DICHIARAZIONE DI PRESTAZIONE N. 18/0355
In accordo al regolamento UE n 305/2011
DECLARATION OF PERFORMANCE N. 18/0355
According to Regulation EU n. 305/211

1. **Codice identificativo unico del prodotto tipo / Unique identification code of the product-type:**
   CONNETTORE CHIODATO A TAGLIO TECNARIA DIAPASON
   TECNARIA DIAPASON NAILED SHEAR CONNECTOR

2. **Uso previsto / Intended use:**
   L'uso previsto per i connettori a taglio chiodati Tecnaria DIAPASON è come mezzo di connessione in elementi strutturali fatti di acciaio e calcestruzzo ai sensi della norma EN 1994-1-1.
   I connettori possono essere utilizzati sia per nuove strutture sia per ristrutturazioni di edifici esistenti con lo scopo di aumentare la capacità portante di vecchi solai.
   L'suo previsto comprende strutture composte con carichi statici e quasi statici.
   Il carico sismico è ammesso se il connettore DIAPASON viene usato come connettore a taglio in travi composite usate come elementi sismici secondari in strutture dissipative e non dissipative ai sensi della norma EN 1998-1.

   The nailed shear connector Tecnaria DIAPASON is intended to be used as connection device in structural elements made of steel and concrete according to EN 1994-1-1.
   The connector can either be used in new building or for renovation of existing buildings with the aim to increase the bearing capacity of aged floor constructions.
   The intended use comprises composite structures with static or quasi-static loading.
   Seismic loading is covered if the DIAPASON connector is used as shear connector in composite beams used as secondary seismic members in dissipative as well as non-dissipative structures according to EN 1998-1.

3. **Fabbricante / Manufacturer:**
   Tecnaria S.p.A. Viale Pecori Giraldi 55 – 36061 Bassano del Grappa VI Italy

4. **Rappresentate autorizzato / Authorised representative:**
   Non applicabile / Not relevant

5. **Sistema VVCP / System of AVCP:**
   2+

6. **Documento per la Valutazione Europea / European Assessment Document:**
   EAD-200033-00-0602-2016
   Valutazione Tecnica Europea / European Technical Assessment:
   ETA-18/0355 of 2021/07/05
   Organismo di Valutazione Tecnica / Technical Assesment Body:
   ETA-Danmark A/S
   Organismo Notificato / Notified body:
   TZUS n 1020

7. **Prestazione dichiarata / Declared performances:**

Resistenza caratteristica in soletta piena di calcestruzzo, connettore a taglio orientato perpendicolarmente all'asse della trave. Characteristic resistance in solid concrