.66e-05	0.01	0.0	140,11,0	4.14e-03	2.64e-04	2.64e-0411,113,113			1.00	0.04	0.96
719	0.01	0.04	0.0	124,9,0	5.89e-03	3.78e-03	9.11e-034,121,125	0.06	4	0.86	0.06	0.94
	3.52e-04	0.01	0.0	140,11,0	5.89e-03	2.64e-04	2.64e-044,113,113			1.00	0.04	0.96
720	2.93e-03	0.04	0.0	124,9,0	4.14e-03	6.49e-03	9.32e-0311,121,125	0.05	11	0.86	0.06	0.94
	0.0	0.01	0.0	0,11,0	4.14e-03	1.27e-03	1.27e-0311,120,120			0.0	0.0	0.0
721	5.13e-03	0.04	0.0	125,9,0	5.50e-03	6.49e-03	9.32e-034,121,125	0.06	4	0.86	0.06	0.94
	0.0	0.01	0.0	0,11,0	5.50e-03	1.27e-03	1.27e-034,120,120			0.0	0.0	0.0
722	0.0	0.04	0.0	0,9,0	1.84e-04	6.49e-03	9.32e-034,121,125	0.01	4	0.0	0.0	0.0
	0.0	0.01	0.0	0,11,0	1.83e-04	1.27e-03	1.27e-034,120,120			0.0	0.0	0.0
723	0.0	0.04	0.0	0,9,0	8.06e-04	6.49e-03	9.32e-033,121,125	0.02	3	0.0	0.0	0.0
	0.0	0.01	0.0	0,11,0	8.06e-04	1.27e-03	1.27e-033,120,120			0.0	0.0	0.0
724	0.0	0.04	0.0	0,11,0	5.03e-03	7.29e-03	0.0111,120,124	0.05	11	0.0	0.0	0.0
	9.40e-03	1.26e-03	0.0	4,125,0	5.02e-03	9.46e-04	9.46e-0411,120,120			1.00	0.04	0.96
725	5.59e-03	0.03	0.0	125,11,0	5.73e-03	4.78e-03	0.014,120,124	0.06	4	0.86	0.06	0.94
	9.40e-03	1.50e-04	0.0	4,140,0	5.73e-03	3.40e-04	3.40e-044,120,120			1.00	0.04	0.96
726	7.94e-03	0.03	0.0	125,11,0	5.89e-03	2.40e-03	9.16e-034,120,124	0.06	4	0.86	0.06	0.94
	1.11e-03	6.87e-04	0.0	3,9,0	5.89e-03	9.11e-05	9.11e-054,120,120			1.00	0.04	0.96
727	8.35e-03	0.02	0.0	125,11,0	5.89e-03	3.41e-03	8.67e-034,121,124	0.06	4	0.86	0.06	0.94
	3.52e-04	6.40e-03	0.0	140,11,0	5.89e-03	2.46e-04	2.46e-044,113,113			1.00	0.04	0.96
728	8.35e-03	0.02	0.0	125,11,0	5.50e-03	6.07e-03	8.67e-034,121,124	0.06	4	0.86	0.06	0.94
	0.0	7.63e-03	0.0	0,11,0	5.50e-03	9.29e-04	9.29e-044,113,113			0.0	0.0	0.0
729	1.22e-03	0.02	0.0	125,11,0	8.06e-04	6.07e-03	8.59e-033,121,124	0.02	3	0.86	0.06	0.94
	0.0	7.63e-03	0.0	0,11,0	8.06e-04	9.29e-04	9.29e-043,113,113			0.0	0.0	0.0
730	0.0	0.04	0.0	0,11,0	2.11e-03	7.29e-03	0.0111,120,124	0.04	11	0.0	0.0	0.0
	2.57e-03	1.01e-03	0.0124,125,0	2.11e-03	9.46e-04	9.46e-0411,120,120			1.00	0.04	0.96	
731	4.40e-03	0.03	0.0	125,11,0	2.29e-03	4.78e-03	0.0111,120,124	0.04	11	0.86	0.06	0.94
	2.21e-03	1.50e-04	0.0	4,140,0	2.29e-03	3.40e-04	3.40e-0411,120,120			1.00	0.04	0.96
732	7.94e-03	0.03	0.0	125,11,0	2.34e-03	2.40e-03	9.16e-034,120,124	0.04	4	0.86	0.06	0.94
	2.14e-04	1.50e-04	0.0141,140,0	2.34e-03	9.11e-05	9.11e-054,120,120			1.00	0.04	0.96	
733	8.35e-03	0.02	0.0125,124,0	2.34e-03	2.93e-03	8.16e-034,121,124	0.04	4	0.86	0.06	0.94	
	1.35e-04	1.86e-03	0.0	124,11,0	2.34e-03	2.21e-04	2.21e-044,113,113			1.00	0.04	0.96
734	8.35e-03	0.02	0.0125,124,0	2.23e-03	5.91e-03	8.19e-034,121,124	0.04	4	0.86	0.06	0.94	
	0.0	2.75e-03	0.0	0,11,0	2.23e-03	6.44e-04	6.44e-044,113,113			0.0	0.0	0.0
735	1.22e-03	0.01	0.0	125,11,0	1.43e-04	5.91e-03	8.19e-033,121,124	9.18e-03	3	0.86	0.06	0.94
	0.0	2.75e-03	0.0	0,11,0	1.43e-04	6.44e-04	6.44e-043,113,113			0.0	0.0	0.0

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.01	0.04	0.0	5.89e-03	7.29e-03	0.01	0.06

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
20	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm 16.0	NO	ok

V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
		kN			kN			kN	kN m	
ok	0.35	42.1	28	0.33	39.3	28	0.52	2982.9	-2.976e+06	117

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
479	0.02	0.03	0.0116,117,0		0.01	0.01	0.02124,113,113		0.08	124	0.86	0.06	0.94
	0.09	0.06	0.0125,124,0		0.01	0.03	0.03124,116,116				1.00	0.04	0.96
480	6.36e-03	0.01	0.0	117,9,0	0.01	7.23e-03	9.40e-03124,116,116		0.08	124	0.86	0.06	0.94
	0.02	0.01	0.0125,124,0		0.01	8.57e-03	8.57e-03124,117,117				1.00	0.04	0.96
487	6.36e-03	8.84e-03	0.0	117,9,0	9.21e-03	4.99e-03	6.49e-03124,116,116		0.07	124	0.86	0.06	0.94
	0.01	5.18e-03	0.0112,113,0	9.21e-03	1.23e-03	1.23e-03124,125,125					1.00	0.04	0.96
494	0.02	0.03	0.0124,125,0	6.30e-03	4.05e-03	7.62e-03124,124,125		0.06	124	0.86	0.06	0.94	
	0.02	5.18e-03	0.0112,113,0	6.30e-03	9.27e-04	9.27e-04124,118,118					1.00	0.04	0.96
501	0.02	0.03	0.0124,125,0	4.06e-03	5.00e-03	9.47e-03125,121,121		0.05	125	0.86	0.06	0.94	
	0.02	5.84e-03	0.0112,113,0	4.05e-03	9.27e-04	9.27e-04125,118,118					1.00	0.04	0.96
507	0.02	0.03	0.0124,125,0	1.83e-04	5.00e-03	9.47e-034,121,121		0.01	4	0.86	0.06	0.94	
	0.01	5.84e-03	0.0112,113,0	1.83e-04	3.62e-04	3.62e-044,122,122					1.00	0.04	0.96
513	0.03	0.04	0.0116,117,0		0.04	0.02	0.04124,117,117		0.15	124	0.86	0.06	0.94
	0.12	0.08	0.0117,116,0		0.04	0.03	0.03124,116,116				1.00	0.04	0.96
531	0.04	0.05	0.0114,111,0		0.04	0.02	0.04124,117,117		0.15	124	0.86	0.06	0.94
	0.12	0.08	0.0117,116,0		0.04	0.01	0.01124,125,125				1.00	0.04	0.96
537	0.04	0.05	0.0114,111,0		0.03	9.98e-03	0.02125,117,116		0.14	125	0.86	0.06	0.94
	0.08	0.05	0.0114,111,0		0.03	0.01	0.01125,125,125				1.00	0.04	0.96
543	0.04	0.04	0.0117,111,0		0.03	2.14e-03	0.01125,113,111		0.12	125	0.86	0.06	0.94
	0.06	0.04	0.0114,111,0		0.03	7.34e-03	7.34e-03125,125,125				1.00	0.04	0.96
549	0.04	0.04	0.0117,116,0		0.01	3.17e-03	8.81e-03125,113,112		0.09	125	0.86	0.06	0.94
	0.04	0.03	0.0118,115,0		0.01	5.32e-03	5.32e-03125,117,117				1.00	0.04	0.96
555	0.06	0.05	0.0114,111,0		0.01	3.17e-03	8.81e-03115,113,112		0.08	115	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0		0.01	7.01e-03	7.01e-03115,135,135				1.00	0.04	0.96
561	0.06	0.05	0.0114,111,0		0.01	2.41e-03	8.52e-03115,122,119		0.08	115	0.86	0.06	0.94
	0.01	6.79e-03	0.0135,138,0		0.01	7.01e-03	7.01e-03115,135,135				1.00	0.04	0.96

736	0.02	0.03	0.0116,117,0	0.01	0.01	0.02124,113,113	0.09	124	0.86	0.06	0.94
	0.09	0.06	0.0125,124,0	0.01	0.03	0.03124,116,116			1.00	0.04	0.96
737	0.01	0.01	0.0117,116,0	0.01	7.23e-03	9.40e-03124,116,116	0.09	124	0.86	0.06	0.94
	0.03	0.02	0.0116,117,0	0.01	8.57e-03	8.57e-03124,117,117			1.00	0.04	0.96
738	0.01	0.02	0.0117,117,0	0.01	3.35e-03	7.19e-03124,116,117	0.09	124	0.86	0.06	0.94
	0.05	0.03	0.0116,117,0	0.01	8.20e-03	8.20e-03124,124,124			1.00	0.04	0.96
739	0.01	0.01	0.0125,116,0	0.01	1.82e-03	5.07e-03124,119,119	0.09	124	0.86	0.06	0.94
	0.03	0.02	0.0116,117,0	0.01	8.20e-03	8.20e-03124,124,124			1.00	0.04	0.96
740	7.84e-03	0.01	0.0117,117,0	0.01	1.24e-03	4.51e-03124,111,116	0.08	124	0.86	0.06	0.94
	0.02	0.02	0.0114,111,0	0.01	3.92e-03	3.92e-03124,112,112			1.00	0.04	0.96
741	0.01	0.01	0.0125,116,0	0.01	1.30e-03	4.59e-03124,124,119	0.08	124	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	0.01	3.17e-03	3.17e-03124,116,116			1.00	0.04	0.96
742	5.13e-03	0.01	0.0 114,11,0	0.01	1.48e-03	3.92e-03124,111,111	0.08	124	0.86	0.06	0.94
	0.02	0.01	0.0114,116,0	0.01	3.92e-03	3.92e-03124,112,112			1.00	0.04	0.96
743	8.61e-03	0.01	0.0 125,9,0	0.01	1.98e-03	4.59e-03124,119,119	0.08	124	0.86	0.06	0.94
	0.02	0.01	0.0114,116,0	0.01	1.72e-03	1.72e-03124,111,111			1.00	0.04	0.96
744	2.23e-03	0.01	0.0 114,9,0	0.01	2.33e-03	3.45e-03124,118,111	0.08	124	0.86	0.06	0.94
	0.02	0.02	0.0125,124,0	0.01	3.31e-03	3.31e-03124,121,121			1.00	0.04	0.96
745	5.83e-03	0.01	0.0 125,9,0	0.01	3.10e-03	4.49e-03124,115,119	0.08	124	0.86	0.06	0.94
	0.02	0.02	0.0125,124,0	0.01	1.49e-03	1.49e-03124,112,112			1.00	0.04	0.96
746	0.0	0.01	0.0 0,9,0	8.89e-03	2.33e-03	3.25e-03124,118,115	0.07	124	0.0	0.0	0.0
	0.02	0.02	0.0125,124,0	8.89e-03	3.31e-03	3.31e-03124,121,121			1.00	0.04	0.96
747	1.65e-03	0.01	0.0 125,9,0	9.18e-03	3.10e-03	4.36e-03124,115,111	0.07	124	0.86	0.06	0.94
	0.02	0.02	0.0125,124,0	9.18e-03	1.23e-03	1.23e-03124,121,121			1.00	0.04	0.96
748	0.01	9.46e-03	0.0117,116,0	0.01	4.99e-03	6.49e-03124,116,116	0.08	124	0.86	0.06	0.94
	0.02	9.54e-03	0.0116,117,0	0.01	3.55e-03	3.55e-03124,117,117			1.00	0.04	0.96
749	0.01	0.01	0.0125,125,0	0.01	2.56e-03	5.66e-03124,119,125	0.08	124	0.86	0.06	0.94
	0.02	0.01	0.0116,117,0	0.01	3.55e-03	3.55e-03124,117,117			1.00	0.04	0.96
750	0.01	0.01	0.0125,125,0	0.01	1.30e-03	4.83e-03124,124,122	0.08	124	0.86	0.06	0.94
	0.01	0.01	0.0114,117,0	0.01	3.17e-03	3.17e-03124,116,116			1.00	0.04	0.96
751	8.61e-03	0.01	0.0 125,9,0	0.01	2.39e-03	5.30e-03124,119,119	0.08	124	0.86	0.06	0.94
	0.01	0.01	0.0114,116,0	0.01	2.01e-03	2.01e-03124,111,111			1.00	0.04	0.96
752	5.83e-03	0.01	0.0 125,9,0	0.01	3.72e-03	5.30e-03124,119,119	0.08	124	0.86	0.06	0.94
	0.02	0.02	0.0125,124,0	0.01	1.40e-03	1.40e-03124,111,111			1.00	0.04	0.96
753	1.65e-03	0.01	0.0 125,9,0	9.18e-03	3.72e-03	5.14e-03124,119,119	0.07	124	0.86	0.06	0.94
	0.02	0.02	0.0125,124,0	9.18e-03	7.63e-04	7.63e-04124,125,125			1.00	0.04	0.96
754	0.02	0.03	0.0124,125,0	9.18e-03	4.05e-03	7.71e-03124,124,125	0.07	124	0.86	0.06	0.94
	0.02	5.34e-03	0.0112,117,0	9.17e-03	1.45e-03	1.45e-03124,117,117			1.00	0.04	0.96
755	0.02	0.03	0.0124,125,0	9.18e-03	2.65e-03	7.71e-03124,119,125	0.07	124	0.86	0.06	0.94
	0.02	5.86e-03	0.0116,111,0	9.17e-03	2.31e-03	2.31e-03124,117,117			1.00	0.04	0.96
756	0.02	0.03	0.0124,125,0	8.74e-03	1.11e-03	6.60e-03124,124,125	0.07	124	0.86	0.06	0.94
	8.11e-03	7.35e-03	0.0114,117,0	8.74e-03	2.31e-03	2.31e-03124,117,117			1.00	0.04	0.96
757	0.01	0.02	0.0124,125,0	8.47e-03	2.77e-03	6.97e-03124,119,125	0.07	124	0.86	0.06	0.94
	8.29e-03	0.01	0.0125,124,0	8.47e-03	2.01e-03	2.01e-03124,111,111			1.00	0.04	0.96
758	8.24e-03	0.02	0.0 124,9,0	8.42e-03	4.45e-03	6.97e-03124,122,125	0.07	124	0.86	0.06	0.94
	0.01	0.02	0.0125,124,0	8.42e-03	1.40e-03	1.40e-03124,111,111			1.00	0.04	0.96
759	0.0	0.02	0.0 0,9,0	5.47e-03	4.45e-03	6.55e-03124,122,125	0.06	124	0.0	0.0	0.0
	0.01	0.02	0.0125,124,0	5.46e-03	6.04e-04	6.04e-04124,119,119			1.00	0.04	0.96
760	0.02	0.04	0.0124,125,0	6.30e-03	5.00e-03	9.53e-03124,121,125	0.06	124	0.86	0.06	0.94
	0.02	5.84e-03	0.0112,113,0	6.30e-03	9.27e-04	9.27e-04124,118,118			1.00	0.04	0.96
761	0.02	0.04	0.0124,125,0	6.30e-03	3.46e-03	9.53e-03124,121,125	0.06	124	0.86	0.06	0.94
	0.01	3.17e-03	0.0116,117,0	6.30e-03	1.31e-03	1.31e-03124,114,114			1.00	0.04	0.96
762	0.02	0.03	0.0 124,9,0	5.49e-03	1.78e-03	8.56e-03124,126,125	0.06	124	0.86	0.06	0.94
	4.80e-03	4.07e-03	0.0117,117,0	5.49e-03	1.49e-03	1.49e-03124,114,114			1.00	0.04	0.96
763	0.01	0.04	0.0 124,9,0	5.98e-03	2.77e-03	7.81e-03124,119,125	0.06	124	0.86	0.06	0.94
	5.92e-03	0.01	0.0 125,11,0	5.98e-03	1.49e-03	1.49e-03124,114,114			1.00	0.04	0.96
764	8.24e-03	0.04	0.0 124,9,0	5.98e-03	4.64e-03	7.81e-03124,122,125	0.06	124	0.86	0.06	0.94
	0.01	0.02	0.0125,124,0	5.98e-03	1.37e-03	1.37e-03124,117,117			1.00	0.04	0.96
765	0.0	0.03	0.0 0,9,0	3.58e-03	4.64e-03	7.39e-03124,122,122	0.05	124	0.0	0.0	0.0
	0.01	0.02	0.0125,124,0	3.58e-03	3.78e-04	3.78e-04124,126,126			1.00	0.04	0.96
766	0.02	0.04	0.0124,125,0	1.20e-03	5.00e-03	9.53e-03120,121,125	0.03	120	0.86	0.06	0.94
	0.01	5.84e-03	0.0112,113,0	1.20e-03	4.46e-04	4.46e-04120,114,114			1.00	0.04	0.96
767	0.02	0.04	0.0124,125,0	1.20e-03	3.46e-03	9.53e-03120,121,125	0.03	120	0.86	0.06	0.94
	0.01	2.97e-03	0.0112,113,0	1.20e-03	4.59e-04	4.59e-04120,117,117			1.00	0.04	0.96
768	0.02	0.03	0.0 124,9,0	8.85e-04	1.78e-03	8.56e-03124,126,125	0.02	124	0.86	0.06	0.94
	3.28e-03	2.62e-03	0.0117,125,0	8.85e-04	5.79e-04	5.79e-04124,113,113			1.00	0.04	0.96
769	0.01	0.04	0.0 124,9,0	1.84e-03	2.49e-03	7.81e-0311,122,125	0.03	11	0.86	0.06	0.94
	2.92e-03	0.01	0.0 125,11,0	1.84e-03	7.47e-04	7.47e-0411,113,113			1.00	0.04	0.96
770	5.71e-03	0.04	0.0 124,9,0	1.84e-03	4.64e-03	7.81e-0311,122,125	0.03	11	0.86	0.06	0.94
	9.01e-03	0.02	0.0125,124,0	1.84e-03	7.47e-04	7.47e-0411,113,113			1.00	0.04	0.96
771	0.0	0.03	0.0 0,9,0	3.11e-04	4.64e-03	7.39e-03124,122,122	0.01	124	0.0	0.0	0.0
	9.01e-03	0.02	0.0125,124,0	3.06e-04	3.78e-04	3.78e-04124,126,126			1.00	0.04	0.96
772	0.03	0.04	0.0116,117,0	0.04	0.02	0.04124,117,117	0.15	124	0.86	0.06	0.94
	0.12	0.08	0.0117,116,0	0.04	0.03	0.03124,116,116			1.00	0.04	0.96
773	8.82e-03	0.02	0.0 116,11,0	0.04	8.06e-03	0.01124,116,111	0.15	124	0.86	0.06	0.94
	0.07	0.05	0.0116,117,0	0.04	0.02	0.02124,118,118			1.00	0.04	0.96
774	5.00e-03	0.02	0.0 116,11,0	0.04	2.33e-03	5.14e-03124,111,111	0.15	124	0.86	0.06	0.94

	0.04	0.03	0.0114,111,0	0.04	0.01	0.01124,118,118		1.00	0.04	0.96	
775	2.97e-03	0.02	0.0 116,11,0	0.04	1.11e-03	3.03e-03124,111,114	0.15	124	0.86	0.06	0.94
	0.02	0.02	0.0114,111,0	0.04	0.01	0.01124,115,115		1.00	0.04	0.96	
776	9.90e-04	0.01	0.0 116,11,0	0.04	1.68e-03	2.58e-03124,118,114	0.15	124	0.86	0.06	0.94
	0.02	0.01	0.0125,124,0	0.04	7.05e-03	7.05e-03124,115,115		1.00	0.04	0.96	
777	0.0	9.72e-03	0.0 0,11,0	0.03	1.68e-03	2.43e-03125,118,118	0.14	125	0.0	0.0	0.0
	0.02	0.01	0.0125,124,0	0.03	3.31e-03	3.31e-03125,121,121		1.00	0.04	0.96	
790	0.04	0.05	0.0114,111,0	0.04	0.02	0.04124,117,117	0.15	124	0.86	0.06	0.94
	0.12	0.08	0.0117,116,0	0.04	0.02	0.02124,118,118		1.00	0.04	0.96	
791	0.02	0.03	0.0118,115,0	0.04	8.86e-03	0.02124,114,111	0.15	124	0.86	0.06	0.94
	0.08	0.06	0.0111,114,0	0.04	0.02	0.02124,118,118		1.00	0.04	0.96	
792	0.01	0.02	0.0118,115,0	0.04	3.90e-03	8.40e-03124,111,111	0.15	124	0.86	0.06	0.94
	0.06	0.04	0.0114,111,0	0.04	0.01	0.01124,118,118		1.00	0.04	0.96	
793	5.26e-03	0.02	0.0113,112,0	0.04	1.56e-03	4.24e-03124,111,115	0.15	124	0.86	0.06	0.94
	0.04	0.03	0.0114,111,0	0.04	0.01	0.01124,115,115		1.00	0.04	0.96	
794	1.87e-03	0.01	0.0 113,11,0	0.04	1.50e-03	2.84e-03124,113,112	0.15	124	0.86	0.06	0.94
	0.02	0.02	0.0114,111,0	0.04	7.05e-03	7.05e-03124,115,115		1.00	0.04	0.96	
795	0.0	0.01	0.0 0,11,0	0.03	1.50e-03	2.37e-03125,113,112	0.14	125	0.0	0.0	0.0
	0.02	9.92e-03	0.0125,124,0	0.03	1.82e-03	1.82e-03125,113,113		1.00	0.04	0.96	
796	0.04	0.05	0.0114,111,0	0.03	9.98e-03	0.02125,117,116	0.14	125	0.86	0.06	0.94
	0.08	0.06	0.0111,114,0	0.03	0.01	0.01125,125,125		1.00	0.04	0.96	
797	0.03	0.04	0.0117,116,0	0.03	8.86e-03	0.02125,114,111	0.14	125	0.86	0.06	0.94
	0.08	0.06	0.0111,114,0	0.03	9.29e-03	9.29e-03125,125,125		1.00	0.04	0.96	
798	0.02	0.03	0.0113,112,0	0.03	3.90e-03	8.65e-03125,111,111	0.14	125	0.86	0.06	0.94
	0.06	0.05	0.0114,111,0	0.03	6.14e-03	6.14e-03125,115,115		1.00	0.04	0.96	
799	0.01	0.02	0.0113,112,0	0.03	1.92e-03	5.39e-03125,116,112	0.14	125	0.86	0.06	0.94
	0.05	0.04	0.0115,115,0	0.03	6.14e-03	6.14e-03125,115,115		1.00	0.04	0.96	
800	5.30e-03	0.01	0.0 113,11,0	0.03	1.80e-03	3.47e-03125,112,112	0.14	125	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.03	4.55e-03	4.55e-03125,115,115		1.00	0.04	0.96	
801	0.0	0.01	0.0 0,11,0	0.03	1.80e-03	2.78e-03125,112,112	0.13	125	0.0	0.0	0.0
	0.03	0.02	0.0115,118,0	0.03	1.37e-03	1.37e-03125,117,117		1.00	0.04	0.96	
802	0.04	0.04	0.0117,111,0	0.03	3.95e-03	0.01125,114,111	0.12	125	0.86	0.06	0.94
	0.07	0.05	0.0115,118,0	0.03	9.29e-03	9.29e-03125,125,125		1.00	0.04	0.96	
803	0.03	0.04	0.0117,116,0	0.02	3.95e-03	0.01125,114,111	0.12	125	0.86	0.06	0.94
	0.07	0.05	0.0115,118,0	0.02	9.29e-03	9.29e-03125,125,125		1.00	0.04	0.96	
804	0.02	0.03	0.0113,112,0	0.02	3.62e-03	8.65e-03125,111,111	0.12	125	0.86	0.06	0.94
	0.06	0.05	0.0114,111,0	0.02	6.17e-03	6.17e-03125,114,114		1.00	0.04	0.96	
805	0.02	0.02	0.0113,112,0	0.02	1.92e-03	5.43e-03125,116,112	0.12	125	0.86	0.06	0.94
	0.05	0.04	0.0115,115,0	0.02	3.87e-03	3.87e-03125,111,111		1.00	0.04	0.96	
806	7.92e-03	0.01	0.0113,112,0	0.02	1.83e-03	3.68e-03125,112,112	0.12	125	0.86	0.06	0.94
	0.03	0.03	0.0118,115,0	0.02	1.90e-03	1.90e-03125,111,111		1.00	0.04	0.96	
807	3.93e-04	0.01	0.0 113,11,0	0.02	1.83e-03	2.86e-03125,112,112	0.11	125	0.86	0.06	0.94
	0.03	0.02	0.0115,118,0	0.02	1.37e-03	1.37e-03125,117,117		1.00	0.04	0.96	
808	0.04	0.04	0.0117,116,0	0.01	3.17e-03	8.81e-03125,113,112	0.09	125	0.86	0.06	0.94
	0.05	0.03	0.0115,118,0	0.01	7.08e-03	7.08e-03125,117,117		1.00	0.04	0.96	
809	0.04	0.04	0.0117,116,0	0.01	1.99e-03	6.99e-03125,111,116	0.09	125	0.86	0.06	0.94
	0.05	0.04	0.0118,115,0	0.01	7.53e-03	7.53e-03125,115,115		1.00	0.04	0.96	
810	0.03	0.03	0.0113,112,0	0.01	1.99e-03	6.99e-03125,111,116	0.09	125	0.86	0.06	0.94
	0.05	0.04	0.0118,115,0	0.01	7.53e-03	7.53e-03125,115,115		1.00	0.04	0.96	
811	0.02	0.02	0.0113,112,0	0.01	1.77e-03	5.43e-03125,116,112	0.09	125	0.86	0.06	0.94
	0.05	0.03	0.0118,115,0	0.01	6.61e-03	6.61e-03125,115,115		1.00	0.04	0.96	
812	0.01	0.01	0.0113,112,0	0.01	1.83e-03	3.68e-03125,112,112	0.08	125	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.01	4.52e-03	4.52e-03125,115,115		1.00	0.04	0.96	
813	1.54e-03	0.01	0.0 113,9,0	0.01	1.83e-03	2.86e-03125,112,112	0.08	125	0.86	0.06	0.94
	0.03	0.02	0.0115,118,0	0.01	7.49e-04	7.49e-04125,113,113		1.00	0.04	0.96	
814	0.06	0.05	0.0114,111,0	0.01	3.17e-03	8.81e-03115,113,112	0.08	115	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.01	8.93e-03	8.93e-03115,115,115		1.00	0.04	0.96	
815	0.05	0.04	0.0114,111,0	0.01	1.07e-03	6.36e-03115,113,112	0.08	115	0.86	0.06	0.94
	0.04	0.03	0.0118,115,0	0.01	9.53e-03	9.53e-03115,115,115		1.00	0.04	0.96	
816	0.03	0.03	0.0114,111,0	0.01	1.12e-03	5.45e-03115,116,116	0.08	115	0.86	0.06	0.94
	0.04	0.03	0.0118,115,0	0.01	9.53e-03	9.53e-03115,115,115		1.00	0.04	0.96	
817	0.02	0.02	0.0114,111,0	0.01	1.12e-03	4.47e-03115,116,112	0.08	115	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.01	9.15e-03	9.15e-03115,115,115		1.00	0.04	0.96	
818	0.01	0.01	0.0113,112,0	0.01	1.31e-03	3.34e-03115,113,112	0.08	115	0.86	0.06	0.94
	0.03	0.02	0.0118,115,0	0.01	6.50e-03	6.50e-03115,115,115		1.00	0.04	0.96	
819	1.54e-03	0.01	0.0 113,9,0	0.01	1.31e-03	2.21e-03115,113,112	0.08	115	0.86	0.06	0.94
	0.02	0.02	0.0115,118,0	0.01	1.47e-03	1.47e-03115,117,117		1.00	0.04	0.96	
820	0.06	0.05	0.0114,111,0	0.01	2.41e-03	8.52e-03115,122,119	0.08	115	0.86	0.06	0.94
	0.01	8.38e-03	0.0115,118,0	0.01	8.93e-03	8.93e-03115,115,115		1.00	0.04	0.96	
821	0.05	0.04	0.0114,111,0	0.01	8.42e-04	5.53e-03115,118,111	0.08	115	0.86	0.06	0.94
	0.01	8.95e-03	0.0118,115,0	0.01	9.53e-03	9.53e-03115,115,115		1.00	0.04	0.96	
822	0.03	0.03	0.0114,111,0	0.01	6.14e-04	4.04e-03115,118,111	0.08	115	0.86	0.06	0.94
	0.01	9.03e-03	0.0118,115,0	0.01	9.53e-03	9.53e-03115,115,115		1.00	0.04	0.96	
823	0.02	0.02	0.0114,111,0	0.01	7.07e-04	3.05e-03115,114,111	0.08	115	0.86	0.06	0.94
	0.01	9.03e-03	0.0118,115,0	0.01	9.15e-03	9.15e-03115,115,115		1.00	0.04	0.96	
824	0.01	0.01	0.0113,112,0	0.01	7.07e-04	2.16e-03115,114,119	0.08	115	0.86	0.06	0.94
	8.00e-03	6.04e-03	0.0115,115,0	0.01	6.50e-03	6.50e-03115,115,115		1.00	0.04	0.96	

825 3.35e-03 0.01 0.0 114,9,0 0.01 1.31e-03 2.16e-03 115,113,112 0.08 115 0.86 0.06 0.94
0.02 9.79e-03 0.0115,118,0 0.01 4.50e-03 4.50e-03 115,115,115 1.00 0.04 0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.12 0.08 0.0 0.04 0.03 0.04 0.15

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
21	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.49 -9.2 17 0.34 -6.5 25 0.42 2290.5 8.652e+04 116

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
513	0.04	0.05	0.0116,117,0		0.04	9.86e-04	5.08e-03	113,139,114	0.15	113	0.86	0.06	0.94
	0.01	8.04e-03	0.0125,124,0		0.04	1.80e-03	1.80e-03	113,119,119			1.00	0.04	0.96
519	0.04	0.05	0.0116,117,0		0.04	4.69e-03	7.85e-03	113,134,129	0.15	113	0.86	0.06	0.94
	0.02	0.01	0.0114,111,0		0.04	1.80e-03	1.80e-03	113,119,119			1.00	0.04	0.96
525	0.01	0.03	0.0132,133,0	5.77e-04	4.69e-03	7.85e-03	127,134,129	0.02	127	0.86	0.06	0.94	
	0.02	0.01	0.0114,111,0	5.71e-04	1.75e-03	1.75e-03	127,136,136			1.00	0.04	0.96	
772	0.04	0.05	0.0116,117,0		0.04	1.53e-03	5.08e-03	113,124,114	0.15	113	0.86	0.06	0.94
	0.01	8.04e-03	0.0125,124,0		0.04	1.80e-03	1.80e-03	113,119,119			1.00	0.04	0.96
773	0.03	0.04	0.0116,113,0		0.03	1.53e-03	4.88e-03	113,124,117	0.13	113	0.86	0.06	0.94
	3.97e-03	2.80e-03	0.0116,117,0		0.03	1.32e-03	1.32e-03	113,128,128			1.00	0.04	0.96
774	0.02	0.03	0.0112,113,0		0.02	1.24e-03	1.27e-03	113,124,122	0.12	113	0.86	0.06	0.94
	1.59e-03	1.21e-03	0.0112,113,0		0.02	1.27e-03	1.27e-03	113,133,133			1.00	0.04	0.96
775	0.01	0.02	0.0112,113,0		0.02	1.59e-03	3.25e-03	113,119,125	0.11	113	0.86	0.06	0.94
	1.59e-03	1.21e-03	0.0112,113,0		0.02	1.27e-03	1.27e-03	113,133,133			1.00	0.04	0.96
776	9.85e-03	0.01	0.0112,113,0		0.02	2.04e-03	3.55e-03	113,132,11	0.10	113	0.86	0.06	0.94
	1.57e-03	1.22e-03	0.0 116,11,0		0.02	7.51e-04	7.51e-04	113,133,133			1.00	0.04	0.96
777	4.56e-03	0.01	0.0 112,11,0		0.02	3.06e-03	3.55e-03	113,132,11	0.10	113	0.86	0.06	0.94
	2.74e-03	2.00e-03	0.0121,120,0		0.02	1.87e-03	1.87e-03	113,141,141			1.00	0.04	0.96
778	0.04	0.05	0.0116,117,0		0.04	4.69e-03	7.85e-03	113,134,129	0.15	113	0.86	0.06	0.94
	0.02	0.01	0.0114,111,0		0.04	1.80e-03	1.80e-03	113,119,119			1.00	0.04	0.96
779	0.03	0.04	0.0116,113,0		0.03	2.82e-03	7.30e-03	113,131,133	0.13	113	0.86	0.06	0.94
	4.58e-03	3.42e-03	0.0112,113,0		0.03	1.32e-03	1.32e-03	113,128,128			1.00	0.04	0.96
780	0.02	0.03	0.0112,113,0		0.02	1.24e-03	5.98e-03	113,124,127	0.12	113	0.86	0.06	0.94
	1.62e-03	1.27e-03	0.0125,124,0		0.02	1.27e-03	1.27e-03	113,133,133			1.00	0.04	0.96
781	0.01	0.02	0.0112,113,0		0.02	3.04e-03	6.25e-03	113,140,133	0.11	113	0.86	0.06	0.94
	1.59e-03	1.21e-03	0.0112,113,0		0.02	1.27e-03	1.27e-03	113,133,133			1.00	0.04	0.96
782	9.85e-03	0.01	0.0112,113,0		0.02	4.90e-03	6.25e-03	113,133,133	0.10	113	0.86	0.06	0.94
	3.72e-03	2.16e-03	0.0113,112,0		0.02	1.87e-03	1.87e-03	113,141,141			1.00	0.04	0.96
783	4.56e-03	4.67e-03	0.0112,113,0		0.02	4.90e-03	6.07e-03	113,133,133	0.10	113	0.86	0.06	0.94
	3.72e-03	2.16e-03	0.0113,112,0		0.02	1.87e-03	1.87e-03	113,141,141			1.00	0.04	0.96
784	0.01	0.03	0.0132,133,0	5.92e-04	4.69e-03	7.85e-03	127,134,129	0.02	127	0.86	0.06	0.94	
	0.02	0.01	0.0114,111,0	5.86e-04	1.75e-03	1.75e-03	127,136,136			1.00	0.04	0.96	
785	0.01	0.03	0.0132,133,0	5.92e-04	2.82e-03	7.30e-03	127,131,133	0.02	127	0.86	0.06	0.94	
	4.58e-03	3.42e-03	0.0112,113,0	5.86e-04	4.12e-04	4.12e-04	127,111,111			1.00	0.04	0.96	
786	0.01	0.02	0.0132,133,0	5.81e-04	1.19e-03	5.98e-03	127,131,127	0.02	127	0.86	0.06	0.94	
	1.62e-03	1.27e-03	0.0125,124,0	5.77e-04	4.19e-04	4.19e-04	127,140,140			1.00	0.04	0.96	
787	0.01	0.02	0.0130,127,0	5.44e-04	3.04e-03	6.25e-03	127,140,133	0.02	127	0.86	0.06	0.94	
	1.46e-03	9.27e-04	0.0115,129,0	5.42e-04	5.79e-04	5.79e-04	127,124,124			1.00	0.04	0.96	
788	9.22e-03	0.01	0.0130,127,0	9.64e-04	4.90e-03	6.25e-03	111,133,133	0.02	111	0.86	0.06	0.94	
	3.72e-03	2.16e-03	0.0113,112,0	9.64e-04	1.35e-03	1.35e-03	111,125,125			1.00	0.04	0.96	
789	3.51e-03	4.24e-03	0.0130,127,0	9.64e-04	4.90e-03	6.07e-03	111,133,133	0.02	111	0.86	0.06	0.94	
	3.72e-03	2.16e-03	0.0113,112,0	9.64e-04	1.35e-03	1.35e-03	111,125,125			1.00	0.04	0.96	

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.04 0.05 0.0 0.04 4.90e-03 7.85e-03 0.15

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
22	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.71 16.1 19 0.63 14.3 19 0.58 5115.7 -2.769e+05 115

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
561	0.04	0.04	0.0122,119,0		0.04	0.01	0.02115,139,123	0.15	115	0.86	0.06	0.94	
	0.06	0.04	0.0128,129,0		0.04	0.02	0.02115,129,129			1.00	0.04	0.96	
567	0.05	0.04	0.0115,118,0		0.04	0.01	0.02115,139,123	0.15	115	0.86	0.06	0.94	

	0.06	0.04	0.0128,129,0	0.04	0.02	0.02115,129,129			1.00	0.04	0.96
573	0.11	0.10	0.0115,118,0	0.03	4.95e-03	0.02115,140,117	0.14	115	0.86	0.06	0.94
	0.02	0.02	0.0136,137,0	0.03	0.01	0.01115,129,129			1.00	0.04	0.96
579	0.11	0.10	0.0115,118,0	6.27e-03	4.95e-03	0.02115,140,117	0.06	115	0.86	0.06	0.94
	5.19e-03	3.83e-03	0.0136,137,0	6.27e-03	4.84e-03	4.84e-03115,141,141			1.00	0.04	0.96
820	0.04	0.04	0.0122,119,0	0.04	0.01	0.02115,139,123	0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0	0.04	0.02	0.02115,129,129			1.00	0.04	0.96
821	0.03	0.02	0.0114,116,0	0.03	2.10e-03	4.62e-03115,119,119	0.14	115	0.86	0.06	0.94
	0.01	0.01	0.0128,128,0	0.03	4.78e-03	4.78e-03115,129,129			1.00	0.04	0.96
822	0.02	0.02	0.0114,111,0	0.03	8.55e-04	2.79e-03115,142,119	0.14	115	0.86	0.06	0.94
	2.36e-03	1.82e-03	0.0128,129,0	0.03	3.99e-03	3.99e-03115,140,140			1.00	0.04	0.96
823	0.01	0.01	0.0114,111,0	0.03	9.00e-04	2.33e-03115,115,119	0.14	115	0.86	0.06	0.94
	2.36e-03	1.82e-03	0.0128,129,0	0.03	1.64e-03	1.64e-03115,129,129			1.00	0.04	0.96
824	8.93e-03	8.11e-03	0.0114,111,0	0.03	1.46e-03	2.19e-03115,118,115	0.13	115	0.86	0.06	0.94
	3.96e-03	3.26e-03	0.0114,111,0	0.03	1.92e-03	1.92e-03115,120,120			1.00	0.04	0.96
825	2.68e-03	3.25e-03	0.0114,111,0	0.03	1.46e-03	2.06e-03115,118,138	0.13	115	0.86	0.06	0.94
	3.96e-03	3.26e-03	0.0114,111,0	0.03	1.92e-03	1.92e-03115,120,120			1.00	0.04	0.96
826	0.05	0.04	0.0115,118,0	0.04	0.01	0.02115,139,123	0.15	115	0.86	0.06	0.94
	0.06	0.04	0.0128,129,0	0.04	0.02	0.02115,129,129			1.00	0.04	0.96
827	0.04	0.03	0.0115,118,0	0.03	2.10e-03	5.25e-03115,119,142	0.14	115	0.86	0.06	0.94
	0.01	0.01	0.0128,128,0	0.03	4.78e-03	4.78e-03115,129,129			1.00	0.04	0.96
828	0.03	0.03	0.0115,118,0	0.03	8.55e-04	4.69e-03115,142,138	0.14	115	0.86	0.06	0.94
	2.94e-03	1.94e-03	0.0140,140,0	0.03	3.99e-03	3.99e-03115,140,140			1.00	0.04	0.96
829	0.02	0.02	0.0115,118,0	0.03	2.03e-03	4.96e-03115,130,138	0.14	115	0.86	0.06	0.94
	3.31e-03	2.52e-03	0.0115,113,0	0.03	1.64e-03	1.64e-03115,129,129			1.00	0.04	0.96
830	0.01	0.01	0.0115,118,0	0.03	3.71e-03	4.96e-03115,134,138	0.13	115	0.86	0.06	0.94
	0.01	9.78e-03	0.0118,115,0	0.03	1.92e-03	1.92e-03115,120,120			1.00	0.04	0.96
831	4.68e-03	4.21e-03	0.0115,118,0	0.03	3.71e-03	4.84e-03115,134,134	0.13	115	0.86	0.06	0.94
	0.01	9.78e-03	0.0118,115,0	0.03	1.92e-03	1.92e-03115,120,120			1.00	0.04	0.96
832	0.11	0.10	0.0115,118,0	0.03	4.95e-03	0.02115,140,117	0.14	115	0.86	0.06	0.94
	0.02	0.02	0.0136,137,0	0.03	0.01	0.01115,129,129			1.00	0.04	0.96
833	0.09	0.08	0.0115,118,0	0.03	4.02e-03	0.01115,129,118	0.13	115	0.86	0.06	0.94
	5.75e-03	4.46e-03	0.0140,140,0	0.03	3.04e-03	3.04e-03115,136,136			1.00	0.04	0.96
834	0.07	0.06	0.0115,118,0	0.03	2.12e-03	0.01115,138,118	0.13	115	0.86	0.06	0.94
	2.94e-03	1.94e-03	0.0140,140,0	0.03	8.76e-04	8.76e-04115,140,140			1.00	0.04	0.96
835	0.05	0.04	0.0115,118,0	0.03	4.26e-03	8.91e-03115,134,130	0.13	115	0.86	0.06	0.94
	3.31e-03	2.52e-03	0.0115,113,0	0.03	6.04e-04	6.04e-04115,127,127			1.00	0.04	0.96
836	0.03	0.03	0.0111,114,0	0.03	6.36e-03	8.91e-03115,134,130	0.13	115	0.86	0.06	0.94
	0.01	9.78e-03	0.0118,115,0	0.03	2.14e-03	2.14e-03115,135,135			1.00	0.04	0.96
837	0.01	9.02e-03	0.0111,114,0	0.03	6.36e-03	8.08e-03115,134,134	0.12	115	0.86	0.06	0.94
	0.01	9.78e-03	0.0118,115,0	0.03	2.14e-03	2.14e-03115,135,135			1.00	0.04	0.96
838	0.11	0.10	0.0115,118,0	6.27e-03	4.95e-03	0.02115,140,117	0.06	115	0.86	0.06	0.94
	5.19e-03	3.83e-03	0.0136,137,0	6.27e-03	4.84e-03	4.84e-03115,141,141			1.00	0.04	0.96
839	0.09	0.08	0.0115,118,0	6.00e-03	4.02e-03	0.01115,129,118	0.06	115	0.86	0.06	0.94
	1.30e-03	9.76e-04	0.0140,140,0	6.00e-03	1.03e-03	1.03e-03115,140,140			1.00	0.04	0.96
840	0.07	0.06	0.0115,118,0	5.73e-03	2.12e-03	0.01115,138,118	0.06	115	0.86	0.06	0.94
	1.30e-03	9.36e-04	0.0140,135,0	5.73e-03	8.76e-04	8.76e-04115,140,140			1.00	0.04	0.96
841	0.05	0.04	0.0115,118,0	5.42e-03	4.26e-03	8.91e-03115,134,130	0.06	115	0.86	0.06	0.94
	2.95e-03	1.99e-03	0.0115,118,0	5.42e-03	6.04e-04	6.04e-04115,127,127			1.00	0.04	0.96
842	0.03	0.03	0.0111,114,0	5.05e-03	6.36e-03	8.91e-03111,134,130	0.05	111	0.86	0.06	0.94
	0.01	8.29e-03	0.0118,115,0	5.05e-03	2.14e-03	2.14e-03111,135,135			1.00	0.04	0.96
843	0.01	9.02e-03	0.0111,114,0	5.05e-03	6.36e-03	8.08e-03111,134,134	0.05	111	0.86	0.06	0.94
	0.01	8.29e-03	0.0118,115,0	5.05e-03	2.14e-03	2.14e-03111,135,135			1.00	0.04	0.96

Nodo V. 127 V. 128 V. 545 V. 129 V. 130 V. 131 V. D.26
0.11 0.10 0.0 0.04 0.02 0.02 0.15

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
23	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	cm 16.0	NO	ok

V. connes. V. piede Azione V Rif. cmb V. testa Azione V Rif. cmb V. h-d Azione N Azione M Rif. cmb
ok 0.71 -16.1 17 0.63 -14.3 17 0.58 5115.7 2.768e+05 113

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
319	0.04	0.04	0.0124,125,0		0.04	0.01	0.02113,133,121		0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0		0.04	0.02	0.02113,135,135				1.00	0.04	0.96
391	0.02	0.02	0.0113,112,0		0.03	2.02e-03	4.94e-03113,140,132		0.14	113	0.86	0.06	0.94
	2.61e-03	2.06e-03	0.0117,115,0		0.03	1.64e-03	1.64e-03113,135,135				1.00	0.04	0.96
392	0.01	0.01	0.0113,112,0		0.03	3.71e-03	4.94e-03113,140,132		0.13	113	0.86	0.06	0.94
	8.82e-03	6.57e-03	0.0112,113,0		0.03	1.83e-03	1.83e-03113,112,112				1.00	0.04	0.96
393	4.71e-03	4.20e-03	0.0113,112,0		0.03	3.71e-03	4.83e-03113,140,140		0.13	113	0.86	0.06	0.94
	8.82e-03	6.57e-03	0.0112,113,0		0.03	1.83e-03	1.83e-03113,112,112				1.00	0.04	0.96
590	0.11	0.10	0.0113,112,0	6.27e-03	4.96e-03		0.02113,134,111		0.06	113	0.86	0.06	0.94

	5.20e-03	3.84e-03	0.0130,127,0	6.27e-03	4.84e-03	4.84e-03	0.02113,131,131			1.00	0.04	0.96
591	0.11	0.10	0.0113,112,0	0.03	4.96e-03		0.02113,134,111	0.14	113	0.86	0.06	0.94
	0.02	0.02	0.0130,127,0	0.03	0.01		0.01113,135,135			1.00	0.04	0.96
597	0.05	0.04	0.0113,112,0	0.04	0.01		0.02113,133,121	0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0	0.04	0.02		0.02113,135,135			1.00	0.04	0.96
611	0.04	0.04	0.0124,125,0	0.04	0.01		0.02113,133,121	0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0	0.04	0.02		0.02113,135,135			1.00	0.04	0.96
613	0.03	0.02	0.0116,114,0	0.03	2.09e-03	4.62e-03	0.02113,125,125	0.14	113	0.86	0.06	0.94
	0.01	0.01	0.0138,138,0	0.03	4.79e-03	4.79e-03	0.02113,135,135			1.00	0.04	0.96
615	0.02	0.02	0.0116,117,0	0.03	8.56e-04	2.80e-03	0.02113,132,125	0.14	113	0.86	0.06	0.94
	2.35e-03	1.82e-03	0.0138,135,0	0.03	3.99e-03	3.99e-03	0.02113,134,134			1.00	0.04	0.96
617	0.01	0.01	0.0116,117,0	0.03	9.21e-04	2.33e-03	0.02113,113,125	0.14	113	0.86	0.06	0.94
	2.35e-03	1.82e-03	0.0138,135,0	0.03	1.64e-03	1.64e-03	0.02113,135,135			1.00	0.04	0.96
619	8.89e-03	8.07e-03	0.0116,117,0	0.03	1.42e-03	2.20e-03	0.02113,112,113	0.13	113	0.86	0.06	0.94
	2.42e-03	2.03e-03	0.0124,125,0	0.03	1.83e-03	1.83e-03	0.02113,112,112			1.00	0.04	0.96
621	2.64e-03	3.21e-03	0.0116,117,0	0.03	1.42e-03	2.03e-03	0.02113,112,128	0.13	113	0.86	0.06	0.94
	2.42e-03	2.03e-03	0.0124,125,0	0.03	1.83e-03	1.83e-03	0.02113,112,112			1.00	0.04	0.96
844	0.11	0.10	0.0113,112,0	6.27e-03	4.96e-03		0.02113,134,111	0.06	113	0.86	0.06	0.94
	5.20e-03	3.84e-03	0.0130,127,0	6.27e-03	4.84e-03	4.84e-03	0.02113,131,131			1.00	0.04	0.96
845	0.11	0.10	0.0113,112,0	0.03	4.96e-03		0.02113,134,111	0.14	113	0.86	0.06	0.94
	0.02	0.02	0.0130,127,0	0.03	0.01		0.01113,135,135			1.00	0.04	0.96
846	0.09	0.08	0.0113,112,0	6.00e-03	4.03e-03		0.01113,135,112	0.06	113	0.86	0.06	0.94
	1.29e-03	9.78e-04	0.0134,134,0	6.00e-03	1.03e-03	1.03e-03	0.02113,134,134			1.00	0.04	0.96
847	0.09	0.08	0.0113,112,0	0.03	4.03e-03		0.01113,135,112	0.13	113	0.86	0.06	0.94
	5.75e-03	4.46e-03	0.0134,134,0	0.03	3.05e-03	3.05e-03	0.02113,130,130			1.00	0.04	0.96
848	0.07	0.06	0.0113,112,0	5.72e-03	2.12e-03		0.01113,128,112	0.06	113	0.86	0.06	0.94
	1.48e-03	1.08e-03	0.0128,129,0	5.72e-03	8.74e-04	8.74e-04	0.01113,134,134			1.00	0.04	0.96
849	0.07	0.06	0.0113,112,0	0.03	2.12e-03		0.01113,128,112	0.13	113	0.86	0.06	0.94
	2.94e-03	1.93e-03	0.0134,134,0	0.03	8.74e-04	8.74e-04	0.02113,134,134			1.00	0.04	0.96
850	0.05	0.04	0.0113,112,0	5.42e-03	4.27e-03	8.92e-03	0.02113,140,136	0.06	113	0.86	0.06	0.94
	4.25e-03	2.88e-03	0.0113,112,0	5.42e-03	6.13e-04	6.13e-04	0.02113,129,129			1.00	0.04	0.96
851	0.05	0.04	0.0113,112,0	0.03	4.27e-03	8.92e-03	0.02113,140,136	0.13	113	0.86	0.06	0.94
	4.25e-03	2.88e-03	0.0113,112,0	0.03	6.13e-04	6.13e-04	0.02113,129,129			1.00	0.04	0.96
852	0.03	0.03	0.0117,116,0	5.04e-03	6.37e-03	8.92e-03	0.02117,140,136	0.05	117	0.86	0.06	0.94
	0.02	0.01	0.0112,113,0	5.04e-03	1.95e-03	1.95e-03	0.02117,137,137			1.00	0.04	0.96
853	0.03	0.03	0.0117,116,0	0.03	6.37e-03	8.92e-03	0.02113,140,136	0.13	113	0.86	0.06	0.94
	0.02	0.01	0.0112,113,0	0.03	1.95e-03	1.95e-03	0.02113,137,137			1.00	0.04	0.96
854	0.01	9.00e-03	0.0117,116,0	5.04e-03	6.37e-03	8.09e-03	0.02117,140,140	0.05	117	0.86	0.06	0.94
	0.02	0.01	0.0112,113,0	5.04e-03	1.95e-03	1.95e-03	0.02117,137,137			1.00	0.04	0.96
855	0.01	9.00e-03	0.0117,116,0	0.03	6.37e-03	8.09e-03	0.02113,140,140	0.12	113	0.86	0.06	0.94
	0.02	0.01	0.0112,113,0	0.03	1.95e-03	1.95e-03	0.02113,137,137			1.00	0.04	0.96
856	0.05	0.04	0.0113,112,0	0.04	0.01		0.02113,133,121	0.15	113	0.86	0.06	0.94
	0.06	0.04	0.0138,135,0	0.04	0.02		0.02113,135,135			1.00	0.04	0.96
857	0.04	0.03	0.0113,112,0	0.03	2.09e-03	5.25e-03	0.02113,125,132	0.14	113	0.86	0.06	0.94
	0.01	0.01	0.0138,138,0	0.03	4.79e-03	4.79e-03	0.02113,135,135			1.00	0.04	0.96
858	0.03	0.03	0.0113,112,0	0.03	8.56e-04	4.68e-03	0.02113,132,128	0.14	113	0.86	0.06	0.94
	2.94e-03	1.93e-03	0.0134,134,0	0.03	3.99e-03	3.99e-03	0.02113,134,134			1.00	0.04	0.96

Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26
	0.11	0.10	0.0	0.04	0.02	0.02	0.15

Setto	Mat.	N. strati	Spessore	Incoll.	Stato
			cm		
24	Legno XLAM n. 1 verticali -legno E = 8.250e+04 (XLAM -1- vert)	5	16.0	NO	ok

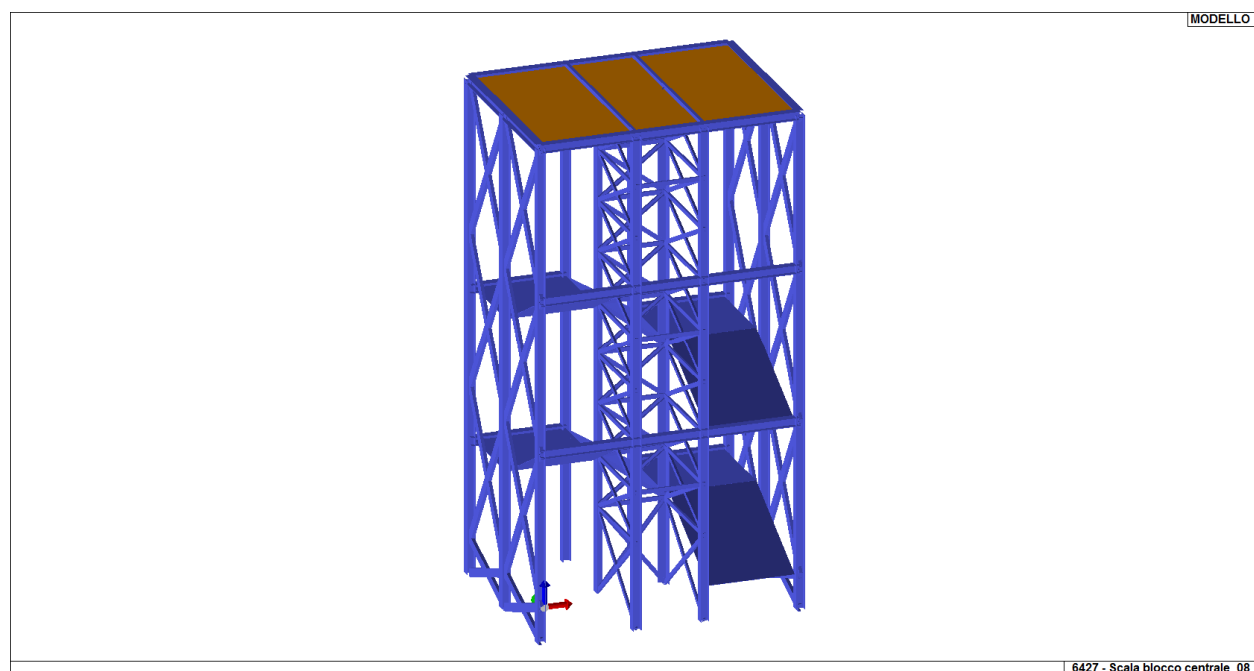
V. connes.	V. piede	Azione V	Rif. cmb	V. testa	Azione V	Rif. cmb	V. h-d	Azione N	Azione M	Rif. cmb
ok	0.48	kN	19	0.34	kN	27	0.42	kN	kN m	114
		9.2			6.5			2289.8	-8.671e+04	

Nodo	V. 127	V. 128	V. 545	Rif. cmb	V. 129	V. 130	V. 131	Rif. cmb	V. D.26	Rif. cmb	Fac. B-A	Qsup. A	Qsup. B
350	0.04	0.05	0.0114,111,0		0.04	9.75e-04	5.08e-03	0.02115,133,116	0.15	115	0.86	0.06	0.94
	0.01	8.11e-03	0.0119,122,0		0.04	1.81e-03	1.81e-03	0.02115,125,125			1.00	0.04	0.96
394	0.04	0.05	0.0114,111,0		0.04	4.69e-03	7.85e-03	0.02115,140,135	0.15	115	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0		0.04	1.81e-03	1.81e-03	0.02115,125,125			1.00	0.04	0.96
395	0.03	0.04	0.0114,111,0		0.03	2.82e-03	7.30e-03	0.02115,141,139	0.13	115	0.86	0.06	0.94
	4.68e-03	3.49e-03	0.0118,115,0		0.03	1.32e-03	1.32e-03	0.02115,138,138			1.00	0.04	0.96
396	0.02	0.03	0.0118,115,0		0.02	1.23e-03	5.98e-03	0.02115,122,137	0.12	115	0.86	0.06	0.94
	1.64e-03	1.28e-03	0.0119,122,0		0.02	1.27e-03	1.27e-03	0.02115,139,139			1.00	0.04	0.96
397	0.01	0.02	0.0118,115,0		0.02	3.04e-03	6.25e-03	0.02115,134,139	0.11	115	0.86	0.06	0.94
	1.58e-03	1.20e-03	0.0118,115,0		0.02	1.27e-03	1.27e-03	0.02115,139,139			1.00	0.04	0.96
398	9.81e-03	0.01	0.0118,115,0		0.02	4.90e-03	6.25e-03	0.02115,139,139	0.10	115	0.86	0.06	0.94
	3.83e-03	2.18e-03	0.0115,118,0		0.02	1.87e-03	1.87e-03	0.02115,131,131			1.00	0.04	0.96
399	4.54e-03	4.66e-03	0.0118,115,0		0.02	4.90e-03	6.08e-03	0.02115,139,139	0.10	115	0.86	0.06	0.94
	3.83e-03	2.18e-03	0.0115,118,0		0.02	1.87e-03	1.87e-03	0.02115,131,131			1.00	0.04	0.96
400	0.01	0.03	0.0142,139,0		5.90e-04	4.69e-03	7.85e-03	0.02137,140,135	0.02	137	0.86	0.06	0.94

	0.02	0.02	0.0116,117,0	5.85e-04	1.76e-03	1.76e-03	137,130,130		1.00	0.04	0.96	
401	0.01	0.03	0.0142,139,0	5.90e-04	2.82e-03	7.30e-03	137,141,139	0.02	137	0.86	0.06	0.94
	4.68e-03	3.49e-03	0.0118,115,0	5.85e-04	4.09e-04	4.09e-04	137,117,117		1.00	0.04	0.96	
402	0.01	0.02	0.0142,139,0	5.79e-04	1.19e-03	5.98e-03	137,141,137	0.02	137	0.86	0.06	0.94
	1.64e-03	1.28e-03	0.0119,122,0	5.75e-04	4.17e-04	4.17e-04	137,134,134		1.00	0.04	0.96	
403	0.01	0.02	0.0136,137,0	5.43e-04	3.04e-03	6.25e-03	137,134,139	0.02	137	0.86	0.06	0.94
	1.46e-03	9.35e-04	0.0113,135,0	5.40e-04	5.74e-04	5.74e-04	122,122		1.00	0.04	0.96	
404	9.23e-03	0.01	0.0136,137,0	2.60e-03	4.90e-03	6.25e-03	117,139,139	0.04	117	0.86	0.06	0.94
	3.83e-03	2.18e-03	0.0115,118,0	2.60e-03	1.38e-03	1.38e-03	117,119,119		1.00	0.04	0.96	
405	3.51e-03	4.24e-03	0.0136,137,0	2.60e-03	4.90e-03	6.08e-03	117,139,139	0.04	117	0.86	0.06	0.94
	3.83e-03	2.18e-03	0.0115,118,0	2.60e-03	1.38e-03	1.38e-03	117,119,119		1.00	0.04	0.96	
603	0.04	0.05	0.0114,111,0	0.04	4.69e-03	7.85e-03	115,140,135	0.15	115	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	0.04	1.81e-03	1.81e-03	115,125,125		1.00	0.04	0.96	
609	0.01	0.03	0.0142,139,0	5.77e-04	4.69e-03	7.85e-03	137,140,135	0.02	137	0.86	0.06	0.94
	0.02	0.02	0.0116,117,0	5.70e-04	1.76e-03	1.76e-03	130,130		1.00	0.04	0.96	
647	0.04	0.05	0.0114,111,0	0.04	1.52e-03	5.08e-03	115,122,116	0.15	115	0.86	0.06	0.94
	0.01	8.11e-03	0.0119,122,0	0.04	1.81e-03	1.81e-03	115,125,125		1.00	0.04	0.96	
648	0.03	0.04	0.0114,111,0	0.03	1.52e-03	4.88e-03	115,122,111	0.13	115	0.86	0.06	0.94
	3.99e-03	2.82e-03	0.0114,111,0	0.03	1.32e-03	1.32e-03	115,138,138		1.00	0.04	0.96	
649	0.02	0.03	0.0118,115,0	0.02	1.23e-03	3.85e-03	115,122,124	0.12	115	0.86	0.06	0.94
	1.58e-03	1.20e-03	0.0118,115,0	0.02	1.27e-03	1.27e-03	115,139,139		1.00	0.04	0.96	
650	0.01	0.02	0.0118,115,0	0.02	1.56e-03	3.26e-03	115,125,119	0.11	115	0.86	0.06	0.94
	1.58e-03	1.20e-03	0.0118,115,0	0.02	1.27e-03	1.27e-03	115,139,139		1.00	0.04	0.96	
651	9.81e-03	0.01	0.0118,115,0	0.02	1.80e-03	3.50e-03	115,11,11	0.10	115	0.86	0.06	0.94
	1.50e-03	1.19e-03	0.0 114,11,0	0.02	7.51e-04	7.51e-04	115,139,139		1.00	0.04	0.96	
652	4.54e-03	0.01	0.0 118,11,0	0.02	2.35e-03	3.50e-03	115,142,11	0.10	115	0.86	0.06	0.94
	2.81e-03	2.03e-03	0.0123,126,0	0.02	1.87e-03	1.87e-03	115,131,131		1.00	0.04	0.96	
Nodo	V. 127	V. 128	V. 545	V. 129	V. 130	V. 131	V. D.26					
	0.04	0.05	0.0	0.04	4.90e-03	7.85e-03	0.15					

13.2 RISULTATI ANALISI US03-S

Di seguito vengono riportati i principali risultati forniti dal programma in termini di configurazione deformate e delle caratteristiche di sollecitazione degli elementi più significativi.



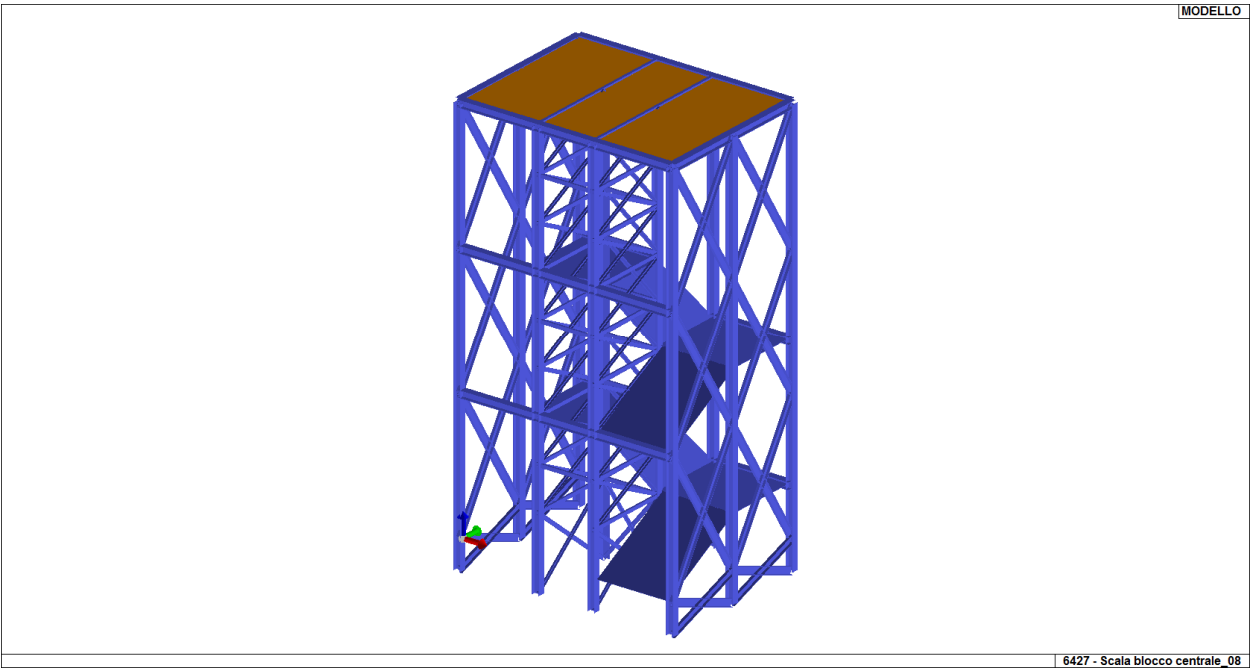


Figura 39: vista solida modello blocco servizi centrale - parte in acciaio

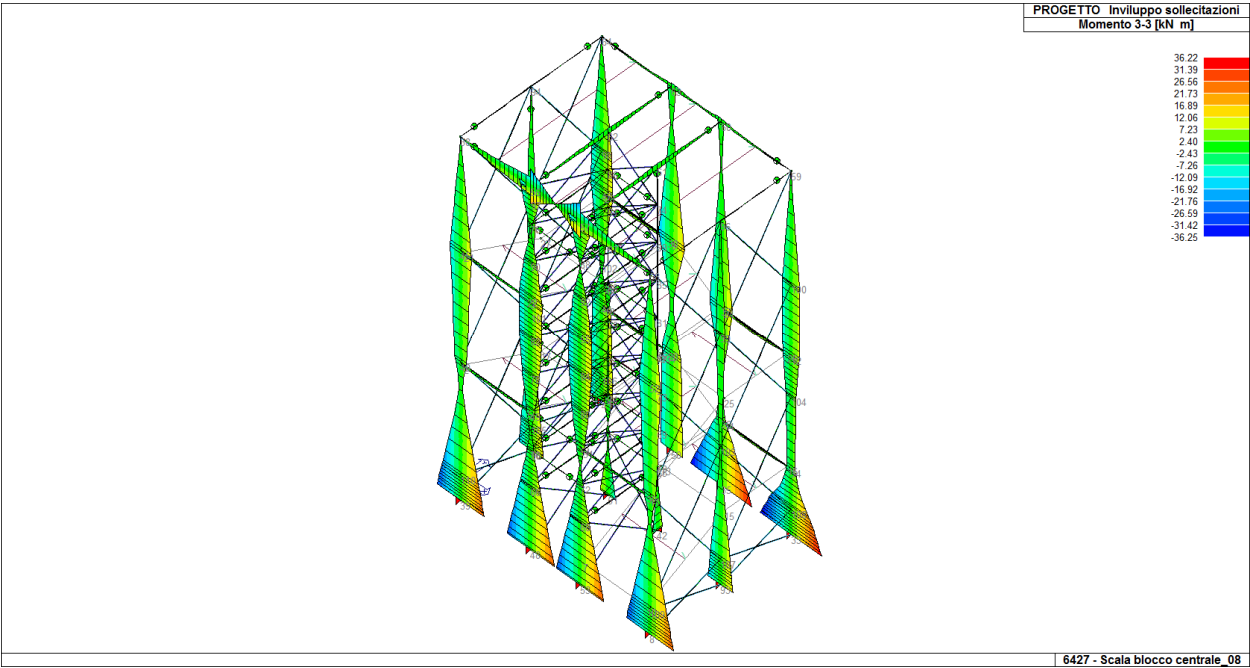


Figura 40: involucro del diagramma dei momenti flettenti M3

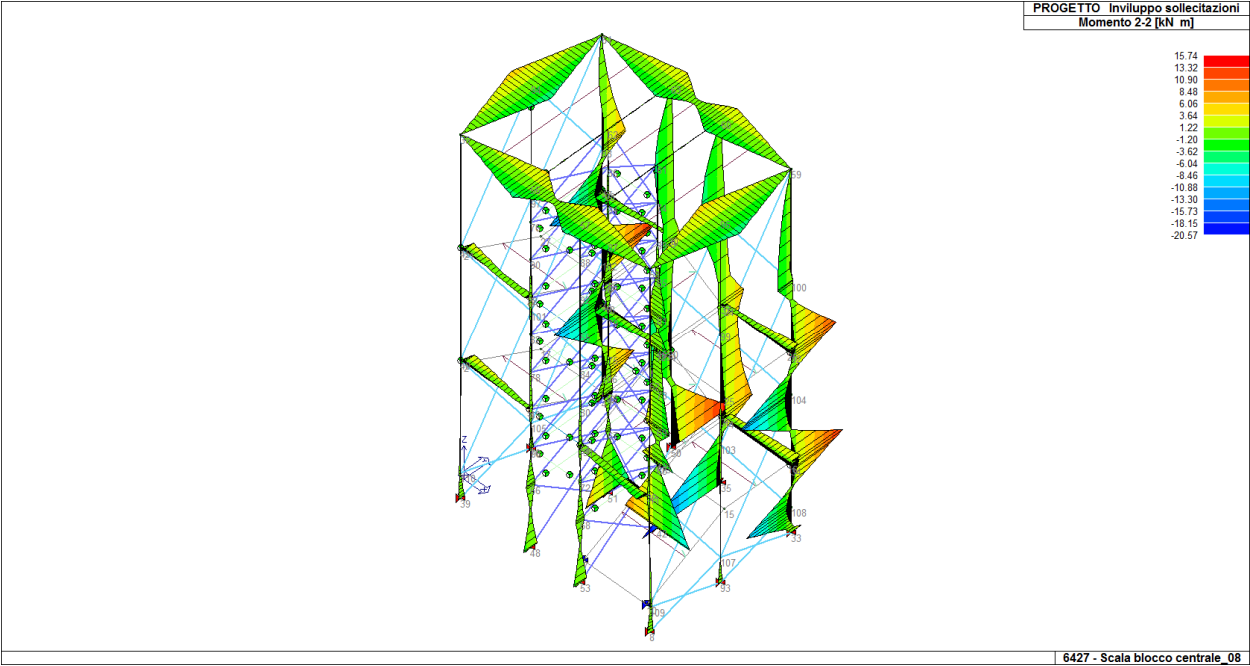


Figura 41: involucro del diagramma dei momenti flettenti M2

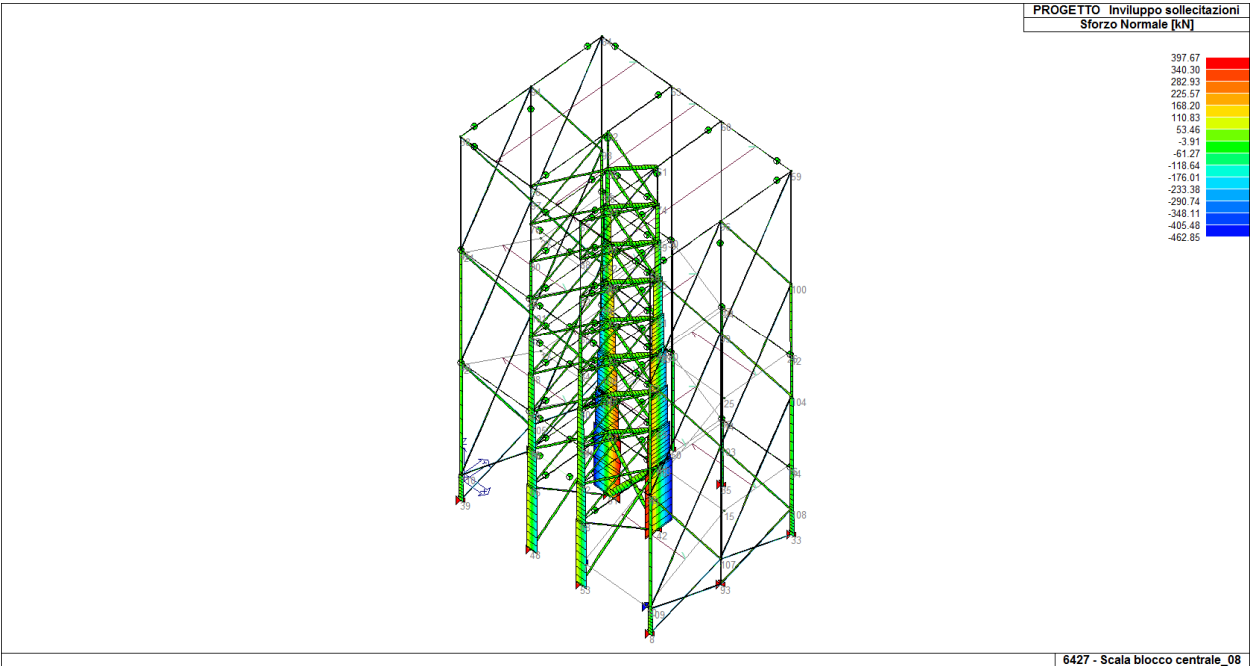


Figura 42: involucro del diagramma dello sforzo assiale

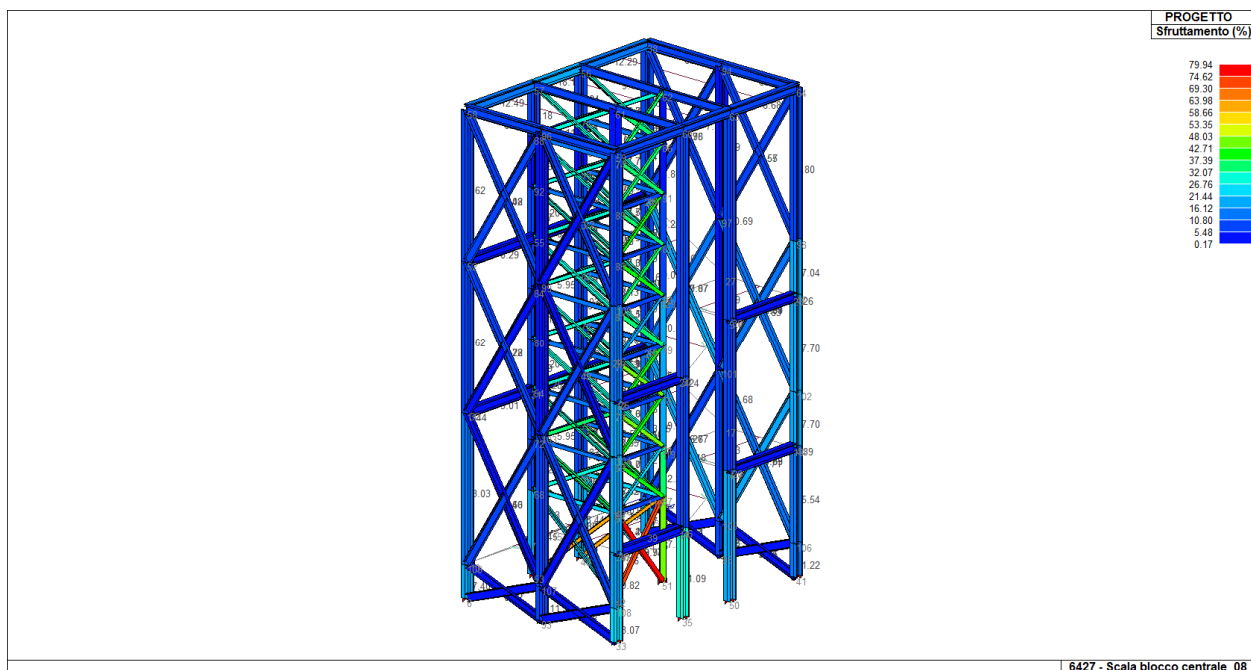


Figura 43: valori in % dello sfruttamento degli elementi

13.2.1 TABELLA VERIFICHE PER ELEMENTI IN ACCIAIO

Asta	Stato	Note	V N	N kN	V stab	N kN	Cl.	Beta x L cm	Snell.	LambDaS	Chi mn	v.Omeg	Rif. cmb
1	ok s=5,m=12	0.03	22.0				1	339.6	158.4	1.82	0.23	0.0	2,0
2	ok s=5,m=12	0.02	13.2		0.06	-11.6	1	339.6	158.4	1.82	0.23	0.0	90,87
3	ok s=5,m=12	0.02	-14.5		0.07	-14.5	1	339.6	158.4	1.82	0.23	0.0	90,90
4	ok s=5,m=12	0.02	16.3		0.06	-11.8	1	339.6	158.4	1.82	0.23	0.0	90,87
5	ok s=5,m=12	0.02	13.1				1	339.6	158.4	1.82	0.23	0.0	87,0
6	ok s=5,m=12	0.03	27.8				1	339.6	158.4	1.82	0.23	0.0	2,0
7	ok s=5,m=12	0.02	17.8		0.07	-12.6	1	339.6	158.4	1.82	0.23	0.0	87,90
8	ok s=5,m=12	0.02	15.4		0.08	-14.9	1	339.6	158.4	1.82	0.23	0.0	90,87
9	ok s=5,m=12	0.03	27.6				1	339.6	158.4	1.82	0.23	0.0	2,0
10	ok s=5,m=12	0.02	-19.1		0.10	-19.1	1	339.6	158.4	1.82	0.23	0.0	87,87
11	ok s=5,m=12	0.03	28.4				1	339.6	158.4	1.82	0.23	0.0	2,0
12	ok s=5,m=12	0.02	-16.3		0.08	-16.3	1	339.6	158.4	1.82	0.23	0.0	90,90
13	ok s=5,m=12	0.01	-8.9				1	191.0	89.1	1.03	0.52	0.0	87,0
14	ok s=5,m=12	0.05	40.3				1	191.0	89.1	1.03	0.52	0.0	2,0
15	ok s=5,m=129.19e-03	7.8					1	191.0	89.1	1.03	0.52	0.0	87,0
16	ok s=5,m=12	0.01	8.6				1	191.0	89.1	1.03	0.52	0.0	90,0
17	ok s=5,m=12	0.04	-32.4		0.17	-32.4	1	339.6	158.4	1.82	0.23	0.0	2,2
18	ok s=5,m=12	0.02	-17.3		0.09	-17.3	1	339.6	158.4	1.82	0.23	0.0	93,93
19	ok s=5,m=12	0.02	-18.9		0.10	-18.9	1	339.6	158.4	1.82	0.23	0.0	92,92
20	ok s=5,m=12	0.02	-16.6		0.09	-16.6	1	339.6	158.4	1.82	0.23	0.0	93,93
21	ok s=5,m=12	0.02	-14.6		0.08	-14.6	1	339.6	158.4	1.82	0.23	0.0	92,92
22	ok s=5,m=12	0.03	-24.5		0.13	-24.5	1	339.6	158.4	1.82	0.23	0.0	2,2
23	ok s=5,m=12	0.03	-26.9		0.14	-26.9	1	339.6	158.4	1.82	0.23	0.0	2,2
24	ok s=5,m=12	0.04	-33.0		0.17	-33.0	1	339.6	158.4	1.82	0.23	0.0	2,2
25	ok s=5,m=12	0.02	-21.0		0.11	-21.0	1	339.6	158.4	1.82	0.23	0.0	2,2
26	ok s=5,m=12	0.03	-22.5		0.12	-22.5	1	339.6	158.4	1.82	0.23	0.0	93,93
27	ok s=5,m=12	0.05	-38.8		0.20	-38.8	1	339.6	158.4	1.82	0.23	0.0	2,2
28	ok s=5,m=12	0.02	-17.9		0.09	-17.9	1	339.6	158.4	1.82	0.23	0.0	92,92
29	ok s=5,m=12	0.01	-8.9				1	191.0	89.1	1.03	0.52	0.0	93,0
30	ok s=5,m=12	0.02	-19.4				1	191.0	89.1	1.03	0.52	0.0	2,0
31	ok s=5,m=12	0.01	-8.8				1	191.0	89.1	1.03	0.52	0.0	92,0
32	ok s=5,m=12	0.01	8.7				1	191.0	89.1	1.03	0.52	0.0	92,0
33	ok s=6,m=12	0.07	-24.7		0.28	-24.7	1	219.7	149.6	1.72	0.25	0.0	96,96
34	ok s=6,m=12	0.07	25.6		0.28	-25.2	1	219.7	149.6	1.72	0.25	0.0	100,101
35	ok s=6,m=12	0.07	25.1		0.28	-24.7	1	219.7	149.6	1.72	0.25	0.0	96,97
36	ok s=6,m=12	0.07	-24.8		0.28	-24.8	1	219.7	149.6	1.72	0.25	0.0	96,96
37	ok s=6,m=12	0.07	25.8		0.29	-25.4	1	219.7	149.6	1.72	0.25	0.0	96,97
38	ok s=6,m=12	0.07	-24.7		0.28	-24.7	1	219.7	149.6	1.72	0.25	0.0	99,99
39	ok s=6,m=12	0.07	26.0		0.29	-25.9	1	219.7	149.6	1.72	0.25	0.0	99,102
40	ok s=6,m=12	0.07	-24.4		0.27	-24.4	1	219.7	149.6	1.72	0.25	0.0	95,95
41	ok s=6,m=12	0.08	-28.1		0.32	-28.1	1	219.7	149.6	1.72	0.25	0.0	102,102
42	ok s=6,m=12	0.07	-25.1		0.28	-25.1	1	219.7	149.6	1.72	0.25	0.0	99,99
43	ok s=6,m=12	0.08	-27.7		0.31	-27.7	1	219.7	149.6	1.72	0.25	0.0	102,102

44	oks=6,m=12	0.07	-25.8	0.29	-25.8	1	219.7	149.6	1.72	0.25	0.0	99,99
45	oks=6,m=12	0.08	29.7	0.32	-28.2	1	219.7	149.6	1.72	0.25	0.0	99,102
46	oks=6,m=12	0.07	-25.0	0.28	-25.0	1	219.7	149.6	1.72	0.25	0.0	99,99
47	oks=6,m=12	0.08	29.6	0.30	-26.5	1	219.7	149.6	1.72	0.25	0.0	99,102
48	oks=6,m=12	0.09	-30.3	0.34	-30.3	1	219.7	149.6	1.72	0.25	0.0	99,99
49	oks=6,m=12	0.07	-24.3	0.27	-24.3	1	219.7	149.6	1.72	0.25	0.0	98,98
50	oks=6,m=12	0.07	25.4	0.28	-24.9	1	219.7	149.6	1.72	0.25	0.0	98,95
51	oks=6,m=12	0.07	25.0	0.28	-24.6	1	219.7	149.6	1.72	0.25	0.0	101,100
52	oks=6,m=12	0.07	-24.8	0.28	-24.8	1	219.7	149.6	1.72	0.25	0.0	101,101
53	oks=6,m=12	0.07	25.6	0.28	-25.2	1	219.7	149.6	1.72	0.25	0.0	97,96
54	oks=6,m=12	0.07	-24.6	0.28	-24.6	1	219.7	149.6	1.72	0.25	0.0	97,97
55	oks=6,m=12	0.08	26.6	0.29	-26.3	1	219.7	149.6	1.72	0.25	0.0	97,96
56	oks=6,m=12	0.07	-24.2	0.27	-24.2	1	219.7	149.6	1.72	0.25	0.0	97,97
57	oks=6,m=12	0.08	27.5	0.31	-27.2	1	219.7	149.6	1.72	0.25	0.0	97,96
58	oks=6,m=12	0.07	-25.5	0.29	-25.5	1	219.7	149.6	1.72	0.25	0.0	97,97
59	oks=6,m=12	0.08	26.7	0.30	-26.6	1	219.7	149.6	1.72	0.25	0.0	97,96
60	oks=6,m=12	0.07	-24.3	0.27	-24.3	1	219.7	149.6	1.72	0.25	0.0	97,97
61	oks=6,m=12	0.08	29.8	0.33	-29.6	1	219.7	149.6	1.72	0.25	0.0	97,96
62	oks=6,m=12	0.07	-24.2	0.27	-24.2	1	219.7	149.6	1.72	0.25	0.0	97,97
63	oks=6,m=12	0.08	27.8	0.30	-26.8	1	219.7	149.6	1.72	0.25	0.0	97,96
64	oks=6,m=12	0.08	-29.4	0.33	-29.4	1	219.7	149.6	1.72	0.25	0.0	97,97
65	oks=6,m=12	0.14	-49.1	0.34	-49.1	1	158.7	108.1	1.25	0.41	0.0	102,102
66	oks=6,m=12	0.14	-49.7	0.34	-49.7	1	158.7	108.1	1.25	0.41	0.0	100,100
67	oks=6,m=12	0.15	-52.7	0.36	-52.7	1	158.7	108.1	1.25	0.41	0.0	102,102
68	oks=6,m=12	0.15	-52.2	0.36	-52.2	1	158.7	108.1	1.25	0.41	0.0	99,99
69	oks=6,m=12	0.15	-54.3	0.37	-54.3	1	158.7	108.1	1.25	0.41	0.0	102,102
70	oks=6,m=12	0.16	-56.3	0.39	-56.3	1	158.7	108.1	1.25	0.41	0.0	100,100
71	oks=6,m=12	0.17	-60.1	0.41	-60.1	1	158.7	108.1	1.25	0.41	0.0	102,102
72	oks=6,m=12	0.15	-53.2	0.36	-53.2	1	158.7	108.1	1.25	0.41	0.0	99,99
73	oks=6,m=12	0.14	-50.9	0.35	-50.9	1	158.7	108.1	1.25	0.41	0.0	101,101
74	oks=6,m=12	0.09	-30.7	0.21	-30.7	1	158.7	108.1	1.25	0.41	0.0	99,99
75	oks=6,m=12	0.18	-63.3	0.43	-63.3	1	158.7	108.1	1.25	0.41	0.0	101,101
76	oks=6,m=12	0.16	-58.3	0.40	-58.3	1	158.7	108.1	1.25	0.41	0.0	99,99
77	oks=6,m=12	0.18	-64.5	0.44	-64.5	1	158.7	108.1	1.25	0.41	0.0	101,101
78	oks=6,m=12	0.17	-59.2	0.41	-59.2	1	158.7	108.1	1.25	0.41	0.0	99,99
79	oks=6,m=12	0.16	-56.0	0.38	-56.0	1	158.7	108.1	1.25	0.41	0.0	101,101
80	oks=6,m=12	0.10	-34.2	0.23	-34.2	1	158.7	108.1	1.25	0.41	0.0	99,99
81	oks=6,m=12	0.23	-80.3	0.80	-80.3	1	203.9	138.9	1.60	0.28	0.0	97,97
82	oks=6,m=12	0.21	-74.1	0.74	-74.1	1	203.9	138.9	1.60	0.28	0.0	99,99
83	oks=6,m=12	0.12	-42.8	0.61	-42.8	1	254.3	173.2	1.99	0.20	0.0	102,102
84	oks=6,m=12	0.05	-17.6	0.25	-17.6	1	254.3	173.2	1.99	0.20	0.0	99,99
85	oks=6,m=12	0.12	-43.7	0.63	-43.7	1	254.3	173.2	1.99	0.20	0.0	96,96
86	oks=6,m=12	0.04	-15.8	0.23	-15.8	1	254.3	173.2	1.99	0.20	0.0	97,97

Asta	V N	N	V stab	N	Beta x L	Snell.	LambDaS	Chi mn	v.Omeg
		-80.35		-80.35			1.03	0.20	0.0
	0.23	40.35	0.80		339.62	173.18	1.99		0.0

Trave Stato	Note	V V/T	V N/M	V stab	Cl.	LamS 22	LamS 33	Snell.	Chi mn	V flst	LamS LT	Chi LT	Rif. cmb
87	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	5,5,0,1
88	oks=4,m=12	0.01	0.06		1					0.06	0.2	1.00	5,6,0,1
89	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,6,0,1
91	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
92	oks=4,m=12	0.01	0.06		1					0.06	0.2	1.00	2,2,0,1
93	oks=4,m=12	0.02	0.16		1					0.15	0.2	1.00	2,6,0,1
94	oks=2,m=121.78e-031.61e-03				1					1.47e-03	0.2	1.00	92,94,0,1
95	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,6,0,1
96	oks=4,m=12	0.01	0.06		1					0.06	0.2	1.00	2,2,0,1
97	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
98	oks=4,m=12	0.01	0.06		1					0.06	0.2	1.00	6,1,0,1
99	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
100	oks=4,m=12	0.01	0.09		1					0.06	0.2	1.00	6,99,0,1
101	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
103	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
104	oks=4,m=12	0.01	0.09		1					0.06	0.2	1.00	6,99,0,1
105	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,5,0,1
106	oks=2,m=121.67e-031.47e-03				1					1.47e-03	0.2	1.00	5,5,0,1
107	oks=4,m=12	0.02	0.16		1					0.15	0.2	1.00	2,5,0,1
108	oks=4,m=12	0.01	0.07		1					0.06	0.2	1.00	5,97,0,1
109	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	2,2,0,1
110	oks=4,m=12	0.01	0.06		1					0.06	0.2	1.00	2,5,0,1
111	oks=4,m=12	0.02	0.15		1					0.15	0.2	1.00	92,2,0,1
112	oks=4,m=12	0.01	0.10		1					0.06	0.2	1.00	2,99,0,1
113	oks=4,m=12	0.02	0.17	0.22	1	1.4	0.8	118.7	0.43	0.15	0.2	1.00	2,101,100,1
115	oks=4,m=12	0.02	0.17	0.22	1	1.4	0.8	118.7	0.43	0.15	0.2	1.00	2,99,102,1
141	oks=2,m=122.35e-032.93e-03				1					2.93e-03	0.3	1.00	2,2,0,2

154	oks=2,m=12	0.01	0.05	1				0.02	0.3	1.00	2,2,0,2
155	oks=2,m=12	0.01	0.05	1				0.02	0.3	1.00	2,2,0,2
156	oks=2,m=12	0.06	0.02	1				0.01	7.32e-03	1.00	2,6,0,2
157	oks=2,m=12	0.04	0.04	1				9.40e-03	7.32e-03	1.00	2,2,0,2
158	oks=2,m=12	0.07	0.02	1				0.02	7.32e-03	1.00	2,6,0,2
162	oks=2,m=12	0.05	0.02	1				0.01	7.32e-03	1.00	2,6,0,2
164	oks=2,m=122.99e-03	0.05		1				0.02	0.3	1.00	2,2,0,2
175	oks=2,m=12	0.02	0.05	1				0.03	0.3	1.00	2,2,0,2
184	oks=2,m=122.88e-03	0.07		1				2.61e-03	0.3	1.00	5,99,0,2
185	oks=2,m=123.90e-03	0.07		1				7.67e-03	0.3	1.00	2,102,0,2
197	oks=2,m=12	0.08	0.05	1				0.02	7.32e-03	1.00	2,2,0,2
198	oks=2,m=12	0.06	0.02	1				0.01	7.32e-03	1.00	2,2,0,2
200	oks=2,m=12	0.05	0.03	1				0.01	7.32e-03	1.00	2,2,0,2
201	oks=2,m=12	0.06	0.02	1				0.01	7.32e-03	1.00	2,6,0,2
217	oks=2,m=122.95e-03	0.05		1				0.02	0.3	1.00	2,2,0,2
218	oks=2,m=12	0.01	0.07	1				0.01	0.3	1.00	2,101,0,101
219	oks=2,m=12	0.02	0.07	1				0.02	0.2	1.00	2,92,0,91
220	oks=2,m=12	0.02	0.05	1				0.03	0.3	1.00	2,2,0,2
221	oks=2,m=123.31e-03	0.05		1				0.02	0.3	1.00	2,2,0,2
222	oks=2,m=12	0.06	0.02	1				0.01	7.32e-03	1.00	2,2,0,2
223	oks=2,m=12	0.04	0.04	1				8.33e-03	7.32e-03	1.00	2,2,0,2
224	oks=2,m=12	0.07	0.05	1				0.02	7.32e-03	1.00	2,2,0,2
225	oks=2,m=12	0.04	0.04	1				9.48e-03	7.32e-03	1.00	2,2,0,2
226	oks=2,m=12	0.04	0.05	1				7.74e-03	7.32e-03	1.00	2,2,0,2
227	oks=2,m=12	0.07	0.05	1				0.02	7.32e-03	1.00	2,2,0,2
228	oks=4,m=12	0.01	0.11	1				0.06	0.2	1.00	2,95,0,1
234	oks=2,m=12	0.01	0.07	1				0.02	0.3	1.00	2,95,0,95
235	oks=2,m=122.88e-03	0.07		1				2.61e-03	0.3	1.00	5,99,0,2
236	oks=2,m=12	0.02	0.12	1				0.07	0.3	1.00	102,98,0,102
237	oks=2,m=12	0.08	0.18	1				0.13	0.2	1.00	93,94,0,94
238	oks=2,m=12	0.02	0.12	1				0.06	0.3	1.00	100,100,0,100
239	oks=2,m=123.90e-03	0.07		1				7.67e-03	0.3	1.00	2,102,0,2
240	oks=5,m=127.58e-03	0.08		1				0.08	0.6	0.69	96,96,0,96
241	oks=5,m=126.61e-03	0.07		1				0.09	0.7	0.62	96,96,0,96
242	oks=5,m=126.59e-03	0.07		1				0.09	0.7	0.62	98,98,0,98
243	oks=5,m=127.55e-03	0.07		1				0.08	0.6	0.69	98,98,0,98
244	oks=4,m=12	0.02	0.15	1				0.15	0.2	1.00	5,5,0,1
245	oks=4,m=12	0.01	0.06	1				0.06	0.2	1.00	2,5,0,1

Trave	V V/T	V N/M	V stab	LamS 22	LamS 33	Snell.	Chi mn	V flst	LamS LT	Chi LT
	0.08	0.18	0.22		1.37	0.79	0.43 118.66		0.15	0.62 0.73

Trave	v.Omeg f.Om. N	Stato	V N/M	V stab	Rif. cmb	V[7.5.4]	M Ed kN m	V[7.5.5]	N Ed kN	V[7.5.6]	V Ed,G kN	V Ed,M kN
87							0.0	0.0	0.0	0.0	0.0	0.0
88							0.0	0.0	0.0	0.0	0.0	0.0
89							0.0	0.0	0.0	0.0	0.0	0.0
91							0.0	0.0	0.0	0.0	0.0	0.0
92							0.0	0.0	0.0	0.0	0.0	0.0
93							0.0	0.0	0.0	0.0	0.0	0.0
94							0.0	0.0	0.0	0.0	0.0	0.0
95							0.0	0.0	0.0	0.0	0.0	0.0
96							0.0	0.0	0.0	0.0	0.0	0.0
97							0.0	0.0	0.0	0.0	0.0	0.0
98							0.0	0.0	0.0	0.0	0.0	0.0
99							0.0	0.0	0.0	0.0	0.0	0.0
100							0.0	0.0	0.0	0.0	0.0	0.0
101							0.0	0.0	0.0	0.0	0.0	0.0
103							0.0	0.0	0.0	0.0	0.0	0.0
104							0.0	0.0	0.0	0.0	0.0	0.0
105							0.0	0.0	0.0	0.0	0.0	0.0
106							0.0	0.0	0.0	0.0	0.0	0.0
107							0.0	0.0	0.0	0.0	0.0	0.0
108							0.0	0.0	0.0	0.0	0.0	0.0
109							0.0	0.0	0.0	0.0	0.0	0.0
110							0.0	0.0	0.0	0.0	0.0	0.0
111							0.0	0.0	0.0	0.0	0.0	0.0
112							0.0	0.0	0.0	0.0	0.0	0.0
113							0.0	0.0	0.0	0.0	0.0	0.0
115							0.0	0.0	0.0	0.0	0.0	0.0
141							0.0	0.0	0.0	0.0	0.0	0.0
154							0.0	0.0	0.0	0.0	0.0	0.0
155							0.0	0.0	0.0	0.0	0.0	0.0
156							0.0	0.0	0.0	0.0	0.0	0.0
157							0.0	0.0	0.0	0.0	0.0	0.0
158							0.0	0.0	0.0	0.0	0.0	0.0

162	0.0	0.0	0.0	0.0	0.0	0.0	0.0
164	0.0	0.0	0.0	0.0	0.0	0.0	0.0
175	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	0.0	0.0	0.0	0.0	0.0	0.0	0.0
197	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201	0.0	0.0	0.0	0.0	0.0	0.0	0.0
217	0.0	0.0	0.0	0.0	0.0	0.0	0.0
218	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	0.0	0.0	0.0	0.0	0.0	0.0	0.0
220	0.0	0.0	0.0	0.0	0.0	0.0	0.0
221	0.0	0.0	0.0	0.0	0.0	0.0	0.0
222	0.0	0.0	0.0	0.0	0.0	0.0	0.0
223	0.0	0.0	0.0	0.0	0.0	0.0	0.0
224	0.0	0.0	0.0	0.0	0.0	0.0	0.0
225	0.0	0.0	0.0	0.0	0.0	0.0	0.0
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	0.0	0.0	0.0	0.0	0.0	0.0	0.0
228	0.0	0.0	0.0	0.0	0.0	0.0	0.0
234	0.0	0.0	0.0	0.0	0.0	0.0	0.0
235	0.0	0.0	0.0	0.0	0.0	0.0	0.0
236	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	0.0	0.0	0.0	0.0	0.0	0.0	0.0
238	0.0	0.0	0.0	0.0	0.0	0.0	0.0
239	0.0	0.0	0.0	0.0	0.0	0.0	0.0
240	0.0	0.0	0.0	0.0	0.0	0.0	0.0
241	0.0	0.0	0.0	0.0	0.0	0.0	0.0
242	0.0	0.0	0.0	0.0	0.0	0.0	0.0
243	0.0	0.0	0.0	0.0	0.0	0.0	0.0
244	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Trave	v.Omeg	V N/M	V stab	V[7.5.4]	M Ed	V[7.5.5]	N Ed	V[7.5.6]	V Ed,G	V Ed,M
					0.0		0.0		0.0	0.0
					0.0	0.0	0.0	0.0	0.0	0.0

Pilas.	Stato	Note	V V/T	V N/M	V stab	Cl.	LamS 22	LamS 33	Snell.	Chi mn	V flst	LamS LT	Chi LT	Rif. cmb
90	oks=3,m=12	0.06	0.17			3								99,99,0,0
102	oks=3,m=125.09e-04	0.04				3								96,102,0,0
114	oks=3,m=122.39e-04	0.04				3								89,100,0,0
116	oks=3,m=121.56e-04	0.01				3								103,87,0,0
117	oks=2,m=127.77e-03	0.08				1					0.08	9.18e-02	1.00	92,88,0,91
118	oks=3,m=121.46e-03	0.19	0.20			3	0.4	0.2	30.7	0.94				96,97,97,0
119	oks=3,m=121.58e-03	0.09				3								100,98,0,0
120	oks=2,m=127.81e-03	0.08				1					0.08	0.1	1.00	92,94,0,91
121	oks=3,m=12	0.06	0.27			3								97,95,0,0
122	oks=3,m=122.19e-03	0.24	0.23			3	0.4	0.2	30.7	0.94				99,99,99,0
123	oks=3,m=12	0.01	0.32	0.31		3	0.3	0.2	27.8	0.96				97,97,97,0
124	oks=2,m=12	0.02	0.09			1					0.07	0.1	1.00	92,102,0,92
125	oks=2,m=12	0.02	0.09			1					0.07	0.1	1.00	92,96,0,92
126	oks=2,m=12	0.03	0.08			1					0.08	8.52e-02	1.00	94,94,0,94
127	oks=2,m=12	0.03	0.08			1					0.08	8.09e-02	1.00	92,92,0,92
128	oks=3,m=122.46e-03	0.13				3								97,99,0,0
129	oks=2,m=12	0.02	0.05			1					0.05	9.59e-02	1.00	91,92,0,92
130	oks=2,m=12	0.02	0.05			1					0.05	0.1	1.00	94,92,0,92
131	oks=2,m=121.48e-03	0.08				1					0.08	8.56e-02	1.00	102,87,0,92
132	oks=3,m=121.83e-03	0.15	0.16			3	0.4	0.2	30.7	0.94				99,97,97,0
133	oks=3,m=121.56e-04	0.01				3								93,94,0,0
134	oks=2,m=121.39e-03	0.08				1					0.08	7.93e-02	1.00	99,93,0,92
135	oks=3,m=122.37e-03	0.17	0.18			3	0.4	0.2	30.7	0.94				96,99,99,0
136	oks=2,m=12	0.02	0.07			1					0.03	9.95e-02	1.00	92,102,0,91
137	oks=2,m=12	0.02	0.07			1					0.03	0.1	1.00	92,96,0,91
138	oks=3,m=123.63e-04	0.06				3								100,98,0,0
139	oks=3,m=125.99e-04	0.06				3								95,99,0,0
140	oks=3,m=127.31e-03	0.21				3								96,97,0,0
142	oks=2,m=128.40e-03	0.09				1					0.09	8.20e-02	1.00	101,100,0,101
143	oks=2,m=128.40e-03	0.09				1					0.09	8.20e-02	1.00	101,95,0,101
147	oks=3,m=127.96e-03	0.15				3								96,99,0,0
159	oks=2,m=12	0.02	0.17			1					0.16	7.92e-02	1.00	92,90,0,92
160	oks=2,m=12	0.01	0.06			1					0.06	0.1	1.00	92,94,0,91
161	oks=2,m=12	0.02	0.11			1					0.09	0.3	1.00	101,96,0,101
163	oks=3,m=12	0.06	0.31			3								97,97,0,0
168	oks=3,m=12	0.06	0.19			3								99,97,0,0
176	oks=2,m=12	0.02	0.13			1					0.13	0.3	1.00	92,90,0,92

177	oks=2,m=12	0.04	0.20	1						0.14	0.1	1.00	99,97,0,102
178	oks=2,m=12	0.02	0.17	1						0.06	0.1	1.00	2,2,0,101
179	oks=2,m=12	0.02	0.13	1						0.13	0.3	1.00	92,93,0,92
180	oks=2,m=12	0.01	0.16	1						0.07	0.2	1.00	2,2,0,102
181	oks=2,m=12	0.02	0.18	1						0.08	0.1	1.00	99,2,0,99
182	oks=2,m=127.43e-03	0.08		1						0.06	0.2	1.00	101,95,0,101
183	oks=2,m=128.69e-03	0.10		1						0.07	0.2	1.00	99,100,0,99
186	oks=2,m=123.91e-03	0.03		1						0.03	0.2	1.00	99,96,0,99
187	oks=2,m=123.91e-03	0.03		1						0.03	0.2	1.00	99,102,0,99
188	oks=2,m=124.38e-03	0.03		1						0.03	0.3	1.00	101,96,0,99
189	oks=2,m=124.38e-03	0.03		1						0.03	0.3	1.00	101,102,0,99
190	oks=2,m=128.40e-03	0.07		1						0.07	0.3	1.00	101,100,0,101
191	oks=2,m=128.40e-03	0.07		1						0.07	0.3	1.00	101,101,0,101
192	oks=2,m=12	0.02	0.18	1						0.06	0.1	1.00	2,2,0,99
193	oks=3,m=12	0.01	0.27	3	0.3	0.2	27.8	0.96					100,95,95,0
194	oks=3,m=129.04e-03	0.40	0.47	3	0.6	0.3	51.1	0.84					99,97,97,0
195	oks=2,m=12	0.02	0.18	1						0.16	0.2	1.00	92,87,0,92
196	oks=2,m=129.46e-03	0.20		1						0.08	0.2	1.00	2,2,0,102
199	oks=2,m=125.12e-03	0.08		1						0.07	0.2	1.00	100,93,0,92
202	oks=3,m=127.09e-03	0.39	0.47	3	0.6	0.3	51.1	0.84					96,95,99,0
203	oks=2,m=12	0.02	0.18	1						0.16	7.99e-02	1.00	92,92,0,92
204	oks=2,m=12	0.02	0.11	1						0.08	7.12e-02	1.00	2,100,0,102
205	oks=2,m=125.14e-03	0.08		1						0.07	0.2	1.00	100,92,0,92
206	oks=2,m=12	0.02	0.18	1						0.16	0.2	1.00	92,92,0,92
207	oks=2,m=129.29e-03	0.08		1						0.07	0.2	1.00	92,92,0,92
208	oks=2,m=12	0.01	0.08	1						0.08	7.23e-02	1.00	91,87,0,92
209	oks=2,m=128.08e-03	0.15		1						0.06	0.2	1.00	2,2,0,101
210	oks=2,m=127.65e-03	0.10		1						0.08	0.3	1.00	99,101,0,99
211	oks=2,m=12	0.01	0.11	1						0.09	0.3	1.00	101,96,0,101
212	oks=2,m=12	0.02	0.17	1						0.08	0.1	1.00	2,2,0,99
213	oks=2,m=12	0.01	0.08	1						0.08	8.16e-02	1.00	94,93,0,92
214	oks=2,m=129.27e-03	0.08		1						0.07	0.2	1.00	92,93,0,92
229	oks=2,m=12	0.01	0.06	1						0.06	9.65e-02	1.00	92,91,0,91
230	oks=2,m=12	0.04	0.23	1						0.22	6.88e-02	1.00	99,102,0,99
231	oks=2,m=12	0.01	0.17	1						0.03	0.2	1.00	2,2,0,100
232	oks=2,m=12	0.04	0.31	1						0.21	0.1	1.00	100,97,0,99
233	oks=2,m=12	0.01	0.10	1						0.08	0.2	1.00	99,2,0,99

Pilas.	V V/T	V N/M	V stab	LamS 22	LamS 33	Snell.	Chi mn	V flst	LamS LT	Chi LT
	0.06	0.40	0.47	0.59	0.30	51.10	0.84	0.22	0.30	1.00

Pilas.f.Om.	Nf.Om.	T	Stato	V V/T	V N/MV stab	V flst	Rif. cmbV[7.5.10]	V Edsovr. Xi kN	sovr. Xfsovr.	Yi	sovr. Yf
90	0.0	0.0	ok	0.0	0.0		0,0,0,0				
102	0.0	0.0	ok	0.0	0.0		0,0,0,0				
114	0.0	0.0	ok	0.0	0.0		0,0,0,0				
116	0.0	0.0	ok	0.0	0.0		0,0,0,0				
117	0.0	0.0	ok	0.0	0.0		0,0,0,0				
118	0.0	0.0	ok	0.0	0.0		0,0,0,0				
119	0.0	0.0	ok	0.0	0.0		0,0,0,0				
120	0.0	0.0	ok	0.0	0.0		0,0,0,0				
121	0.0	0.0	ok	0.0	0.0		0,0,0,0				
122	0.0	0.0	ok	0.0	0.0		0,0,0,0				
123	0.0	0.0	ok	0.0	0.0		0,0,0,0				
124	0.0	0.0	ok	0.0	0.0		0,0,0,0				
125	0.0	0.0	ok	0.0	0.0		0,0,0,0				
126	0.0	0.0	ok	0.0	0.0		0,0,0,0				
127	0.0	0.0	ok	0.0	0.0		0,0,0,0				
128	0.0	0.0	ok	0.0	0.0		0,0,0,0				
129	0.0	0.0	ok	0.0	0.0		0,0,0,0				
130	0.0	0.0	ok	0.0	0.0		0,0,0,0				
131	0.0	0.0	ok	0.0	0.0		0,0,0,0				
132	0.0	0.0	ok	0.0	0.0		0,0,0,0				
133	0.0	0.0	ok	0.0	0.0		0,0,0,0				
134	0.0	0.0	ok	0.0	0.0		0,0,0,0				
135	0.0	0.0	ok	0.0	0.0		0,0,0,0				
136	0.0	0.0	ok	0.0	0.0		0,0,0,0				
137	0.0	0.0	ok	0.0	0.0		0,0,0,0				
138	0.0	0.0	ok	0.0	0.0		0,0,0,0				
139	0.0	0.0	ok	0.0	0.0		0,0,0,0				
140	0.0	0.0	ok	0.0	0.0		0,0,0,0				
142	0.0	0.0	ok	0.0	0.0		0,0,0,0				
143	0.0	0.0	ok	0.0	0.0		0,0,0,0				
147	0.0	0.0	ok	0.0	0.0		0,0,0,0				
159	0.0	0.0	ok	0.0	0.0		0,0,0,0				
160	0.0	0.0	ok	0.0	0.0		0,0,0,0				

161	0.0	0.0	ok	0.0	0.0	0,0,0,0
163	0.0	0.0	ok	0.0	0.0	0,0,0,0
168	0.0	0.0	ok	0.0	0.0	0,0,0,0
176	0.0	0.0	ok	0.0	0.0	0,0,0,0
177	0.0	0.0	ok	0.0	0.0	0,0,0,0
178	0.0	0.0	ok	0.0	0.0	0,0,0,0
179	0.0	0.0	ok	0.0	0.0	0,0,0,0
180	0.0	0.0	ok	0.0	0.0	0,0,0,0
181	0.0	0.0	ok	0.0	0.0	0,0,0,0
182	0.0	0.0	ok	0.0	0.0	0,0,0,0
183	0.0	0.0	ok	0.0	0.0	0,0,0,0
186	0.0	0.0	ok	0.0	0.0	0,0,0,0
187	0.0	0.0	ok	0.0	0.0	0,0,0,0
188	0.0	0.0	ok	0.0	0.0	0,0,0,0
189	0.0	0.0	ok	0.0	0.0	0,0,0,0
190	0.0	0.0	ok	0.0	0.0	0,0,0,0
191	0.0	0.0	ok	0.0	0.0	0,0,0,0
192	0.0	0.0	ok	0.0	0.0	0,0,0,0
193	0.0	0.0	ok	0.0	0.0	0,0,0,0
194	0.0	0.0	ok	0.0	0.0	0,0,0,0
195	0.0	0.0	ok	0.0	0.0	0,0,0,0
196	0.0	0.0	ok	0.0	0.0	0,0,0,0
199	0.0	0.0	ok	0.0	0.0	0,0,0,0
202	0.0	0.0	ok	0.0	0.0	0,0,0,0
203	0.0	0.0	ok	0.0	0.0	0,0,0,0
204	0.0	0.0	ok	0.0	0.0	0,0,0,0
205	0.0	0.0	ok	0.0	0.0	0,0,0,0
206	0.0	0.0	ok	0.0	0.0	0,0,0,0
207	0.0	0.0	ok	0.0	0.0	0,0,0,0
208	0.0	0.0	ok	0.0	0.0	0,0,0,0
209	0.0	0.0	ok	0.0	0.0	0,0,0,0
210	0.0	0.0	ok	0.0	0.0	0,0,0,0
211	0.0	0.0	ok	0.0	0.0	0,0,0,0
212	0.0	0.0	ok	0.0	0.0	0,0,0,0
213	0.0	0.0	ok	0.0	0.0	0,0,0,0
214	0.0	0.0	ok	0.0	0.0	0,0,0,0
229	0.0	0.0	ok	0.0	0.0	0,0,0,0
230	0.0	0.0	ok	0.0	0.0	0,0,0,0
231	0.0	0.0	ok	0.0	0.0	0,0,0,0
232	0.0	0.0	ok	0.0	0.0	0,0,0,0
233	0.0	0.0	ok	0.0	0.0	0,0,0,0

Pilas. V V/T V N/MV stab V flst V[7.5.10] V Edsovr. Xi sovr. Xfsovr. Yi sovr. Yf
0.0 0.0

13.2.1.1 STATI LIMITE D' ESERCIZIO ACCIAIO

13.2.1.1.1 LEGENDA TABELLA STATI LIMITE D' ESERCIZIO ACCIAIO

In tabella vengono riportati i valori di interesse per il controllo degli stati limite d'esercizio.

In particolare vengono riportati, per gli elementi trave, i risultati relativi alle combinazioni considerate (rare o caratteristiche).

I valori di interesse sono i seguenti:

f*1000/L	massima deformazione normalizzata in combinazioni rare
----------	--

Si precisa che i valori di massima deformazione per travi sono riferiti ai due piani locali (1-2 con momenti flettenti 3-3 e 1-3 con momenti flettenti 2-2). Il valore riportato (massimo) è espresso in 1000/L per rendere agevole il confronto di più valori e in particolare di più range di valori (ad esempio 2 rappresenta L/500, 4 L/250 e così via).

Trave	f*1000/L	Trave	f*1000/L	Trave	f*1000/L	Trave	f*1000/L	Trave	f*1000/L	Trave	f*1000/L
87	0.9	88	0.2	89	0.9	91	0.9	92	0.2	93	0.9
95	0.9	96	0.2	97	0.9	98	0.2	99	0.9	100	0.2
103	0.9	104	0.2	105	0.9	106	4.91e-02	107	0.9	108	0.2
110	0.2	111	0.9	112	0.2	113	0.9	115	0.9	141	7.05e-02
155	2.0	156	0.3	157	2.3	158	2.7	162	0.2	164	0.1
184	2.70e-02	185	2.59e-02	197	0.3	198	0.3	200	0.9	201	1.8
218	8.86e-02	219	3.84e-02	220	2.8	221	0.2	222	1.8	223	2.4
225	3.0	226	1.7	227	0.2	228	0.2	234	0.1	235	2.66e-02
237	3.81e-02	238	8.55e-02	239	5.11e-02	240	2.69e-02	241	4.08e-02	242	3.28e-02
244	0.9	245	0.2							243	2.65e-02

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13.2.2 VERIFICA PIASTRA DI BASE

Il collegamento viene dimensionato con l'elemento maggiormente sollecitato nelle strutture metalliche dell'intero polo dinamico, essendo i collegamenti realizzati tutti nel medesimo modo.

Coefficienti di sicurezza utilizzati

$$\gamma_{M0} = 1.05$$

$$\gamma_{M1} = 1.10$$

$$\gamma_{M2} = 1.25$$

Colonna

Tipo di profilo: HEB 200

Materiale: Acciaio S275 $f_y = 275 \text{ N/mm}^2$ $f_t = 430 \text{ N/mm}^2$ $\gamma_{ov} = 1.25$

Classe sezione: 1

Flangia:

Materiale: Acciaio S275 $f_y = 275 \text{ N/mm}^2$ $f_t = 430 \text{ N/mm}^2$ $\gamma_{ov} = 1.25$

Dimensioni (B x H x Sp): 450.0 x 450.0 x 20.0 mm

Spessore nervature verticali: 15.0 mm

Spessore nervature orizzontali: 15.0 mm

Bullonature:

Viti cl. 8.8 Dadi 8 o 10 ($f_{yb} = 640 \text{ N/mm}^2$, $f_{tb} = 800 \text{ N/mm}^2$)

Diametro $\varnothing = 20 \text{ mm}$ $A_{res} = 245.0 \text{ mm}^2$ (ridotta per filettatura)

Diametro foro $\varnothing_0 = 21 \text{ mm}$

Saldature:

Materiale: Acciaio S275 $f_y = 275 \text{ N/mm}^2$ $f_t = 430 \text{ N/mm}^2$ $\beta_1 = 0.70$ $\beta_2 = 0.85$

Spessore cordoni d'angolo $s_c = 8 \text{ mm}$

Sollecitazioni:

Nodo.CMB	V2 [N]	V3 [N]	N [N]	M2 [N mm]	M3 [N mm]	T [N mm]
42.1	16.9	-312.4	-77932.0	423838.0	-118582.0	28.0
42.2	30.8	55.2	-83316.6	329205.0	-347691.0	-33.0
42.3	14.7	-256.1	-61477.4	376979.0	-91519.0	35.0
42.4	28.7	111.4	-66862.1	282345.0	-320628.0	-27.0
42.5	22.4	-423.1	-96606.4	614986.0	-133179.0	62.0
42.6	32.2	-165.8	-100400.0	548742.0	-293556.0	18.0
42.7	20.2	-366.9	-80151.8	568126.0	-106116.0	68.0
42.8	30.0	-109.6	-83921.1	501882.0	-266493.0	25.0
42.19	3858.2	1573.8	356000.0	-2765000.0	-15460000.0	29157.0
42.20	2537.1	972.6	167900.0	-1408000.0	-10030000.0	20088.0
42.21	-2518.3	-1030.9	-242600.0	1568000.0	9797000.0	-20144.0
42.22	-3839.4	-1632.1	-430700.0	2925000.0	15220000.0	-29213.0
42.23	3800.3	1612.2	378100.0	-2931000.0	-15290000.0	28820.0
42.24	2595.0	934.2	145800.0	-1242000.0	-10210000.0	20424.0
42.25	-2576.2	-992.5	-220500.0	1402000.0	9969000.0	-20481.0
42.26	-3781.5	-1670.5	-452800.0	3091000.0	15050000.0	-28876.0
42.27	3096.7	1795.4	382000.0	-2939000.0	-13230000.0	18800.0
42.28	1775.6	1194.2	193900.0	-1582000.0	-7802000.0	9731.0
42.29	-1756.9	-1252.5	-268500.0	1742000.0	7566000.0	-9787.0
42.30	-3078.0	-1853.7	-456700.0	3099000.0	12990000.0	-18856.0
42.31	3038.8	1833.8	404100.0	-3105000.0	-13060000.0	18463.0
42.32	1833.5	1155.8	171800.0	-1416000.0	-7974000.0	10067.0
42.33	-1814.8	-1214.1	-246400.0	1576000.0	7738000.0	-10124.0
42.34	-3020.1	-1892.1	-478800.0	3265000.0	12820000.0	-18519.0
42.35	3167.7	1363.6	366000.0	-2832000.0	-12950000.0	22482.0
42.36	-1236.0	-640.5	-261100.0	1692000.0	5140000.0	-7749.0
42.37	1254.7	582.1	186400.0	-1532000.0	-5377000.0	7692.0
42.38	-3148.9	-1421.9	-440700.0	2992000.0	12720000.0	-22539.0

42.39	2939.2	1430.0	373800.0	-2885000.0	-12280000.0	19375.0
42.40	-1464.4	-574.0	-253300.0	1640000.0	5810000.0	-10856.0
42.41	1483.2	515.7	178600.0	-1480000.0	-6046000.0	10799.0
42.42	-2920.5	-1488.3	-448400.0	3044000.0	12050000.0	-19432.0
42.43	2974.7	1491.5	439700.0	-3386000.0	-12380000.0	21360.0
42.44	-1043.0	-768.4	-334800.0	2246000.0	4566000.0	-6626.0
42.45	1061.7	710.1	260100.0	-2086000.0	-4803000.0	6570.0
42.46	-2955.9	-1549.8	-514300.0	3546000.0	12140000.0	-21416.0
42.47	2746.2	1558.0	447500.0	-3438000.0	-11710000.0	18253.0
42.48	-1271.4	-701.9	-327000.0	2194000.0	5236000.0	-9733.0
42.49	1290.1	643.6	252300.0	-2034000.0	-5472000.0	9677.0
42.50	-2727.5	-1616.3	-522100.0	3598000.0	11470000.0	-18309.0
42.115	4651.6	1902.7	437200.0	-3352000.0	-18630000.0	35165.0
42.116	3059.5	1177.2	210000.0	-1713000.0	-12080000.0	24273.0
42.117	-3040.8	-1235.5	-284600.0	1873000.0	11850000.0	-24330.0
42.118	-4632.8	-1961.0	-511800.0	3512000.0	18400000.0	-35221.0
42.119	4581.7	1950.1	464100.0	-3555000.0	-18430000.0	34758.0
42.120	3129.4	1129.8	183000.0	-1511000.0	-12290000.0	24680.0
42.121	-3110.7	-1188.1	-257700.0	1671000.0	12050000.0	-24736.0
42.122	-4562.9	-2008.4	-538800.0	3714000.0	18190000.0	-34815.0
42.123	3739.7	2179.5	470200.0	-3574000.0	-15970000.0	22640.0
42.124	2147.6	1454.0	243000.0	-1935000.0	-9425000.0	11748.0
42.125	-2128.9	-1512.3	-317600.0	2095000.0	9189000.0	-11805.0
42.126	-3720.9	-2237.8	-544800.0	3734000.0	15740000.0	-22697.0
42.127	3669.8	2226.9	497100.0	-3776000.0	-15770000.0	22234.0
42.128	2217.5	1406.6	216000.0	-1733000.0	-9631000.0	12155.0
42.129	-2198.8	-1465.0	-290700.0	1892000.0	9395000.0	-12212.0
42.130	-3651.0	-2285.2	-571800.0	3936000.0	15530000.0	-22290.0
42.131	3816.7	1650.8	449600.0	-3436000.0	-15610000.0	27049.0
42.132	-1490.2	-767.6	-307700.0	2028000.0	6226000.0	-9257.0
42.133	1508.9	709.3	233100.0	-1868000.0	-6462000.0	9201.0
42.134	-3797.9	-1709.1	-524300.0	3596000.0	15370000.0	-27105.0
42.135	3543.1	1733.8	459500.0	-3502000.0	-14810000.0	23292.0
42.136	-1763.8	-684.6	-297800.0	1962000.0	7023000.0	-13014.0
42.137	1782.5	626.3	223200.0	-1802000.0	-7259000.0	12958.0
42.138	-3524.3	-1792.1	-534200.0	3662000.0	14570000.0	-23348.0
42.139	3583.6	1808.6	539400.0	-4110000.0	-14920000.0	25694.0
42.140	-1257.2	-925.5	-397500.0	2702000.0	5539000.0	-7902.0
42.141	1275.9	867.2	322900.0	-2542000.0	-5775000.0	7845.0
42.142	-3564.9	-1866.9	-614100.0	4270000.0	14680000.0	-25750.0
42.143	3310.0	1891.7	549300.0	-4176000.0	-14120000.0	21936.0
42.144	-1530.7	-842.4	-387600.0	2636000.0	6337000.0	-11659.0
42.145	1549.5	784.1	313000.0	-2476000.0	-6573000.0	11603.0
42.146	-3291.3	-1950.0	-624000.0	4336000.0	13890000.0	-21993.0

Calcolo resistenze

Resistenza a trazione dei bulloni

$$F_{tb,Rd} = 0.9 \cdot f_{tb} \cdot A_{res} / \gamma_{M2} = 141145.5 \text{ N}$$

Resistenza a punzonamento flangia

$$B_{pf,Rd} = 0.6 \cdot \pi \cdot d_m \cdot t_f \cdot f_{tk} / \gamma_{M2} = 389054.8 \text{ N}$$

Bull.	$F_{f,Rd} \text{ [N]}$	$F_{t,Rd} \text{ [N]}$
1	92005.7	92005.7
2	93918.9	93918.9
3	92005.7	92005.7
4	88103.3	88103.3
5	88103.3	88103.3
6	92005.7	92005.7
7	93918.9	93918.9
8	92005.7	92005.7

Legenda

$F_{f,Rd} = M_{res,m} / (B_m \cdot R_m)$ resistenza a flessione flangia

$F_{t,Rd} = \min [F_{tb,Rd}, B_{pf,Rd}, F_{f,Rd}]$ resistenza a trazione di progetto

Resistenza a taglio dei bulloni

$$F_{vb,Rd} = 0.6 \cdot f_{tb} \cdot A_{res} / \gamma_{M2} = 94097.0 \text{ N}$$

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Bull.	$F_{bf,x,Rd}$ [N]	$F_{v,x,Rd}$ [N]	$F_{bf,y,Rd}$ [N]	$F_{v,y,Rd}$ [N]
1	278476.2	94097.0	327619.1	94097.0
2	278476.2	94097.0	344000.0	94097.0
3	278476.2	94097.0	327619.1	94097.0
4	344000.0	94097.0	327619.1	94097.0
5	344000.0	94097.0	327619.1	94097.0
6	278476.2	94097.0	327619.1	94097.0
7	278476.2	94097.0	344000.0	94097.0
8	278476.2	94097.0	327619.1	94097.0

Legenda

$F_{bf,x,Rd} = k \cdot \alpha \cdot f_{tk} \cdot \varnothing \cdot t_f / \gamma_{M2}$ resistenza a rifollamento flangia in direzione x

$F_{v,x,Rd} = \min [F_{vb,Rd} , F_{bf,x,Rd}]$ resistenza a taglio di progetto in direzione x

$F_{bf,y,Rd} = k \cdot \alpha \cdot f_{tk} \cdot \varnothing \cdot t_f / \gamma_{M2}$ resistenza a rifollamento flangia in direzione y

$F_{v,y,Rd} = \min [F_{vb,Rd} , F_{bf,y,Rd}]$ resistenza a taglio di progetto in direzione y

Verifiche sui bulloni

1-Taglio e trazione (Nodo n. 42, CMB n. 143)

Bull.	X [mm]	Y [mm]	$F_{v,Ed}$ [N]	$F_{v,Rd}$ [N]	$F_{t,Ed}$ [N]	$F_{t,Rd}$ [N]	FV_1	VER
1	174.00	-165.00	472.4	94097.0	50399.9	92005.7	0.396299	Ok
2	174.00	0.00	467.0	94097.0	64662.5	93918.9	0.496744	Ok
3	174.00	165.00	461.8	94097.0	78925.1	92005.7	0.617642	Ok
4	0.00	-165.00	481.8	94097.0	54399.9	88103.3	0.446161	Ok
5	0.00	165.00	471.4	94097.0	82925.1	88103.3	0.677315	Ok
6	-174.00	-165.00	491.4	94097.0	58399.9	92005.7	0.458609	Ok
7	-174.00	0.00	486.2	94097.0	72662.5	93918.9	0.557791	Ok
8	-174.00	165.00	481.2	94097.0	86925.1	92005.7	0.679956	Ok

2-Trazione (Nodo n. 42, CMB n. 143)

Bull.	X [mm]	Y [mm]	$F_{t,Ed}$ [N]	$F_{t,Rd}$ [N]	FV_2	VER
1	174.00	-165.00	50399.9	92005.7	0.547791	Ok
2	174.00	0.00	64662.5	93918.9	0.688493	Ok
3	174.00	165.00	78925.1	92005.7	0.857829	Ok
4	0.00	-165.00	54399.9	88103.3	0.617456	Ok
5	0.00	165.00	82925.1	88103.3	0.941227	Ok
6	-174.00	-165.00	58399.9	92005.7	0.634742	Ok
7	-174.00	0.00	72662.5	93918.9	0.773673	Ok
8	-174.00	165.00	86925.1	92005.7	0.944780	Ok

Legenda

$F_{v,Ed}$ forza di taglio agente sul bullone

$F_{v,Rd}$ resistenza a taglio di progetto del bullone

$F_{t,Ed}$ forza di trazione agente sul bullone

$F_{t,Rd}$ resistenza a trazione di progetto del bullone

$FV_1 = F_{v,Ed} / F_{v,Rd} + F_{t,Ed} / (1.4 \cdot F_{t,Rd})$

$FV_2 = F_{t,Ed} / F_{t,Rd}$

VER $\rightarrow FV_i \leq 1$

Verifiche sulle saldature profilo-flangia (versione beta)

Si considera la sezione di gola (avente altezza $a = s_c / 2^{0.5} = 5.657$) in posizione ribaltata: vengono considerate positive le tensioni normali di trazione e le tensioni tangenziali agenti verso destra e verso il basso. Tutte le tensioni sono espresse in N/mm².

Verifica formula (4.2.78) (Nodo n. 42, CMB n. 142)

Cordoni	$n_{\perp}$	$t_{\perp}$	$\tau_{\parallel}$	FV_1	VER ₁
Nerv. verticale lato destro esterno	-42.97	0.00	-0.32	42.98	Ok
Nerv. vert. lato destro interno zona inferiore	-23.25	0.00	-0.32	23.25	Ok
Nerv. vert. lato sinistro interno zona inferiore	-26.31	0.00	-0.32	26.32	Ok
Nerv. verticale lato sinistro esterno	-46.69	0.00	-0.32	46.69	Ok
Nerv. orizz. inferiore lato destro esterno	-23.15	0.00	-0.22	23.16	Ok
Ala inferiore esterno	-26.67	0.00	-0.22	26.67	Ok
Nerv. orizz. inferiore lato sinistro esterno	-28.64	0.00	-0.22	28.64	Ok
Nerv. orizz. inferiore lato destro interno	-24.40	0.00	-0.22	24.40	Ok
Ala inferiore interno lato destro	-25.98	0.00	-0.22	25.98	Ok
Ala inferiore interno lato sinistro	-27.91	0.00	-0.22	27.91	Ok
Nerv. orizz. inferiore lato sinistro interno	-29.88	0.00	-0.22	29.88	Ok

Nerv. vert. lato destro interno zona centrale	-34.39	0.00	-0.32	34.39	Ok
Anima lato destro	-35.32	0.00	-0.32	35.32	Ok
Anima lato sinistro	-35.32	0.00	-0.32	35.32	Ok
Nerv. vert. lato sinistro interno zona centrale	-37.45	0.00	-0.32	37.45	Ok
Nerv. orizz. superiore lato destro interno	-34.29	0.00	-0.22	34.29	Ok
Ala superiore interno lato destro	-35.88	0.00	-0.22	35.88	Ok
Ala superiore interno lato sinistro	-37.81	0.00	-0.22	37.81	Ok
Nerv. orizz. superiore lato sinistro interno	-39.78	0.00	-0.22	39.78	Ok
Nerv. orizz. superiore lato destro esterno	-35.54	0.00	-0.22	35.54	Ok
Ala superiore esterno	-39.05	0.00	-0.22	39.05	Ok
Nerv. orizz. superiore lato sinistro esterno	-41.02	0.00	-0.22	41.02	Ok
Nerv. vert. lato destro interno zona superiore	-43.30	0.00	-0.32	43.30	Ok
Nerv. vert. lato sinistro interno zona superiore	-46.36	0.00	-0.32	46.36	Ok

Verifica formula (4.2.79) (Nodo n. 42, CMB n. 142)

Cordoni	$n_{\perp}$	$t_{\perp}$	$\tau_{\parallel}$	FV_2	VER_2
Nerv. verticale lato destro esterno	-42.97	0.00	-0.32	42.97	Ok
Nerv. vert. lato destro interno zona inferiore	-23.25	0.00	-0.32	23.25	Ok
Nerv. vert. lato sinistro interno zona inferiore	-26.31	0.00	-0.32	26.31	Ok
Nerv. verticale lato sinistro esterno	-46.69	0.00	-0.32	46.69	Ok
Nerv. orizz. inferiore lato destro esterno	-23.15	0.00	-0.22	23.15	Ok
Ala inferiore esterno	-26.67	0.00	-0.22	26.67	Ok
Nerv. orizz. inferiore lato sinistro esterno	-28.64	0.00	-0.22	28.64	Ok
Nerv. orizz. inferiore lato destro interno	-24.40	0.00	-0.22	24.40	Ok
Ala inferiore interno lato destro	-25.98	0.00	-0.22	25.98	Ok
Ala inferiore interno lato sinistro	-27.91	0.00	-0.22	27.91	Ok
Nerv. orizz. inferiore lato sinistro interno	-29.88	0.00	-0.22	29.88	Ok
Nerv. vert. lato destro interno zona centrale	-34.39	0.00	-0.32	34.39	Ok
Anima lato destro	-35.32	0.00	-0.32	35.32	Ok
Anima lato sinistro	-35.32	0.00	-0.32	35.32	Ok
Nerv. vert. lato sinistro interno zona centrale	-37.45	0.00	-0.32	37.45	Ok
Nerv. orizz. superiore lato destro interno	-34.29	0.00	-0.22	34.29	Ok
Ala superiore interno lato destro	-35.88	0.00	-0.22	35.88	Ok
Ala superiore interno lato sinistro	-37.81	0.00	-0.22	37.81	Ok
Nerv. orizz. superiore lato sinistro interno	-39.78	0.00	-0.22	39.78	Ok
Nerv. orizz. superiore lato destro esterno	-35.54	0.00	-0.22	35.54	Ok
Ala superiore esterno	-39.05	0.00	-0.22	39.05	Ok
Nerv. orizz. superiore lato sinistro esterno	-41.02	0.00	-0.22	41.02	Ok
Nerv. vert. lato destro interno zona superiore	-43.30	0.00	-0.32	43.30	Ok
Nerv. vert. lato sinistro interno zona superiore	-46.36	0.00	-0.32	46.36	Ok

Legenda

$n_{\perp}$ tensione normale perpendicolare all'asse del cordone

$t_{\perp}$ tensione tangenziale perpendicolare all'asse del cordone

$\tau_{\parallel}$ tensione tangenziale parallela all'asse del cordone

$$FV_1 = (n_{\perp}^2 + t_{\perp}^2 + \tau_{\parallel}^2)^{0.5}$$

$$FV_2 = |n_{\perp}| + |t_{\perp}|$$

$$VER_i \rightarrow FV_i \leq \beta_i \cdot f_{yk} \quad (\beta_1 \cdot f_{yk} = 192.50 \text{ N/mm}^2 \quad \beta_2 \cdot f_{yk} = 233.75 \text{ N/mm}^2)$$

Verifiche a flessione piastra in zona compressa

Sezione parallela a X a filo della colonna (Nodo n. 42, CMB n. 142)

Pressione media a bordo piastra	$p_{med} = 4,04 \text{ N/mm}^2$
Carico lineare sbalzo	$q_{lin} = 1818,13 \text{ N/mm}$
Lunghezza sbalzo	$L_s = 125,0 \text{ mm}$
Modulo di resistenza minimo	$W_{min} = 199425,1 \text{ mm}^3$
Momento resistente	$M_{p,Rd} = 52230390,0 \text{ N mm}$
Momento massimo	$M_{p,Ed} = 14204100,0 \text{ N mm}$
$M_{p,Ed} / M_{p,Rd} = 0,271951 \quad \text{Ok}$	

Sezione parallela a Y a filo della nervatura verticale (Nodo n. 42, CMB n. 146)

Pressione media a bordo piastra	$p_{med} = 3,40 \text{ N/mm}^2$
Carico lineare sbalzo	$q_{lin} = 1530,39 \text{ N/mm}$
Lunghezza sbalzo	$L_s = 110,0 \text{ mm}$
Modulo di resistenza minimo	$W_{min} = 199425,1 \text{ mm}^3$

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Momento resistente $M_{p,Rd} = 52230390,0 \text{ N mm}$
 Momento massimo $M_{p,Ed} = 9258869,0 \text{ N mm}$
 $M_{p,Ed} / M_{p,Rd} = 0,177270 \text{ Ok}$

Verifica del momento di progetto del giunto (Nodo n. 42, CMB n. 115)
 Momento resistente del giunto $M_{j,Rd} = 164715100,0 \text{ N mm}$
 Momento di progetto $M_{j,Ed} = 18630000,0 \text{ N mm}$
 $M_{j,Ed} / M_{j,Rd} = 0,113104 \text{ Ok}$

Ancoraggio

Tirafondi ad aderenza

Lunghezza tirafondi $L_t = 600 \text{ mm}$

Lunghezza minima tirafondi: 40 diametri (800 mm)

Calcestruzzo

Resistenza cubica caratteristica a compressione $R_{ck} = 30,00 \text{ N/mm}^2$
 Resistenza cilindrica caratteristica a compressione $f_{ck} = 0,83 \cdot R_{ck} = 24,90 \text{ N/mm}^2$
 Resistenza di calcolo a compressione $f_{cd} = \alpha_{cc} \cdot f_{ck} / \gamma_c = 14,11 \text{ N/mm}^2$
 Resistenza caratteristica a trazione $f_{ctk} = 0,7 \cdot 0,30 \cdot f_{ck}^{2/3} = 1,79 \text{ N/mm}^2$
 Resistenza tangenziale di aderenza di calcolo $f_{bd} = 2,25 \cdot \eta \cdot f_{ctk} / \gamma_c = 2,69 \text{ N/mm}^2$

Compressione massima calcestruzzo (Nodo n. 42, CMB n. 146)
 $p_{max} = 4,33 \text{ N/mm}^2 < f_{cd} \text{ Ok}$

Verifica ancoraggio

Si considera la massima resistenza a trazione di progetto dei tirafondi

Trazione di progetto dell'ancoraggio $F_{t,an,Ed} = \max [F_{t,Rd}] = 93918,9 \text{ N}$
 Resistenza a trazione per aderenza $F_{t,ad,Rd} = L_t \cdot \pi \cdot \varnothing \cdot f_{bd} = 101260,8 \text{ N}$
 $F_{t,ad,Rd} > F_{t,an,Ed} \text{ Ok}$

13.3 VERIFICHE MANUALI

Nel presente paragrafo si riportano le verifiche, mediante calcoli manuali, relativamente agli elementi che riportano verifica negativa nelle tabelle sopra riportate.

Nel seguito si riportano le considerazioni relativamente ai collegamenti metallici e il loro dimensionamento mediante calcoli manuali.

13.3.1 VERIFICA SOLAI

Il dimensionamento dei solai lignei viene eseguito facendo riferimento alla dimensione maggiore visto che le luci inferiori, a parità di sezione e carico, risulteranno verificati in modo superiore. L'analisi prenderà a riferimento sia la condizione statica, con tutte le verifiche allo SLU ed allo SLE, oltre che il comportamento in condizione d'incendio ove la norma prevede un resistenza minima R60. Per quest'ultimo si considera l'incendio solo da un lato in quanto si ritiene che il posizionamento all'estradosso di lastre di fermacell®, necessarie per fornire una maggiore rigidità trasversale, possa costituire idonea protezione passiva per il tempo richiesto.

Il solaio viene realizzato con elementi di trave in legno lamellare tipo GL32h posti in orizzontale ed adeguatamente collegati tra loro al fine di avere, nella direzione longitudinale, un comportamento d'insieme attraverso la mutua trasmissione di forze di taglio che saranno assorbite con appositi presidi. Il dimensionamento, quindi, avverrà, a favore di sicurezza, considerando l'elemento monodimensionale nella direzione della sua estensione. La presenza dei collegamenti tra i vari elementi e il

posizionamento di lastre superiori conferiscono al sistema un'adeguata rigidità anche nella direzione ortogonale.

Il Fermacell®, nome commerciale per individuare lastre in Gesso fibra prodotte dalla James Hardie Group, presentano varie caratteristiche meccaniche e non solo riportate nelle loro schede tecniche. Nel seguito si riporta un estratto per l'individuazione delle principali.

Sollecitazioni perpendicolari al piano lastra	
Modulo di elasticità a flessione $E_{m,mean}$	3.800,0 N/mmq
Modulo di elasticità tangenziale G_{mean}	1.600,0 N/mmq
Sollecitazioni parallele al piano lastra	
Modulo di elasticità a flessione $E_{m,mean}$	3.800,0 N/mmq
Modulo di elasticità a trazione $E_{t,mean}$	3.800,0 N/mmq
Modulo di elasticità a compressione $E_{c,mean}$	3.800,0 N/mmq
Modulo di elasticità tangenziale G_{mean}	1.600,0 N/mmq

	Spessore nominale delle lastre [mm]			
	10	12,5	15	18
Tipo di sollecitazione delle lastre				
Flessione $f_{m,k}$	4,6	4,3	4,0	3,6
Taglio $f_{v,k}$	1,9	1,8	1,7	1,6
Sollecitazione dei pannelli				
Flessione $f_{m,k}$	4,3	4,2	4,1	4,0
Trazione $f_{t,k}$	2,5	2,4	2,4	2,3
Compressione $f_{c,k}$	8,5	8,5	8,5	8,5
Taglio $f_{v,k}$	3,7	3,6	3,5	3,4

Inoltre la lastra presenta un peso specifico pari a $\rho_k = 11,50 \pm 0,50$ kN/mc. A livello di reazione al fuoco il materiale risulta essere non combustibile di classe A2-s1,d0 secondo DIN EN 13501-1 (rapportata a normativa italiana può essere considerato materiale di classe 1).

Tutti i valori meccanici sopra riportati sono stati determinati con prove dirette secondo le modalità previste da EN 1995 ovvero assimilando il Fermacell® a materiale riconducibile al legno ed in quanto tale verrà considerato nel prosieguo della trattazione in termini anche di fattori di sicurezza parziali e non come richiesto dalla Norma vigente.

Risulta evidente come il posizionamento di tale materiale all'estradosso del solaio ligneo presenta una peculiarità sia in termini di rigidità (modesta per lo spessore utilizzato) sia per la risposta al fuoco anche in termini di compartimentazione oltre che di protezione passiva dall'estradosso.

13.3.1.1 CARATTERISTICHE MATERIALE STRUTTURALE

Il dimensionamento del solaio avviene in funzione dei vari parametri richiesti sia in termini di resistenza (verifiche allo SLU) sia in termini di garantire le corrette condizioni d'esercizio (verifiche di deformabilità e di vibrazioni). Per questo motivo si considera uno spessore di 22 cm (dimensione commerciale) ed un materiale di legno lamellare tipo GL32h di cui si riportano le caratteristiche minime previste dalla norma di classificazione del legno lamellare (UNI EN 14080:2013):

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MATERIALE RICHIESTO: GL32h

- Flessione $f_{m,g,k} = 32,0 \text{ N/mm}^2$;
- Trazione $f_{t,0,g,k} = 25,6 \text{ N/mm}^2$;
 $f_{t,90,g,k} = 0,5 \text{ N/mm}^2$;
- Compressione $f_{c,0,g,k} = 32,0 \text{ N/mm}^2$;
 $f_{c,90,g,k} = 2,5 \text{ N/mm}^2$;
- Taglio $f_{v,g,k} = 3,5 \text{ N/mm}^2$;
- Modulo di elasticità $E_{0,g,mean} = 14.200,0 \text{ N/mm}^2$;
 $E_{0,g,05} = 11.800,0 \text{ N/mm}^2$;
 $E_{90,g,mean} = 300,0 \text{ N/mm}^2$;
 $E_{90,g,05} = 250,0 \text{ N/mm}^2$;
- Modulo a taglio $G_{g,mean} = 650,0 \text{ N/mm}^2$;
 $G_{g,05} = 540,0 \text{ N/mm}^2$;
- Densità $\rho_{g,k} = 440,0 \text{ kg/m}^3$;
 $\rho_{g,mean} = 490,0 \text{ kg/m}^3$.

Il dimensionamento e le verifiche vengono eseguite facendo riferimento ad una larghezza unitaria del solaio con un comportamento monodimensionale (a trave).

13.3.1.2 DIMENSIONAMENTO DEL SOLAIO IN CAMPO STATICO

Il solaio che verrà dimensionato è quello che presenta la luce massima pari a circa 7,80 m con un carico di natura permanente, escluso il peso proprio, pari a 1,00 kN/mq (completamente caratterizzato) ed un carico di natura variabile pari a 3,00 kN/mq in quanto la destinazione d'uso (scuola) viene ricompresa negli ambienti suscettibili di affollamento in Cat. C1.

Per tale categoria i coefficienti di combinazione (Tab. 2.5.I) risultano essere:

- $\psi_{0j} = 0,7$;
- $\psi_{1j} = 0,7$;
- $\psi_{2j} = 0,6$.

In definitiva i carichi da considerare per il dimensionamento risultano:

- Peso proprio solaio strutturale: $g_{k1} = 0,22 \times 5,00 = 1,10 \text{ kN/mq}$;
- Carichi permanenti definiti: $g_{k2} = 1,00 \text{ kN/mq}$;
- Carichi variabili (cat. C1): $q_k = 3,00 \text{ kN/mq}$.

Si vuole evidenziare come nell'analisi dei carichi non si prende in considerazione la presenza delle tramezzature in quanto tutte le pareti, realizzate con X-Lam, risultano "portanti ed in quanto tali non rimovibili e/o modificabili senza attenta analisi delle conseguenze. L'eventuale presenza di elementi di separazione verrà verificato localmente riferendosi a situazioni ben definite. La dimensione considerata risulta quella delle aule per cui risulta difficile ipotizzare la loro separazione senza adeguate analisi.

Come già riferito si considera una striscia di solaio unitaria per l'analisi e si procede con tutte le verifiche.

VERIFICHE S.L.U.

Al fine delle verifiche S.L.U. (ovvero quelle che considerano la resistenza del materiale) si considera la seguente combinazione dei carichi:

- Carichi permanenti: $\gamma_g (g_{k1} + g_{k2}) = 1,3 \times (1,10 + 1,00) = 2,73 \text{ kN/m}$;
- Carichi di media durata: $\gamma_g (g_{k1} + g_{k2}) + \gamma_q q_k = 7,23 \text{ kN/m}$.

La suddivisione delle durate dei carichi, oltre alla classe di servizio che viene assunta come “II” in quanto gli elementi risultano all’interno con condizioni di controllo sia della temperatura sia dell’umidità, risulta importante per l’assegnazione dei k_{mod} relativi per la determinazione dei valori di resistenza.

CARICHI PERMANENTI

Considerando la condizione con solo carichi permanenti i parametri risultano:

- $k_{mod} = 0,6$;
- $k_{def} = 0,8$.

A livello di coefficiente parziale di sicurezza si adotta $\gamma_M = 1,45$ considerando una produzione ordinaria senza controlli continuativi (nel qual caso la sicurezza risulterà maggiore). I parametri di resistenza risultano pari a $X_d = k_{mod} X_k / \gamma_M$ da cui si ha:

- $f_{md} = 13,24 \text{ N/mm}^2$;
- $f_{vd} = 1,45 \text{ N/mm}^2$.

Si considera uno schema di doppio appoggio da cui le massime sollecitazioni risultano:

- $M_{Sd} = 20,76 \text{ kNm}$;
- $V_{Sd} = 10,65 \text{ kN}$.

Segue che le massime sollecitazioni risultano:

- $\sigma_{md} = 2,57 \text{ N/mm}^2$ da cui $\sigma_{md}/f_{md} = 0,19 < 1$;
- $\tau_{vd} = 0,07 \text{ N/mm}^2$ fa cui $\tau_{vd}/f_{vd} = 0,05 < 1$.

Risulta evidente come le verifiche risultano positive.

CARICHI DI MEDIA DURATA

Considerando la condizione con tutti i carichi ove risultano dominanti quelli di media durata i parametri risultano:

- $k_{mod} = 0,8$.

I parametri di resistenza risultano pari a $X_d = k_{mod} X_k / \gamma_M$ da cui si ha:

- $f_{md} = 17,66 \text{ N/mm}^2$;
- $f_{vd} = 1,93 \text{ N/mm}^2$.

Si considera uno schema di doppio appoggio da cui le massime sollecitazioni risultano:

- $M_{Sd} = 54,98 \text{ kNm}$;
- $V_{Sd} = 28,20 \text{ kN}$.

Segue che le massime sollecitazioni risultano:

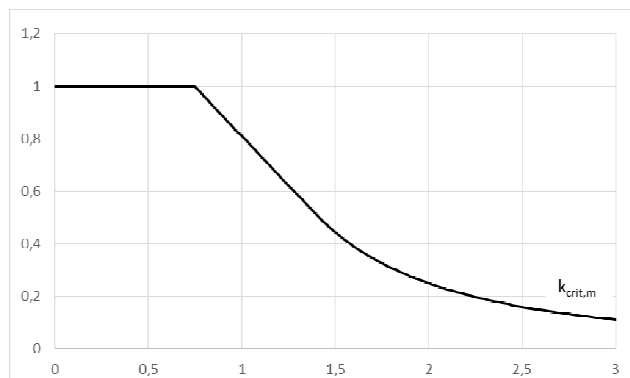
- $\sigma_{md} = 6,82 \text{ N/mm}^2$ da cui $\sigma_{md}/f_{md} = 0,39 < 1$;
- $\tau_{vd} = 0,19 \text{ N/mm}^2$ fa cui $\tau_{vd}/f_{vd} = 0,10 < 1$.

Risulta evidente come le verifiche risultano positive

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- **VERIFICA DI STABILITÀ FLESSIONALE**

Vista la dimensione della luce del solaio ed il suo spessore si procede, oltre alle sovra riportate verifiche flessionali classiche, anche alla valutazione della stabilità flessionale della sezione considerata con la formula riportata in normativa pari a $\sigma_{md}/(k_{crit,m} f_{md}) \leq 1$ dove $k_{crit,m}$ assume valori in funzione di $\lambda_{rel,m}$ come riportato nel diagramma seguente.



La valutazione della tensione critica viene eseguita con la formula suggerita dalla normativa ovvero

$\sigma_{m,cr} = \frac{\pi}{l_{eff}} \frac{b^2}{h} E_{05} \sqrt{\frac{G_{mean}}{E_{mean}}}$ dove l_{eff} risulta pari a 0,9 l in quanto trattasi di schema in doppio appoggio con carico distribuito. Andando a sostituire si trova che $\sigma_{m,cr} = 54,68 \text{ N/mm}^2$ da cui $\lambda_{rel,m} = 0,76$ che risulta leggermente superiore a 0,75 da cui $k_{crit,m} = 1,56 - 0,75 \lambda_{rel,m} = 0,99$. Il valore di $k_{crit,m}$ risulta molto prossimo all'unità da cui è immediato riscontrare come la stabilità flessionale non risulta modificare in modo importante la verifica tensionale già ampiamente positiva.

VERIFICHE S.L.E.

- **VERIFICA DI DEFORMABILITÀ**

A livello di verifiche S.L.E. si considera sia la condizione deformativa a breve e lungo termine sia la condizione indotta dalle vibrazioni.

A livello di verifica di deformabilità si considerano i carichi permanenti e variabili con il valore caratteristico. Si calcola la deformazione in modo autonomo sempre con lo schema di doppio appoggio considerando anche la deformabilità a taglio oltre che quella flessionale. Si ha che:

- $f_g = 8,17 \text{ mm}$;
- $f_q = 11,61 \text{ mm}$.

La deformazione totale a tempo 0 risulta essere la somma delle singole deformazioni ovvero:

- $f_{tot,0} = f_g + f_q = 19,78 \text{ mm}$ pari ad L/394.

La deformazione totale a tempo infinito deve considerare gli effetti viscosi indotti dai carichi di natura permanente da cui:

- $f_{tot,\infty} = (1+k_{def}) f_g + f_q = 24,68 \text{ mm}$ pari ad L/316.

Le verifiche di deformabilità risultano positive facendo riferimento a quanto previsto al §4.4.7 delle NTC 2018 in merito agli Stati Limite di Esercizio per le strutture lignee. Particolare attenzione viene posta alla limitazione di L/300 per i soli carichi variabili (nel nostro caso si ha L/670 circa) e di L/200 per i carichi totali a tempo infinito (nel nostro caso siamo ad L/316).

• VERIFICA VIBRAZIONALE

Relativamente alle verifiche di vibrazioni la bibliografia è ricca di formulazioni che portano a valutazioni diverse. Nella seguente redazione si farà riferimento ad alcune formulazioni per procedere alle considerazioni di merito. I diversi riferimenti normativi procedono con limiti diversi (frequenza e/o spostamenti massimi) con diversi riferimenti di carico da considerare in termini di massa. Il riferimento EN 1995 pone a riferimento un dimensionamento da eseguirsi con il solo carico permanente mentre il CNR DT 207 parla di carico valutato in condizione semi permanente. I risultati che si ottengono, come è prevedibile, risultano avere valenza diversa. Altro aspetto importante è la modalità di valutazione della rigidità del sistema considerando o solamente il comportamento monodimensionale o considerando anche l'effetto bidimensionale (effetto lastra). In funzione delle risultanze e delle metodologie i riferimenti normativi obbligano o meno ad eseguire ulteriori valutazioni più o meno complesse. Ricordiamo che la valutazione delle vibrazioni di una struttura (e di un solaio in particolare) è da ricondurre alla percezione umana che assume intervalli più o meno di sensibilità soggettiva. Quello che è senza dubbio è che all'aumentare del valore della frequenza principale la sensibilità umana cala. I diversi riferimenti normativi, infatti, riportano valori superiori all'interno dell'intervallo 4-8 Hz, valori, soprattutto quelli maggiori, particolarmente impegnativi. Ricordiamo che i valori fanno sempre riferimento a solai aventi destinazione residenziale; nel caso in esame con destinazione scolastica i valori possono ritenersi soddisfatti anche se leggermente inferiori ai limiti previsti. In tale ottica si è concordato con la Committenza un valore minimo non inferiore a 5 Hz¹, valore sotto al quale non scendere al fine di preservare le sensazioni che potrebbero ingenerarsi a fronte di tale evenienza. Il calcolo viene eseguito con la consueta formula riportata anche sul documento EN 1995-1-1 (Eurocodice sul legno) $f = \frac{\pi}{2 l^2} \sqrt{\frac{E J}{m}}$ dove m rappresenta la massa per unità di lunghezza riferita alla base di riferimento del momento d'inerzia. Non risulta del tutto chiaro a quale massa si debba fare riferimento per il calcolo ovvero solo quella permanente o a quella per la combinazione quasi permanente. Si riportano i risultati per entrambe le condizioni:

- carico solo permanente ($p_d = 2,10 \text{ kN/mq}$): $f = 6,26 \text{ Hz}$;
- carico in combinazione quasi permanente ($p_d = 3,90 \text{ kN/mq}$): $f = 4,60 \text{ Hz}$.

Risulta immediato osservare come nel primo caso la verifica risulta ampiamente soddisfatta mentre nel secondo caso si è un po' al di sotto. Per questo motivo occorre ricordare come la valutazione della frequenza è stata valutata senza mettere in conto il potenziale (e naturale) irrigidimento degli elementi secondari che, anche se in questo caso risultano di modesta influenza, tendono ad aumentare il valore della frequenza.

Ulteriore considerazione è relativa alla non considerazione dell'effetto lastra (bidimensionale) che, nel caso in esame, non risulta del tutto quantificabile in quanto si riscontra un comportamento prevalentemente monodimensionale ma la presenza dei collegamenti tra singoli pannelli fornisce,

¹ Nel testo "Strutture in legno" edito da Hoepli di Piazza, Tomasi e Modena si trova scritto "Sempre per il caso abbastanza frequente dei solai sui quali sia previsto un intenso calpestio, salvo altre esigenze specifiche, è in generale opportuno che la frequenza naturale f_1 presentata dal solaio stesso non sia inferiore a 5 Hz".

anche se modesto, un contributo irrigidente che apporta un beneficio in termini di incremento della frequenza propria.

In ultima analisi si riporta, in forma di diagramma, l'andamento delle frequenze, nelle due condizioni di "carico", in funzione della luce. Questo aspetto vuole anche evidenziare come al diminuire della luce di calcolo (valori presenti in alcune zone degli edifici) la frequenza tende ad aumentare portandosi su valori importanti.

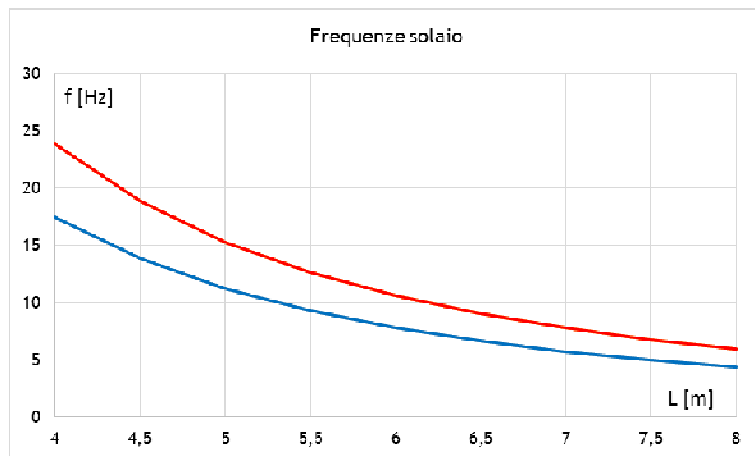


Figura 44: variazione frequenza in funzione della luce

Nella Figura 44 si riporta in rosso la condizione di carico permanente ed in blu quella quasi permanente. L'asticella di 5 Hz viene raggiunta proprio in prossimità della luce in oggetto per la condizione di carico quasi permanente (per $L = 7,48$ m si ha $f = 5,00$ Hz), valore che si ritiene accettabile per le considerazioni poste in precedenza.

14 CARATTERISTICHE A AFFIDABILITÀ CODICE DI CALCOLO

Il codice di calcolo, utilizzato per il dimensionamento degli elementi strutturali, è PRO SAP e risulta testato ed affidabile secondo anche le indicazioni riportate sul sito della software house produttrice (2SI s.r.l.).

Informazioni sul codice di calcolo

Titolo:	PRO_SAP PROfessional Structural Analysis Program
Versione:	PROFESSIONAL (build 2018-07-183)
Produttore-Distributore:	2S.I. Software e Servizi per l'Ingegneria s.r.l., Ferrara
Codice Licenza:	Licenza dsi3083

Affidabilità dei codici utilizzati

2S.I. ha verificato l'affidabilità e la robustezza del codice di calcolo attraverso un numero significativo di casi prova in cui i risultati dell'analisi numerica sono stati confrontati con soluzioni teoriche.

E' possibile reperire la documentazione contenente alcuni dei più significativi casi trattati al seguente link: <http://www.2si.it/Software/Affidabilità.htm>

15 STRUTTURE DI FONDAZIONE

Per quanto riguarda il dimensionamento delle fondazioni della struttura si rimanda all'elaborato "ST-R 13 Relazione Geotecnica" in cui sono riportate tutte le considerazioni geotecniche e relative alle fondazioni.

San Giorgio di Piano, lì 24 Giugno 2019

Ing. Francesca Malaguti

Ing. Paolo Parma

16 ALLEGATI

- ETA collegamenti pannelli X-lam



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Authorised and notified according
to Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011

MEMBER OF EOTA



European Technical Assessment ETA-11/0086 of 2015-01-26

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Rotho Blaas WHT hold downs and angle brackets

Product family to which the above construction product belongs:

Three-dimensional nailing plate (Angle brackets and hold-downs for timber-to-timber or timber-to-concrete or steel connections)

Manufacturer:

Rotho Blaas s.r.l
Via dell'Adige 2/1
IT-38040 Cortaccia (BZ)
Tel. + 39 0471 81 84 00
Fax + 39 0471 81 84 84
Internet www.rothoblaas.com

Manufacturing plant:

Rotho Blaas s.r.l
Manufacturing plant II

This European Technical Assessment contains:

26 pages including 2 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

This version replaces:

The previous ETA with the same number issued on 2011-02-01 and expiry on 2015-01-26

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

Rotho Blaas WHT angle brackets or hold-downs, respectively, are one-piece non-welded or welded, face-fixed angle brackets to be used in timber to timber or in timber to concrete or to steel connections. They are connected to construction members made of timber or wood-based products with profiled (ringed shank) nails or screws according to EN 14592 or screws and profiled nails according to ETA-13/0523 and to concrete or steel members with bolts or metal anchors.

The angle brackets or hold-downs with a steel plate thickness of 2 mm to 4 mm are made from pre-galvanized steel S250 GD / Z 275 or DX 51 D / Z 275 according to EN 10346 with $R_e \geq 250 \text{ N/mm}^2$, $R_m \geq 360 \text{ N/mm}^2$ and $A_{80} \geq 19\%$ or steel grade S355 according to EN 10025-2. The Washers are made from steel grade S235 according to EN 10025-2. Dimensions, hole positions and typical installations are shown in Annex A and B. Rotho Blaas angle brackets and hold-downs are made from steel with tolerances according to EN 10143.

2 Specification of the intended use in accordance with the applicable EAD

The angle brackets and hold-downs are intended for use in making connections in load bearing timber structures, as a connection between a column or a purlin and a concrete or steel member, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled.

The static and kinematical behaviour of the timber members or the supports shall be as described in Annex B.

The wood members may be of solid timber, glued laminated timber and similar glued members, or wood-based structural members with a characteristic density from 290 kg/m^3 to 420 kg/m^3 . This requirement to the material of the wood members can be fulfilled by using the following materials:

- Structural solid timber classified to C14-C40 according to EN 14081,

- Glulam classified to GL24-GL36 according to EN 14080,
- LVL according to EN 14374,
- Parallam PSL,
- Intrallam LSL,
- Glued solid timber according to EN 14080,
- Cross laminated timber,
- Plywood according to EN 636

Annex B states the load-carrying capacities of the angle bracket connections for a characteristic density of 350 kg/m^3 . For timber or wood based material with a lower characteristic density than 350 kg/m^3 the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^2$$

Where ρ_k is the characteristic density of the timber in kg/m^3 .

The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code. The wood members shall have a thickness which is larger than the penetration depth of the fasteners into the members. If a wood-based panel interlayer is placed between the connector plate and the timber member, the lateral load-carrying capacity of the nail or screw, respectively, has to take into account the effect of the interlayer.

The angle brackets and hold-downs are primarily for use in timber structures subject to the dry, internal conditions defined by service classes 1 and 2 of Eurocode 5 and for connections subject to static or quasi-static loading.

The angle brackets may also be used in outdoor timber structures, service class 3, when a corrosion protection in accordance with Eurocode 5 is applied, or when stainless steel with similar or better characteristic yield and ultimate strength is employed. If a stainless steel with a lower characteristic yield or ultimate strength is employed, the load-carrying capacities $F_{m,Rk}$, $F_{v,Rk}$ or $F_{t,Rk}$ in Tables 1 and 2 (see annex B) are to be reduced proportionally.

The angle brackets and hold-downs may also be used for connections between two timber members.

The scope of the brackets regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the connectors of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance determined
Ductility in cyclic testing	No performance determined
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The angle brackets and hold-downs are made from steel classified as Euroclass A1 in accordance with EN 1350-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated March 2012**)
3.7 Sustainable use of natural resources (BWR7)	No Performance Determined
3.8 General aspects related to the performance of the product	The angle brackets and hold-downs have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1 and 2
Identification	See Annex A

*) See additional information in section 3.9 – 3.12.

**) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification

The characteristic load-carrying capacities are based on the characteristic values of the nail or screw connections and the steel plates. To obtain design values the capacities have to be divided by different partial factors for the material properties, the nail connection in addition multiplied with the coefficient k_{mod} .

According to EN 1990 (Eurocode – Basis of design) paragraph 6.3.5 the design value of load-carrying capacity may be determined by reducing the characteristic values of the load-carrying capacity with different partial factors.

Thus, the characteristic values of the load-carrying capacity are determined also for timber failure $F_{Rk,H}$ (obtaining the embedment strength of nails or screws subjected to shear or the withdrawal capacity of the most loaded nail or screw, respectively) as well as for steel plate failure $F_{Rk,S}$. The design value of the load-carrying capacity is the smaller value of both load-carrying capacities.

$$F_{Rd} = \min \left\{ \frac{k_{mod} \cdot F_{Rk,H}}{\gamma_{M,H}}; \frac{F_{Rk,S}}{\gamma_{M,S}} \right\}$$

Therefore, for timber failure the load duration class and the service class are included. The different partial factors γ_M for steel or timber, respectively, are also correctly taken into account.

3.10 Mechanical resistance and stability

See annex B for the characteristic load-carrying capacity in the different directions F_1 to F_3 .

The characteristic capacities of the angle brackets and hold-downs are determined by calculation assisted by testing as described in the EOTA Guideline 015 clause 5.1.2. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties to be used for the analysis of the serviceability limit state.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1 and 2.

In accordance with ETAG 015 the zinc-coated hold downs and angle brackets have a zinc coating weight of min Z275. The steel employed is S250 GD+Z275 to EN 10346:2009 or DX51D with min Z275 according to EN 10346:2009, and steel grade S355 according to EN 10025-2 with Fe Zn 12C.

3.12 General aspects related to the fitness for use of the product

The performance given in this ETA are based on the following:

- The structural members – the components 1 and 2 shown in the figure on page 12 – to which the brackets are fixed shall be:
 - Restrained against rotation.
 - Strength class C14 or better, see section 3 of this evaluation report
 - Free from wane under the bracket.
- The actual end bearing capacity of the timber member to be used in conjunction with the bracket is checked by the designer of the structure to ensure it is not less than the bracket capacity and, if necessary, the bracket capacity reduced accordingly.
- The gap between the timber members does not exceed 3 mm.

There are no specific requirements relating to preparation of the timber members.

4 Attestation and verification of constancy of performance (AVCP)

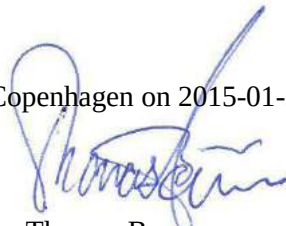
4.1 AVCP system

According to the decision 97/638/EC of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark

Issued in Copenhagen on 2015-01-26 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex A - Product details definitions

Table A.1 Materials specification

Bracket type	Thickness (mm)	Steel specification	Coating specification
WZU15550	3,0	S250 GD or DX51D	Z 275
WZU2002	2,0	S250 GD or DX51D	Z 275
WZU2004	4,0	S250 GD or DX51D	Z 275
WZU3002	2,0	S250 GD or DX51D	Z 275
WZU3004	4,0	S250 GD or DX51D	Z 275
WZU4002	2,0	S250 GD or DX51D	Z 275
WZU4004	4,0	S250 GD or DX51D	Z 275
WZU342 Strong	2,0	S250 GD or DX51D	Z 275
WZU422 Strong	2,0	S250 GD or DX51D	Z 275
WZU482 Strong	2,5	S250 GD or DX51D	Z 275
WHT340	3,0	S355	Fe Zn 12c
WHT440	3,0	S355	Fe Zn 12c
WHT540 Hole Ø1 7	3,0	S355	Fe Zn 12c
WHT620 Hole Ø 21	3,0	S355	Fe Zn 12c
WHT740	3,0	S355	Fe Zn 12c
WHT540 Hole Ø 22	3,0	S355	Fe Zn 12c
WHT620 Hole Ø 26	3,0	S355	Fe Zn 12c
WZUBS43 Washer	10,0	S 235	Fe Zn 12c
WZU STRONG Washer	15,0	S 235	Fe Zn 12c
WZU STRONG Washer	20,0	S 235	Fe Zn 12c
WZU STRONG Washer	20,0	S 235	Fe Zn 12c
WHTBS50 Washer WHTBS50L Washer	10,0	S 235	Fe Zn 12c
WHTBS70 Washer WHTBS70L Washer	20,0	S 235	Fe Zn 12c
WHTBS130 Washer	40,0	S 235	Fe Zn 12c

Table A.2 Range of sizes

Bracket type	Height (mm)		Height (mm)		Width (mm)	
	vertical		horizontal			
WZU15550	154	156	49	51	39	41
WZU2002	199	201	39	41	39	41
WZU2004	199	201	39	41	39	41
WZU3002	299	301	39	41	39	41
WZU3004	299	301	39	41	39	41
WZU4002	399	401	39	41	39	41
WZU4004	399	401	39	41	39	41
WZU342 Strong	339	341	179	181	39	41
WZU422 Strong	319	421	219	221	59	61
WZU482 Strong	479	481	99	101	59	61
WHT340	339	341	62	64	59	61
WHT440	439	441	62	64	64	61
WHT540 Hole Ø 17	539	541	62	64	59	61
WHT620 Hole Ø 21	619	621	62/82	64/84	79	81
WHT740	739	741	82	84	139	141
WHT540 Hole Ø 22	539	541	62	64	59	61
WHT620 Hole Ø 26	619	621	82	84	79	81
WZUBS43 Washer	-	-	39	41	42	44
WZU STRONG Washer	-	-	159	161	49	51
WZU STRONG Washer	-	-	199	201	59	61
WZU STRONG Washer	-	-	114	116	69	71
WHTBS50 Washer WHTBS50L Washer	-	-	55	57	49	51
WHTBS70 Washer WHTBS70L Washer	-	-	76	78	69	71
WHTBS130 Washer	-	-	79	81	129	131

FASTENER	Length Min – max	Nail type
Profiled nail 4.0 mm	40 – 100 mm	Ringed shank nails according to EN 14592
GH-Nail 4.0 mm	40 – 100 mm	Ringed shank nails according to ETA-13/0523
GH-Screw 5.0 mm	35 – 70 mm	Self-tapping screws according to ETA-13/0523

In the load-carrying-capacities of the nailed or screwed connection in Annex B the capacities calculated from the formulas of Eurocode 5 are used assuming a thick steel plate when calculating the lateral fastener load-carrying-capacity. The load-carrying-capacities of the hold downs have been determined based on the use of connector nails $\varnothing 4,0$ mm or screws $\varnothing 5,0$ mm in accordance with the european technical approval for the nails or the screws. The characteristic withdrawal capacity of the nails according to EN 14592 has to be determined by calculation in accordance with EN 1995-1-1, paragraph 8.3.2 (head pull-through is not relevant):

$$F_{ax,Rk} = f_{1,k} \times d \times t_{pen}$$

Where:

$f_{1,k}$ Characteristic value of the withdrawal parameter in N/mm²

d Nail or screw diameter in mm

t_{pen} Penetration depth of the profiled shank in mm;

(4,0 x 40 mm $t_{pen} \geq 31$ mm; 4,0 x 50 mm $t_{pen} \geq 40$ mm; 4,0 x 60 mm $t_{pen} \geq 50$ mm)

Based on tests by Versuchsanstalt für Stahl, Holz und Steine, University of Karlsruhe, the characteristic value of the withdrawal resistance for the threaded nails according to EN 14592 can be calculated as:

$$f_{1,k} = 50 \times 10^{-6} \times \rho_k^2$$

Where:

ρ_k Characteristic density of the timber in kg/m³

The shape of the nail or screw directly under the head shall be in the form of a truncated cone with a diameter under the head which fits or exceeds the hole diameter.

BOLTS diameter	Correspondent Hole diameter	Bolt type
10.0 - 30.0 mm	Max. 2 mm. larger than the bolt diameter	Bolt according to EN 14592

METAL ANCHORS diameter	Correspondent Hole diameter	Anchor type
10.0 - 30.0 mm	Max. 2 mm. larger than the anchor diameter	See specification of the manufacturer

Annex B
Characteristic load-carrying capacities

Table 1: Force F_1 , 1 angle bracket / connection timber-timber

type	capacity per nail or screw in the vertical flange ($F_{v,Rk}$) [kN] ²⁾			capacity in the horizontal flange ($F_{ax,Rk}$) [kN] ^{1) 2)}			steel
	4x40/ 5x40	4x50/ 5x40	4x60/ 5x50	4x40/ 5x40	4x50/ 5x40	4x60/ 5x50	bending ($F_{m,Rk}$) [kN]
WZU 15550	1,57	1,87	1,93	1,0	1,3	1,7	1,3
WZUxxx2; t=2,0 mm	1,57	1,87	1,93	0,9	1,1	1,4	0,6
WZUxxx4; t=4,0 mm	1,57	1,87	1,93	0,9	1,1	1,4	2,4

¹⁾ Both nail holes in the horizontal flange next to the bending line have to be nailed or screwed

²⁾ Given is the minimum load-carrying capacity of 4,0 mm nails according to EN 14592 and 5,0 mm screws according to ETA-13/0523. If a wood-based panel interlayer is placed between the connector plate and the timber member, the lateral load-carrying capacity of the nail or screw, respectively, has to take into account the effect of the interlayer.

Table 2: Force F_1 , 1 angle bracket / connection timber-concrete

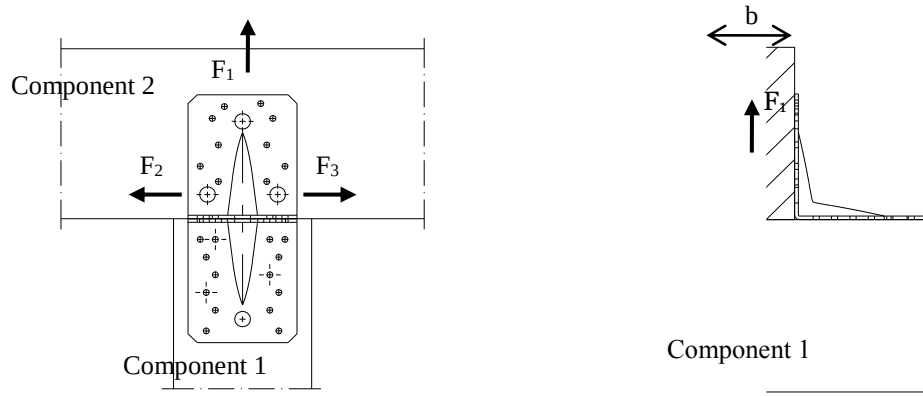
type	capacity per nail or screw in the vertical flange ($F_{v,Rk}$) [kN] ²⁾			concrete	steel ³⁾			bolt
	4x40/ 5x40	4x50/ 5x40	4x60/ 5x50		bending ($F_{m,Rk}$) [kN]	shear ($F_{v,Rk}$) [kN]	tensile ($F_{t,Rk}$) [kN]	$k_{t,II}$
type WZU 15550	1,57	1,87	1,93	see EN 1992	3,5	17,3	25,8	3,08
type WZUxxx2, t=2,0 mm	1,57	1,87	1,93		23,3	11,6	17,8	3,16
type WZUxxx4, t=4,0 mm	1,57	1,87	1,93		23,9	23,1	35,6	4,00
WZU 342	1,57	1,87	1,93		41,9	11,6	17,8	1,20
WZU 422	1,57	1,87	1,93		62,0	17,3	26,7	1,23
WZU 482	1,57	1,87	1,93		83,4	21,7	33,4	1,50
WHT340, WHT440, WHT540 without base plate	1,57	1,87	1,93		42,0	42,0	63,4	1
WHT340, WHT440, WHT540 Ø17, WHT540 Ø22	1,57	1,87	1,93		63,4	63,4	63,4	1
WHT620 without base plate	1,57	1,87	1,93		42,0	42,0	85,2	1
WHT620 Ø21, WHT620 Ø26	1,57	1,87	1,93		85,2	85,2	85,2	1
WHT740	1,57	1,87	1,93		158	158	158	1

²⁾ Given is the minimum load-carrying capacity of 4,0 mm nails according to EN 14592 and 5,0 mm screws according to ETA-13/0523. Alternative fasteners according to Table A.3 may be used and their load-carrying capacity calculated based on EN 1995-1-1 and ETA-13/0523. If a wood-based panel interlayer is placed between the connector plate and the timber member, the lateral load-carrying capacity of the nail or screw, respectively, has to take into account the effect of the interlayer.

³⁾ base plates/washers according to the engineering drawings must be used except where otherwise specified

Table 3: Force $F_{2,3}$, 1 angle bracket (nails 4,0 x 50 mm, 4,0 x 60 mm or screws 5,0 x 40 mm, 5,0 x 50 mm)

1
2
2
4) in



ACI

F_1

prevented from rotation.

F_2 and F_3

Lateral force acting in the joint between the component 2 and the component 1 in the component 2 direction. The component 2 shall be prevented from rotation.

Double angle brackets per connection

The angle brackets must be placed at each side opposite to each other, symmetrically to the component axis.

Acting forces

F_1

Lifting force acting along the central axis of the joint. The load-carrying capacity is twice the load-carrying capacity of a connection with one angle bracket.

F_2 and F_3

Lateral force acting in the joint between the component 2 and component 1 in the component 2 direction. The load-carrying capacity is twice the load-carrying capacity of a connection with one angle bracket.

Wane

Wane is not allowed, the timber has to be sharp-edged in the area of the angle brackets.

Timber splitting

For the lifting force F_1 it must be checked in accordance with Eurocode 5 or a similar national Timber Code that splitting will not occur.

Connection to timber, concrete or steel with a bolt or metal anchor

The load $F_{B,Ed}$ for the design of a bolt or metal anchor is calculated as:

$$F_{B,t,Ed} = k_{t\parallel} \cdot F_{Ed} \text{ for tensile load}$$

$$F_{B,v,Ed} = k_{t\perp} \cdot F_{Ed} \text{ for shear load}$$

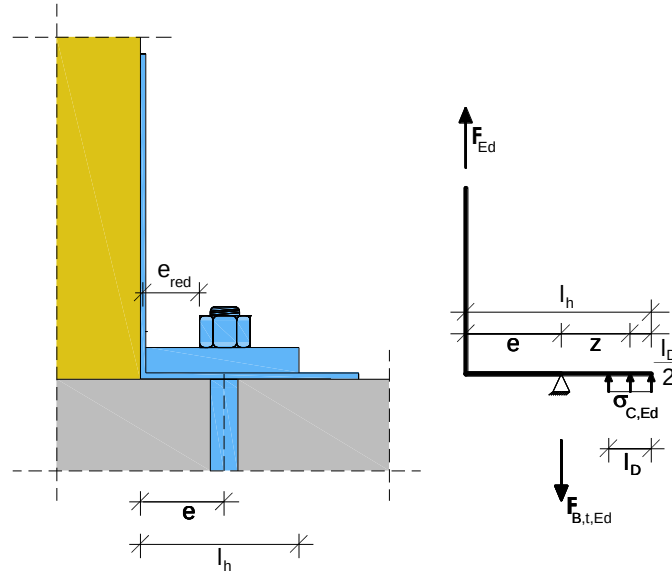
Where:

$F_{B,t,Ed}$ Bolt tensile load in N

$F_{B,v,Ed}$ Bolt shear load in N

k_t Coefficient taking into account the moment arm or hole tolerance, respectively

F_{Ed} Tensile load F_1 on vertical flap of the angle bracket or shear load $F_{2,3}$ in N



Combined forces

If the forces F_1 and F_2/F_3 act at the same time, the following inequality shall be fulfilled:

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}} \right)^2 + \left(\frac{F_{2,Ed}}{F_{2,Rd}} \right)^2 + \left(\frac{F_{3,Ed}}{F_{3,Rd}} \right)^2 \leq 1$$

The forces F_2 and F_3 are forces with opposite direction. Therefore only one force F_2 or F_3 is able to act simultaneously with F_1 , while the other shall be set to zero.

Rotho Blaas Angle Brackets

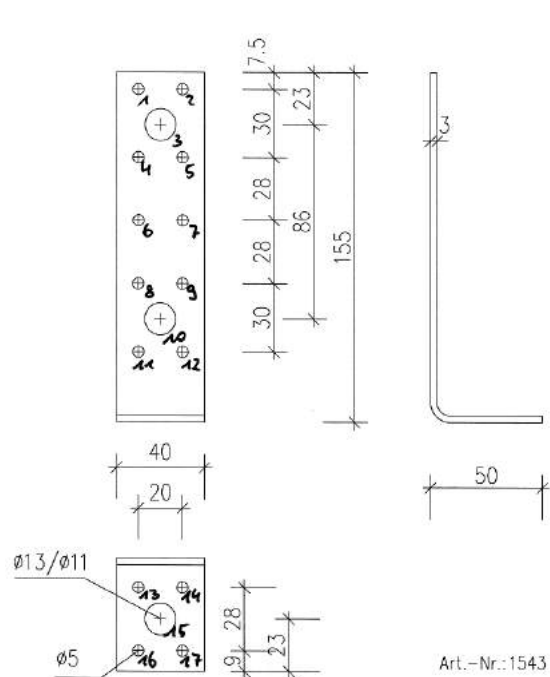


Figure B. 1 Dimensions of type WZU 15550

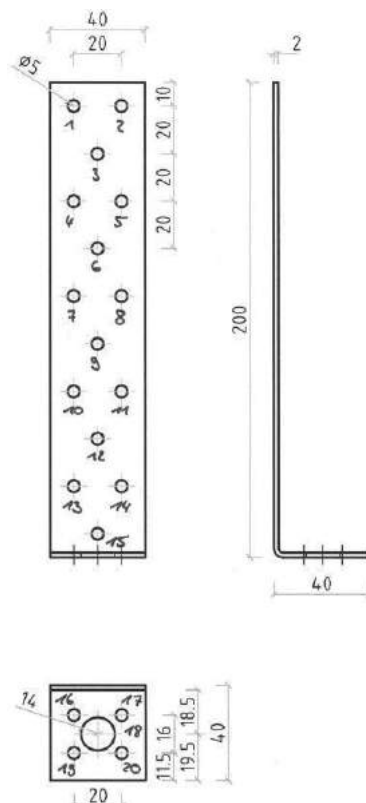


Figure B. 2 Dimensions of type WZU2002

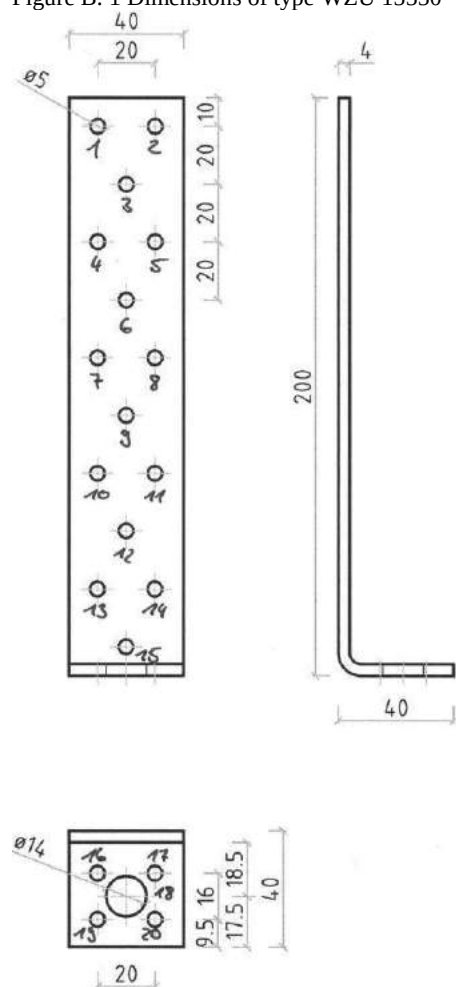


Figure B. 3 Dimensions of type WZU2004

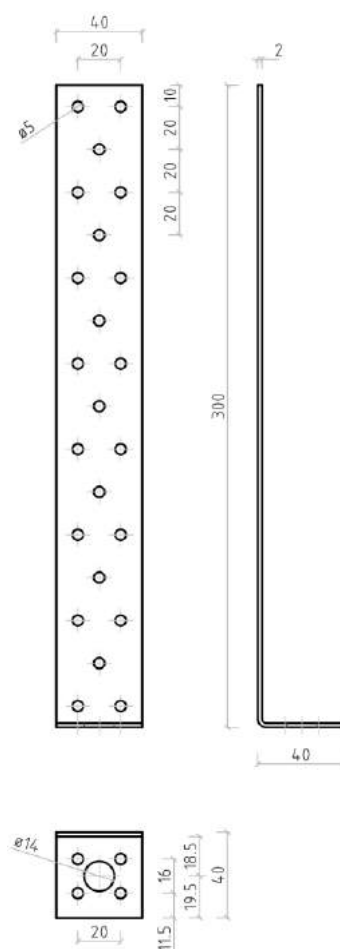


Figure B. 4 Dimensions of type WZU3002

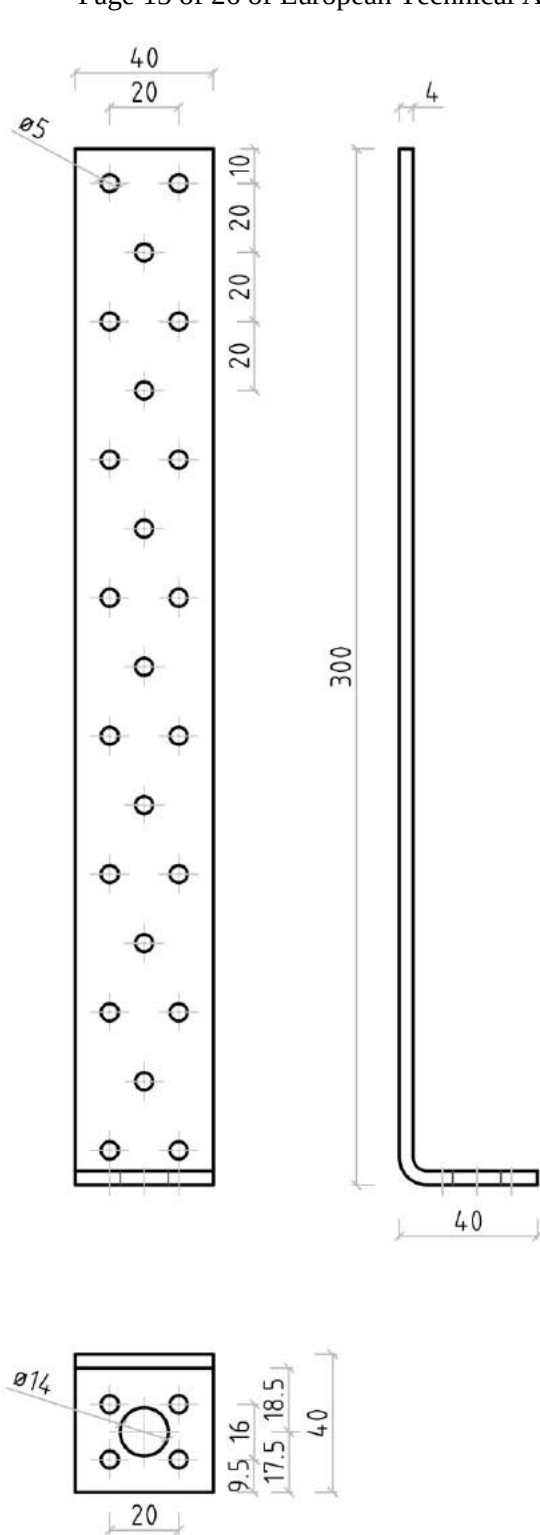


Figure B. 5 Dimensions of type WZU3004

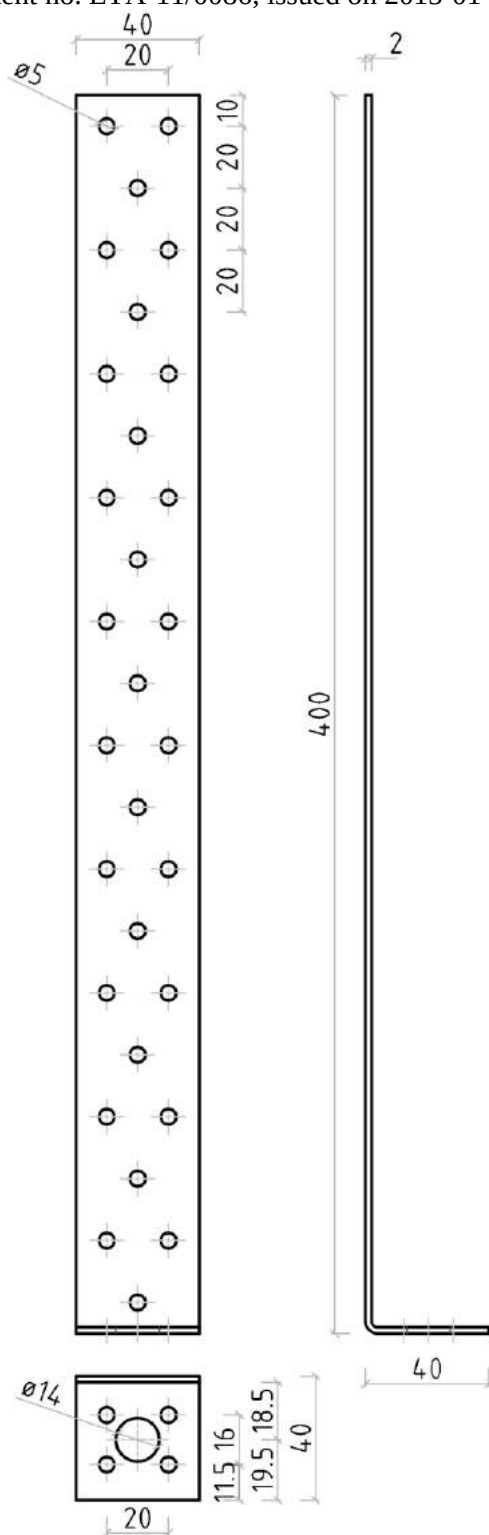


Figure B. 6 Dimensions of type WZU4002

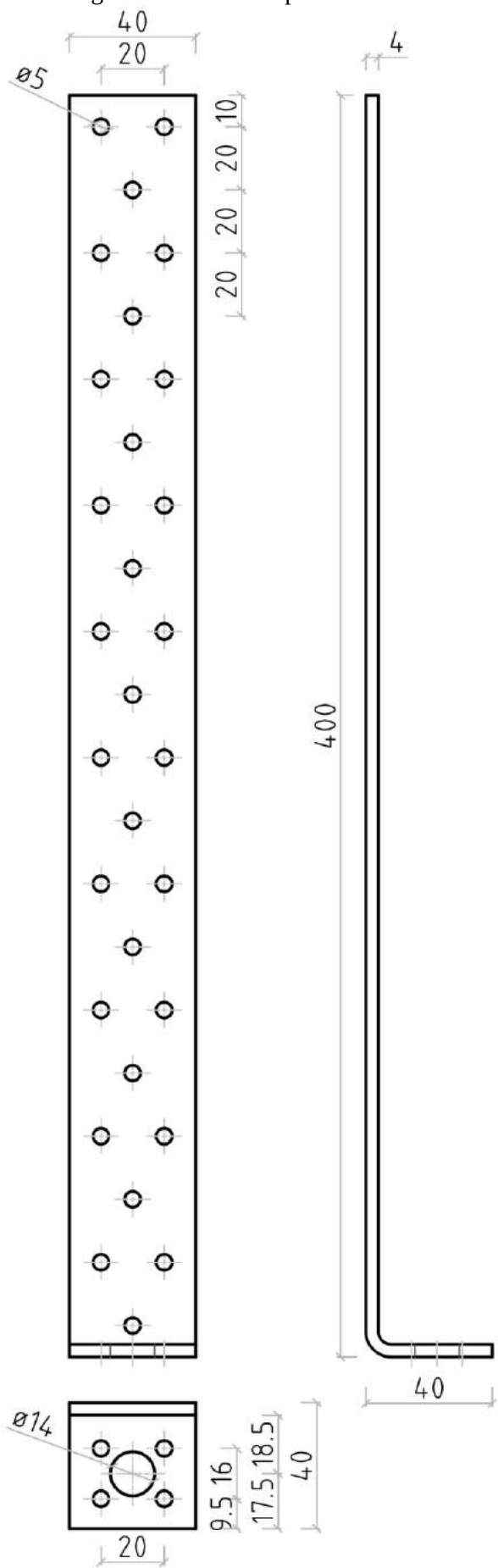


Figure B. 7 Dimensions of type WZU4004

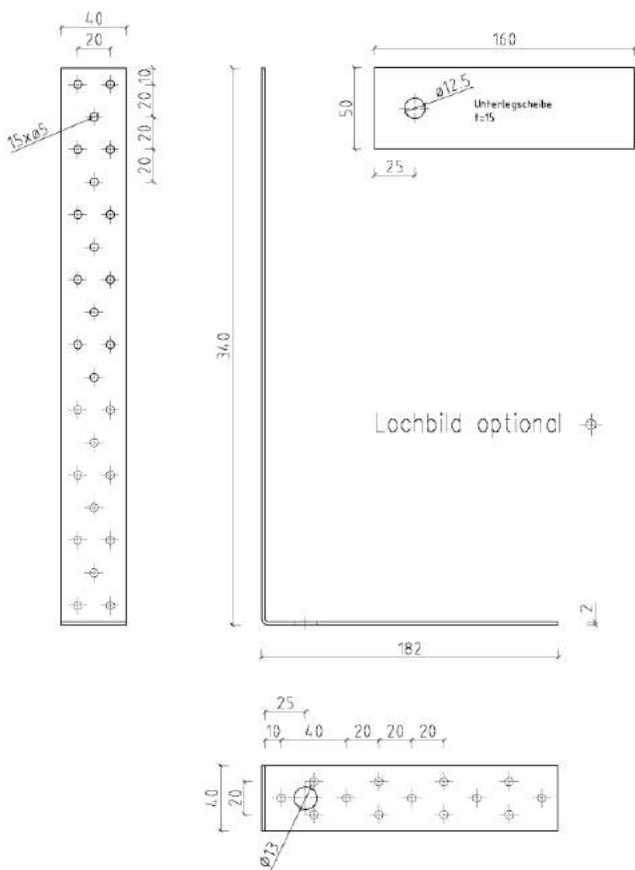


Figure B. 8 Dimensions of type WZU342

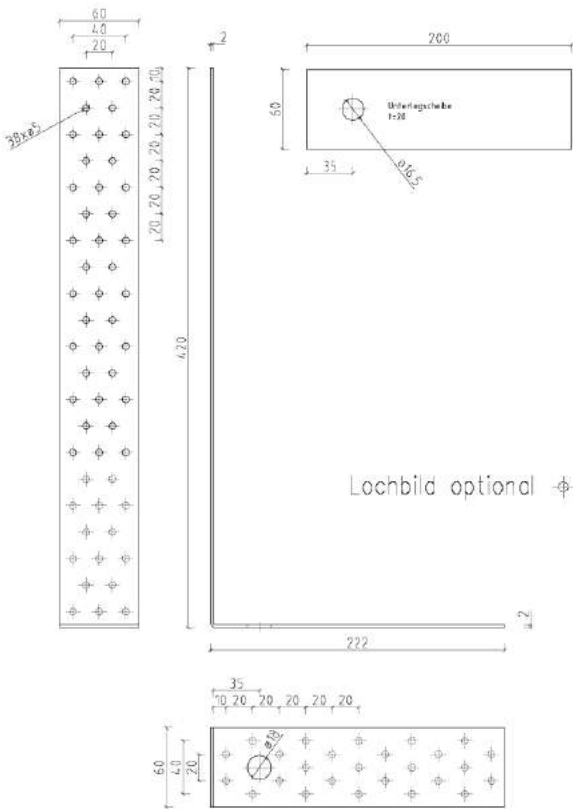


Figure B. 9 Dimensions of type WZU422

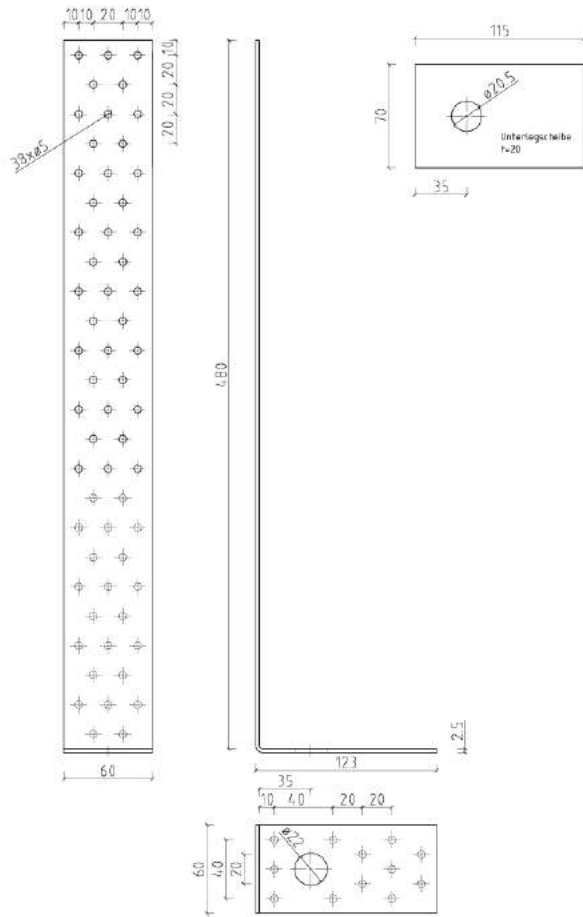


Figure B. 10 Dimensions of type WZU 482

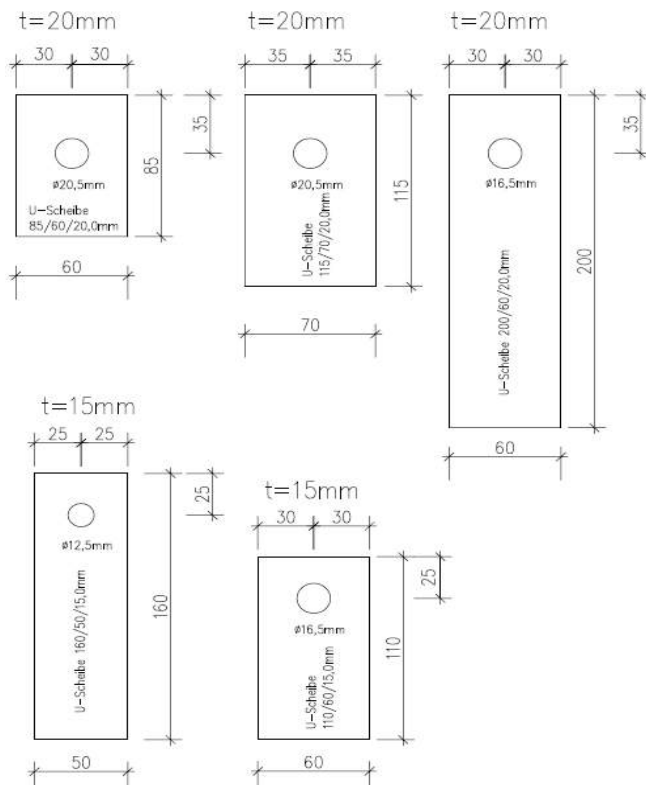


Figure B. 11 Dimensions of washers for hold-downs

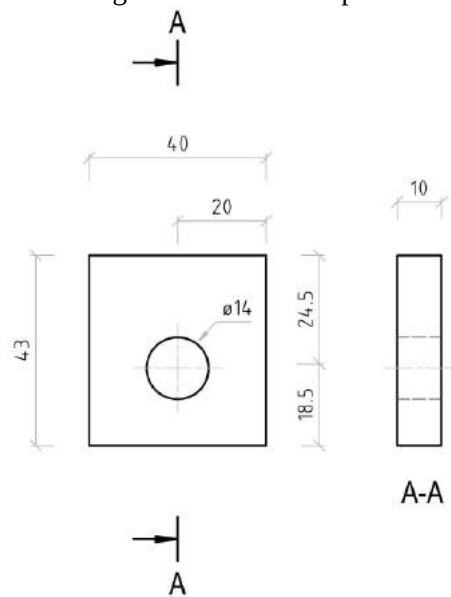


Figure B. 12 Dimensions of washer for type WZU

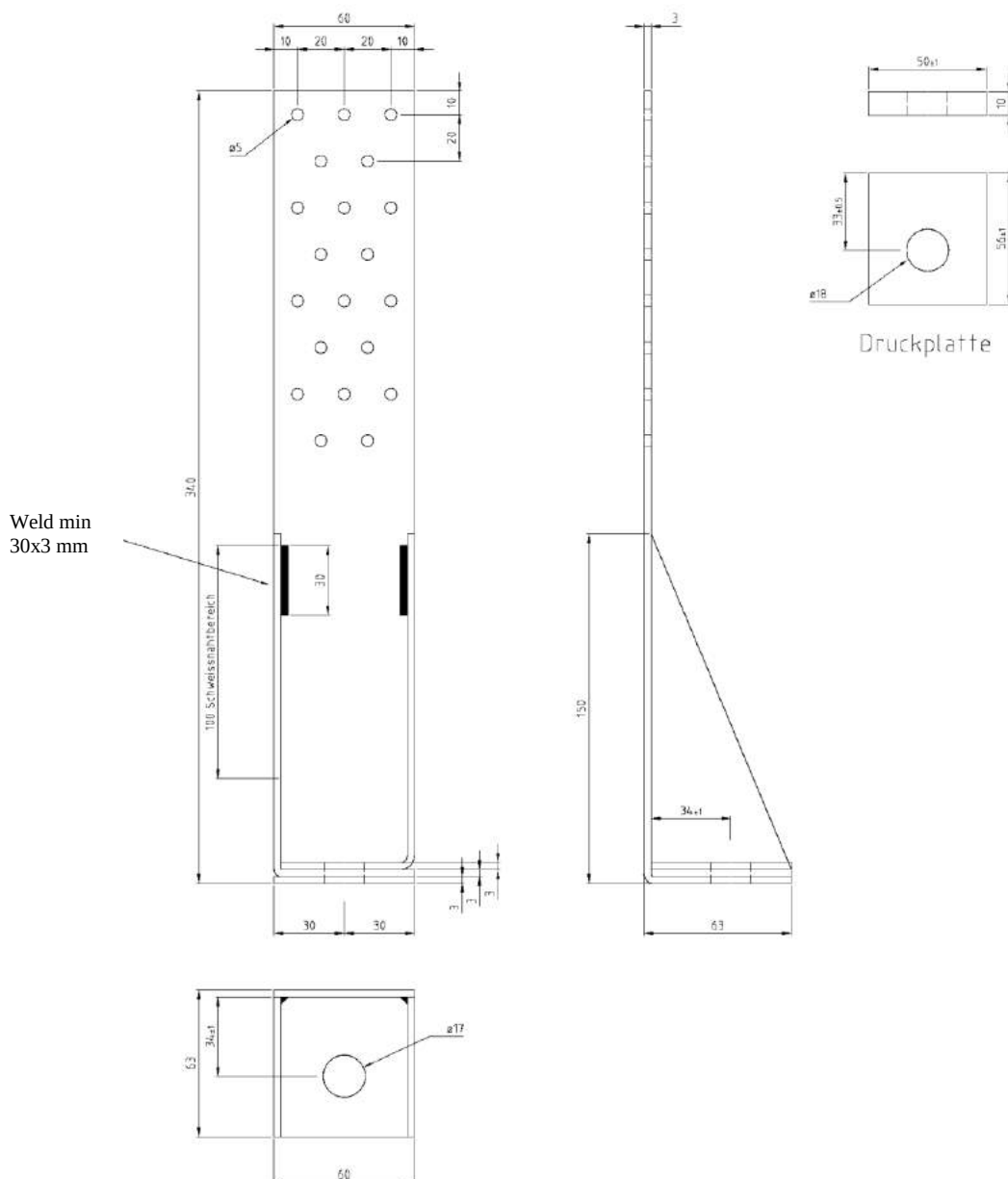


Figure B. 13 Dimensions of type WHT340 (drawing with washer 56x50x10)

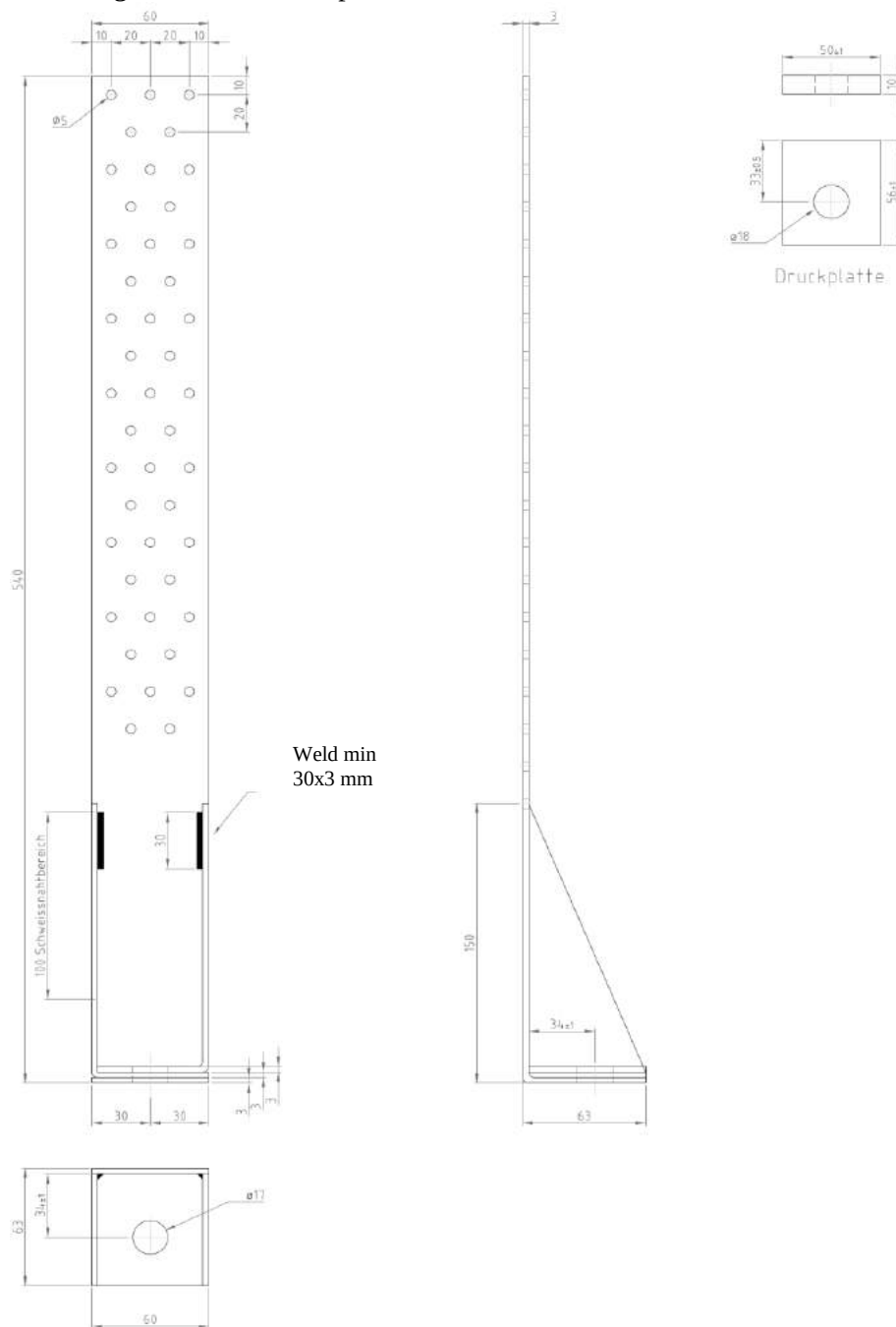


Figure B. 15 Dimensions of type WHT540 (drawing with washer 56x50x10)

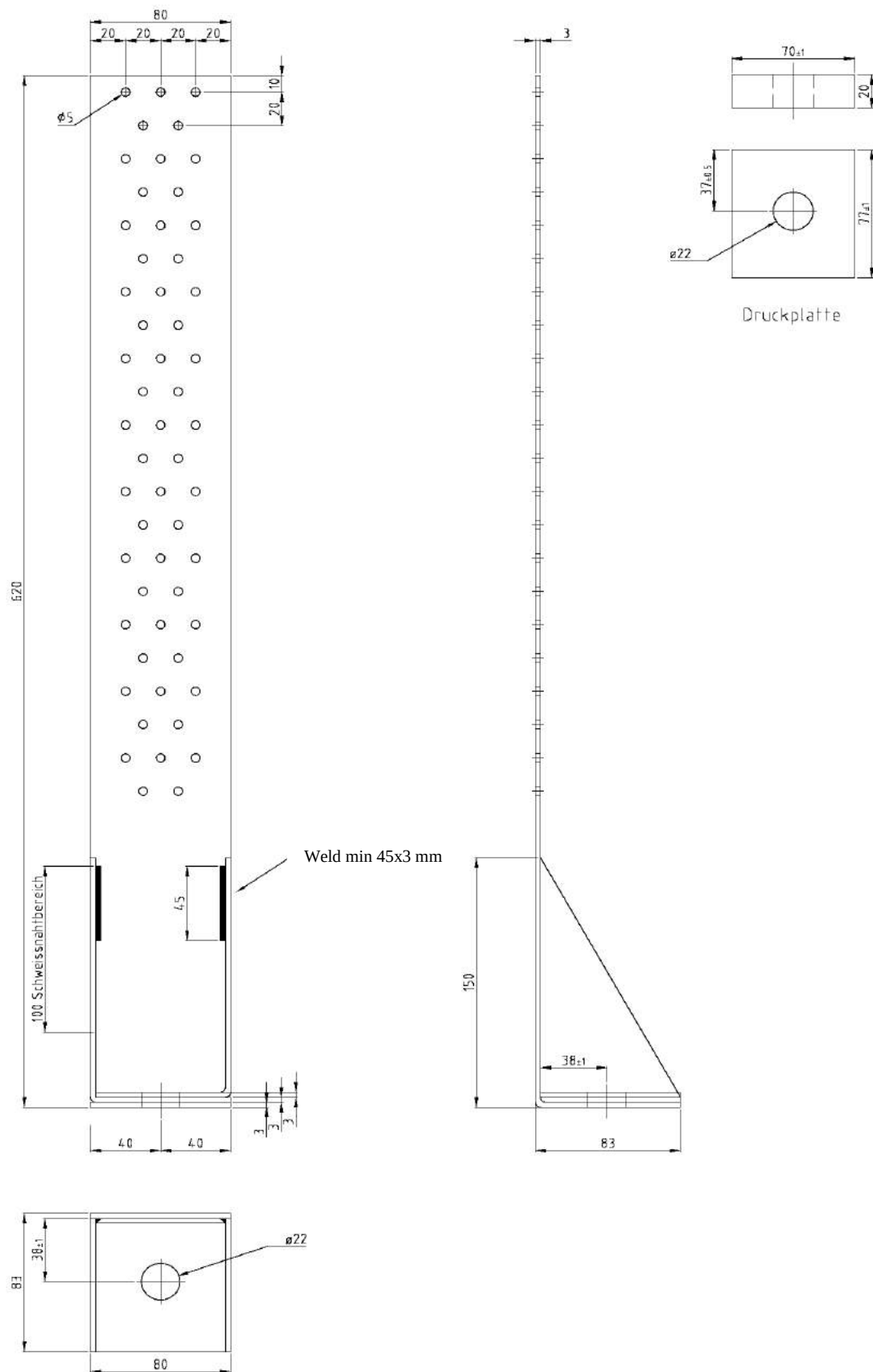


Figure B. 16 Dimensions of type WHT620 (drawing with washer 77x70x20)

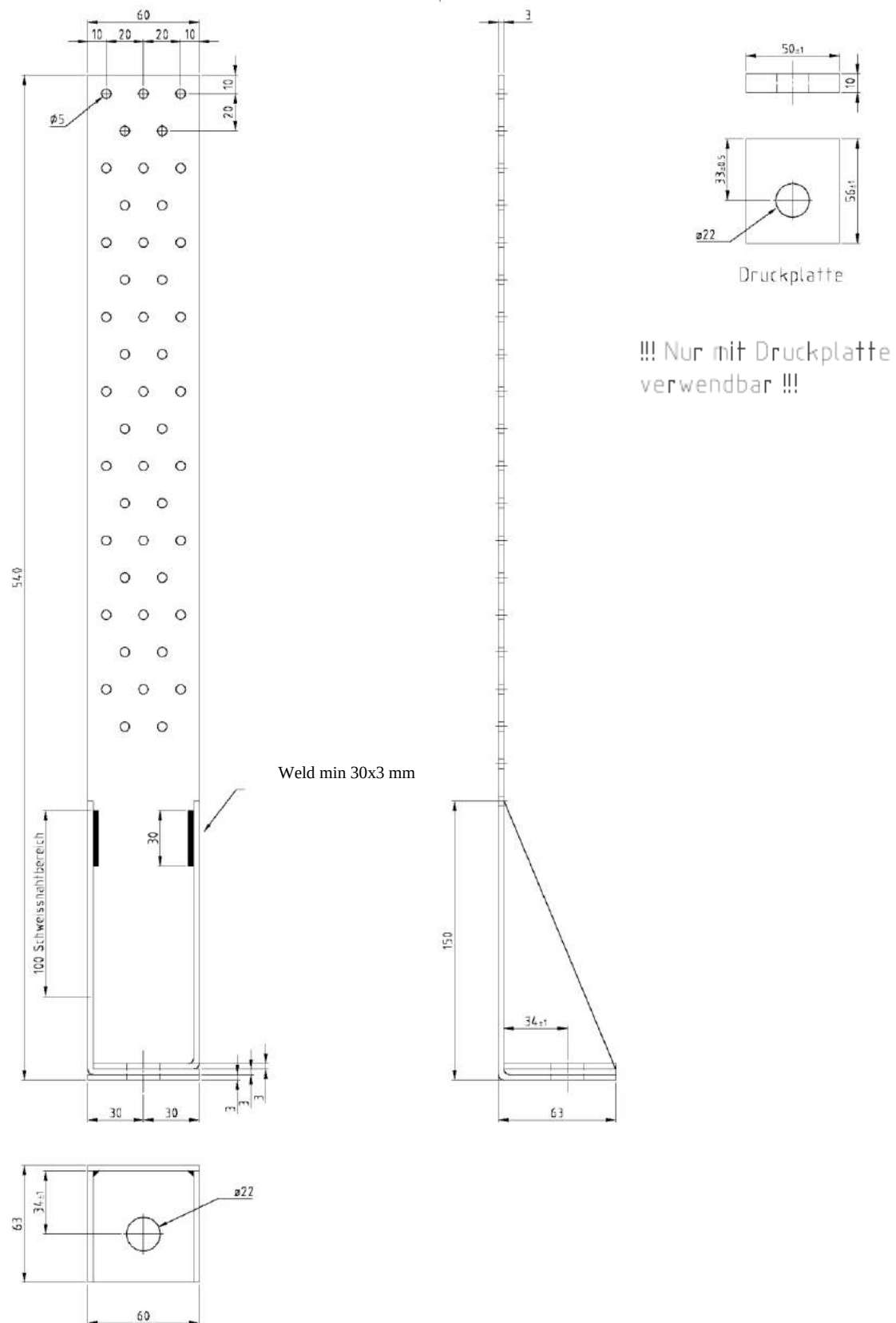


Figure B. 17 Dimensions of type WHT540 Big Hole (with washer 56x50x10)

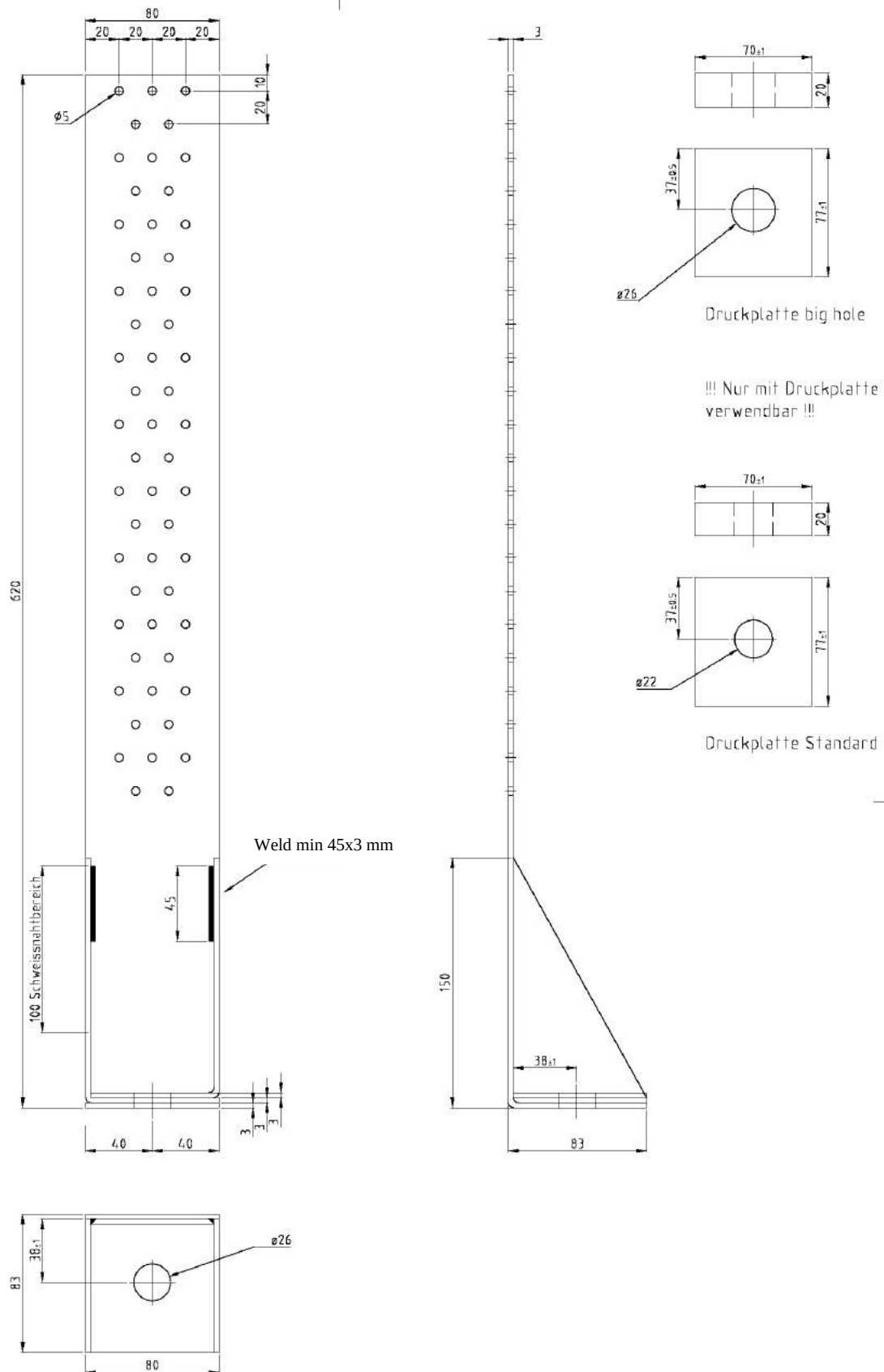


Figure B. 18 Dimensions of type WHT620 Big hole (with washer 77x70x20x $\phi 22$ or 77x70x20x $\phi 26$)

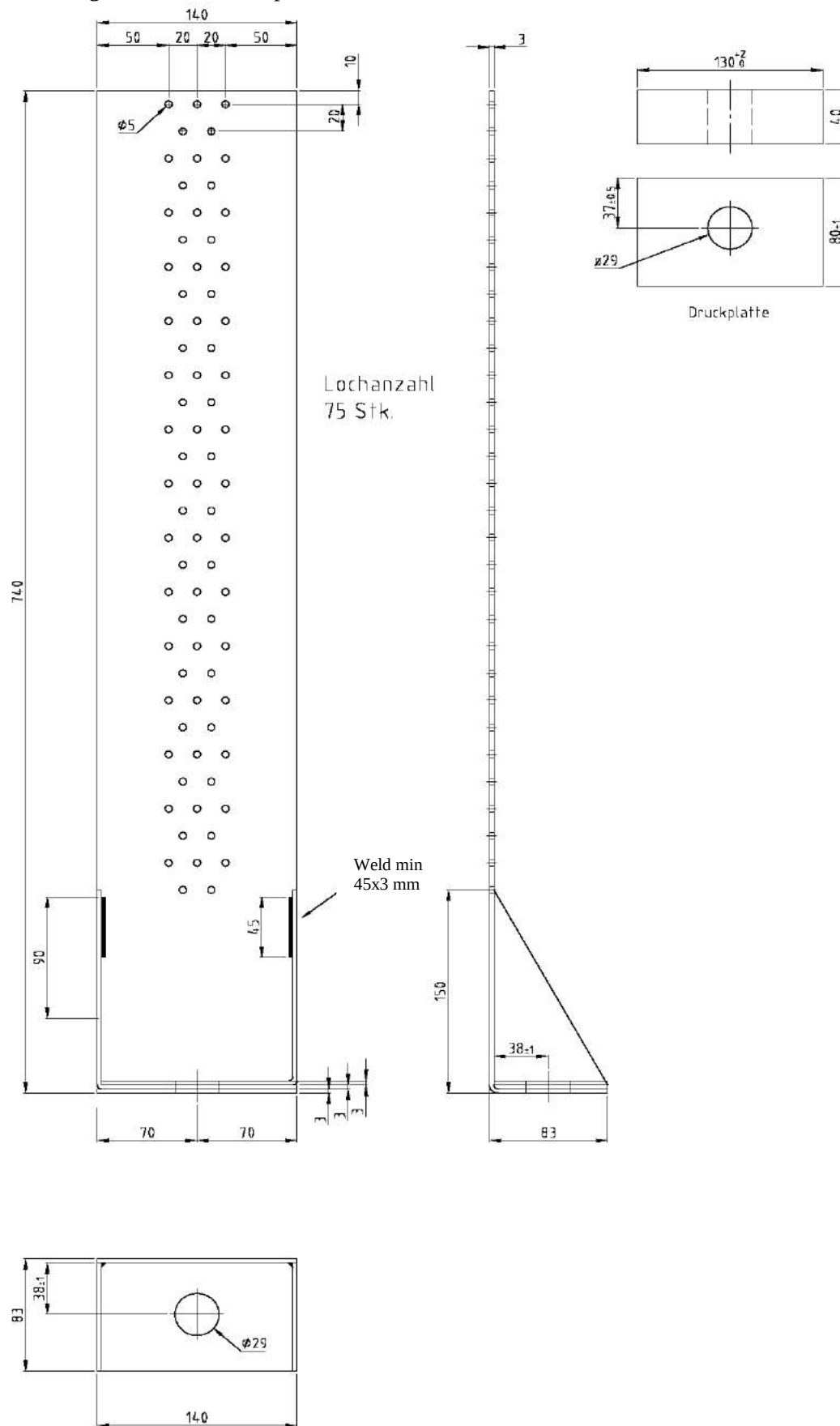


Figure B. 19 Dimensions of type WHT740 (drawing with washer 80x130x40)

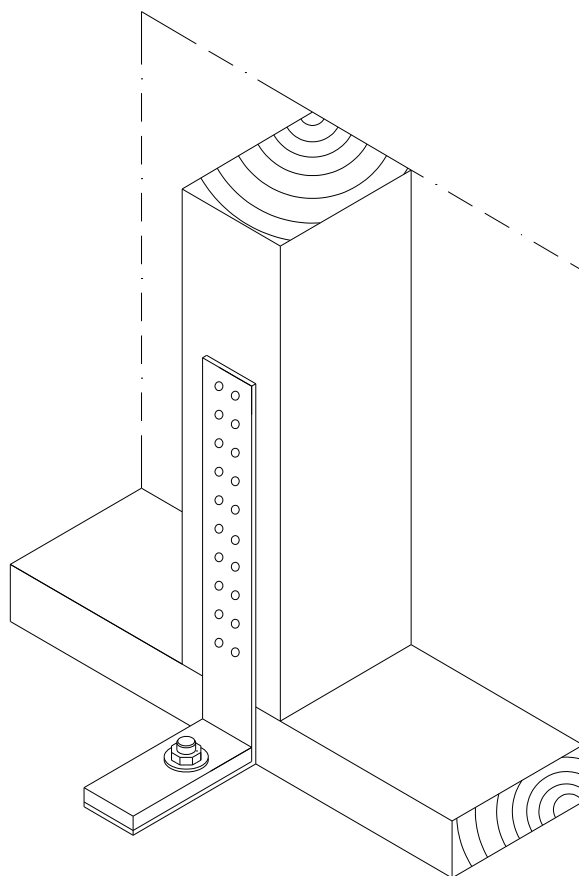


Figure B. 20 Typical installation



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Authorised and notified according
to Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011

MEMBER OF EOTA



European Technical Assessment ETA-11/0496 of 2018/11/06

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Rotho Blaas TITAN Angle Brackets

Product family to which the above construction product belongs:

Three-dimensional nailing plate (Angle Bracket for timber-to-timber or timber-to-concrete or steel connections)

Manufacturer:

Rotho Blaas s.r.l
Via dell'Adige 2/1
IT-39040 Cortaccia (BZ)
Tel. + 39 0471 818400
Fax + 39 0471 818484
Internet www.rothoblaas.com

Manufacturing plant:

Rotho Blaas s.r.l
Manufacturing Plants: T1, T2, T3

This European Technical Assessment contains:

27 pages including 2 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

This version replaces:

The previous ETA with the same number and issued on 2014-10-31

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

Rotho Blaas srl. angle brackets are one-piece non-welded, face-fixed angle brackets to be used in timber to timber or in timber to concrete or timber to steel connections. They are connected to construction members made of timber or wood-based products with threaded (ring shank) nails according to EN 14592 or ETA or screws type LBS according to ETA-11/0030 or screws type HBS+ according to ETA-11/0030 or screws type VGS according to ETA-11/0030 or bolts according to EN 14592 and to concrete or steel members with bolts or metal anchors.

The angle brackets with a steel plate thickness of up to 4 mm are made from the following materials:

- steel S355 / Z 275 or FeZn12c according to EN 10025:2005 with $R_e \geq 355 \text{ N/mm}^2$, $R_m \leq 630 \text{ N/mm}^2$ and $A_{80} \geq 22\%$
- steel S235 / Z 275 or FeZn12c according to EN 10025:2005 with $R_e \geq 235 \text{ N/mm}^2$, $R_m \leq 510 \text{ N/mm}^2$ and $A_{80} \geq 26\%$
- steel S275 / Z 275 or FeZn12c according to EN 10025:2005 with $R_e \geq 275 \text{ N/mm}^2$, $R_m \leq 560 \text{ N/mm}^2$ and $A_{80} \geq 23\%$
- steel DX51D / Z275 according to EN 10346:2015 with $R_e \geq 220 \text{ N/mm}^2$, $R_m \leq 500 \text{ N/mm}^2$ and $A_{80} \geq 22\%$
- steel S250GD / Z275 according to EN 10346:2015 with $R_e \geq 250 \text{ N/mm}^2$, $R_m \leq 470 \text{ N/mm}^2$ and $A_{80} \geq 19\%$
- stainless steel with $R_e \geq 355 \text{ N/mm}^2$, $R_m \leq 630 \text{ N/mm}^2$ and $A_{80} \geq 22\%$

Dimensions, hole positions and typical installations are shown in Annex B. Rotho Blaas srl. angle brackets are made from steel with tolerances according to EN 10143.

2 Specification of the intended use in accordance with the applicable EAD

The angle brackets are intended for use in making connections in load bearing timber structures, as a connection between a beam and a purlin, or as a connection between wall and floor elements or as wall-to-wall connection and on concrete/steel elements, where requirements for mechanical resistance and stability and

safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled.

The connection may be with a single angle bracket or with an angle bracket on each side of the fastened timber member (see Annex B).

The static and kinematical behaviour of the timber members or the supports shall be as described in Annex A and B.

The wood members may be of solid timber, glued laminated timber and similar glued members, or wood-based structural members with a characteristic density from 290 kg/m^3 to 420 kg/m^3 . The wood members may be of Laminated Veneer Lumber (LVL) with a characteristic density up to 500 kg/m^3 with nails/screws in the wide face of the LVL component. This requirement to the material of the wood members can be fulfilled by using the following materials:

- Structural solid timber according to EN 14081,
- Glulam according to EN 14080,
- Glued solid timber according to EN14080,
- LVL according to EN 14374 or ETA,
- Parallam PSL,
- Intrallam LSL,
- Cross laminated timber according to ETA,
- Plywood according to EN 636 or ETA.

Annex B states the load-carrying capacities of the angle bracket connections for a characteristic density of 350 kg/m^3 . For timber or wood based material with a lower or higher characteristic density than 350 kg/m^3 the load-carrying capacities shall be converted by the factor k_{dens} :

In load case F_1 :

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^{0,5} \text{ for } 290 \text{ kg/m}^3 \leq \rho_k \leq 350 \text{ kg/m}^3$$

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^{0,5} \text{ for } 350 \text{ kg/m}^3 \leq \rho_k \leq 420 \text{ kg/m}^3$$

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^{0,5} \text{ for LVL with } \rho_k \leq 500 \text{ kg/m}^3$$

In load case $F_{2/3}$ and $F_{4/5}$:

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^2 \text{ for } 290 \text{ kg/m}^3 \leq \rho_k \leq 350 \text{ kg/m}^3$$

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^{0,5} \text{ for } 350 \text{ kg/m}^3 \leq \rho_k \leq 420 \text{ kg/m}^3$$

$$k_{\text{dens}} = \left(\frac{\rho_k}{350} \right)^{0,5} \text{ for LVL with } \rho_k \leq 500 \text{ kg/m}^3$$

where ρ_k is the characteristic density of the timber in

kg/m³.

If a wood-based panel interlayer with a thickness of not more than 26 mm is placed between the connector plate and the timber member, the lateral load-carrying capacity of the nail or screw, respectively, has to take into account the effect of the interlayer.

The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code. The wood members shall have a thickness which is larger than the penetration depth of the nails into the members.

The angle brackets are primarily for use in timber structures subject to the dry, internal conditions defined by service classes 1 and 2 of Eurocode 5 and for connections subject to static or quasi-static loading.

The angle brackets can also be used in outdoor timber structures, service class 3, when a corrosion protection in accordance with Eurocode 5 is applied, or when stainless steel with similar or better characteristic yield strength and ultimate strength is employed.

The angle brackets may also be used for connections between a timber member and a member of concrete or steel (TITAN TCN, TCS and TCF).

The scope of the angle brackets regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions and in conjunction with the admissible service conditions according to EN 1995-1-1 and the admissible corrosivity category as described and defined in EN ISO 12944-2

The provisions made in this European Technical Assessment are based on an assumed intended working life of the angle brackets of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance assessed
Ductility in cyclic testing	No performance assessed
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The angle brackets are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	No dangerous materials
3.7 Sustainable use of natural resources (BWR7)	No performance assessed
3.8 General aspects related to the performance of the product	The angle brackets have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1 and 2
Identification	See Annex A

*) See additional information in section 3.9 – 3.12.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification

Safety principles and partial factors

The characteristic load-carrying capacities are based on the characteristic values of the nail or screw connections and the steel plates. To obtain design values the capacities have to be divided by different partial factors for the material properties, in case of timber failure in addition multiplied with the coefficient k_{mod} .

According to EN 1990 (Eurocode – Basis of design) paragraph 6.3.5 the design value of load-carrying capacity may be determined by reducing the characteristic values of the load-carrying capacity with different partial factors.

Thus, the characteristic values of the load-carrying capacity are determined also for timber failure $F_{Rk,H}$ (obtaining the embedment strength of fasteners subjected to shear or the withdrawal capacity of the most loaded fastener, respectively) as well as for steel plate failure $F_{Rk,S}$. The design value of the load-carrying capacity is the smaller value of both load-carrying capacities.

$$F_{Rd} = \min \left\{ \frac{k_{mod} \cdot F_{Rk,H}}{\gamma_{M,H}}; \frac{F_{Rk,S}}{\gamma_{M,S}} \right\}$$

Therefore, for timber failure the load duration class and the service class are included. The different partial factors γ_M for steel or timber, respectively, are also correctly taken into account.

3.10 Mechanical resistance and stability

See annex B for the characteristic load-carrying capacity in the different directions F_1 , F_2 , F_3 , F_4 and F_5

The characteristic capacities of the angle brackets are determined by calculation assisted by testing and testing as described in the EOTA Guideline 015 clause 2.4.1. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

Other connector nails or screws according to EN 14592 or ETA with the same or better performance than the fasteners given in table A.4 may be used.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1, 2 and 3.

In accordance with ETAG 015 the angle brackets are produced from:

- steel S355 / Z 275 or FeZn12c treated according to EN 10025:2005 with $R_e \geq 355 \text{ N/mm}^2$, $R_m \leq 630 \text{ N/mm}^2$ and $A_{80} \geq 22\%$
- steel S235 / Z 275 or FeZn12c treated according to EN 10025:2005 with $R_e \geq 235 \text{ N/mm}^2$, $R_m \leq 510 \text{ N/mm}^2$ and $A_{80} \geq 26\%$
- steel S275 / Z 275 or FeZn12c treated according to EN 10025 with $R_e \geq 275 \text{ N/mm}^2$, $R_m \leq 560 \text{ N/mm}^2$ and $A_{80} \geq 23\%$
- steel DX51D / Z275 according to EN 10346 with $R_e \geq 220 \text{ N/mm}^2$, $R_m \leq 500 \text{ N/mm}^2$ and $A_{80} \geq 22\%$
- steel S250GD / Z275 according to EN 10346 with $R_e \geq 250 \text{ N/mm}^2$, $R_m \leq 470 \text{ N/mm}^2$ and $A_{80} \geq 19\%$
- stainless steel with $R_e \geq 355 \text{ N/mm}^2$, $R_m \leq 630 \text{ N/mm}^2$ and $A_{80} \geq 22\%$

3.12 General aspects related to the use of the product

The angle brackets are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation

The nailing pattern used shall be either the maximum or the minimum pattern as defined in Annex A.

The following provisions apply:

- The structural members – the components 1 and 2 shown in the figure on page 15 - to which the brackets are fixed shall be:
 - Restrained against rotation. At a load F_4/F_5 , the component 2 is allowed to be restrained against rotation by the Angle brackets.
 - Strength class C14 or better, see section II.2 of this ETA
 - Free from wane under the bracket.
- The actual end bearing capacity of the timber member to be used in conjunction with the bracket is checked by the designer of the structure to ensure it is not less than the bracket capacity and, if necessary, the bracket capacity reduced accordingly.
- The minimum nail's end and edge distances according to EN 1995-1-1:2010 have to be provided for
- The soundproofing interlayer of TITAN SILENT angle brackets shall be arranged between the

horizontal flange and the timber member
(component 1 as shown in the figure on page 15).

- There are no specific requirements relating to preparation of the timber members.

The execution of the connection shall be in accordance with the assessment holder's technical literature.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/EC of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2018-11-06 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex A
Product details definitions

Table A.1 Materials specification

Angel Bracket type	Thickness (mm)	Steel specification	Coating specification
TITAN TTN160	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTN200	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTN240	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTS140	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTS195	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTS240	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCN160	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCN200	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCN240	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCS140	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCS195	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCS240	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTF200	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TCF200	3,0	S235/S275/S355/DX51D/S250GD	FeZn12c / Z 275
TITAN TTV240	4,0	S275/S355 ¹⁾	FeZn12c / Z 275
TITAN Washer TCW200	12,0	S235/S275/S355	FeZn12c / Z 275
TITAN Washer TCW240	12,0	S235/S275/S355	FeZn12c / Z 275

¹⁾ or steel DX51D with minimum and maximum mechanical properties of S275 with thickness of 4 mm. An inspection certificate 3.1 according to EN 10204 is required to confirm these values.

Table A.2 Materials specification – Soundproofing Interlayer for TITAN SILENT

Interlayer type	Thickness (mm)
Xylofon or Xylofonplate	6,0
Aladin Stripe Soft	5,0
Aladin Stripe Extrasoft	7,0

Table A.3 Range of sizes

Angle Bracket type	Height (mm) vertical		Height (mm) horizontal		Width (mm)	
TITAN TTN160	119	121	92	94	159	161
TITAN TTN200	119	121	92	94	199	201
TITAN TTN240	119	121	92	94	239	241
TITAN TTS140	129	131	129	131	139	141
TITAN TTS195	129	131	129	131	194	196
TITAN TTS240	129	131	129	131	239	241
TITAN TCN160	119	121	102	104	159	161
TITAN TCN200	119	121	102	104	199	201
TITAN TCN240	119	121	122	124	239	241
TITAN TCS140	129	131	102	104	139	141
TITAN TCS195	129	131	102	104	194	196
TITAN TCS240	129	131	122	124	239	241
TITAN TTF200	70	72	70	72	199	201
TITAN TCF200	70	72	102	104	199	201
TITAN TTV240	119	121	92	93	239	241
TITAN Washer TCW200	-	-	71	73	189	191
TITAN Washer TCW240	-	-	73	75	229	231

Table A.4 Fastener specification

Fastener	Minimum Length	Minimum Threaded Length	Fastener type
Nail 4.0 mm	60 mm	50 mm	Ringed shank nails according to EN 14592 or ETA
Rotho Blaas screw 5.0 mm, type LBS	50 mm	46 mm	Self-tapping screws according to ETA-11/0030
Rotho Blaas screw 8.0 mm, type HBS+	80 mm	52 mm	Self-tapping screws according to ETA-11/0030
Rotho Blaas screw 11.0 mm, type VGS	150 mm	140 mm	Self-tapping screws according to ETA-11/0030
Rotho Blaas screw 11.0 mm, type VGS	200 mm	190 mm	Self-tapping screws according to ETA-11/0030

In the load-carrying-capacities of the nailed or with 5.0 mm screwed connection in Annex B the capacities calculated from the formulas of Eurocode 5 are used assuming a thick steel plate when calculating the lateral fastener load-carrying-capacity. For the connection with 8.0 mm screws a thin steel plate is assumed. The load-carrying-capacities of the angle brackets have been determined based on the use of connector nails $\varnothing$ 4.0 mm in accordance with EN 14592 and self-tapping screws according to ETA-11/0030. The characteristic withdrawal capacity of the nails or screws has to be determined by calculation in accordance with EN 1995-1-1:2010, paragraph 8.3.2 (head pull-through is not relevant):

$$F_{ax,Rk} = f_{ax,k} \cdot d \cdot t_{pen} \quad \text{for the nails 4.0 mm}$$

$$F_{ax,Rk} = \frac{n_{ef} \cdot f_{ax,k} \cdot d \cdot \left(\frac{t_{pen}}{d} \right)^{0,8}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha \left(\frac{\rho_a}{\rho_k} \right)} \quad \text{for the screws}$$

where:

- n_{ef} Effective number of fasteners
- $f_{ax,k}$ Characteristic value of the withdrawal parameter in N/mm²
- d Nail or screw diameter in mm
- t_{pen} Penetration depth of the ring shank in mm
- ρ_k Characteristic density of the timber in kg/m³
- ρ_a Characteristic density of the timber in kg/m³ according to $f_{ax,k}$

Based on tests by Versuchsanstalt für Stahl, Holz und Steine, Karlsruhe Institute of Technology, the characteristic value of the withdrawal resistance for the threaded nails used can be calculated as:

$$f_{ax,k} = 50 \cdot 10^{-6} \cdot \rho_k^2$$

Based on ETA-11/0030 the characteristic value of the withdrawal resistance for the screws type HBS+ $d = 8.0$ mm, VGS $d = 11.0$ mm and LBS $d = 5.0$ mm is:

$$f_{ax,k} = 11,7 \text{ N/mm}^2 \text{ (with } \rho_k = 350 \text{ kg/m}^3 \text{)}$$

The shape of the nail or screw directly under the head shall be in the form of a truncated cone with a diameter under the head which fits or exceeds the hole diameter.

Bolts diameter	Correspondent hole diameter	Bolts type
12.0 or 16.0 mm	Max. 2 mm larger than the bolt diameter	See specification of the manufacturer

Metal Anchors diameter	Correspondent Hole diameter	Anchors type
12.0 or 16.0 mm	Max. 2 mm larger than the anchor diameter	See specification of the manufacturer

Annex B
Characteristic load-carrying capacities and slip moduli

Table B.1: Force F_1 , 1 angle bracket / connection timber to concrete or steel

TITAN Type	timber		steel		Bolts inner row	concrete	K _{1,ser} [kN/mm]
	capacity per fastener in the vertical flange F _{v,Rk} [kN] F _{1,Rk} = n _{ef} ·F _{v,Rk} [kN]		F _{1,Rk} [kN]		k _{t,II}	ℓ _D [mm]	
TCN200	30 screws Ø5 x 50 ¹⁾		11,8		1,09	7,3	3,0 ³⁾
	-						
TCN200 + Washer TCW200	Nail Ø4 x 60	Screw Ø5 x 50	Washer S235	Washer S355	1,09	7,3	-
	1,93	2,27	45,7	69,0			
TCN240	36 screws Ø5 x 50 ¹⁾		14,1		1,08	6,5	4,1 ³⁾
	-						
TCN240 + Washer TCW240	Nail Ø4 x 60	Screw Ø5 x 50	Washer S235	Washer S355	1,08	6,5	-
	1,93	2,27	69,8	105,4			
TCS 240	14 screws Ø8 x 80 ²⁾		16,2		1,08	6,5	5,5 ³⁾
	-						
TCS 240 + Washer TCW240	14 screws Ø8 x 80 ²⁾		75,9		1,08	6,5	11,5 ³⁾
	-						

¹⁾ Number of fasteners in the vertical flange may be reduced. In this case, the load-carrying capacity for a steel-to-timber connection is $F_{1,Rk} = n_{ef} \cdot 1,93$ kN for nails Ø4 x 60 or $F_{1,Rk} = n_{ef} \cdot 2,27$ kN for screws Ø 5 x 50. Fasteners must be arranged symmetrically.

²⁾ Number of screws in the vertical flange may be reduced. In this case, the load-carrying capacity for a steel-to-timber connection is $F_{1,Rk} = n_{ef} \cdot 3,77$ kN for screws Ø 8 x 80. Screws must be arranged symmetrically.

³⁾ Value is only valid when using the full number of fasteners given in column "timber".

Table B.2: Force F_1 , 1 angle bracket with washer / connection timber to timber

TITAN Type	timber		steel	Bolts inner row	
	capacity per fastener in the vertical flange F _{v,Rk} [kN] F _{1,Rk} = n _{ef} · F _{v,Rk} [kN]		F _{1,Rk} [kN]	F _{1,Rk} [kN]	k _{t,II}
TCN200 + Washer TCW200	Nail Ø4 x 60	Screw Ø5 x 50	13,2	49,8	1,07
	1,93	2,27			
TCN240 + Washer TCW240	Nail Ø4 x 60	Screw Ø5 x 50	17,7	63,1	1,05
	1,93	2,27			
TCS240 + Washer TCW240	Screw Ø8 x 80		17,7	63,1	1,05
	3,77				

Table B.3: Force F_1 , 1 angle bracket without washer / connection timber to timber

TITAN Type	Number of fasteners		timber			
			$F_{1,Rk}$ [kN]			$K_{1,ser}$ [kN/mm]
	n_V	n_H	nails Ø4 x 60	screws Ø5 x 50	screws Ø8 x 80	Screws or nails
TTN240	36	36	7,37	16,2	-	36 screws Ø5 x 50: 11,5
TTS240	14	14	-	-	10,3	14 screws Ø8 x 80: 4,8
TTV240 full	36	30 + 5 ¹⁾	101	101	-	Full nailing: 12,5
TTV240 partial	24	24 + 5 ²⁾	64,5	64,5	-	Partial nailing: 10,5

¹⁾ with 5 screws 11 x 200 mm (see Figure B. 22, Annex B)²⁾ with 5 screws 11 x 150 mm (see Figure B. 22, Annex B)**Table B.4:** Force $F_{2/3}$, 1 angle bracket / connection timber to timber

TITAN Type	Number of fasteners		Timber			
			$F_{2/3,Rk}$ [kN]			$K_{2/3,ser}$ [kN/mm]
	number n_V	number n_H	Nails Ø4 x 60	Screws Ø5 x 50	Screws Ø8 x 80	
TTN160	24	24	19,3	24,0	-	-
TTN200	30	30	28,0	34,7	-	-
TTN240	36	36	37,9	46,7	-	-
TTN240 + Xylofonplate	36	36	24,8	22,8	-	-
TTN240 + Aladin Stripe Soft	36	36	28,9	27,5	-	-
TTN240 + Aladin Stripe Extrasoft	36	36	27,5	25,8	-	-
TTS140	8	8	-	-	10,7	-
TTS195	11	11	-	-	17,1	-
TTS240	14	14	-	-	60,0	5,6
TTS240 + Xylofonplate	14	14	-	-	12,5	-
TTS240 + Aladin Stripe Soft	14	14	-	-	14,7	-
TTS240 + Aladin Stripe Extrasoft	14	14	-	-	13,9	-
TTF200, h=9cm ¹⁾	30	30	35,5	42,5	-	-
TTF200, h=8cm ¹⁾	25	25	31,0	37,2	-	-
TTF200, h=7cm ¹⁾	15	15	20,9	25,1	-	-
TTF200, h=6cm ¹⁾	10	10	15,1	18,1	-	-
TTF200 + Xylofonplate	30	30	17,2	15,8	-	-
TTF200 + Aladin Stripe Soft	30	30	20,0	19,0	-	-
TTF200 + Aladin Stripe Extrasoft	30	30	19,0	17,9	-	-
TTV240 full	36	30 + 2 ²⁾	59,7	59,7	-	Full nailing: 6,6
TTV240 partial	24	24 + 2 ³⁾	51,5	51,5	-	Partial nailing: 4,8

¹⁾ h = height of purlin (see Figure B. 20, Annex B)²⁾ with 2 screws 11 x 200 mm (see Figure B. 22, Annex B)³⁾ with 2 screws 11 x 150 mm (see Figure B. 22, Annex B)

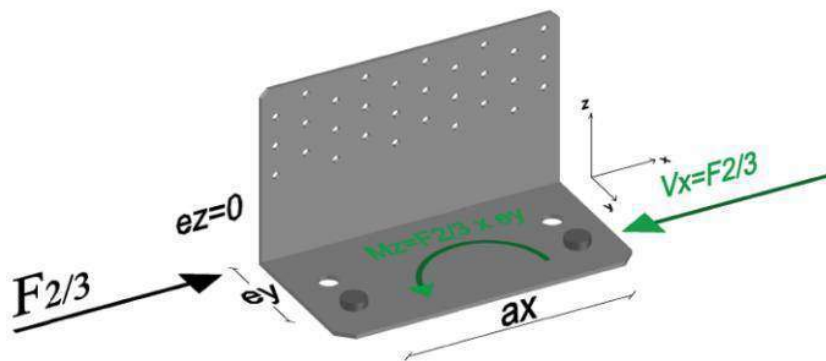
Table B.5: Force $F_{2/3}$, 1 angle bracket with washer / connection timber to timber

TITAN Type	Number of fasteners		Timber F _{2/3,Rk} [kN]			Bolts inner row		a _x
	number n _v	number n _H						
			Nails Ø4 x 60	Screws Ø5 x 50	Screws Ø8 x 80	k _{t,⊥}	e _y	
TCN 200 + TCW 200	30	2	22,1	26,5	-	0,56	38,5	150
TCN 240 + TCW 240	36	2	30,3	36,3	-	0,56	39,5	162
TCS 240 + TCW 240	14	2	-	-	25,0	0,56	39,5	162

Table B.6: Force $F_{2/3}$, 1 angle bracket / connection timber to concrete or steel

TITAN Type	Number of fasteners		Timber $F_{2/3,Rk}$ [kN]			Bolts inner row					$K_{2/3,ser}$ [kN/mm]
	number n_v	number n_H	Nails $\varnothing 4 \times 60$	Screws $\varnothing 5 \times 50$	Screws $\varnothing 8 \times 80$	$k_{t,\perp}$	e_y	$k_{t,\parallel}$	e_z	a_x	Screws
TCN 200 + TCW 200	30	2	56,7	66,4	-	0,56	38,5	0,56	83,5	150	9,6
TCN 240 + TCW 240	36	2	70,5	82,6	-	0,56	39,5	0,52	83,5	162	10
TCS 240 + TCW 240	14	2	-	-	85,9	0,56	39,5	0,48	78,5	162	8,6

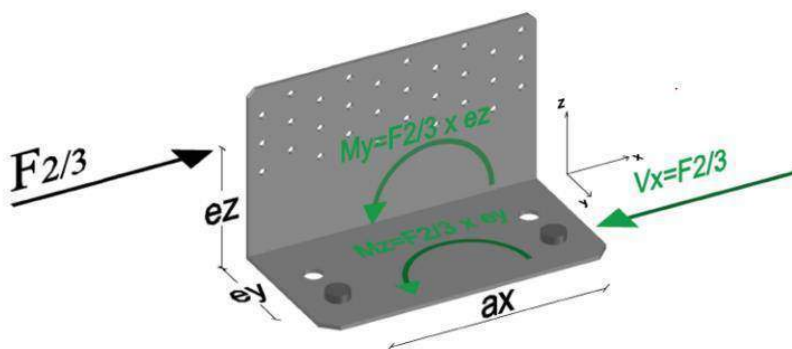
Explanation for table B.5 and B.7



$$F_{2/3}$$

$$M_z = F_{2/3} * e_y$$

Explanation for table B.6



$$F_{2/3}$$

$$M_z = F_{2/3} * e_y$$

$$M_y = F_{2/3} * e_z$$

Table B.7: Force $F_{2/3}$, 1 angle bracket / connection timber to concrete or steel

TITAN Type	Number of fasteners		Timber F _{2/3,Rk} [kN]			Bolts inner row		Bolts outer row		a _x	K _{2/3,ser} [kN/mm]
	number n _v	number n _H									
			Nails Ø4 x 60	Screws Ø5 x 50	Screws Ø8 x 80	k _{t,⊥}	e _y	k _{t,⊥}	e _y		
TCN160	24	2	15,1	18,1	-	0,61	38,5	0,81	70,0	110	-
TCN200	30	2	22,1	26,5	-	0,56	38,5	0,68	70,0	150	-
TCN200 (Nailing pattern 1)	10	2	6,38	7,48	-	0,56	38,5	0,68	70,0	150	-
TCN200 (Nailing pattern 2)	15	2	9,58	11,2	-	0,56	38,5	0,68	70,0	150	-
TCN200 (Nailing pattern 3)	20	2	13,7	16,0	-	0,56	38,5	0,68	70,0	150	-
TCN200 (Nailing pattern 4)	25	2	17,4	20,4	-	0,56	38,5	0,68	70,0	150	-
TCN240	36	2	30,3	36,3	-	0,56	39,5	0,70	80,5	150	-
TCN240 (Nailing pattern 1)	12	2	8,85	10,4	-	0,56	39,5	0,70	80,5	162	-
TCN240 (Nailing pattern 2)	18	2	13,3	15,6	-	0,56	39,5	0,70	80,5	162	-
TCN240 (Nailing pattern 3)	24	2	18,8	22,1	-	0,56	39,5	0,70	80,5	162	-
TCN240 (Nailing pattern 4)	30	2	24,0	28,2	-	0,56	39,5	0,70	80,5	162	-
TCS140	8	2	-	-	10,7	0,66	38,5	0,92	70,00	90	-
TCS195	11	2	-	-	17,1	0,56	38,5	0,68	70,00	150	-
TCS240	14	2	-	-	70,3	0,56	39,5	0,70	80,5	162	8,2
TCF200, h=9cm ¹⁾	30	2	35,5	42,5	-	0,56	38,5	0,68	70,00	150	-
TCF200, h=8cm ¹⁾	25	2	31,0	37,2	-	0,56	38,5	0,68	70,00	150	-
TCF200, h=7cm ¹⁾	15	2	20,9	25,1	-	0,56	38,5	0,68	70,00	150	-
TCF200, h=6cm ¹⁾	10	2	15,1	18,1	-	0,56	38,5	0,68	70,00	150	-

¹⁾h = height of purlin (see Figure Figure B. 20, Annex B)**Table B.8:** Force $F_{4/5}$, 2 angle brackets

TITAN Type	Number of fasteners		F _{4/5,Rk} [kN]		Bolts inner row	
	number	number				
	n _v	n _H	timber	steel	k _{t,⊥}	k _{t,}
TTN240	72	72	26,7	31,6	-	-
TTS240	28	28	25,2	23,4	-	-
TCN200	60	4	25,6	14,9	0,41	0,09
TCN200 (nailing pattern 2)	30	4	22,4	20,9	0,46	0,06
TCN240	72	4	27,8	24,7	0,43	0,06
TCN240 (nailing pattern 2)	36	4	25,2	30,6	0,48	0,04
TCS240	72	4	27,4	18,8	0,39	0,08
TTF200	60	60	21,0	14,2	-	-
TCF200	60	4	23,8	12,3	0,31	0,10

Table B.9: Force F_4 , 1 angle bracket

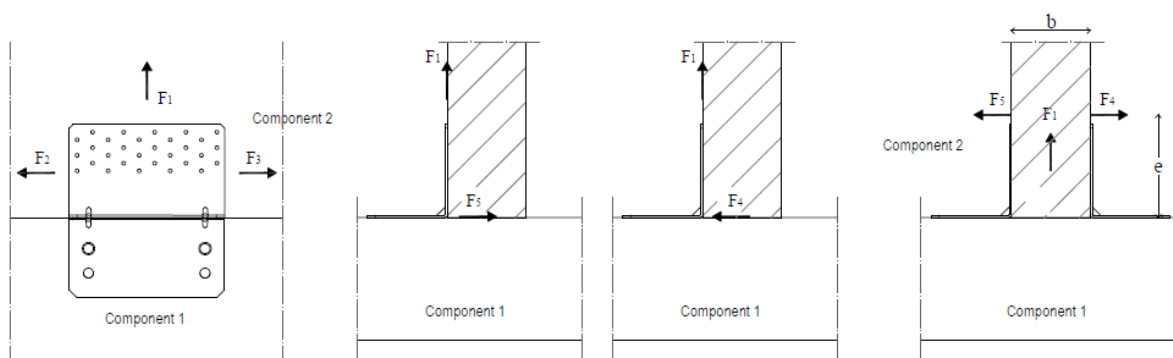
TITAN Type	Number of fasteners		$F_{4,Rk}$ [kN]		Bolts inner row	
	number n_v	number n_H				
			timber	steel	$k_{t,\perp}$	$k_{t,\parallel}$
TTN240	36	36	23,8	31,1	-	-
TTS240	14	14	20,7	20,9	-	-
TCN200	30	2	20,9	22,4	0,50	-
TCN200 (nailing pattern 2)	15	2	20,7	24,3	0,50	-
TCN240	36	2	24,1	26,9	0,50	-
TCN240 (nailing pattern 2)	18	2	23,9	29,1	0,50	-
TCS240	36	2	21,1	18,1	0,50	-
TTF200	30	30	14,1	10,4	-	-
TCF200	30	2	14,6	9,48	0,50	-

Table B.10: Force F_5 , 1 angle bracket

TITAN Type	Number of fasteners		$F_{5,Rk}$ [kN]		Bolts inner row	
	number n_v	number n_H				
			timber	steel	$k_{t,\perp}$	$k_{t,\parallel}$
TTN240	36	36	7,26	3,41	-	-
TTS240	14	14	16,8	4,24	-	-
TCN200	30	2	6,64	2,74	0,50	0,47
TCN200 (nailing pattern 2)	15	2	3,60	1,58	0,50	0,83
TCN240	36	2	8,02	3,28	0,50	0,48
TCN240 (nailing pattern 2)	18	2	4,33	1,89	0,50	0,83
TCS240	36	2	17,1	4,30	0,50	0,36
TTF200	30	30	10,8	4,69	-	-
TCF200	30	2	10,7	4,77	0,50	0,27

Definitions of forces, their directions and eccentricity

Forces – Example:



Fastener specification

Nailing patterns are given in figures B.20, B.21 and B.22. Unless otherwise stated the load-carrying capacities are applicable for connections with nails $\varnothing$ 4.0 mm as well as for LBS screws $\varnothing$ 5.0 mm. In Connections with bolts or metal anchors, there are always two bolts/metal anchors per angle bracket. Unless otherwise stated, their position is in the first row from the bend line (inward).

Double angle brackets per connection

The angle brackets must be placed at each side opposite to each other, symmetrically to the component axis.

Acting forces

- F_1 Lifting force acting along the central axis of the joint.
- F_2 and F_3 Lateral force acting in the joint between the component 2 and component 1 in the component 2 direction
- F_4 and F_5 Lateral force acting in the component 1 direction along the central axis of the joint.
The load may be applied with an eccentricity e , then a design for combined loading is required.

Single angle bracket per connection

Acting forces

- F_1 Lifting force acting in the central axis of the angle bracket. The component 2 shall be prevented from rotation. If the component 2 is prevented from rotation the load-carrying capacity will be half of a connection with double angle brackets.
- F_2 and F_3 Lateral force acting in the joint between the component 2 and the component 1 in the component 2 direction. The component 2 shall be prevented from rotation. If the component 2 is prevented from rotation the load-carrying capacity will be half of a connection with double angle brackets.
- F_4 and F_5 Lateral force acting in the component 1 direction along the central axis of the joint. The components must be prevented from rotation. F_4 causes compression between the angle bracket and component 2; F_5 causes tension between the angle bracket and component 2.

Wane

Wane is not allowed, the timber has to be sharp-edged in the area of the angle brackets.

Timber splitting

For the lifting force F_1 it must be checked in accordance with Eurocode 5 or a similar national Timber Code that splitting will not occur.

Combined forces

If the forces F_1 and F_2/F_3 or F_4/F_5 act at the same time, the following inequality shall be fulfilled:

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}} \right) + \left(\frac{F_{2,Ed}}{F_{2,Rd}} \right) + \left(\frac{F_{3,Ed}}{F_{3,Rd}} \right) + \left(\frac{F_{4,Ed}}{F_{4,Rd}} \right) + \left(\frac{F_{5,Ed}}{F_{5,Rd}} \right) \leq 1$$

The forces F_2 and F_3 or F_4 and F_5 are forces with opposite direction. Therefore only one force F_2 or F_3 , and F_4 or F_5 , respectively, is able to act simultaneously with F_1 , while the other shall be set to zero.

If the load $F_{4/5,Ed}$ is applied with an eccentricity e , a design for combined loading **for connections with double angle brackets** is required. Here, an additional force ΔF_1 has to be added to the existing force F_1 .

$$\Delta F_{1,Ed} = F_{4/5,Ed} \cdot \frac{e}{b} \quad b \text{ is the width of component 2.}$$

Bolt design

The load $F_{B,Ed}$ for the design of the maximally loaded bolt or metal anchor is calculated as:

$$F_{B,t,Ed} = k_{t,\parallel} \cdot F_{Ed}$$

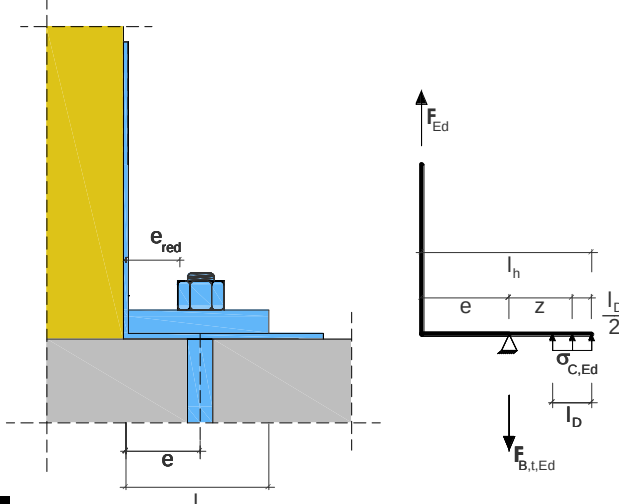
$$F_{B,v,Ed} = k_{t,\perp} \cdot F_{Ed}$$

where:

- $F_{B,t,Ed}$ Resulting tensile load on the maximally loaded bolt in the group in N
- $F_{B,v,Ed}$ Resulting shear load on the maximally loaded bolt in the group in N
- $k_{t,\parallel}$ Coefficient taking into account the resulting axial force
- $k_{t,\perp}$ Coefficient taking into account the moment arm or hole tolerance, respectively
- F_{Ed} Load on vertical flap of the angle bracket or pair of angle brackets in N

Load combinations have to be considered.

Compressive stress on the support (concrete or steel):



$$\sigma_{C,Ed} = \frac{F_{1,Ed} \cdot (2 \cdot k_{t,\perp} - 1)}{b \cdot \ell}$$

where:

- $F_{1,Ed}$ Tensile load F_1 on vertical flap of the angle bracket in N
- b Width of the washer in mm
- $\sigma_{C,Ed}$ compressive stress on the support (concrete or steel) in N/mm^2

Rotho Blaas Angle Brackets

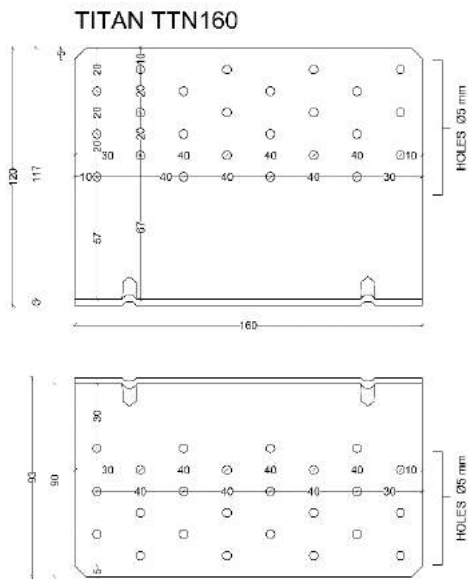


Figure B. 1
Dimensions of Angle Bracket TITAN TTN160

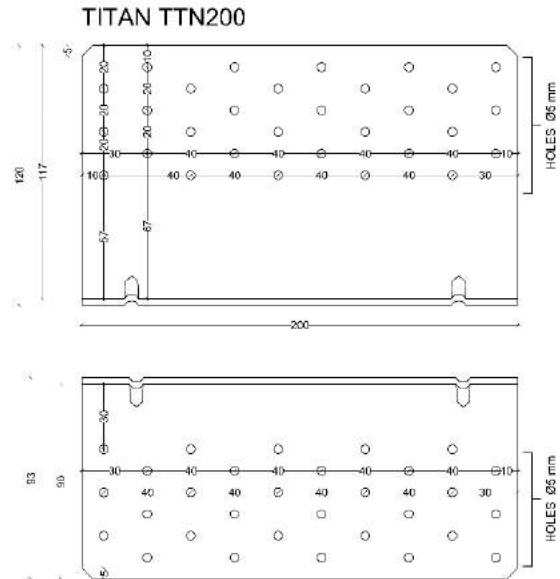


Figure B. 2
Dimensions of Angle Bracket TITAN TTN200

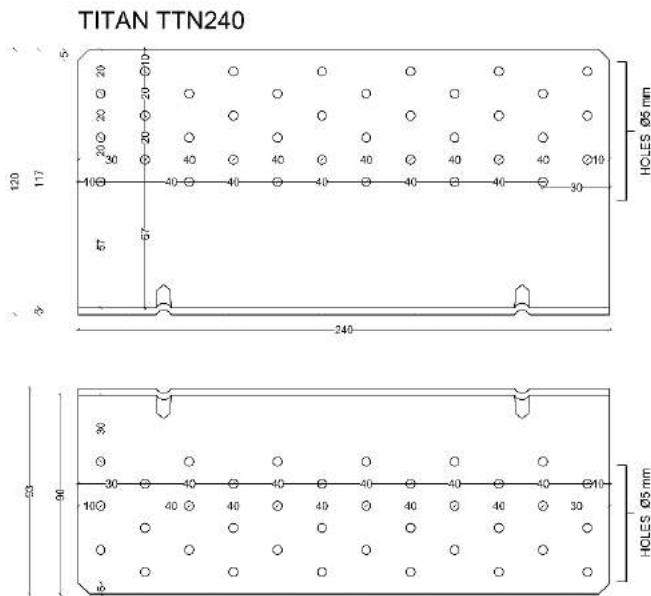


Figure B. 3
Dimensions of Angle Bracket TITAN TTN240

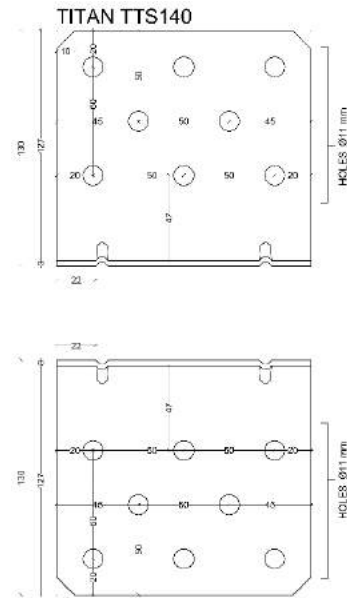


Figure B. 4
Dimensions of Angle Bracket TITAN TTS140

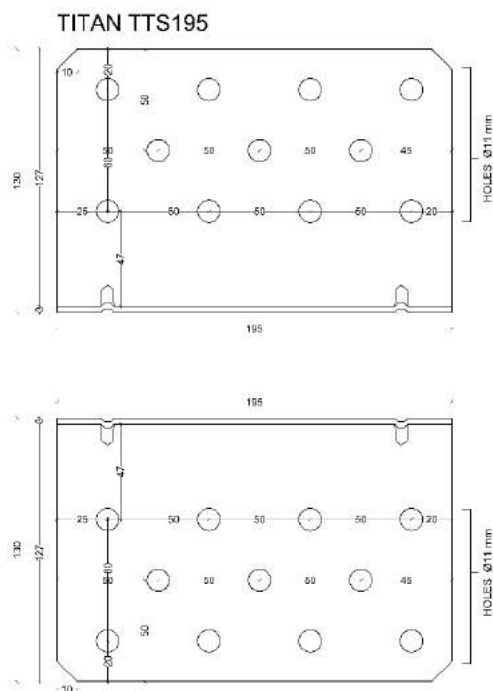


Figure B. 5
Dimensions of Angle Bracket TITAN TTS195

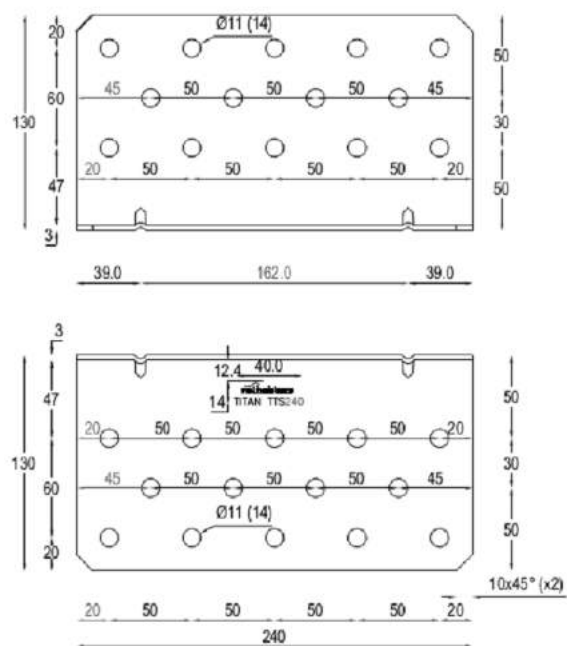


Figure B. 6
Dimensions of Angle Bracket TITAN TTS240

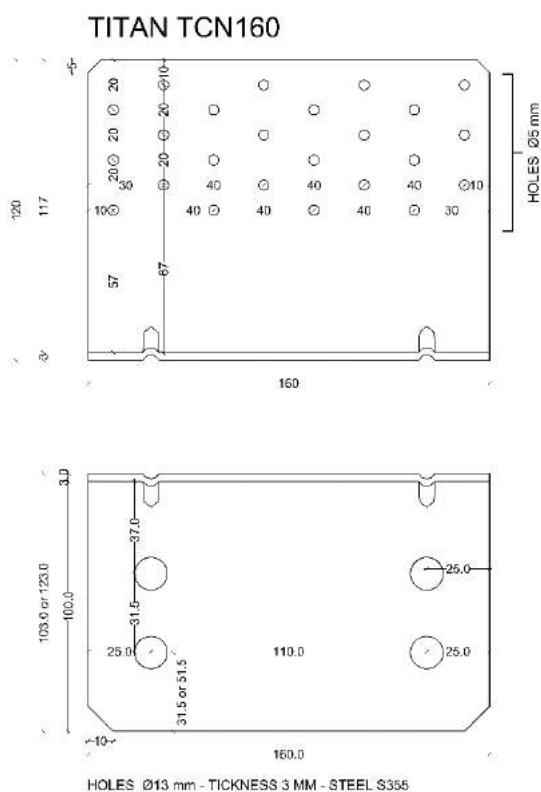


Figure B. 7
Dimensions of Angle Bracket TITAN TCN160

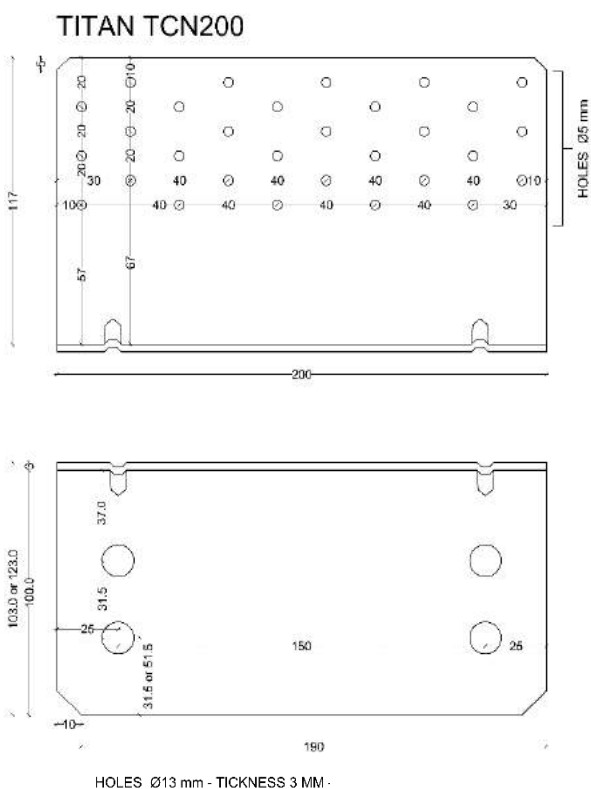


Figure B. 8
Dimensions of Angle Bracket TITAN TCN200

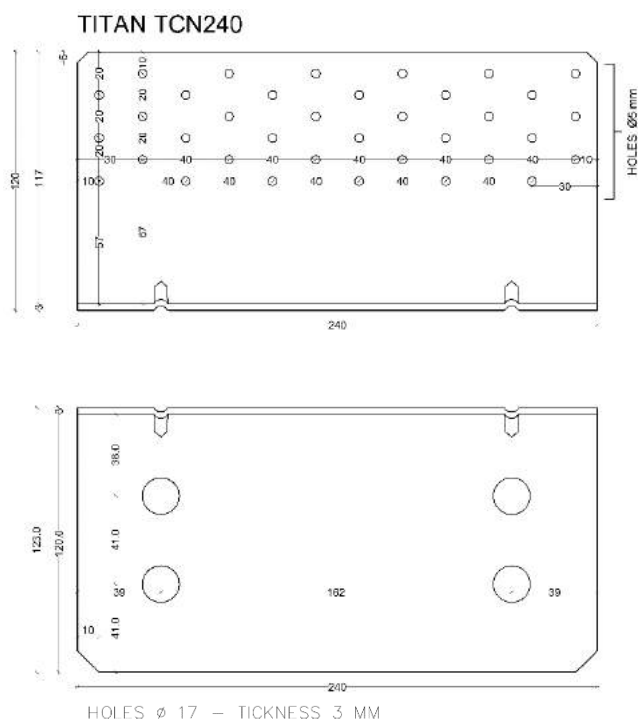


Figure B. 9
Dimensions of Angle Bracket TITAN TCN240

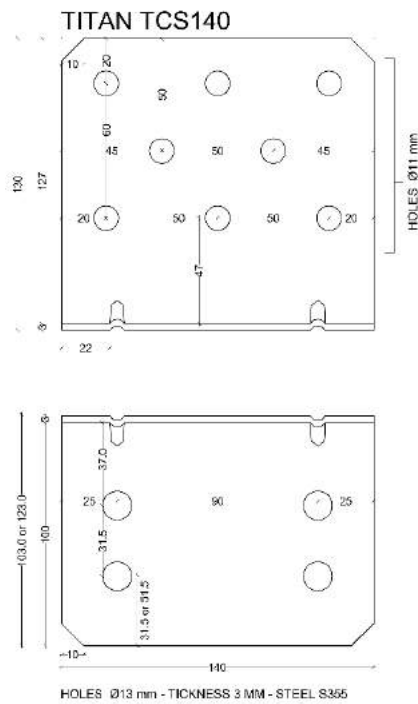


Figure B. 10
Dimensions of Angle Bracket TITAN TCS140

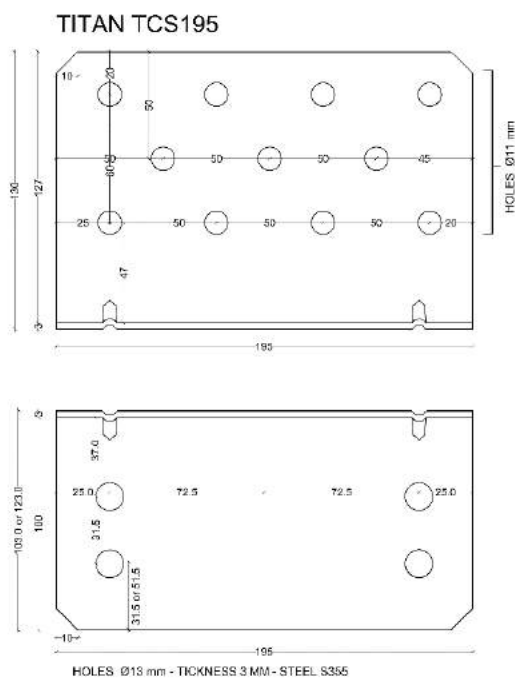


Figure B. 11
Dimensions of Angle Bracket TITAN TCS195

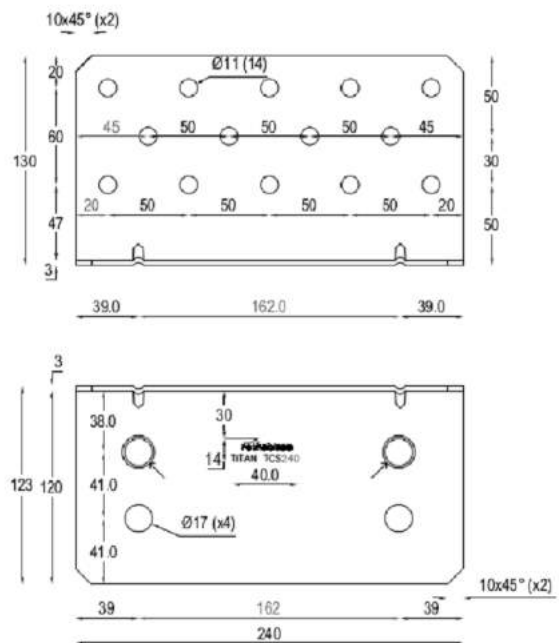


Figure B. 12
Dimensions of Angle Bracket TITAN TCS240

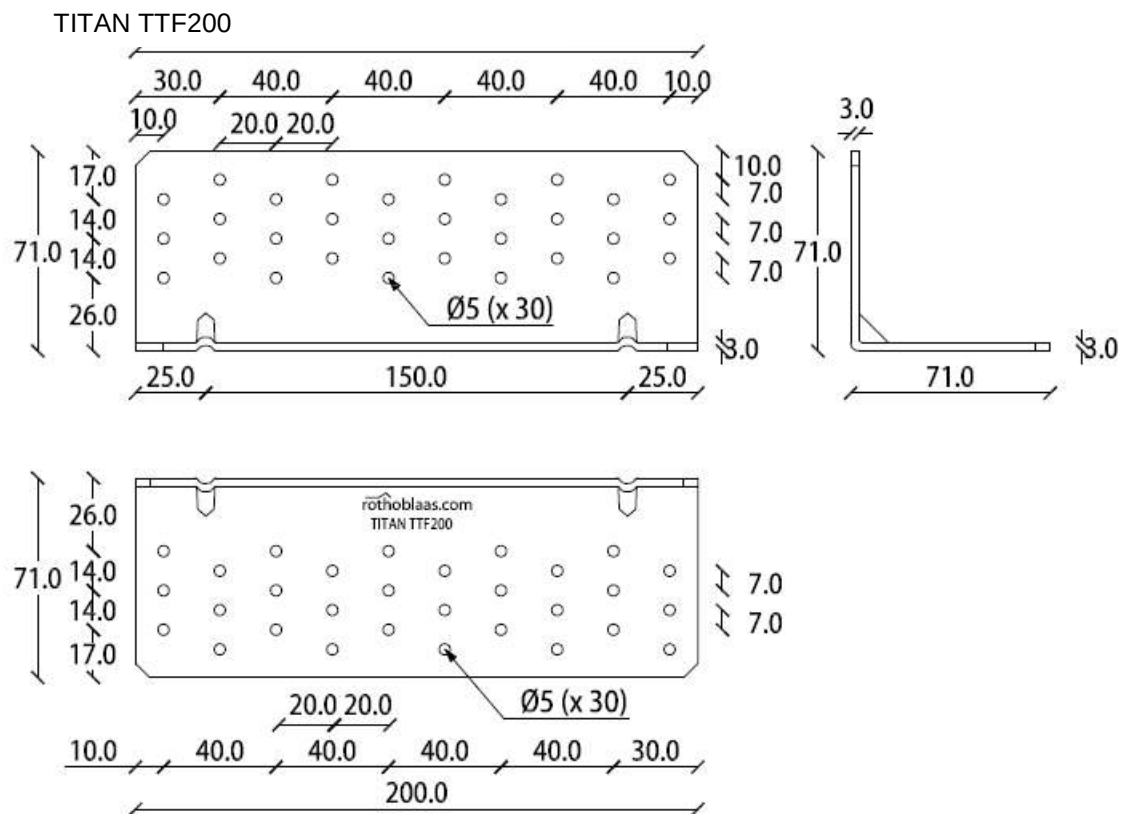


Figure B. 13 Dimensions of Angle Bracket TITAN TTF200

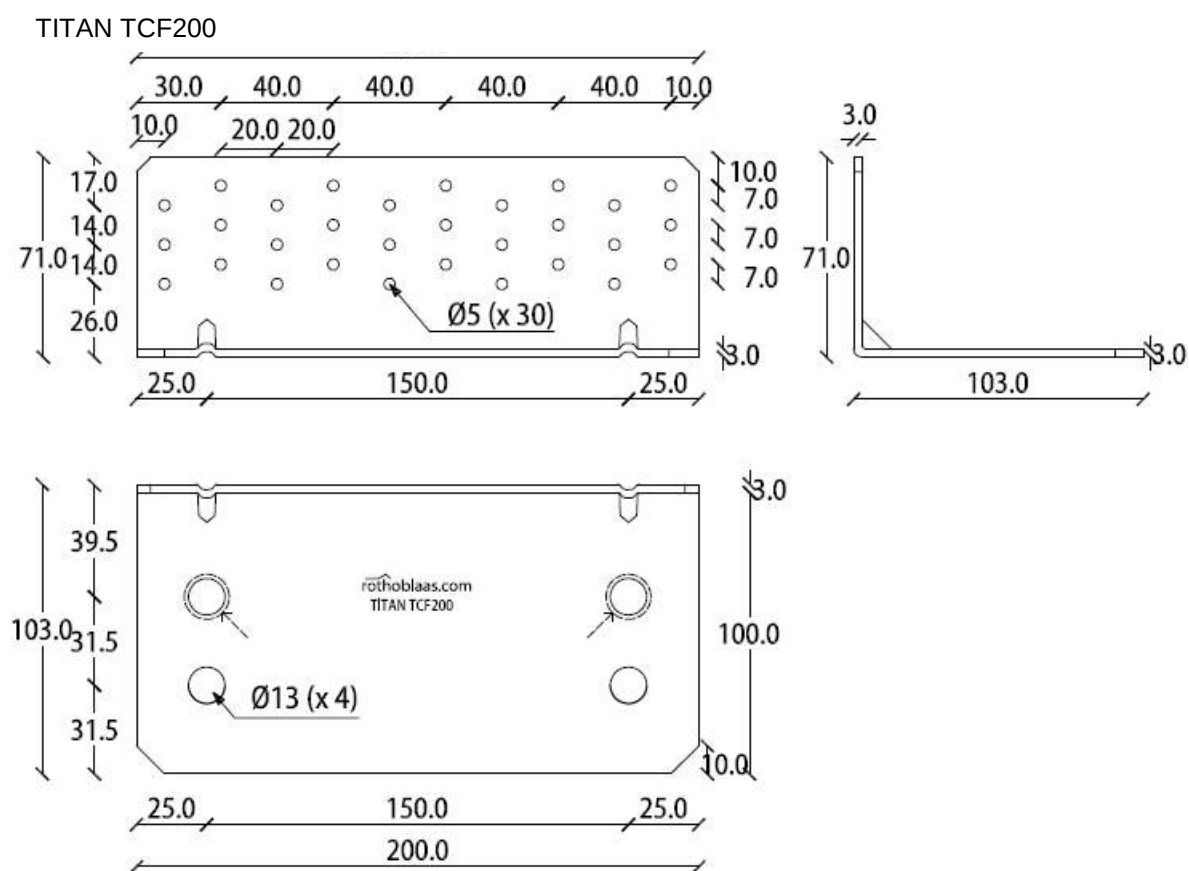


Figure B. 14 Dimensions of Angle Bracket TITAN TCF200

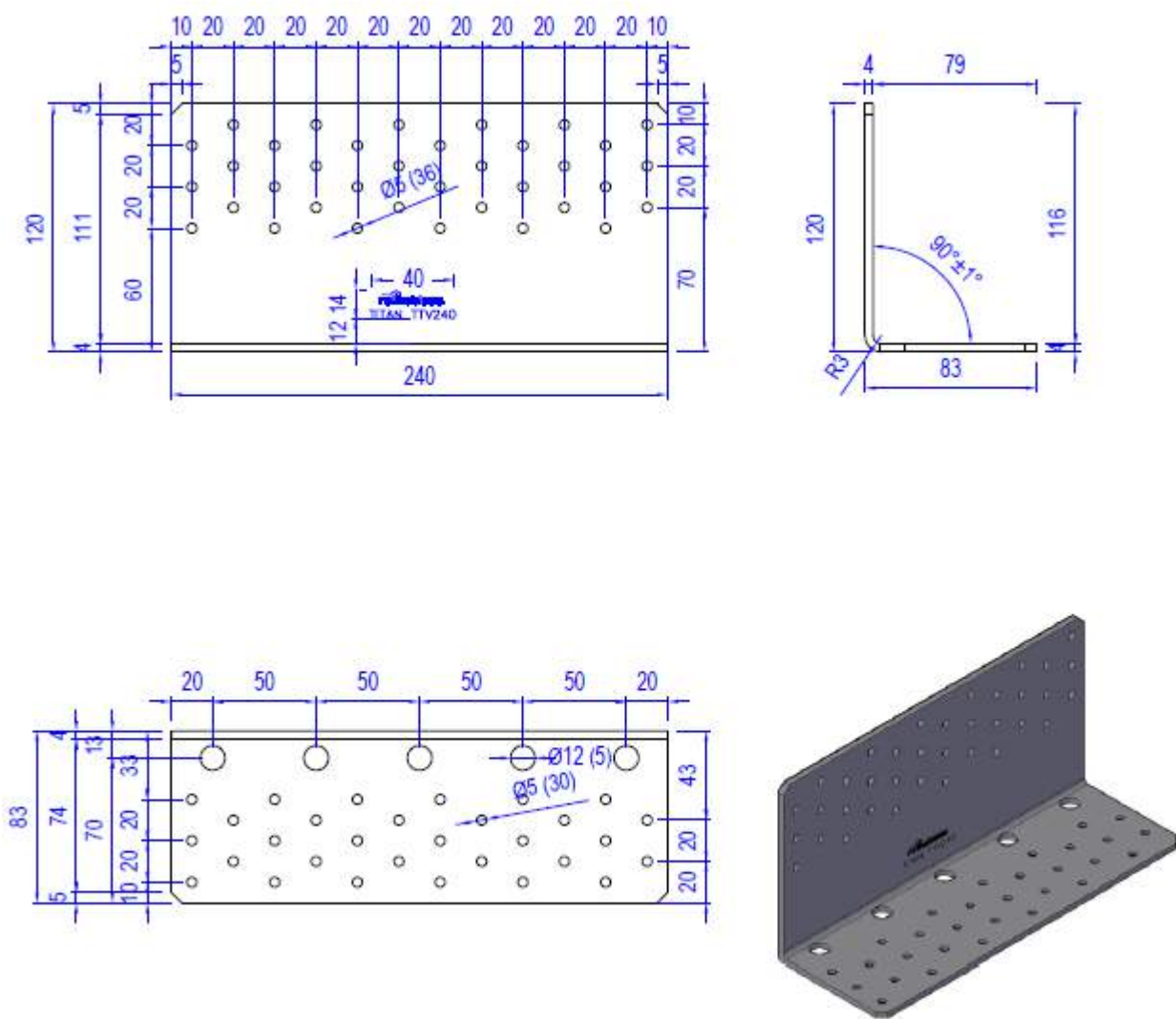


Figure B. 15 Dimensions of Angle Bracket TITAN TTV240

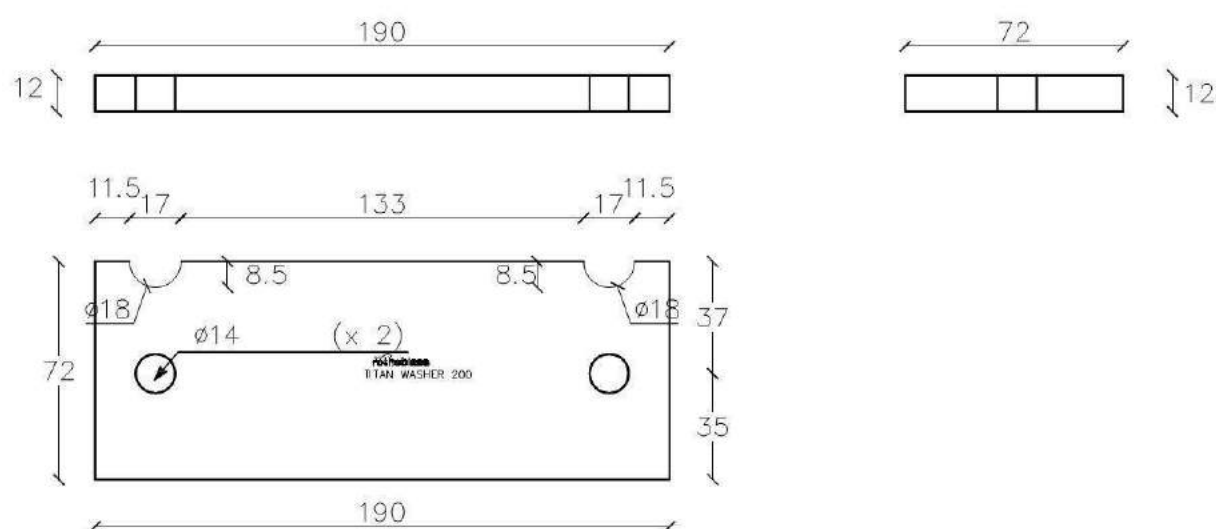


Figure B. 16 Dimensions of TITAN Washer TCW200

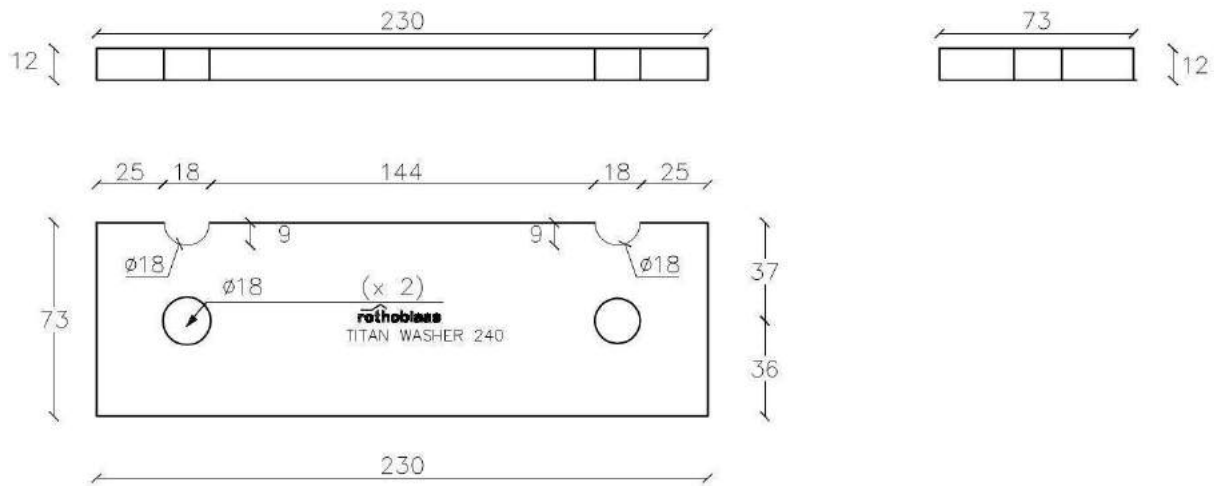


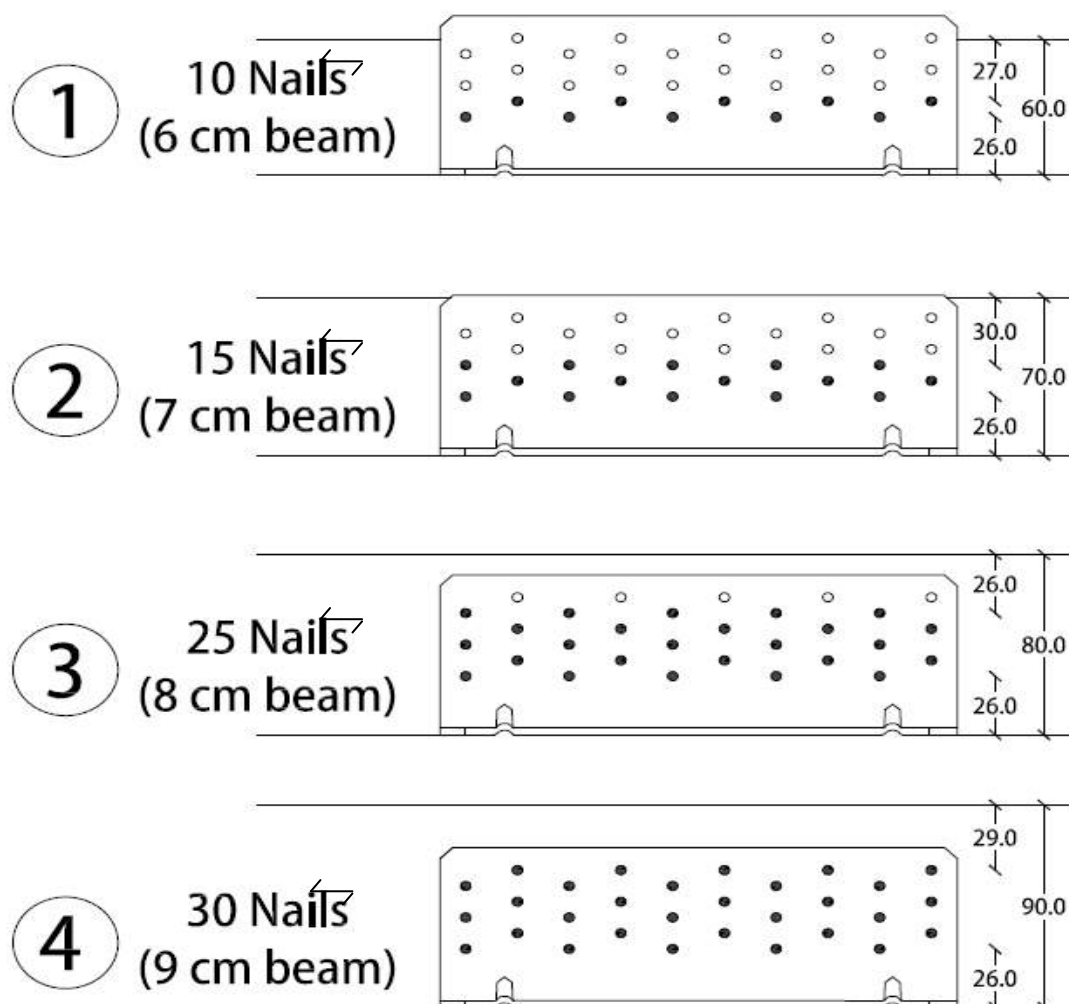
Figure B. 17 Dimensions of TITAN Washer TCW240



Figure B. 18 Typical installation on concrete



Figure B. 19 Typical installation TITAN Silent



In timber to timber connection horizontal flange can be fully nailed or optimized in function of vertical nailing

Figure B. 20 Nailing patterns for Angle Bracket TITAN TTF200 and TCF200
(for TTF200: symmetrical hole-pattern for horizontal and vertical flange)

Partial Nailing pattern for TCN200 and TCN240 - F2/3

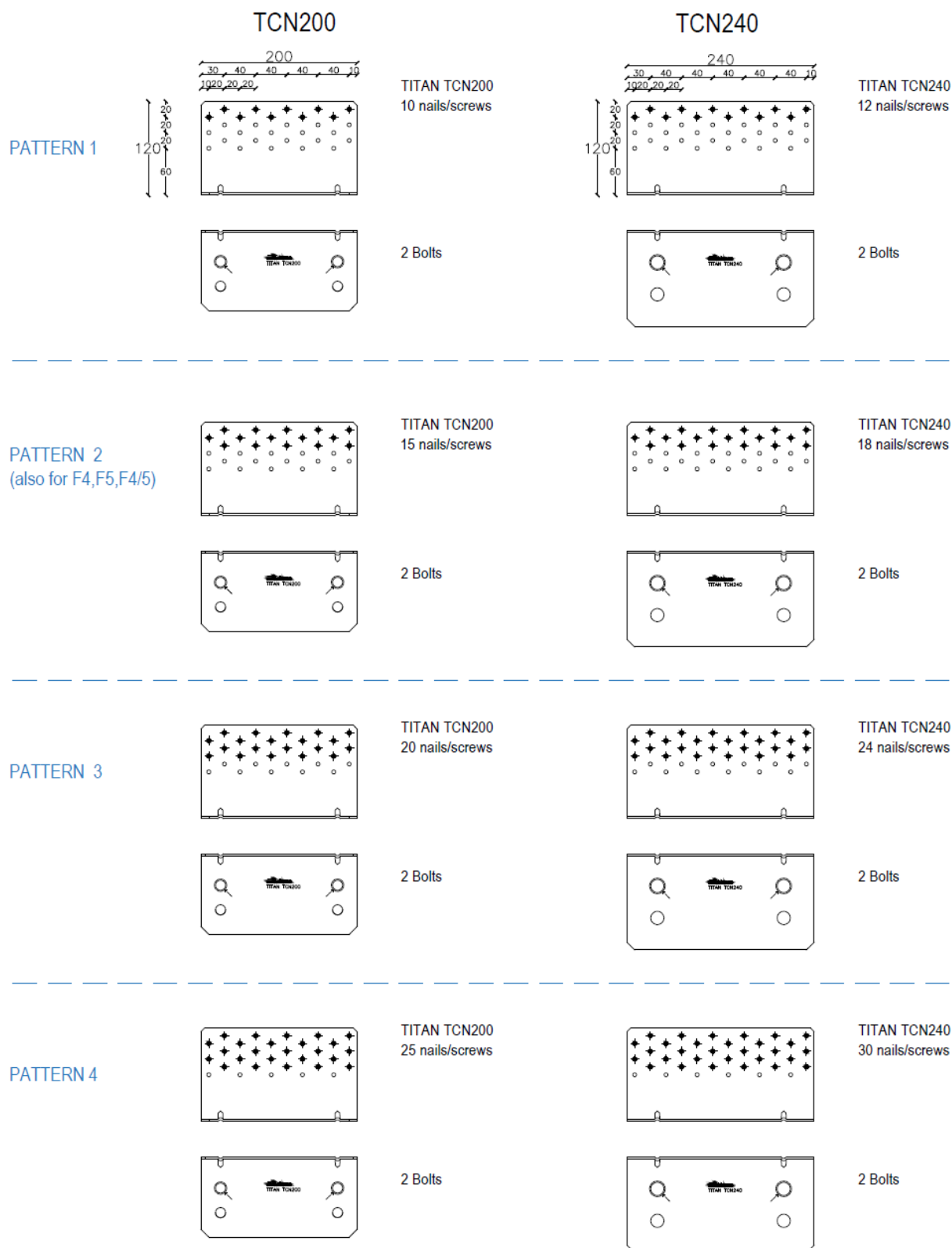
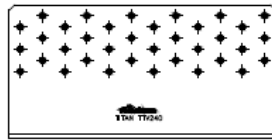


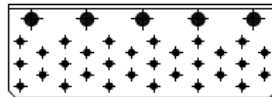
Figure B. 21 Nailing patterns for Angle Bracket TITAN TCN200 and TCN240

Nailing pattern for TTV240 - F1

FULL NAILING PATTERN
36+30 NAILS and 5 VGS SCREWS

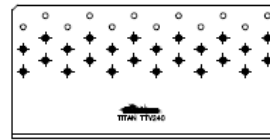


36 Anker nails Ø4X60

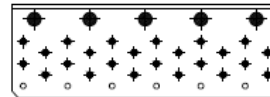


5 VGS screws Ø11X200
30 Anker nails Ø4X60

PARTIAL NAILING PATTERN
24+24 NAILS and 5 VGS SCREWS



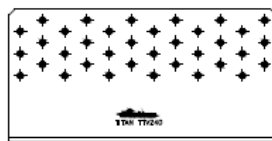
24 Anker nails Ø4X60



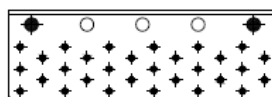
5 VGS screws Ø11X150
24 Anker nails Ø4X60

Nailing pattern for TTV240 - F2/3

FULL NAILING PATTERN
36+30 NAILS and 2 VGS SCREWS

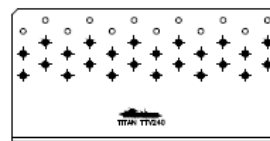


36 Anker nails Ø4X60

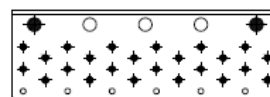


2 VGS screws Ø11X200
30 Anker nails Ø4X60

PARTIAL NAILING PATTERN
24+24 NAILS and 2 VGS SCREWS



24 Anker nails Ø4X60



2 VGS screws Ø11X150
24 Anker nails Ø4X60

Insertion angle VGS screw for TTV240

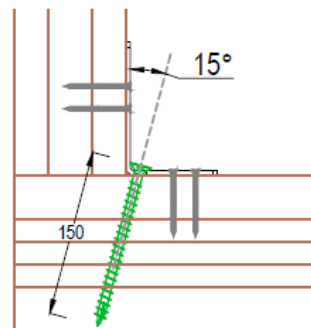
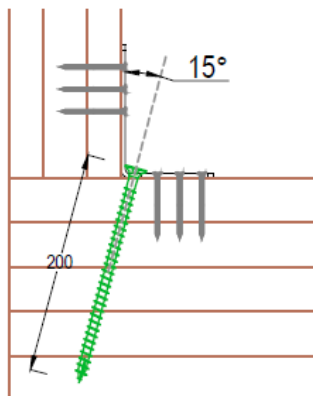


Figure B. 22 Nailing patterns for Angle Bracket TITAN TTV240

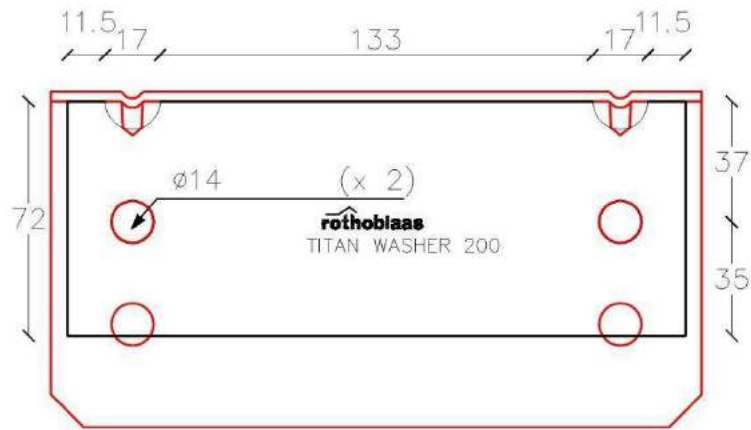


Figure B. 23 Typical installation for Angle Bracket TITAN TCN200 with Washer

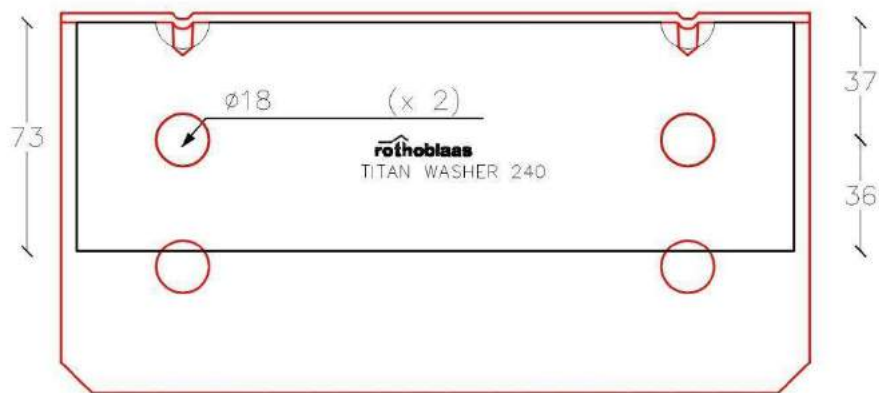


Figure B. 24 Typical installation for Angle Bracket TITAN TCN240 with Washer



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March 2011

MEMBER OF EOTA



European Technical Assessment ETA-11/0030 of 2016-04-07

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Rotho Blaas Self-tapping screws*)

Product family to which the above construction product belongs:

Screws for use in timber constructions

Manufacturer:

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Rotho Blaas s.r.l
Manufacturing Plants: S1, S2, S3, S4, S5, S6, S7, S8, S9, S10

This European Technical Assessment contains:

47 pages including 4 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

European Assessment document (EAD) no. EAD 130118-00-0603 "Screws for timber constructions"

This version replaces:

The previous ETA with the same number issued on 2012-11-08 and expiry on 2016-04-05

*) See section II.1 of this ETA

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

Rotho Blaas “HBS”, “HBS+”, “TBS”, “KKF”, “SCI”, “VGS”, “VGZ”, “DGZ”, “KKT” and “LBS” screws are self-tapping screws to be used in timber structures. “HBS” screws are also called “SCH”, “GHS” “PSC”, “SENK”, “HTP”, “SNK” or “HTS” screws, “HBS+” screws are also called “GHS+”, “KEGEL”, “KGL” or “HTK” screws, “KKF” screws are also called „GHKF”, “KEGEL410”, “KGA” or “HTK4” screws and “TBS” screws are also called “GHSK”, “TELLER”, “TLL” or “HTT” screws, “VGS” screws are also called “GWS” screws, “VGZ” screws are also called “GWZ” screws, “KKT” screws are also called “MNA”, “MNG” or “MNB” screws. Rotho Blaas “HBS”, “HBS+”, “TBS”, “KKF” and “SCI” screws shall be threaded over a part of the length. Rotho Blaas “VGS”, “VGZ” and “LBS” screws shall be threaded over the full length. Rotho Blaas “DGZ” and “KKT” screws shall have two threaded parts over the length. The screws shall be produced from carbon steel wire for nominal diameters of 3,0 mm to 12,0 mm and from stainless steel wire for nominal diameters of 3,5 mm to 8,0 mm. Where corrosion protection is required, the material or coating shall be declared in accordance with the relevant specification given in Annex A of EN 14592.

Geometry and Material

The nominal diameter (outer thread diameter), d , shall not be less than 3,0 mm and shall not be greater than 12,0 mm. The overall length, L , of screws shall not be less than 20 mm and shall not be greater than 600 mm. Other dimensions are given in Annex A.

Screw types “HBS”, “SCH”, “GHS”, “PSC”, “HTP”, “SENK”, “SNK”, “HTS”, “HBS+”, “GHS+”, “KEGEL”, “KGL”, “HTK”, “TBS”, „GHSK”, “TELLER”, “TLL”, “HTT”, “DGZ”, “LBS”, “VGS”, “GWS”, “VGZ” and “GWZ” are made from carbon steel.

Screw types “KKF” and “GHKF” are made from martensitic stainless steel 1.4006 and SCI are made from stainless steel grade 1.4401 or 1.4567.

Screw types “KKT” are made from either carbon steel or stainless steel.

The ratio of inner thread diameter to outer thread diameter d_i/d ranges from 0,55 to 0,71.

The screws are threaded over a minimum length ℓ_g of $3,3 \cdot d$ (i.e. $\ell_g \geq 3,3 \cdot d$).

The lead p (distance between two adjacent thread flanks) ranges from $0,43 \cdot d$ to $0,76 \cdot d$.

No breaking shall be observed at a bend angle, α , of less than $(45/d^{0.7} + 20)$ degrees.

2 Specification of the intended use in accordance with the applicable EAD

The screws are used for connections in load bearing timber structures between members of solid timber (softwood), glued laminated timber, cross-laminated timber, and laminated veneer lumber, similar glued members, wood-based panels or steel. Rotho Blaas “VGS” and “VGZ” screws are also used as tensile or compressive reinforcement perpendicular to the grain.

Furthermore Rotho Blaas screws with diameters between 6 mm and 12 mm may also be used for the fixing of thermal insulation material on rafters and on vertical facades.

Steel plates and wood-based panels except solid wood panels and cross laminated timber shall only be located on the side of the screw head. The following wood-based panels may be used:

- Plywood according to EN 636 or ETA
- Particleboard according to EN 312 or ETA
- Oriented Strand Board, Type OSB/3 and OSB/4 according to EN 300 or ETA
- Fibreboard according to EN 622-2 and 622-3 or ETA (minimum density 650 kg/m³)
- Cement bonded particleboard
- Solid wood panels according to EN 13353 and EN 13986 and cross laminated timber according to ETA
- Laminated Veneer Lumber, LVL
- Engineered wood products according to ETA, provided that the ETA for the product provides provisions for the use of self-tapping screws and these provisions are applied

The screws shall be driven into the wood without pre-drilling or after pre-drilling with a diameter not larger than the inner thread diameter.

The screws are intended to be used in timber connections for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled.

The design of the connections shall be based on the characteristic load-carrying capacities of the screws. The design capacities shall be derived from the characteristic capacities in accordance with Eurocode 5 or an appropriate national code (e.g. DIN 1052:2008-12).

The screws are intended for use for connections subject to static or quasi static loading.

Section 3.11 of this ETA contains the corrosion protection for Rotho Blaas screws made from carbon steel and the material number of the stainless steel. The martensitic stainless steel screws are for use in timber structures subject to the conditions defined by the service classes 1, 2 and 3 of EN 1995-1-1 (Eurocode 5).

The scope of the screws regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the screws of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Tensile strength	Characteristic value $f_{tens,k}$:
Screw made from carbon steel "HBS", "SCH", "GHS", "PSC", "HTP", "SENK", "SNK", "HTS", "HBS+", "GHS+", "KEGEL", "KGL", "HTK", "TBS", "GHSK", "TELLER", "TLL", "HTT", "DGZ", "LBS", "VGS", "GWS", "VGZ", "GWZ", "KKT", "MNB" and "MNG" and screws made from stainless steel "KKT", "MNA", "MNB", "MNG", "KKF" and "GHKF" screws	Screw d = 3,0 mm: 2,8 kN Screw d = 3,5 mm: 3,8 kN Screw d = 4,0 mm: 5,0 kN Screw d = 4,5 mm: 6,4 kN Screw d = 5,0 mm: 7,9 kN Screw d = 6,0 mm: 11,3 kN Screw d = 7,0 mm: 15,4 kN Screw d = 8,0 mm: 20,1 kN Screw d = 9,0 mm: 25,4 kN Screw d = 10,0 mm: 31,4 kN Screw d = 11,0 mm: 38,0 kN Screw d = 12,0 mm: 33,9 kN
Screws made from stainless steel "SCI"	Screw d = 3,5 mm: 2,1 kN Screw d = 4,0 mm: 2,8 kN Screw d = 4,5 mm: 3,5 kN Screw d = 5,0 mm: 4,3 kN Screw d = 6,0 mm: 6,2 kN Screw d = 8,0 mm: 11,1 kN
Insertion moment	Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} / R_{tor,mean} \geq 1,5$
Torsional strength	Characteristic value $f_{tor,k}$:
"HBS", "SCH", "GHS", "PSC", "HTP", "SENK", "SNK", "HTS", "HBS+", "GHS+", "KEGEL", "KGL", "HTK", "TBS", "GHSK", "TELLER", "TLL", "HTT", "KKF", "GHKF", "KEGEL410", "KGA", "HTK4", "VGS", "GWS", "VGZ", "GWZ" and "DGZ" screws	Screw d = 3,0 mm: 1,3 Nm Screw d = 3,5 mm: 2,0 Nm Screw d = 4,0 mm: 3,0 Nm Screw d = 4,5 mm: 5,0 Nm Screw d = 5,0 mm: 7,5 Nm Screw d = 6,0 mm: 12,0 Nm Screw d = 7,0 mm: 18,0 Nm Screw d = 8,0 mm: 28,0 Nm Screw d = 9,0 mm: 35,0 Nm Screw d = 10,0 mm: 40,0 Nm Screw d = 11,0 mm: 60,0 Nm Screw d = 12,0 mm: 60,0 Nm
"KKT", "MNA", "MNB", "MNG", "SCI" and "LBS" screws	Screw d = 3,5 mm: 1,5 Nm Screw d = 4,0 mm: 2,0 Nm Screw d = 4,5 mm: 3,0 Nm Screw d = 5,0 mm: 5,0 Nm Screw d = 6,0 mm: 8,0 Nm Screw d = 8,0 mm: 18,0 Nm

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The screws are made from steel classified as performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC, amended by EC Decision 2000/605/EC.
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated March 2012 **)
3.7 Sustainable use of natural resources (BR7)	No Performance Determined
3.8 General aspects related to the performance of the product	The screws have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service classes 1, 2 and 3
Identification	See Annex A

*) See additional information in section 3.9 – 3.12.

**) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Mechanical resistance and stability

The load-carrying capacities for Rotho Blaas screws are applicable to the wood-based materials mentioned in paragraph 1 even though the term timber has been used in the following.

The characteristic lateral load-carrying capacities and the characteristic axial withdrawal capacities of Rotho Blaas screws should be used for designs in accordance with Eurocode 5 or an appropriate national code.

Pointside penetration length must be $\ell_{ef} \geq 4 \cdot d$, where d is the outer thread diameter of the screw. For the fixing of rafters, point side penetration must be at least 40 mm, $\ell_{ef} \geq 40$ mm.

ETA's for structural members may be considered if applicable.

For wood-based panels the relevant ETA's must be considered where applicable.

Lateral load-carrying capacity

The characteristic lateral load-carrying capacity of Rotho Blaas screws shall be calculated according to EN 1995-1-1:2008 (Eurocode 5) using the outer thread diameter d as the nominal diameter of the screw.

The characteristic yield moment shall be calculated from:

Rotho Blaas screws made from carbon steel and "KKT" and "KKF" screws made from stainless steel for $3,0 \text{ mm} \leq d \leq 5,0 \text{ mm}$:

$$M_{y,k} = 0,15 \cdot 550 \text{ (N/mm}^2\text{)} \cdot d^{2,6} \text{ [Nmm]}$$

Rotho Blaas screws made from carbon steel and "KKT" and "KKF" screws made from stainless steel for $6,0 \text{ mm} \leq d \leq 11,0 \text{ mm}$:

$$M_{y,k} = 0,15 \cdot 600 \text{ (N/mm}^2\text{)} \cdot d^{2,6} \text{ [Nmm]}$$

Rotho Blaas screws made from carbon steel for $d = 12,0 \text{ mm}$:

$$M_{y,k} = 0,15 \cdot 500 \text{ (N/mm}^2\text{)} \cdot d^{2,6} \text{ [Nmm]}$$

Rotho Blaas screws made from stainless steel "SCI":

$$M_{y,k} = 0,15 \cdot 220 \text{ (N/mm}^2\text{)} \cdot d^{2,6} \text{ [Nmm]}$$

where

d outer thread diameter [mm]

Axial withdrawal capacity

The characteristic axial withdrawal capacity of Rotho Blaas screws in solid timber (softwood), glued laminated timber or cross-laminated timber members at an angle of $30^\circ \leq \alpha \leq 90^\circ$ to the grain shall be calculated according to EN 1995-1-1:2008 from:

$$F_{ax,\alpha,Rk} = \frac{n_{ef} \cdot 11,7 \cdot d \cdot \ell_{ef}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \text{ [N]} \quad [N]$$

where

$F_{ax,\alpha,Rk}$	characteristic withdrawal capacity of the screw at an angle α to the grain [N]
n_{ef}	effective number of screws according to EN 1995-1-1:2008
d	outer thread diameter [mm]
ℓ_{ef}	pointside penetration length of the threaded part according to EN 1995-1-1:2008 [mm]
α	angle between grain and screw axis ($\alpha \geq 30^\circ$)
ρ_k	characteristic density [kg/m ³]

The axial withdrawal capacity is limited by the head pull-through capacity and the tensile strength of the screw.

Bending angle

A minimum plastic bending angle of $45^\circ/d^{0,7} + 20^\circ$ was reached without breaking the screws.

Head pull-through capacity

The characteristic head pull-through capacity of Rotho Blaas screws in softwoods and wood-based panels shall be calculated according to EN 1995-1-1:2008 from:

$$F_{ax,\alpha,Rk} = n_{ef} \cdot f_{head,k} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \text{ [N]} \quad [N]$$

where:

$F_{ax,\alpha,Rk}$	characteristic head pull-through capacity of the connection at an angle $\alpha \geq 30^\circ$ to the grain [N]
n_{ef}	effective number of screws according to EN 1995-1-1:2008
$f_{head,k}$	characteristic head pull-through parameter [N/mm ²]
d_h	diameter of the screw head [mm]
ρ_k	characteristic density [kg/m ³], for wood-based panels $\rho_k = 380 \text{ kg/m}^3$

Characteristic head pull-through parameter for Rotho Blaas screws or for washer except "KKF" and "KKT" screws in connections with softwood and in connections with wood-based panels with thicknesses above 20 mm:
 $f_{head,k} = 10,5 \text{ N/mm}^2$

Characteristic head pull-through parameter for Rotho Blaas "KKF" and "KKT" screws in connections with softwood and in connections with wood-based panels with thicknesses above 20 mm:
 $f_{head,k} = 16,5 \text{ N/mm}^2$

Characteristic head pull-through parameter for screws in connections with wood-based panels with thicknesses between 12 mm and 20 mm:
 $f_{head,k} = 8 \text{ N/mm}^2$

Screws in connections with wood-based panels with a thickness below 12 mm (minimum thickness of the wood based panels of $1,2 \cdot d$ with d as outer thread diameter):

$$f_{\text{head,k}} = 8 \text{ N/mm}^2$$

limited to $F_{\text{ax,Rk}} = 400 \text{ N}$

The head diameter d_h of all screws except “KKF” and “KKT” screws shall be greater than $1,8 \cdot d_s$, where d_s is the smooth shank or the wire diameter. Otherwise the characteristic head pull-through capacity $F_{\text{ax},\alpha,\text{Rk}} = 0$.

The minimum thickness of wood-based panels according to the clause 3.9 must be observed.

In steel-to-timber connections the head pull-through capacity may be disregarded.

Tensile capacity

The characteristic tensile strength $f_{\text{tens,k}}$ of screws made from carbon steel and “KKF” and “KKT” screws made from stainless steel is:

Screw $d = 3,0 \text{ mm}$:	2,8 kN
Screw $d = 3,5 \text{ mm}$:	3,8 kN
Screw $d = 4,0 \text{ mm}$:	5,0 kN
Screw $d = 4,5 \text{ mm}$:	6,4 kN
Screw $d = 5,0 \text{ mm}$:	7,9 kN
Screw $d = 6,0 \text{ mm}$:	11,3 kN
Screw $d = 7,0 \text{ mm}$:	15,4 kN
Screw $d = 8,0 \text{ mm}$:	20,1 kN
Screw $d = 9,0 \text{ mm}$:	25,4 kN
Screw $d = 10,0 \text{ mm}$:	31,4 kN
Screw $d = 11,0 \text{ mm}$:	38,0 kN
Screw $d = 12,0 \text{ mm}$:	33,9 kN

Screws made from stainless steel “SCI”:

Screw $d = 3,5 \text{ mm}$:	2,1 kN
Screw $d = 4,0 \text{ mm}$:	2,8 kN
Screw $d = 4,5 \text{ mm}$:	3,5 kN
Screw $d = 5,0 \text{ mm}$:	4,3 kN
Screw $d = 6,0 \text{ mm}$:	6,2 kN
Screw $d = 8,0 \text{ mm}$:	11,1 kN

For screws used in combination with steel plates, the tear-off capacity of the screw head should be greater than the tensile strength of the screw.

Combined laterally and axially loaded screws

For screwed connections subjected to a combination of axial and lateral load, the following expression should be satisfied:

$$\left(\frac{F_{\text{ax,Ed}}}{F_{\text{ax,Rd}}} \right)^2 + \left(\frac{F_{\text{la,Ed}}}{F_{\text{la,Rd}}} \right)^2 \leq 1$$

where

$F_{\text{ax,Ed}}$	axial design load of the screw
$F_{\text{la,Ed}}$	lateral design load of the screw
$F_{\text{ax,Rd}}$	design load-carrying capacity of an axially loaded screw

$F_{\text{la,Rd}}$ design load-carrying capacity of a laterally loaded screw

Mechanically jointed beams

“VGS” and “VGZ” screws with a full thread may be used for connections in structural members which are composed of several parts in mechanically jointed beams or columns.

The axial slip modulus K_{ser} of a screw with a full thread for the serviceability limit state should be taken independent of angle α to the grain as:

$$C = K_{\text{ser}} = 780 \cdot d^{0,2} \cdot \ell_{\text{ef}}^{0,4} \quad [\text{N/mm}]$$

where

d outer thread diameter [mm]

ℓ_{ef} penetration length in the structural member [mm] (ℓ_1 or ℓ_2) (see Annex B)

Compression reinforcement

“VGS” and “VGZ” screws with a full thread may be used for reinforcement of timber members with compression stresses at an angle α to the grain of $45^\circ < \alpha < 90^\circ$. The compression force must be evenly distributed over all screws.

The characteristic load-carrying capacity for a contact area with screws with a full thread at an angle α to the grain of $45^\circ \leq \alpha \leq 90^\circ$ shall be calculated from:

$$F_{90,\text{Rk}} = \min \left\{ \begin{array}{l} k_{\text{c},90} \cdot B \cdot \ell_{\text{ef},1} \cdot f_{\text{c},90,\text{k}} + n \cdot \min(F_{\text{ax,Rk}}, F_{\text{ki,Rk}}) \\ B \cdot \ell_{\text{ef},2} \cdot f_{\text{c},90,\text{k}} \end{array} \right.$$

where

$F_{90,\text{Rk}}$ load-carrying capacity of reinforced contact area [N]

$k_{\text{c},90}$ factor for compression perpendicular to the grain according to EN 1995-1-1:2008, 6.1.5

B bearing width [mm]

$\ell_{\text{ef},1}$ effective length of contact area according to EN 1995-1-1:2008, 6.1.5 [mm]

$f_{\text{c},90,\text{k}}$ characteristic compressive strength perpendicular to the grain [N/mm²]

n number of reinforcement screws, $n = n_0 \cdot n_{90}$

n_0 number of reinforcement screws arranged in a row parallel to the grain

n_{90} number of reinforcement screws arranged in a row perpendicular to the grain

$F_{\text{ax,Rk}}$ characteristic axial withdrawal capacity [N]

$F_{\text{ki,Rk}}$ characteristic buckling capacity [N]

$\ell_{\text{ef},2}$ effective distribution length in the plane of the screw tips [mm]

$\ell_{\text{ef},2} = \ell_{\text{ef}} + (n_0 - 1) \cdot a_1 + \min(\ell_{\text{ef}}, a_{1,\text{c}})$ for reinforced end-bearings [mm]

$\ell_{\text{ef},2} = 2 \cdot \ell_{\text{ef}} + (n_0 - 1) \cdot a_1$ for reinforced centre-bearings [mm]

ℓ_{ef} point side penetration length [mm]
 a_1 spacing parallel to the grain [mm]
 $a_{1,c}$ end distance [mm]

Reinforcing screws for compression shall be arranged according to Annex C.

Reinforcing screws for wood-based panels are not covered by this European Technical Assessment.

The characteristic buckling capacity $F_{ki,Rk}$ shall be calculated from:

$$F_{ki,Rk} = \kappa_c \cdot N_{pl,k} \quad [N]$$

where

$$\kappa_c = \begin{cases} 1 & \text{for } \bar{\lambda}_k \leq 0,2 \\ \frac{1}{k + \sqrt{k^2 - \bar{\lambda}_k^2}} & \text{for } \bar{\lambda}_k > 0,2 \end{cases}$$

$$k = 0,5 \cdot \left[1 + 0,49 \cdot (\bar{\lambda}_k - 0,2) + \bar{\lambda}_k^2 \right]$$

The relative slenderness ratio shall be calculated from:

$$\bar{\lambda}_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$$

where

$$N_{pl,k} = \pi \cdot \frac{d_1^2}{4} \cdot f_{y,k} \quad [N]$$

is the characteristic value for the axial capacity in case of plastic analysis referred to the inner thread cross section.

Characteristic yield strength of screws from carbon steel:
 $f_{y,k} = 1000 \quad [N/mm^2]$

Characteristic ideal elastic buckling load:

$$N_{ki,k} = \sqrt{c_h \cdot E_s \cdot I_s} \quad [N]$$

Elastic foundation of the screw:

$$c_h = (0,19 + 0,012 \cdot d) \cdot \rho_k \cdot \left(\frac{\alpha}{180^\circ} + 0,5 \right) \quad [N/mm^2]$$

Modulus of elasticity:

$$E_s = 210000 \quad [N/mm^2]$$

Second moment of area:

$$I_s = \frac{\pi}{64} \cdot d_1^4 \quad [mm^4]$$

$$d_1 = \text{inner thread diameter} \quad [mm]$$

Note: When determining design values of the compressive capacity it should be considered that $f_{ax,d}$ is to be calculated using k_{mod} and γ_M for timber according to EN 1995 while $N_{pl,d}$ is calculated using $\gamma_{M,0}$ for steel according to EN 1993.

Thermal insulation material on top of rafters

Rotho Blaas screws with an outer thread diameter of at least $d = 6$ mm may be used for the fixing of Thermal insulation material on top of rafters.

The thickness of the insulation shall not exceed 300 mm. The rafter insulation must be placed on top of solid timber or glued laminated timber rafters or cross-laminated timber members and be fixed by battens arranged parallel to the rafters or by wood-based panels on top of the insulation layer. The insulation of vertical facades is also covered by the rules given here.

Screws must be screwed in the rafter through the battens or panels and the insulation without pre-drilling in one sequence.

The angle α between the screw axis and the grain direction of the rafter should be between 30° and 90° .

The battens must be from solid timber (softwood) according to EN 338:2003-04. The minimum thickness t and the minimum width b of the battens is given as follows:

Screws $d = 6$ mm:	$b_{min} = 50$ mm	$t_{min} = 30$ mm
Screws $d = 7$ mm:	$b_{min} = 50$ mm	$t_{min} = 30$ mm
Screws $d = 8$ mm:	$b_{min} = 50$ mm	$t_{min} = 30$ mm
Screws $d = 9$ mm:	$b_{min} = 60$ mm	$t_{min} = 40$ mm
Screws $d = 10$ mm:	$b_{min} = 60$ mm	$t_{min} = 40$ mm
Screws $d = 11$ mm:	$b_{min} = 80$ mm	$t_{min} = 60$ mm
Screws $d = 12$ mm:	$b_{min} = 100$ mm	$t_{min} = 80$ mm

Alternatively to the battens, boards with a minimum thickness of 20 mm from plywood according to EN 636, particle board according to EN 312, oriented strand board OSB/3 and OSB/4 according to EN 300, solid wood panels according to EN 13353 or to ETA or national provision that apply at the installation site or cross laminated timber according to ETA may be used.

The rafter consists of solid timber (softwood) according to EN 338, glued laminated timber according to EN 14081, cross-laminated timber, and laminated veneer lumber according to EN 14374 or to ETA or similar glued members according to ETA.

The insulation must comply with a European Technical specification.

The insulation must have a minimum compressive stress of $\sigma_{10\%} = 0,05$ N/mm² at 10 % deformation according to EN 826:1996-05.

The analysis of the fixing of the insulation and battens or boards, respectively, may be carried out using the static model in Annex D. The battens or boards, respectively, must have sufficient strength and stiffness. The maximum design value of the compressive stress between the battens

or boards, respectively, and the insulation shall not exceed $1,1 \cdot \sigma_{10\%}$.

The characteristic axial capacity of the “HBS”, “HBS+”, „TBS”, “KKF” and “SCI” screws for rafter or facade insulation shall be calculated from:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot \ell_{ef} \cdot k_1 \cdot k_2}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8}; f_{head,d} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350} \right)^{0,8}; \frac{f_{tens,k}}{\gamma_{M2}} \right\}$$

The characteristic axial capacity of the “DGZ”, “VGS” or “VGZ” screws for rafter or facade insulation shall be calculated from:

$$F_{ax,\alpha,Rd} = \min \left\{ \begin{array}{l} \frac{f_{ax,d} \cdot d \cdot \ell_{ef} \cdot k_1 \cdot k_2}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \\ \max \left\{ f_{head,d} \cdot d_h^2; \frac{f_{ax,d} \cdot d \cdot \ell_{ef,b}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \right\} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \\ \frac{f_{tens,k}}{\gamma_{M2}} \end{array} \right\}$$

where

$F_{ax,\alpha,Rd}$	Design value of the axial capacity of the connection at an angle α to the grain [N]
$f_{ax,d}$	Design value of the axial withdrawal parameter of the threaded part of the screw [N/mm ²]
d	Outer thread diameter [mm]
ℓ_{ef}	Point side penetration length of the threaded part according to EN 1995-1-1:2008 [mm]
$\ell_{ef,b}$	Length of the threaded part in the batten [mm]
α	Angle between grain and screw axis ($\alpha \geq 30^\circ$)
γ_{M2}	Partial factor according to EN 1993-1-1 or to the particular national annex
k_1	$\min \{1; 200/t_{HI}\}$
k_2	$\min \{1; \sigma_{10\%}/0,12\}$
t_{HI}	Thickness of the Thermal insulation material [mm]
$\sigma_{10\%}$	Compressive stress of the Thermal insulation material under 10 % deformation [N/mm ²] $\sigma_{10\%} \geq 0,05 \text{ N/mm}^2$
$f_{head,d}$	Design value of the head pull-through capacity [N/mm ²]
d_h	Outer diameter of the screw head [mm]
ρ_k	Characteristic density of the batten or rafter, respectively [kg/m ³]

Friction forces shall not be considered for the design of the characteristic axial capacity of the screws.

The anchorage of wind suction forces as well as the bending stresses of the battens or the boards, respectively, shall be considered in design. Additional screws perpendicular to the grain of the rafter (angle $\alpha = 90^\circ$) may be arranged if necessary.

The maximum screw spacing is $e_s = 1,75 \text{ m}$.

Screws for the anchorage of rafter insulation shall be arranged according to Annex D (thermal insulation on rafters with parallel inclined screws or with alternatively inclined screws).

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1, 2 and 3.

The Rotho Blaas screws are produced from steel wire. Screws made from steel are electrogalvanised and yellow or blue chromate. The thickness of the zinc coating is minimum 5 μm .

Steel no. 1.4006, 1.4401 and 1.4567 is used for screws made from stainless steel.

3.12 General aspects related to the intended use of the product

The screws are manufactured in accordance with the provisions of the ETA using the automated manufacturing process and laid down in the technical documentation.

The installation shall be carried out in accordance with Eurocode 5 or an appropriate national code unless otherwise is defined in the following. Instructions from Rotho Blaas SRL should be considered for installation.

The screws are used for connections in load bearing timber structures between members of solid timber (softwood), glued laminated timber, cross-laminated timber, laminated veneer lumber, similar glued members, wood-based panels or steel members.

The screws may be used for connections in load bearing timber structures with structural members according to an associated ETA, if according to the associated ETA of the structural member a connection in load bearing timber structures with screws according to a ETA is allowed.

Rotho Blaas fully threaded “VGS” and “VGZ” screws are also used as tensile or compressive reinforcement perpendicular to the grain.

Furthermore the screws with diameters of at least 6 mm may also be used for the fixing of insulation on top of rafters.

A minimum of two screws should be used for connections in load bearing timber structures.

The minimum penetration depth in structural members made of solid, glued or cross-laminated timber is $4 \cdot d$.

Wood-based panels and steel plates should only be arranged on the side of the screw head. The minimum thickness of wood-based panels should be $1,2 \cdot d$. Furthermore the minimum thickness for following wood-based panels should be:

- Plywood, Fibreboards: 6 mm
- Particleboards, OSB, Cement Particleboards: 8 mm
- Solid wood panels: 12 mm

For structural members according to ETA's the terms of the ETA's must be considered.

If screws with an outer thread diameter $d \geq 8$ mm are used in load bearing timber structures, the structural solid or glued laminated timber, laminated veneer lumber and similar glued members must be from spruce, pine or fir. This does not apply for screws in pre-drilled holes.

The minimum angle between the screw axis and the grain direction is $\alpha = 30^\circ$.

The screws shall be driven into the wood with or without pre-drilling. The maximum pre-drilling diameter is the inner thread diameter. The hole diameter in steel members must be predrilled with a suitable diameter. Hard wood substrates shall always be pre-drilled.

Only the equipment prescribed by Rotho Blaas SRL shall be used for driving the screws.

In connections with screws with countersunk head according to Annex A the head must be flush with the surface of the connected structural member. A deeper countersink is not allowed.

For structural timber members, minimum spacing and distances for screws in predrilled holes are given in EN 1995-1-1:2008 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in predrilled holes. Here, the outer thread diameter d must be considered.

For screws in non-predrilled holes, minimum spacing and distances are given in EN 1995-1-1:2008 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in non-predrilled holes.

Minimum distances and spacing for "KKT" screws in non-predrilled holes in members with a minimum thickness $t = 4 \cdot d$ and a minimum width of $12 \cdot d$ or 60 mm, whichever is the greater, may be taken as:

Spacing a_1 parallel to the grain	$a_1 = 8 \cdot d$
Spacing a_2 perpendicular to the grain	$a_2 = 4 \cdot d$
Loaded end distance:	$a_{3,t} = 12 \cdot d$
Unloaded end distance:	$a_{3,c} = 5 \cdot d$
Loaded edge distance:	$a_{4,t} = 5 \cdot d$
Unloaded edge distance:	$a_{4,c} = 4 \cdot d$

For Douglas fir members minimum spacing and distances parallel to the grain shall be increased by 50%.

Minimum distances from loaded or unloaded ends must be $15 \cdot d$ for screws in non-predrilled holes with outer thread diameter $d \geq 8$ mm and timber thickness $t < 5 \cdot d$.

Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $3 \cdot d$ also for timber thickness $t < 5 \cdot d$, if the spacing parallel to the grain and the end distance is at least $25 \cdot d$.

Minimum distances and spacing for exclusively axially loaded screws in predrilled and non-predrilled holes in members with a minimum thickness $t = 12 \cdot d$ and a minimum width of $8 \cdot d$ or 60 mm, whichever is the greater, may be taken as:

Spacing a_1 parallel to the grain	$a_1 = 5 \cdot d$
Spacing a_2 perpendicular to the grain	$a_2 = 5 \cdot d$
Distance $a_{1,CG}$ from centre of the screw-part in timber to the end grain	$a_{1,CG} = 10 \cdot d$
Distance $a_{2,CG}$ from centre of the screw-part in timber to the edge	$a_{2,CG} = 4 \cdot d$

Spacing a_2 perpendicular to the grain may be reduced from $5 \cdot d$ to $2,5 \cdot d$, if the condition $a_1 \cdot a_2 \geq 25 \cdot d^2$ is fulfilled.

For a crossed screw couple the minimum spacing between the crossing screws is $1,5 \cdot d$.

Minimum thickness for structural members is $t = 30$ mm for screws with outer thread diameter $d = 8$ mm, $t = 40$ mm for screws with outer thread diameter $d = 10$ mm, $t = 60$ mm for screws with outer thread diameter $d = 11$ mm, and $t = 80$ mm for screws with outer thread diameter $d = 12$ mm.

Unless specified otherwise in the technical specification (ETA or hEN) of cross laminated timber, minimum distances and spacing for screws in the wide face of cross laminated timber members with a minimum thickness $t = 10 \cdot d$ may be taken as (see Annex B):

Spacing a_1 parallel to the grain	$a_1 = 4 \cdot d$
Spacing a_2 perpendicular to the grain	$a_2 = 2,5 \cdot d$
Distance $a_{3,c}$ from centre of the screw-part in timber to the unloaded end grain	$a_{3,c} = 6 \cdot d$
Distance $a_{3,t}$ from centre of the screw-part in timber to the loaded end grain	$a_{3,t} = 6 \cdot d$
Distance $a_{4,c}$ from centre of the screw-part in timber to the unloaded edge	$a_{4,c} = 2,5 \cdot d$
Distance $a_{4,t}$ from centre of the screw-part in timber to the loaded edge	$a_{4,t} = 6 \cdot d$

Unless specified otherwise in the technical specification (ETA or hEN) of cross laminated timber, minimum distances and spacing for screws in the edge surface of cross laminated timber members with a minimum thickness $t = 10 \cdot d$ and a minimum penetration depth perpendicular to the edge surface of $10 \cdot d$ may be taken as (see Annex B):

Spacing a_1 parallel to the CLT plane	$a_1 = 10 \cdot d$
Spacing a_2 perpendicular to the CLT plane	$a_2 = 4 \cdot d$
Distance $a_{3,c}$ from centre of the screw-part in	

timber to the unloaded end	$a_{3,c} = 7 \cdot d$
Distance $a_{3,t}$ from centre of the screw-part in timber to the loaded end	$a_{3,t} = 12 \cdot d$
Distance $a_{4,c}$ from centre of the screw-part in timber to the unloaded edge	$a_{4,c} = 3 \cdot d$
Distance $a_{4,t}$ from centre of the screw-part in timber to the loaded edge	$a_{4,t} = 6 \cdot d$

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/176/EC of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 3.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark.

Issued in Copenhagen on 2016-04-07 by



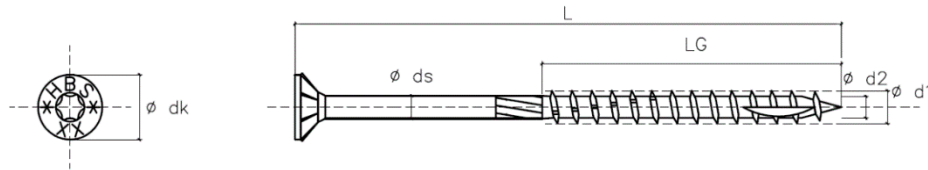
Thomas Bruun
Managing Director, ETA-Danmark

Annex A

Drawings of Rotho Blaas Screws

Rotho Blaas Screws “HBS”

d₁ [mm]	3.00 ± 0.08	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d₂ [mm]	2.00 ± 0.05	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.16 ± 0.05	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	6.00 ± 0.15	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52



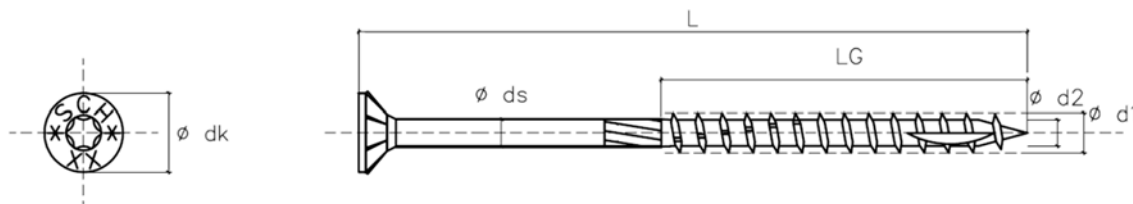
Shank Ribs Optional

d ₁ 3.00 mm		d ₁ 3.50 mm		d ₁ 4.00 mm		d ₁ 4.50 mm		d ₁ 5.00 mm		d ₁ 6.00 mm		d ₁ 8.00 mm		d ₁ 10.00 mm		d ₁ 12.00 mm	
L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
20	15	20	14	25	20	25	20	40	20	40	35	40	32	60	52	160	80
25	20	25	14	30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	25	25	20	30	18	35	18	50	24	50	45	80	52	90	52	200	100
35	30	30	18	30	25	35	24	50	30	60	30	90	52	100	52	220	80
40	35	30	25	35	16	40	24	60	30	60	35	100	52	120	52	220	100
		35	18	35	18	45	24	60	35	70	30	100	60	120	60	240	80
		40	18	40	24	45	30	70	35	70	40	100	80	120	80	240	100
		45	24	45	24	50	24	70	40	80	40	120	52	140	52	260	80
		50	24	45	30	50	30	80	40	80	50	120	60	140	60	260	100
				50	24	60	30	80	50	90	40	120	80	140	80	280	80
				50	30	60	35	90	45	90	50	140	52	160	80	280	100
				60	30	70	35	90	55	90	55	140	60	180	80	300	80
				60	35	70	40	100	50	100	50	140	80	180	90	300	100
				70	35	80	40	100	60	100	60	160	80	200	80	300	120
				70	40			110	50	110	50	160	90	200	100	320	80
				80	40			110	55	110	60	160	100	220	80	320	100
								110	60	120	50	180	80	220	100	320	120
								120	50	120	60	180	90	240	80	340	80
								120	60	120	75	180	100	240	100	340	100
										130	50	200	80	260	80	340	120
										130	60	200	100	260	100	360	80
										130	75	220	80	280	80	360	100
										140	75	220	100	280	100	360	120
										140	80	240	80	300	80	380	80
										150	75	240	100	300	100	380	100
										150	80	260	80	300	120	380	120
										160	75	260	100	320	80	400	80
										160	90	280	80	320	100	400	100
										180	75	280	100	320	120	400	120
										180	100	300	80	340	80	440	100
										200	75	300	100	340	100	440	120
										200	100	300	120	340	120	480	100
										220	75	320	80	360	80	480	120
										220	100	320	100	360	100	500	100
										240	75	320	120	360	120	500	120
										240	100	340	80	380	80	520	100
										260	75	340	100	380	100	520	120
										260	100	340	120	380	120	540	100
										280	75	360	80	400	80	540	120
										280	100	360	100	400	100	550	100
										300	75	360	120	400	120	550	120
										300	100	380	80	420	80	560	100
												380	100	420	100	560	120
												380	120	420	120	600	100
												400	80	440	100	600	120
												400	100	440	120		
												400	120	450	100		
												420	80	450	120		
												420	100	460	100		
												420	120	460	120		
												440	100	480	100		
												440	120	480	120		
												450	100	500	100		
												450	120	500	120		
												460	100				
												460	120				
												480	100				
												480	120				
												500	100				
												500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws "SCH"

d₁ [mm]	3.00 ± 0.08	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d₂ [mm]	2.00 ± 0.05	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.16 ± 0.05	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	6.00 ± 0.15	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52



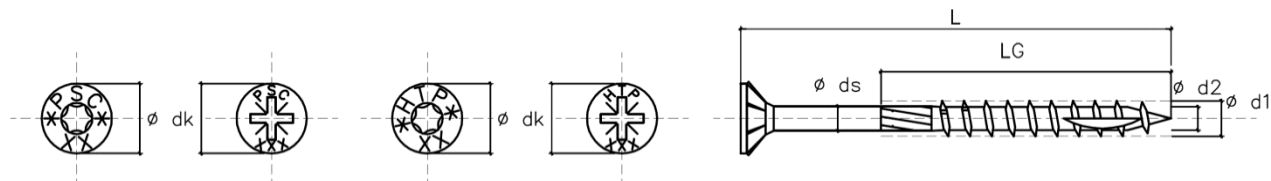
Shank Ribs and Carving Optional

d ₁ 3.00 mm		d ₁ 3.50 mm		d ₁ 4.00 mm		d ₁ 4.50 mm		d ₁ 5.00 mm		d ₁ 6.00 mm		d ₁ 8.00 mm		d ₁ 10.00 mm		d ₁ 12.00 mm	
L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
20	15	20	14	25	20	25	20	40	20	40	35	40	32	60	52	160	80
25	20	25	14	30	16	30	25	45	24	50	35	60	52	80	52	200	80
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35	30	30	18	30	25	35	24	50	30	60	30	90	52	100	52	220	80
40	35	30	25	35	16	40	24	60	30	60	35	100	52	120	52	220	100
		35	18	35	18	45	24	60	35	70	30	100	60	120	60	240	80
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				60	30	70	35	90	55	90	55	140	60	180	80	300	80
				60	35	70	40	100	50	100	50	140	80	180	90	300	100
				70	35	80	40	100	60	100	60	160	80	200	80	300	120
				80	40			110	50	110	50	160	90	200	100	320	80
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										150	75	240	100	300	100	380	100
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												460	100				
												460	120				
												480	100				
												480	120				
												500	100				
												500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “PSC” or “HTP”

d_1 [mm]	3.00 ± 0.08	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20
d_2 [mm]	2.00 ± 0.05	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13
d_s [mm]	2.16 ± 0.05	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14
d_k [mm]	6.00 ± 0.15	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36



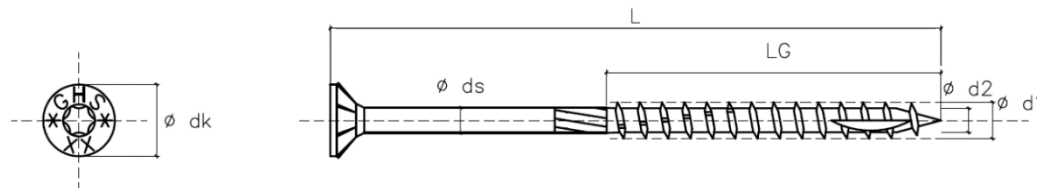
Shank Ribs and Carving Optional

d_1 3.00 mm		d_1 3.50 mm		d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm	
L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G	L	L _G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
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25	20	25	14	30	16	30	25	45	24	50	35	60	52
30	25	25	20	30	18	35	18	50	24	50	45	80	52
35	30	30	18	30	25	35	24	50	30	60	30	90	52
40	35	30	25	35	16	40	24	60	30	60	35	100	52
		35	18	35	18	45	24	60	35	70	30	100	60
		40	18	40	24	45	30	70	35	70	40	100	80
		45	24	45	24	50	24	70	40	80	40	120	52
		50	24	45	30	50	30	80	40	80	50	120	60
				50	24	60	30	80	50	90	40	120	80
				50	30	60	35	90	45	90	50	140	52
				60	30	70	35	90	55	90	55	140	60
				60	35	70	40	100	50	100	50	140	80
				70	35	80	40	100	60	100	60	160	80
				70	40			110	50	110	50	160	90
				80	40			110	55	110	60	160	100
								110	60	120	50	180	80
								120	50	120	60	180	90
								120	60	120	75	180	100
										130	50	200	80
										130	60	200	100
										130	75	220	80
										140	75	220	100
										140	80	240	80
										150	75	240	100
										150	80	260	80
										160	75	260	100
										160	90	280	80
										180	75	280	100
										180	100	300	80
										200	75	300	100
										200	100	300	120
										220	75	320	80
										220	100	320	100
										240	75	320	120
										240	100	340	80
										260	75	340	100
										260	100	340	120
										280	75	360	80
										280	100	360	100
										300	75	360	120
										300	100	380	80
												380	100
												380	120
												400	80
												400	100
												400	120
												420	80
												420	100
												420	120
												440	100
												440	120
												450	100
												450	120
												460	100
												460	120
												480	100
												480	120
												500	100
												500	120

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “GHS”

d_1 [mm]	3.00 ± 0.08	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d_2 [mm]	2.00 ± 0.05	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.16 ± 0.05	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	6.00 ± 0.15	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52



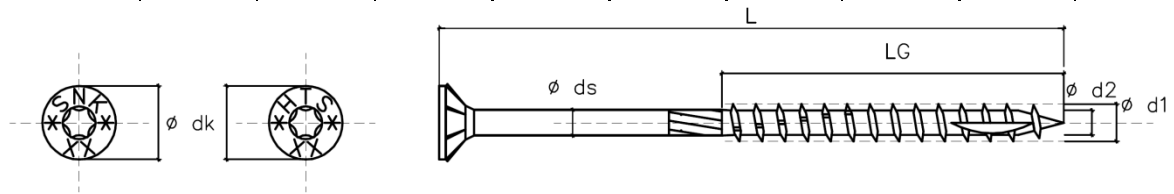
Shank Ribs Optional

d_1 3.00 mm		d_1 3.50 mm		d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm		d_1 10.00 mm		d_1 12.00 mm	
L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]
20	15	20	14	25	20	25	20	40	20	40	35	40	32	60	52	160	80
25	20	25	14	30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	25	25	20	30	18	35	18	50	24	50	45	80	52	90	52	200	100
35	30	30	18	30	25	35	24	50	30	60	30	90	52	100	52	220	80
40	35	30	25	35	16	40	24	60	30	60	35	100	52	120	52	220	100
		35	18	35	18	45	24	60	35	70	30	100	60	120	60	240	80
		40	18	40	24	45	30	70	35	70	40	100	80	120	80	240	100
		45	24	45	24	50	24	70	40	80	40	120	52	140	52	260	80
		50	24	45	30	50	30	80	40	80	50	120	60	140	60	260	100
				50	24	60	30	80	50	90	40	120	80	140	80	280	80
				50	30	60	35	90	45	90	50	140	52	160	80	280	100
				60	30	70	35	90	55	90	55	140	60	180	80	300	80
				60	35	70	40	100	50	100	50	140	80	180	90	300	100
				70	35	80	40	100	60	100	60	160	80	200	80	300	120
				70	40			110	50	110	50	160	90	200	100	320	80
				80	40			110	55	110	60	160	100	220	80	320	100
								110	60	120	50	180	80	220	100	320	120
								120	50	120	60	180	90	240	80	340	80
								120	60	120	75	180	100	240	100	340	100
										130	50	200	80	260	80	340	120
										130	60	200	100	260	100	360	80
										130	75	220	80	280	80	360	100
										140	75	220	100	280	100	360	120
										140	80	240	80	300	80	380	80
										150	75	240	100	300	100	380	100
										150	80	260	80	300	120	380	120
										160	75	260	100	320	80	400	80
										160	90	280	80	320	100	400	100
										180	75	280	100	320	120	400	120
										180	100	300	80	340	80	440	100
										200	75	300	100	340	100	440	120
										200	100	300	120	340	120	480	100
										220	75	320	80	360	80	480	120
										220	100	320	100	360	100	500	100
										240	75	320	120	360	120	500	120
										240	100	340	80	380	80	520	100
										260	75	340	100	380	100	520	120
										260	100	340	120	380	120	540	100
										280	75	360	80	400	80	540	120
										280	100	360	100	400	100	550	100
										300	75	360	120	400	120	550	120
										300	100	380	80	420	80	560	100
												380	100	420	100	560	120
												380	120	420	120	600	100
												400	80	440	100	600	120
												400	100	440	120		
												400	120	450	100		
												420	80	450	120		
												420	100	460	100		
												420	120	460	120		
												440	100	480	100		
												440	120	480	120		
												450	100	500	100		
												450	120	500	120		
												460	100				
												460	120				
												480	100				
												480	120				
												500	100				
												500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “SENK” or “SNK” or “HTS”

d_1 [mm]	3.00 ± 0.08	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d_2 [mm]	2.00 ± 0.05	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.16 ± 0.05	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	6.00 ± 0.15	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52



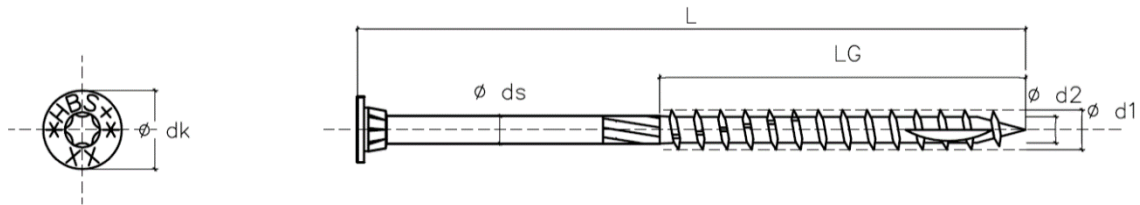
Shank Ribs and Carving Optional

d_1 3.00 mm		d_1 3.50 mm		d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm		d_1 10.00 mm		d_1 12.00 mm	
L	LG	L	LG	L	LG	L	LG	L	LG	L	LG	L	LG	L	LG	L	LG
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
20	15	20	14	25	20	25	20	40	20	40	35	40	32	60	52	160	80
25	20	25	14	30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	25	25	20	30	18	35	18	50	24	50	45	80	52	90	52	200	100
35	30	30	18	30	25	35	24	50	30	60	30	90	52	100	52	220	80
40	35	30	25	35	16	40	24	60	30	60	35	100	52	120	52	220	100
		35	18	35	18	45	24	60	35	70	30	100	60	120	60	240	80
		40	18	40	24	45	30	70	35	70	40	100	80	120	80	240	100
		45	24	45	24	50	24	70	40	80	40	120	52	140	52	260	80
		50	24	45	30	50	30	80	40	80	50	120	60	140	60	260	100
				50	24	60	30	80	50	90	40	120	80	140	80	280	80
				50	30	60	35	90	45	90	50	140	52	160	80	280	100
				60	30	70	35	90	55	90	55	140	60	180	80	300	80
				60	35	70	40	100	50	100	50	140	80	180	90	300	100
				70	35	80	40	100	60	100	60	160	80	200	80	300	120
				70	40			110	50	110	50	160	90	200	100	320	80
				80	40			110	55	110	60	160	100	220	80	320	100
								110	60	120	50	180	80	220	100	320	120
								120	50	120	60	180	90	240	80	340	80
								120	60	120	75	180	100	240	100	340	100
										130	50	200	80	260	80	340	120
										130	60	200	100	260	100	360	80
										130	75	220	80	280	80	360	100
										140	75	220	100	280	100	360	120
										140	80	240	80	300	80	380	80
										150	75	240	100	300	100	380	100
										150	80	260	80	300	120	380	120
										160	75	260	100	320	80	400	80
										160	90	280	80	320	100	400	100
										180	75	280	100	320	120	400	120
										180	100	300	80	340	80	440	100
										200	75	300	100	340	100	440	120
										200	100	300	120	340	120	480	100
										220	75	320	80	360	80	480	120
										220	100	320	100	360	100	500	100
										240	75	320	120	360	120	500	120
										240	100	340	80	380	80	520	100
										260	75	340	100	380	100	520	120
										260	100	340	120	380	120	540	100
										280	75	360	80	400	80	540	120
										280	100	360	100	400	100	550	100
										300	75	360	120	400	120	550	120
										300	100	380	80	420	80	560	100
												380	100	420	100	560	120
												380	120	420	120	600	100
												400	80	440	100	600	120
												400	100	440	120		
												400	120	450	100		
												420	80	450	120		
												420	100	460	100		
												420	120	460	120		
												440	100	480	100		
												440	120	480	120		
												450	100	500	100		
												450	120	500	120		
												460	100				
												460	120				
												480	100				
												480	120				
												500	100				
												500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “HBS+”

d_1 [mm]	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d_2 [mm]	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52

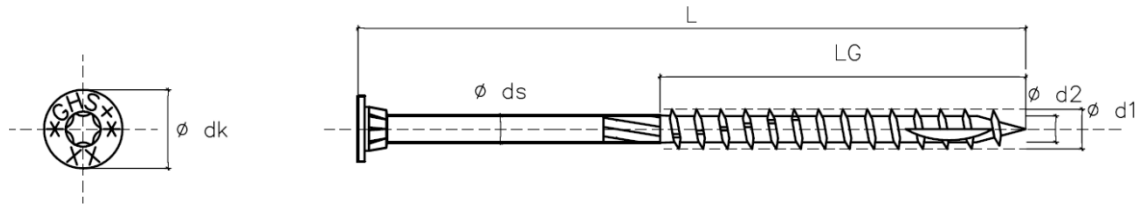


d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm		d_1 10.00 mm		d_1 12.00 mm	
L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]
25	20	25	20	40	20	40	35	40	32	60	52	160	80
30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	18	35	18	50	24	50	45	80	52	90	52	200	100
30	25	35	24	50	30	60	30	90	52	100	52	220	80
35	16	40	24	60	30	60	35	100	52	120	52	220	100
35	18	45	24	60	35	70	30	100	60	120	60	240	80
40	24	45	30	70	35	70	40	100	80	120	80	240	100
45	24	50	24	70	40	80	40	120	52	140	52	260	80
45	30	50	30	80	40	80	50	120	60	140	60	260	100
50	24	60	30	80	50	90	40	120	80	140	80	280	80
50	30	60	35	90	45	90	50	140	52	160	80	280	100
60	30	70	35	90	55	90	55	140	60	180	80	300	80
60	35	70	40	100	50	100	50	140	80	180	90	300	100
70	35	80	40	100	60	100	60	160	80	200	80	300	120
70	40			110	50	110	50	160	90	200	100	320	80
80	40			110	55	110	60	160	100	220	80	320	100
				110	60	120	50	180	80	220	100	320	120
				120	50	120	60	180	90	240	80	340	80
				120	60	120	75	180	100	240	100	340	100
						130	50	200	80	260	80	340	120
						130	60	200	100	260	100	360	80
						130	75	220	80	280	80	360	100
						140	75	220	100	280	100	360	120
						140	80	240	80	300	80	380	80
						150	75	240	100	300	100	380	100
						150	80	260	80	300	120	380	120
						160	75	260	100	320	80	400	80
						160	90	280	80	320	100	400	100
						180	75	280	100	320	120	400	120
						180	100	300	80	340	80	440	100
						200	75	300	100	340	100	440	120
						200	100	300	120	340	120	480	100
						220	75	320	80	360	80	480	120
						220	100	320	100	360	100	500	100
						240	75	320	120	360	120	500	120
						240	100	340	80	380	80	520	100
						260	75	340	100	380	100	520	120
						260	100	340	120	380	120	540	100
						280	75	360	80	400	80	540	120
						280	100	360	100	400	100	550	100
						300	75	360	120	400	120	550	120
						300	100	380	80	420	80	560	100
								380	100	420	100	560	120
								380	120	420	120	600	100
								400	80	440	100	600	120
								400	100	440	120		
								400	120	450	100		
								420	80	450	120		
								420	100	460	100		
								420	120	460	120		
								440	100	480	100		
								440	120	480	120		
								450	100	500	100		
								450	120	500	120		
								460	100				
								460	120				
								480	100				
								480	120				
								500	100				
								500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “GHS+”

d_1 [mm]	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d_2 [mm]	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_k [mm]	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52

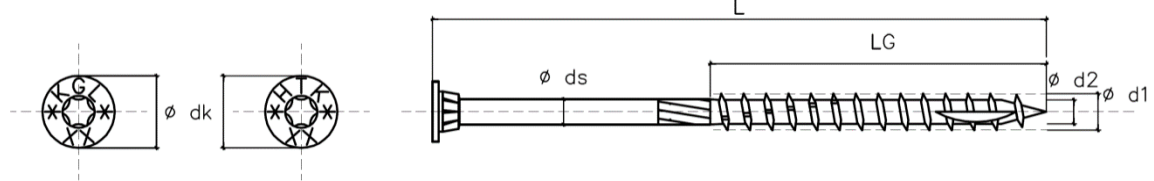


d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm		d_1 10.00 mm		d_1 12.00 mm	
L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]
25	20	25	20	40	20	40	35	40	32	60	52	160	80
30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	18	35	18	50	24	50	45	80	52	90	52	200	100
30	25	35	24	50	30	60	30	90	52	100	52	220	80
35	16	40	24	60	30	60	35	100	52	120	52	220	100
35	18	45	24	60	35	70	30	100	60	120	60	240	80
40	24	45	30	70	35	70	40	100	80	120	80	240	100
45	24	50	24	70	40	80	40	120	52	140	52	260	80
45	30	50	30	80	40	80	50	120	60	140	60	260	100
50	24	60	30	80	50	90	40	120	80	140	80	280	80
50	30	60	35	90	45	90	50	140	52	160	80	280	100
60	30	70	35	90	55	90	55	140	60	180	80	300	80
60	35	70	40	100	50	100	50	140	80	180	90	300	100
70	35	80	40	100	60	100	60	160	80	200	80	300	120
70	40			110	50	110	50	160	90	200	100	320	80
80	40			110	55	110	60	160	100	220	80	320	100
				110	60	120	50	180	80	220	100	320	120
				120	50	120	60	180	90	240	80	340	80
				120	60	120	75	180	100	240	100	340	100
						130	50	200	80	260	80	340	120
						130	60	200	100	260	100	360	80
						130	75	220	80	280	80	360	100
						140	75	220	100	280	100	360	120
						140	80	240	80	300	80	380	80
						150	75	240	100	300	100	380	100
						150	80	260	80	300	120	380	120
						160	75	260	100	320	80	400	80
						160	90	280	80	320	100	400	100
						180	75	280	100	320	120	400	120
						180	100	300	80	340	80	440	100
						200	75	300	100	340	100	440	120
						200	100	300	120	340	120	480	100
						220	75	320	80	360	80	480	120
						220	100	320	100	360	100	500	100
						240	75	320	120	360	120	500	120
						240	100	340	80	380	80	520	100
						260	75	340	100	380	100	520	120
						260	100	340	120	380	120	540	100
						280	75	360	80	400	80	540	120
						280	100	360	100	400	100	550	100
						300	75	360	120	400	120	550	120
						300	100	380	80	420	80	560	100
								380	100	420	100	560	120
								380	120	420	120	600	100
								400	80	440	100	600	120
								400	100	440	120		
								400	120	450	100		
								420	80	450	120		
								420	100	460	100		
								420	120	460	120		
								440	100	480	100		
								440	120	480	120		
								450	100	500	100		
								450	120	500	120		
								460	100				
								460	120				
								480	100				
								480	120				
								500	100				
								500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “KEGEL” or “KGL” or “HTK”

d_1 [mm]	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20	10.00 ± 0.25	12.00 ± 0.30
d_2 [mm]	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13	6.40 ± 0.16	6.80 ± 0.17
d_s [mm]	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14	7.00 ± 0.18	8.00 ± 0.20
d_K [mm]	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36	18.25 ± 0.46	20.75 ± 0.52

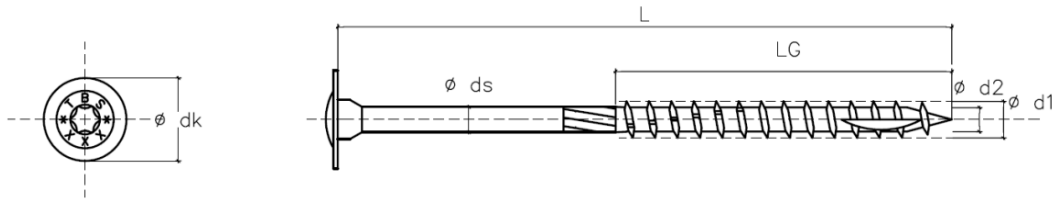


d_1 4.00 mm		d_1 4.50 mm		d_1 5.00 mm		d_1 6.00 mm		d_1 8.00 mm		d_1 10.00 mm		d_1 12.00 mm	
L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]	L [mm]	L _G [mm]
25	20	25	20	40	20	40	35	40	32	60	52	160	80
30	16	30	25	45	24	50	35	60	52	80	52	200	80
30	18	35	18	50	24	50	45	80	52	90	52	200	100
30	25	35	24	50	30	60	30	90	52	100	52	220	80
35	16	40	24	60	30	60	35	100	52	120	52	220	100
35	18	45	24	60	35	70	30	100	60	120	60	240	80
40	24	45	30	70	35	70	40	100	80	120	80	240	100
45	24	50	24	70	40	80	40	120	52	140	52	260	80
45	30	50	30	80	40	80	50	120	60	140	60	260	100
50	24	60	30	80	50	90	40	120	80	140	80	280	80
50	30	60	35	90	45	90	50	140	52	160	80	280	100
60	30	70	35	90	55	90	55	140	60	180	80	300	80
60	35	70	40	100	50	100	50	140	80	180	90	300	100
70	35	80	40	100	60	100	60	160	80	200	80	300	120
70	40			110	50	110	50	160	90	200	100	320	80
80	40			110	55	110	60	160	100	220	80	320	100
				110	60	120	50	180	80	220	100	320	120
				120	50	120	60	180	90	240	80	340	80
				120	60	120	75	180	100	240	100	340	100
						130	50	200	80	260	80	340	120
						130	60	200	100	260	100	360	80
						130	75	220	80	280	80	360	100
						140	75	220	100	280	100	360	120
						140	80	240	80	300	80	380	80
						150	75	240	100	300	100	380	100
						150	80	260	80	300	120	380	120
						160	75	260	100	320	80	400	80
						160	90	280	80	320	100	400	100
						180	75	280	100	320	120	400	120
						180	100	300	80	340	80	440	100
						200	75	300	100	340	100	440	120
						200	100	300	120	340	120	480	100
						220	75	320	80	360	80	480	120
						220	100	320	100	360	100	500	100
						240	75	320	120	360	120	500	120
						240	100	340	80	380	80	520	100
						260	75	340	100	380	100	520	120
						260	100	340	120	380	120	540	100
						280	75	360	80	400	80	540	120
						280	100	360	100	400	100	550	100
						300	75	360	120	400	120	550	120
						300	100	380	80	420	80	560	100
								380	100	420	100	560	120
								380	120	420	120	600	100
								400	80	440	100	600	120
								400	100	440	120		
								400	120	450	100		
								420	80	450	120		
								420	100	460	100		
								420	120	460	120		
								440	100	480	100		
								440	120	480	120		
								450	100	500	100		
								450	120	500	120		
								460	100				
								460	120				
								480	100				
								480	120				
								500	100				
								500	120				

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “TBS”

d₁ [mm]	6.00 ± 0.15	8.00 ± 0.20	8.00 ± 0.20	10.00 ± 0.25
d₂ [mm]	3.95 ± 0.10	5.40 ± 0.13	5.40 ± 0.13	6.40 ± 0.16
d_s [mm]	4.30 ± 0.11	5.80 ± 0.14	5.80 ± 0.14	7.00 ± 0.18
d_k [mm]	15.50 ± 0.38	19.00 ± 0.47	22.00 ± 0.55	25.00 ± 0.62

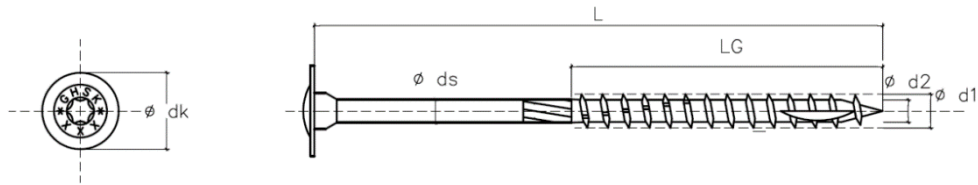


d₁ 6.00 mm		d₁ 8.00 mm		d₁ 10.00 mm	
L	L_G	L	L_G	L	L_G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
40	35	40	32	60	52
50	35	60	52	80	52
50	45	80	52	90	52
60	30	90	52	100	52
60	35	100	52	120	52
70	30	100	60	120	60
70	40	100	80	120	80
80	40	120	52	140	52
80	50	120	60	140	60
90	40	120	80	140	80
90	50	140	52	160	80
90	55	140	60	180	80
100	50	140	80	180	90
100	60	160	80	200	80
110	50	160	90	200	100
110	60	160	100	220	80
120	50	180	80	220	100
120	60	180	90	240	80
120	75	180	100	240	100
130	50	200	80	260	80
130	60	200	100	260	100
130	75	220	80	280	80
140	75	220	100	280	100
140	80	240	80	300	80
150	75	240	100	300	100
150	80	260	80	300	120
160	75	260	100	320	80
160	90	280	80	320	100
180	75	280	100	320	120
180	100	300	80	340	80
200	75	300	100	340	100
200	100	300	120	340	120
220	75	320	80	360	80
220	100	320	100	360	100
240	75	320	120	360	120
240	100	340	80	380	80
260	75	340	100	380	100
260	100	340	120	380	120
280	75	360	80	400	80
280	100	360	100	400	100
300	75	360	120	400	120
300	100	380	80	420	80
		380	100	420	100
		380	120	420	120
		400	80	440	100
		400	100	440	120
		400	120	450	100
		420	80	450	120
		420	100	460	100
		420	120	460	120
		440	100	480	100
		440	120	480	120
		450	100	500	100
		450	120	500	120
		460	100		
		460	120		
		480	100		
		480	120		
		500	100		
		500	120		

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “GHSK”

d₁ [mm]	6.00 ± 0.15	8.00 ± 0.20	8.00 ± 0.20	10.00 ± 0.25
d₂ [mm]	3.95 ± 0.10	5.40 ± 0.13	5.40 ± 0.13	6.40 ± 0.16
d_s [mm]	4.30 ± 0.11	5.80 ± 0.14	5.80 ± 0.14	7.00 ± 0.18
d_K [mm]	15.50 ± 0.38	19.00 ± 0.47	22.00 ± 0.55	25.00 ± 0.62

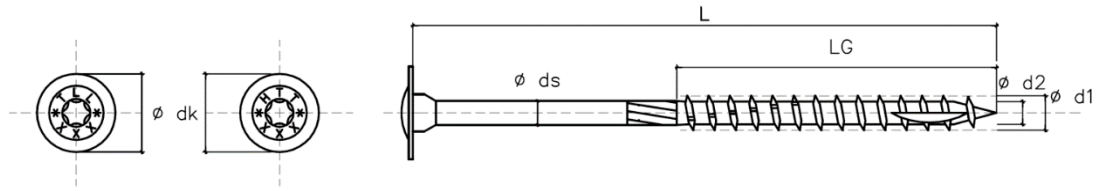


d₁ 6.00 mm		d₁ 8.00 mm		d₁ 10.00 mm	
L	L_G	L	L_G	L	L_G
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
40	35	40	32	60	52
50	35	60	52	80	52
50	45	80	52	90	52
60	30	90	52	100	52
60	35	100	52	120	52
70	30	100	60	120	60
70	40	100	80	120	80
80	40	120	52	140	52
80	50	120	60	140	60
90	40	120	80	140	80
90	50	140	52	160	80
90	55	140	60	180	80
100	50	140	80	180	90
100	60	160	80	200	80
110	50	160	90	200	100
110	60	160	100	220	80
120	50	180	80	220	100
120	60	180	90	240	80
120	75	180	100	240	100
130	50	200	80	260	80
130	60	200	100	260	100
130	75	220	80	280	80
140	75	220	100	280	100
140	80	240	80	300	80
150	75	240	100	300	100
150	80	260	80	300	120
160	75	260	100	320	80
160	90	280	80	320	100
180	75	280	100	320	120
180	100	300	80	340	80
200	75	300	100	340	100
200	100	300	120	340	120
220	75	320	80	360	80
220	100	320	100	360	100
240	75	320	120	360	120
240	100	340	80	380	80
260	75	340	100	380	100
260	100	340	120	380	120
280	75	360	80	400	80
280	100	360	100	400	100
300	75	360	120	400	120
300	100	380	80	420	80
		380	100	420	100
		380	120	420	120
		400	80	440	100
		400	100	440	120
		400	120	450	100
		420	80	450	120
		420	100	460	100
		420	120	460	120
		440	100	480	100
		440	120	480	120
		450	100	500	100
		450	120	500	120
		460	100		
		460	120		
		480	100		
		480	120		
		500	100		
		500	120		

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “TELLER” or “TLL” or “HTT”

d₁ [mm]	6.00 ± 0.15	8.00 ± 0.20	8.00 ± 0.20	10.00 ± 0.25
d₂ [mm]	3.95 ± 0.10	5.40 ± 0.13	5.40 ± 0.13	6.40 ± 0.16
d_s [mm]	4.30 ± 0.11	5.80 ± 0.14	5.80 ± 0.14	7.00 ± 0.18
d_k [mm]	15.50 ± 0.38	19.00 ± 0.47	22.00 ± 0.55	25.00 ± 0.62

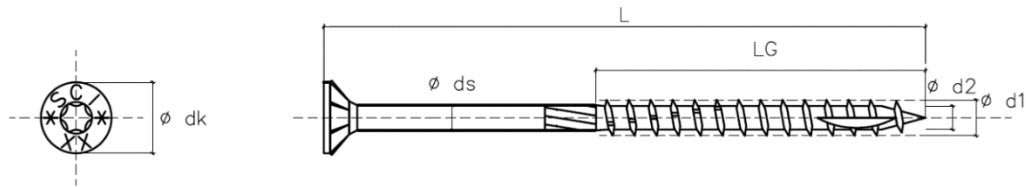


d₁ 6.00 mm		d₁ 8.00 mm		d₁ 10.00 mm	
L [mm]	L_G [mm]	L [mm]	L_G [mm]	L [mm]	L_G [mm]
40	35	40	32	60	52
50	35	60	52	80	52
50	45	80	52	90	52
60	30	90	52	100	52
60	35	100	52	120	52
70	30	100	60	120	60
70	40	100	80	120	80
80	40	120	52	140	52
80	50	120	60	140	60
90	40	120	80	140	80
90	50	140	52	160	80
90	55	140	60	180	80
100	50	140	80	180	90
100	60	160	80	200	80
110	50	160	90	200	100
110	60	160	100	220	80
120	50	180	80	220	100
120	60	180	90	240	80
120	75	180	100	240	100
130	50	200	80	260	80
130	60	200	100	260	100
130	75	220	80	280	80
140	75	220	100	280	100
140	80	240	80	300	80
150	75	240	100	300	100
150	80	260	80	300	120
160	75	260	100	320	80
160	90	280	80	320	100
180	75	280	100	320	120
180	100	300	80	340	80
200	75	300	100	340	100
200	100	300	120	340	120
220	75	320	80	360	80
220	100	320	100	360	100
240	75	320	120	360	120
240	100	340	80	380	80
260	75	340	100	380	100
260	100	340	120	380	120
280	75	360	80	400	80
280	100	360	100	400	100
300	75	360	120	400	120
300	100	380	80	420	80
		380	100	420	100
		380	120	420	120
		400	80	440	100
		400	100	440	120
		400	120	450	100
		420	80	450	120
		420	100	460	100
		420	120	460	120
		440	100	480	100
		440	120	480	120
		450	100	500	100
		450	120	500	120
		460	100		
		460	120		
		480	100		
		480	120		
		500	100		
		500	120		

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “SCI”

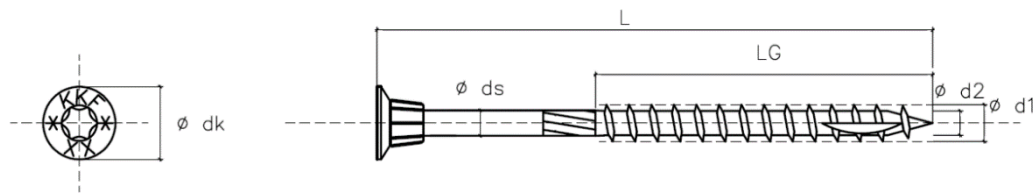
d₁ [mm]	3.50 ± 0.09	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15	8.00 ± 0.20
d₂ [mm]	2.25 ± 0.05	2.55 ± 0.06	2.80 ± 0.07	3.40 ± 0.09	3.95 ± 0.10	5.40 ± 0.13
d_s [mm]	2.45 ± 0.06	2.75 ± 0.07	3.15 ± 0.08	3.65 ± 0.09	4.30 ± 0.11	5.80 ± 0.14
d_k [mm]	7.00 ± 0.18	8.00 ± 0.20	9.00 ± 0.23	10.00 ± 0.25	12.00 ± 0.30	14.50 ± 0.36

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “KKF”

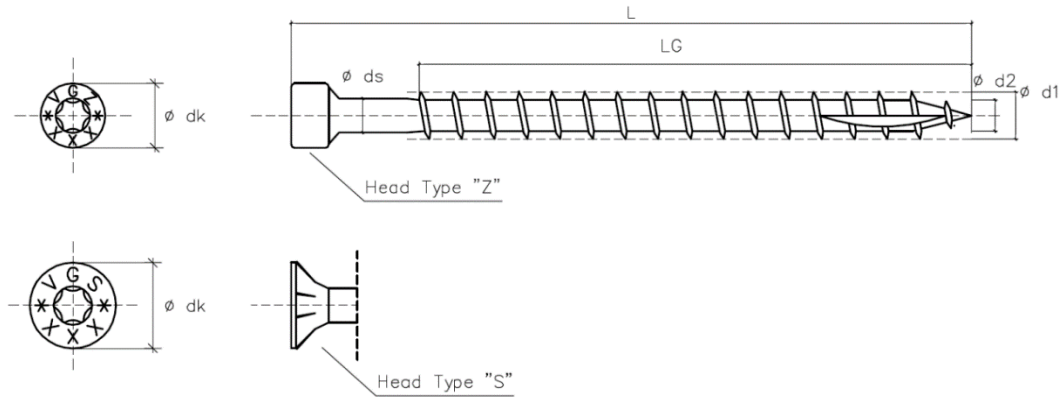
d₁ [mm]	4.00 ± 0.10	4.50 ± 0.11	5.00 ± 0.12	6.00 ± 0.15
d₂ [mm]	2.60 ± 0.06	3.05 ± 0.08	3.25 ± 0.08	4.05 ± 0.10
d_s [mm]	2.90 ± 0.07	3.35 ± 0.08	3.60 ± 0.09	4.30 ± 0.11
d_k [mm]	7.80 ± 0.20	8.80 ± 0.22	9.80 ± 0.25	11.80 ± 0.29

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “VGZ” and “VGS”

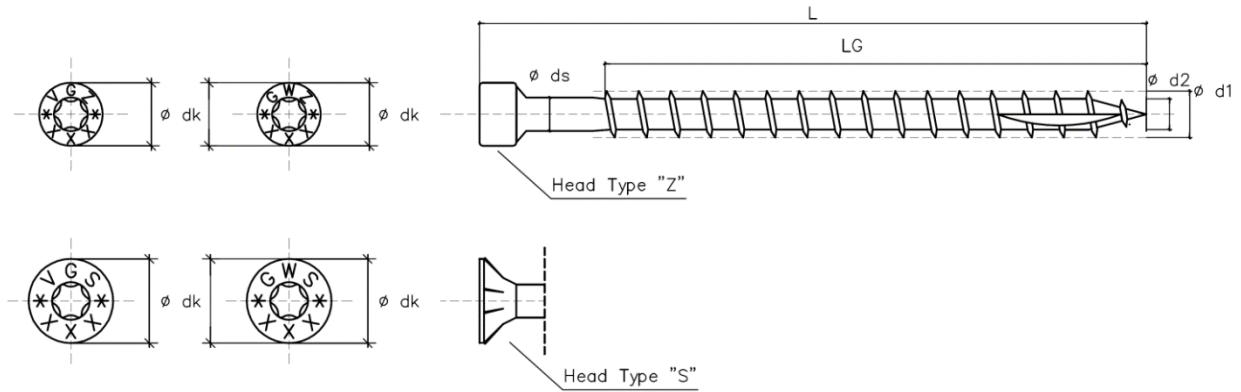
d₁ [mm]	7.00 ± 0.17	9.00 ± 0.22	11.00 ± 0.27
d₂ [mm]	4.60 ± 0.11	5.90 ± 0.15	6.60 ± 0.17
d_s [mm]	5.00 ± 0.12	6.50 ± 0.16	7.70 ± 0.19
d_K [mm] Type Z	9.50 ± 0.24	11.50 ± 0.29	13.50 ± 0.34
d_K [mm] Type S	13.00 ± 0.32	16.00 ± 0.40	19.30 ± 0.48

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “GWZ” and “GWS”

d₁ [mm]	7.00 ± 0.17	9.00 ± 0.22	11.00 ± 0.27
d₂ [mm]	4.60 ± 0.11	5.90 ± 0.15	6.60 ± 0.17
d_s [mm]	5.00 ± 0.12	6.50 ± 0.16	7.70 ± 0.19
d_k [mm] Type Z	9.50 ± 0.24	11.50 ± 0.29	13.50 ± 0.34
d_k [mm] Type S	13.00 ± 0.32	16.00 ± 0.40	19.30 ± 0.48

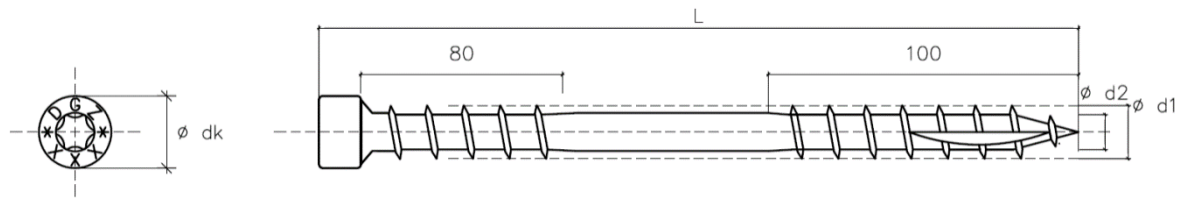


d₁ 7.00 mm		d₁ 9.00 mm		d₁ 11.00 mm	
L [mm]	L_G [mm]	L [mm]	L_G [mm]	L [mm]	L_G [mm]
100	80	140	120	100	80
100	90	140	130	100	90
120	100	160	140	125	105
120	110	160	150	125	115
140	120	180	160	150	130
140	130	180	170	150	140
160	140	200	180	175	155
160	150	200	190	175	165
180	160	220	200	200	180
180	170	220	210	200	190
200	180	240	220	220	200
200	190	240	230	220	210
220	200	260	240	240	220
220	210	260	250	240	230
240	220	280	260	250	230
240	230	280	270	250	240
260	240	300	280	260	240
260	250	300	290	260	250
280	260	320	300	280	260
280	270	320	310	280	270
300	280	340	300	300	280
300	290	340	320	300	290
320	300	360	320	325	305
320	310	360	340	325	315
340	300	380	340	350	330
340	320	380	360	375	355
360	320	400	360	400	380
360	340	400	380	425	405
380	340	425	385	450	430
380	360	425	405	475	455
400	360	450	410	500	480
400	380	450	430	525	505
		475	435	550	530
		475	455	575	555
		500	460	600	580
		500	480		

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “DGZ”

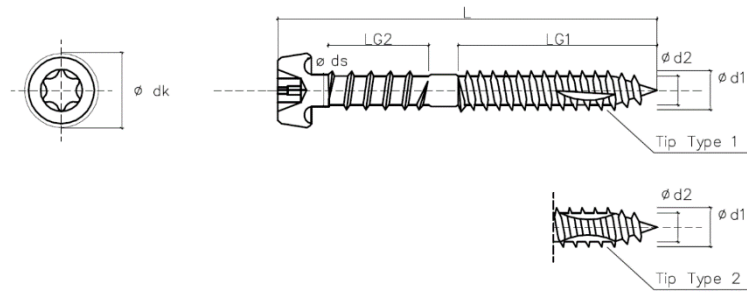
d₁ [mm]	7.00 ± 0.17	9.00 ± 0.22
d₂ [mm]	4.60 ± 0.11	5.90 ± 0.15
d_S [mm]	5.00 ± 0.12	6.50 ± 0.16
d_K [mm]	9.50 ± 0.24	11.50 ± 0.29

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “KKT”

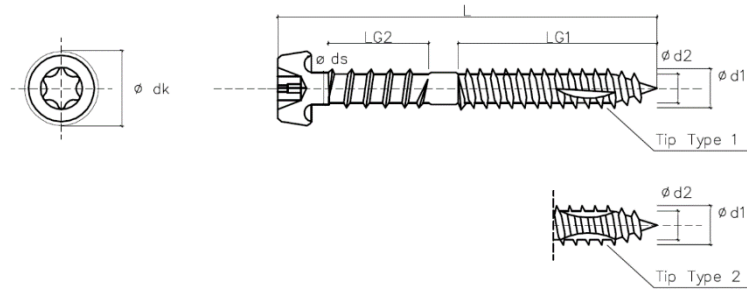
d₁ [mm]	5.00 ± 0.12	6.00 ± 0.15
d₂ [mm]	3.10 ± 0.08	3.90 ± 0.10
d_S [mm]	3.80 ± 0.10	4.50 ± 0.11
d_K [mm]	6.75 ± 0.14	7.75 ± 0.16

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “MNA/MNB/MNG”

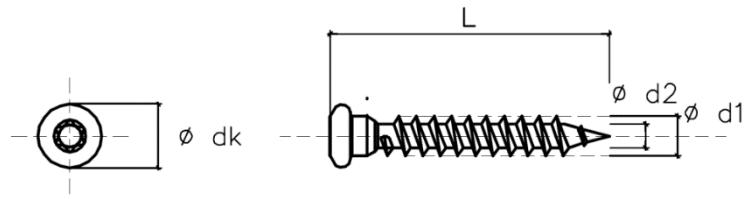
d₁ [mm]	5.00 ± 0.12	6.00 ± 0.15
d₂ [mm]	3.10 ± 0.08	3.90 ± 0.10
d_S [mm]	3.80 ± 0.10	4.50 ± 0.11
d_K [mm]	6.75 ± 0.14	7.75 ± 0.16

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “LBS”

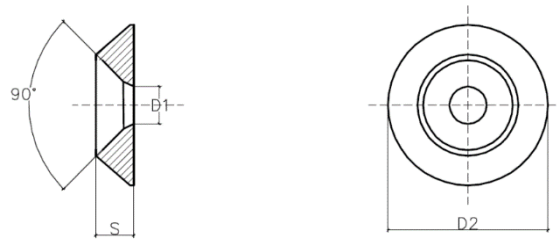
d₁ [mm]	5.00 ± 0.13
d₂ [mm]	3.00 ± 0.10
d_K [mm]	7.80 ± 0.20

[illegible]

Tolerance (L and L_G): + 2.00 mm - 1.00 mm / All specification in [mm] / Intermediate length (L) and thread length (L_G) are possible.

Rotho Blaas Screws “HUS”, “SCB”, “SHT”, “SUS”

d₁ SCREW	6.00	8.00	10.00	12.00
D₁ [mm]	7.50 ± 0.19	8.50 ± 0.21	11.00 ± 0.28	14.00 ± 0.35
D₂ [mm]	20.00 ± 0.50	25.00 ± 0.63	32.00 ± 0.80	37.00 ± 0.93
S [mm]	4.00 ± 0.10	5.00 ± 0.13	6.00 ± 0.15	7.50 ± 0.19



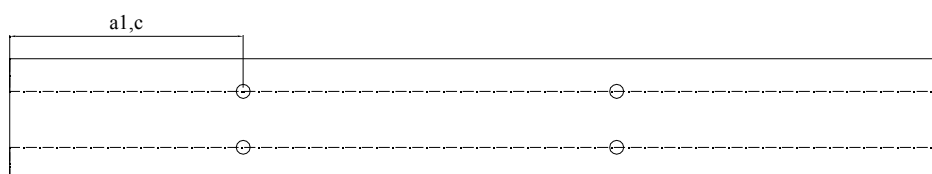
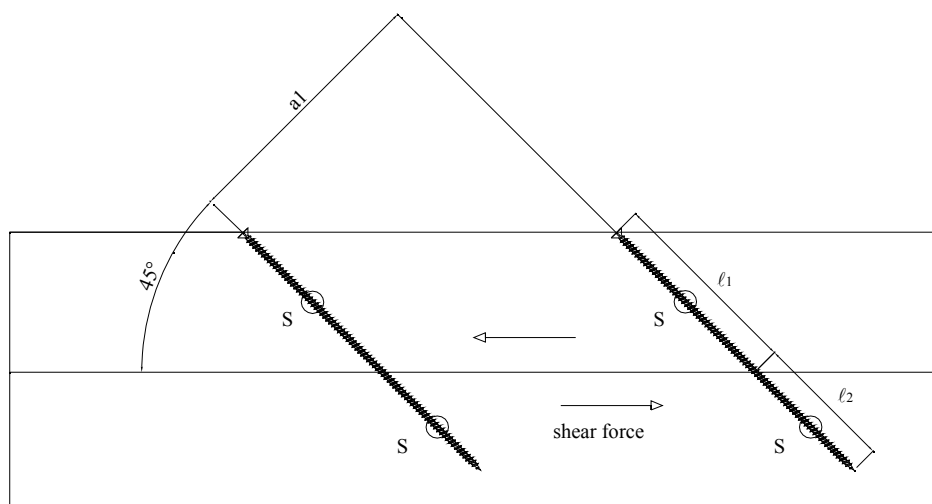
All specification in [mm] / Intermediate size are possible. / Material: carbon steel or stainless steel

Annex B

Minimum distances and spacing

Axially loaded screws

Single configuration



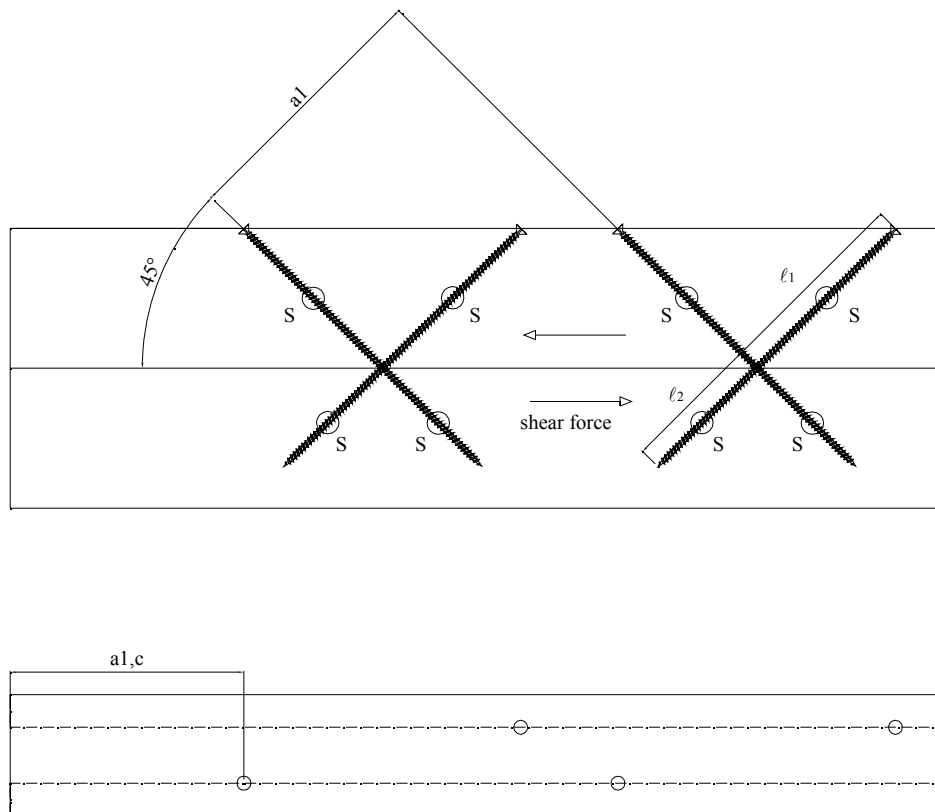
$$\begin{aligned}
 a_1 &\geq 5 \cdot d \\
 a_2 &\geq 2,5 \cdot d \quad \text{if } a_1 \cdot a_2 \geq 25 \cdot d^2 \\
 a_{3,c} &\geq 10 \cdot d \\
 a_{4,c} &\geq 4 \cdot d
 \end{aligned}$$

Minimum distances and spacing see also 4.2
 Minimum timber thickness $t = 12 \cdot d$, see also 4.2

S = centroid of the part of the screw in the timber

Axially loaded screws

Crosswise configuration



$$\begin{aligned}
 a_1 &\geq 5 \cdot d \\
 a_2 &\geq 1,5 \cdot d \quad \text{if } a_1 \cdot a_2 \geq 25 \cdot d^2 \\
 a_{3,c} &\geq 10 \cdot d \\
 a_{4,c} &\geq 4 \cdot d
 \end{aligned}$$

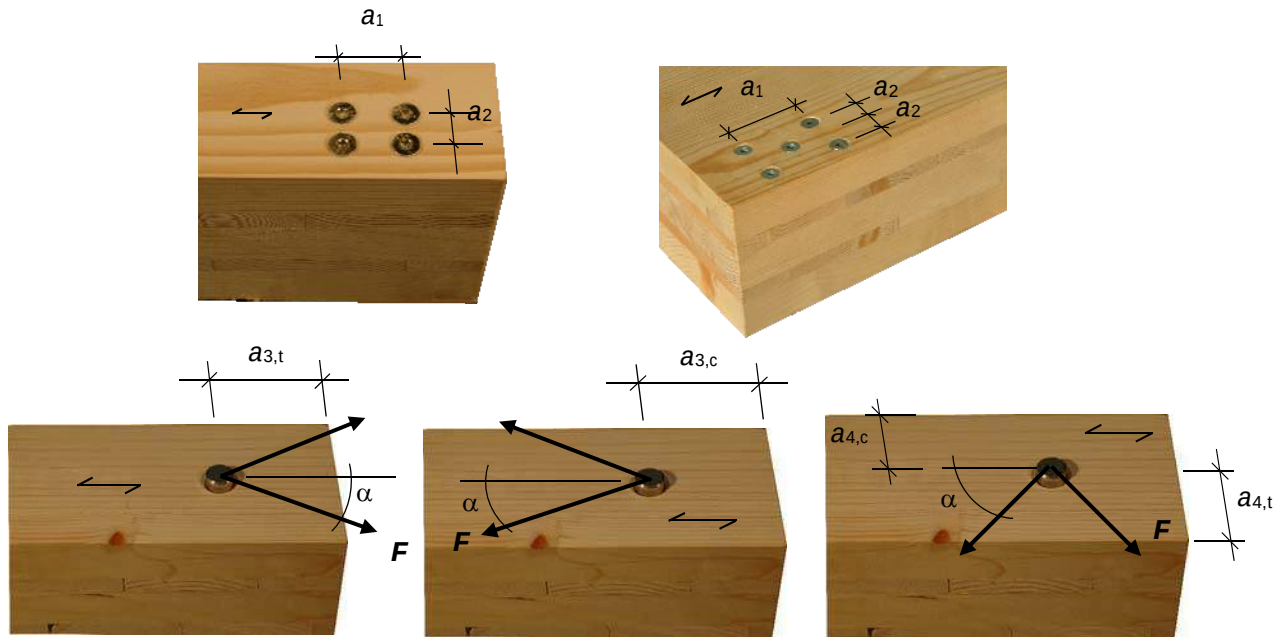
Minimum distances and spacing see also 4.2

Minimum timber thickness $t = 12 \cdot d$, see also 4.2

S = centroid of the part of the screw in the timber

Axially or laterally loaded screws in the plane or edge surface of cross laminated timber

Definition of spacing, end and edge distances in the plane surface unless otherwise specified in the technical specification (ETA or hEN) for the cross laminated timber:



Definition of spacing, end and edge distances in the edge surface unless otherwise specified in the technical specification (ETA or hEN) for the cross laminated timber:

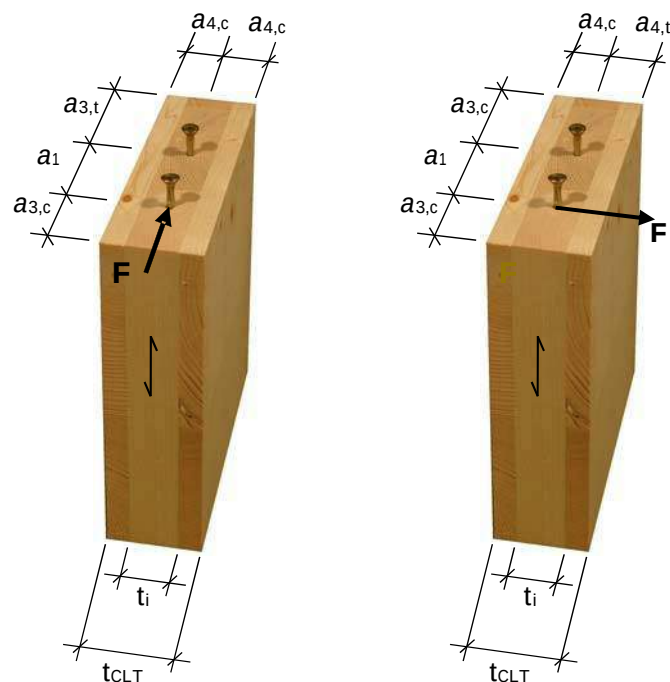


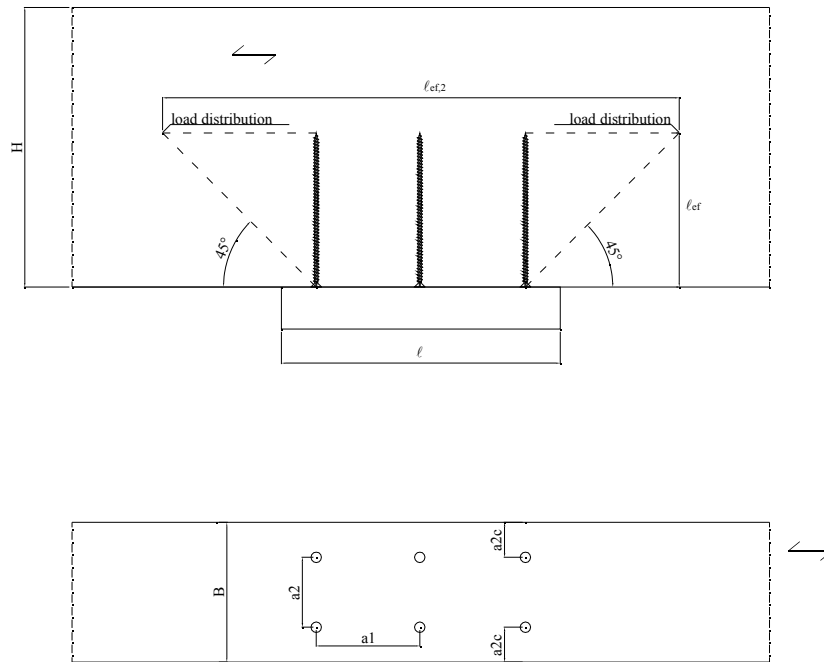
Table B1: Minimum spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber

	a_1	$a_{3,t}$	$a_{3,c}$	a_2	$a_{4,t}$	$a_{4,c}$
Plane surface (see Figure 1)	$4 \cdot d$	$6 \cdot d$	$6 \cdot d$	$2,5 \cdot d$	$6 \cdot d$	$2,5 \cdot d$
Edge surface (see Figure 2)	$10 \cdot d$	$12 \cdot d$	$7 \cdot d$	$4 \cdot d$	$6 \cdot d$	$3 \cdot d$

Annex C

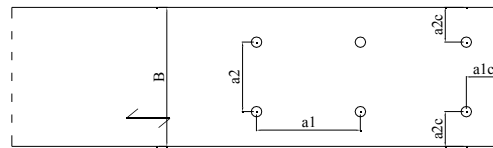
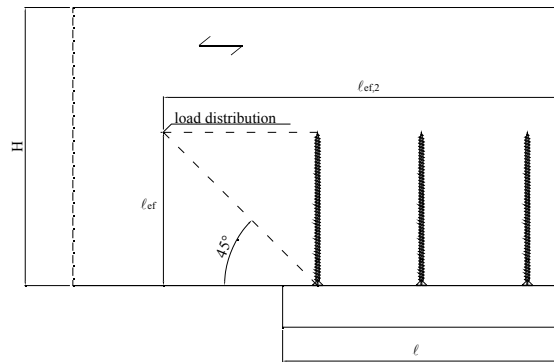
Compression reinforcement

Reinforced centre-bearing



- H component height [mm]
 B bearing width [mm]
 l_{ef} point side penetration length [mm]
 $l_{ef,2}$ effective distribution length in the plane of the screw tips [mm]
 $= 2 \cdot l_{ef} + (n_0 - 1) \cdot a_1$ for centre-bearings

Reinforced end-bearing



- H component height [mm]
 B bearing width [mm]
 ℓ_{ef} point side penetration length [mm]
 $\ell_{ef,2}$ effective distribution length in the plane of the screw tips [mm]
 $= \ell_{ef} + (n_0 - 1) \cdot a_1 + \min(\ell_{ef}, a_{1,c})$ for end-bearings

Annex D

Thermal insulation material on top of rafters or facades

Rotho Blaas screws with an outer thread diameter of at least 6 mm may also be used for the fixing of thermal insulation on top of rafters.

The thickness of the insulation shall not exceed 300 mm. The rafter insulation must be placed on top of solid timber or glued laminated timber rafters and be fixed by battens arranged parallel to the rafters or by wood-based panels on top of the insulation layer. The insulation of vertical facades is also covered by the rules given here.

Screws must be screwed in the rafter through the battens or panels and the insulation without pre-drilling in one sequence.

The angle α between the screw axis and the grain direction of the rafter should be between 30° and 90°.

The rafter consists of solid timber (softwood) according to EN 338, glued laminated timber according to EN 14081, cross-laminated timber, or laminated veneer lumber according to EN 14374 or to ETA or similar glued members according to ETA.

The battens must be from solid timber (softwood) according to EN 338:2003-04. The minimum thickness t and the minimum width b of the battens is given as follows:

Screws $d \leq 8$ mm:	$b_{\min} = 50$ mm	$t_{\min} = 30$ mm
Screws $9 \leq d \leq 10$ mm:	$b_{\min} = 60$ mm	$t_{\min} = 40$ mm
Screws $d = 11$ mm:	$b_{\min} = 80$ mm	$t_{\min} = 60$ mm
Screws $d = 12$ mm:	$b_{\min} = 100$ mm	$t_{\min} = 80$ mm

The insulation must comply with a ETA.

Friction forces shall not be considered for the design of the characteristic axial capacity of the screws.

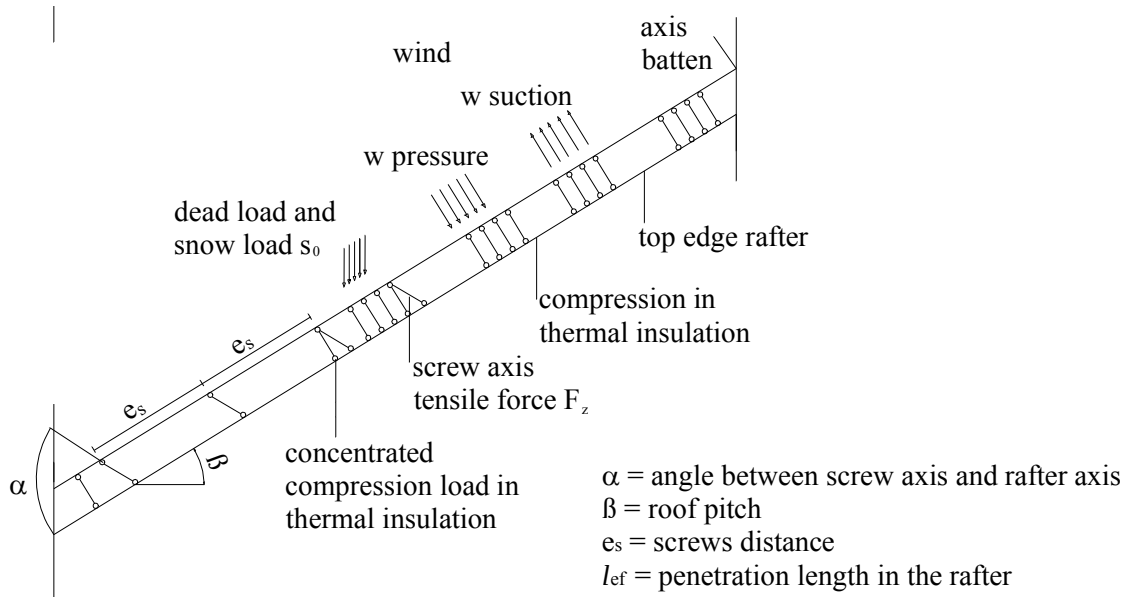
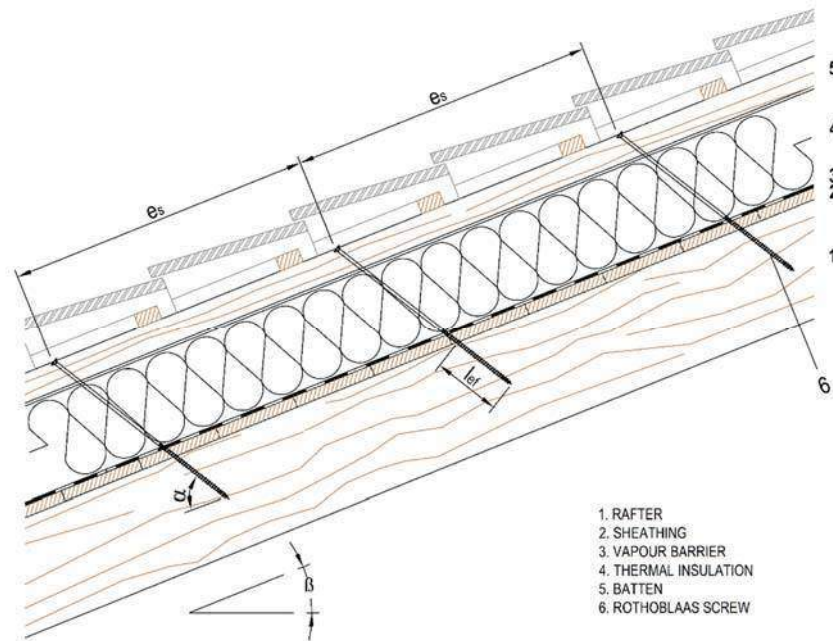
The anchorage of wind suction forces as well as the bending stresses of the battens or the boards, respectively, shall be considered in design. Additional screws perpendicular to the grain of the rafter (angle $\alpha = 90^\circ$) may be arranged if necessary.

The maximum screw spacing is $e_s = 1,75$ m.

Thermal insulation on rafters with parallel inclined screws

Mechanical model

The system of rafter, thermal insulation material on top of rafter and battens parallel to the rafter may be considered as a beam on elastic foundation. The batten represents the beam, and the thermal insulation material on top of the rafter the elastic foundation. The minimum compression stress of the thermal insulation material at 10 % deformation, measured according to EN 826 (1), shall be $\sigma_{(10\%)} = 0,05 \text{ N/mm}^2$. The batten is loaded perpendicular to the axis by point loads F_b . Further point loads F_s are from the shear load of the roof due to dead and snow load, which are transferred from the screw heads into the battens.



(1) EN 826:1996 Thermal insulating products for building applications - Determination of compression behaviour

Design of the battens

The bending stresses are calculated as:

$$M = \frac{(F_b + F_s) \cdot \ell_{\text{char}}}{4}$$

where

$$\ell_{\text{char}} = \text{characteristic length } \ell_{\text{char}} = \sqrt[4]{\frac{4 \cdot EI}{w_{\text{ef}} \cdot K}}$$

EI = bending stiffness of the batten

K = coefficient of subgrade

w_{ef} = effective width of the thermal insulation material

F_b = point loads perpendicular to the battens

F_s = point loads perpendicular to the battens, load application in the area of the screw heads

The coefficient of subgrade K may be calculated from the modulus of elasticity E_{HI} and the thickness t_{HI} of the thermal insulation material if the effective width w_{ef} of the thermal insulation material under compression is known. Due to the load extension in the thermal insulation material the effective width w_{ef} is greater than the width of the batten or rafter, respectively. For further calculations, the effective width w_{ef} of the thermal insulation material may be determined according to:

$$w_{\text{ef}} = w + t_{\text{HI}} / 2$$

where

w = minimum width of the batten or rafter, respectively

t_{HI} = thickness of the thermal insulation material

$$K = \frac{E_{\text{HI}}}{t_{\text{HI}}}$$

The following condition shall be satisfied:

$$\frac{\sigma_{\text{m,d}}}{f_{\text{m,d}}} = \frac{M_{\text{d}}}{W \cdot f_{\text{m,d}}} \leq 1$$

For the calculation of the section modulus W the net cross section has to be considered.

The shear stresses shall be calculated according to:

$$V = \frac{(F_b + F_s)}{2}$$

The following condition shall be satisfied:

$$\frac{\tau_{\text{d}}}{f_{\text{v,d}}} = \frac{1,5 \cdot V_{\text{d}}}{A \cdot f_{\text{v,d}}} \leq 1$$

For the calculation of the cross section area the net cross section has to be considered.

Design of the thermal insulation material

The compressive stresses in the thermal insulation material shall be calculated according to:

$$\sigma = \frac{1,5 \cdot F_b + F_s}{2 \cdot \ell_{\text{char}} \cdot w}$$

The design value of the compressive stress shall not be greater than 110 % of the compressive stress at 10 % deformation calculated according to EN 826.

Design of the screws

The screws are loaded predominantly axially. The axial tension force in the screw may be calculated from the shear loads of the roof R_s :

$$T_s = \frac{R_s}{\cos \alpha}$$

The load-carrying capacity of axially loaded screws is the minimum design value of the axial withdrawal capacity of the threaded part of the screw, the head pull-through capacity of the screw and the tensile capacity of the screw.

In order to limit the deformation of the screw head for thermal insulation material thicknesses over 200 mm or with compressive strength below 0,12 N/mm², respectively, the axial withdrawal capacity of the screws shall be reduced by the factors k_1 and k_2 :

- for “HBS”, “HBS+”, “TBS”, “KKF”, “SCI” screws with partial thread:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot \ell_{ef} \cdot k_1 \cdot k_2}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8}; f_{head,d} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350} \right)^{0,8}; \frac{f_{tens,k}}{\gamma_{M2}} \right\}$$

- for “DGZ”, “VGS”, “GWZ”, “GWS”, “VGZ” screws with full thread or double thread:

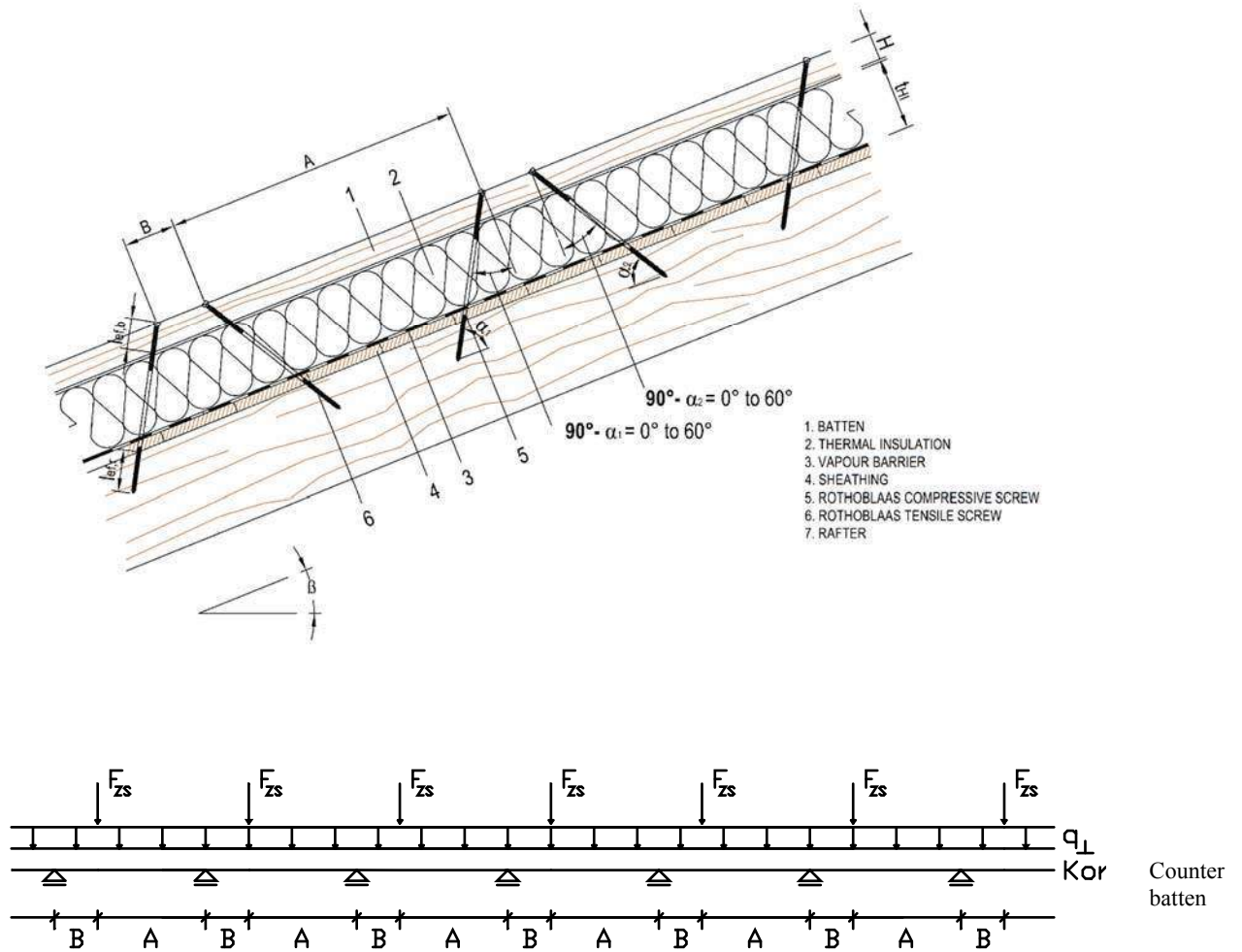
$$F_{ax,\alpha,Rd} = \min \left\{ \begin{array}{l} \frac{f_{ax,d} \cdot d \cdot \ell_{ef} \cdot k_1 \cdot k_2}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \\ \max \left\{ f_{head,d} \cdot d_h^2; \frac{f_{ax,d} \cdot d \cdot \ell_{ef,b}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \right\} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \\ \frac{f_{tens,k}}{\gamma_{M2}} \end{array} \right\}$$

where:

$F_{ax,\alpha,d}$	design value of the load-carrying capacity of axially loaded screws [N]
$f_{ax,d}$	design value of the axial withdrawal parameter of the threaded part of the screw in the rafter or batten, $f_{ax,d}$ does not apply for wood-based panels except plywood, LVL or solid wood panels [N/mm ²] ($f_{ax,k} = 11,7$ N/mm ²)
d	outer thread diameter of the screw [mm]
ℓ_{ef}	point side penetration length of the threaded part of the screw in the batten, $\ell_{ef} \geq 40$ mm [mm]
$\ell_{ef,b}$	length of the threaded part in the batten including the head for tensile and excluding the head for compressive force [mm]
α	angle between grain and screw axis ($30^\circ \leq \alpha \leq 90^\circ$)
ρ_k	characteristic density of the wood-based member [kg/m ³]
$f_{head,d}$	design value of the head pull-through capacity of the screw [N/mm ²]
d_h	head diameter [mm]
$f_{tens,k}$	characteristic tensile capacity of the screw [N]
γ_{M2}	partial factor according to EN 1993-1-1 or to the particular national annex
k_1	$\min \{1; 200/t_{HI}\}$
k_2	$\min \{1; \sigma_{10\%}/0,12\}$
t_{HI}	thickness of the thermal insulation material [mm]
$\sigma_{10\%}$	compressive stress of the thermal insulation material under 10 % deformation [N/mm ²]

If k_1 and k_2 are considered, the deflection of the battens does not need to be considered. Alternatively to the battens, panels with a minimum thickness of 20 mm from plywood according to EN 636 or an ETA or national provisions that apply at the installation site, particle board according to EN 312 or an ETA or national provisions that apply at the installation site, oriented strand board according to EN 300 or an ETA or national provisions that apply at the installation site and solid wood panels according to EN 13353 or an ETA or national provisions that apply at the installation site or cross laminated timber according to an ETA may be used.

Thermal insulation on rafters with alternatively inclined “DGZ”, “GWZ”, “GWS”, “VGZ” or “VGS” screws



Mechanical model

Depending on the screw spacing and the arrangement of tensile and compressive screws with different inclinations the battens are loaded by significant bending moments. The bending moments are derived based on the following assumptions:

- The tensile and compressive loads in the screws are determined based on equilibrium conditions from the actions parallel and perpendicular to the roof plane. These actions are constant line loads $q_{\perp}$ and $q_{\parallel}$.
- The screws act as hinged columns supported 10 mm within the batten or rafter, respectively. The effective column length consequently equals the length of the screw between batten and rafter plus 20 mm.
- The batten is considered as a continuous beam with a constant span $\ell = A + B$. The compressive screws constitute the supports of the continuous beam while the tensile screws transfer concentrated loads perpendicular to the batten axis.

The screws are predominantly loaded in withdrawal or compression, respectively. The screw's normal forces are determined based on the loads parallel and perpendicular to the roof plane:

$$\text{Compressive screw: } F_{c,Ed} = (A + B) \cdot \left(-\frac{q_{\parallel} \cdot \sin \alpha_2 + q_{\perp} \cdot \cos \alpha_2}{\sin(\alpha_1 + \alpha_2)} \right)$$

Tensile screw:

$$F_{t,Ed} = (A + B) \cdot \left(\frac{q_{II} \cdot \sin \alpha_1 - q_{\perp} \cdot \cos \alpha_1}{\sin(\alpha_1 + \alpha_2)} \right)$$

The bending moments in the batten follow from the constant line load $q_{\perp}$ and the load components perpendicular to the batten from the tensile screws. The span of the continuous beam is $(A + B)$. The load component perpendicular to the batten from the tensile screw is:

$$F_{ZS,Ed} = (A + B) \cdot \left(\frac{q_{II} \cdot \sin \alpha_1 \cdot \sin \alpha_2 - q_{\perp} \cdot \cos \alpha_1 \cdot \sin \alpha_2}{\sin(\alpha_1 + \alpha_2)} \right)$$

where:

- q_{II} constant line load parallel to batten
- $q_{\perp}$ constant line load perpendicular to batten
- α_1 angle between compressive screw axis and grain direction
- α_2 angle between tensile screw axis and grain direction

A positive value for F_{ZS} means a load towards the rafter, a negative value a load away from the rafter.

Design of the screws

The load-carrying capacity of the screws shall be calculated as follows:

Screws loaded in tension:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot \ell_{ef,b}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_{b,k}}{350} \right)^{0,8}; \frac{f_{ax,d} \cdot d \cdot \ell_{ef,r}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_{r,k}}{350} \right)^{0,8}; \frac{f_{tens,k}}{\gamma_{M2}} \right\}$$

Screws loaded in compression:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot \ell_{ef,b}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_{b,k}}{350} \right)^{0,8}; \frac{f_{ax,d} \cdot d \cdot \ell_{ef,r}}{1,2 \cdot \cos^2 \alpha + \sin^2 \alpha} \cdot \left(\frac{\rho_{r,k}}{350} \right)^{0,8}; \frac{\kappa_c \cdot N_{pl,k}}{\gamma_{M1}} \right\}$$

where:

- $F_{ax,\alpha,Rd}$ design value of the load-carrying capacity of the screw [N]
- $f_{ax,d}$ design value of the axial withdrawal parameter of the threaded part of the screw in the rafter or batten, $f_{ax,d}$ does not apply for wood-based panels except plywood, LVL or solid wood panels [N/mm²] ($f_{ax,k} = 11,7$ N/mm²)
- d outer thread diameter of the screw [mm]
- $\ell_{ef,b}$ penetration length of the threaded part of the screw in the batten [mm]
- $\ell_{ef,r}$ penetration length of the threaded part of the screw in the rafter, $\ell_{ef} \geq 40$ mm [mm]
- $\rho_{b,k}$ characteristic density of the batten [kg/m³]
- $\rho_{r,k}$ characteristic density of the rafter [kg/m³]
- α angle α_1 or α_2 between screw axis and grain direction, $30^\circ \leq \alpha \leq 90^\circ$, $30^\circ \leq \alpha_2 \leq 90^\circ$
- $f_{tens,k}$ characteristic tensile capacity of the screw [N]
- γ_{M1}, γ_{M2} partial factor according to EN 1993-1-1 or to the particular national annex
- $\kappa_c \cdot N_{pl,k}$ buckling capacity of the screw [N]

Buckling capacity of the screw

Free screw length [mm]	“DGZ”		“GWZ”, “GWS”, “VGZ” or “VGS”		
	7 mm	9 mm	7 mm	9 mm	11 mm
	$\kappa_c \cdot N_{pl,k}$ [kN]	$\kappa_c \cdot N_{pl,k}$ [kN]	$\kappa_c \cdot N_{pl,k}$ [kN]	$\kappa_c \cdot N_{pl,k}$ [kN]	$\kappa_c \cdot N_{pl,k}$ [kN]
≤ 100	3,52	9,23	2,57	6,49	9,75
120	2,68	7,15	1,95	4,99	7,57
140	2,10	5,68	1,53	3,95	6,02
160	1,70	4,61	1,23	3,19	4,89
180	1,40	3,82	1,01	2,63	4,05
200	1,17	3,21	0,84	2,22	3,40
220	0,99	2,74	0,71	1,88	2,91
240	0,85	2,36	0,61	1,62	2,50
260	0,74	2,05	0,53	1,41	2,18
280	0,65	1,80	0,47	1,23	1,91
300	0,57	1,59	0,41	1,09	1,69
320		1,42			
340		1,27			
360		1,15			
380		1,04			
400		0,95			

where

free screw length = $t_{HI} / \sin \alpha$ [mm] ($\alpha = \alpha_1$ or α_2)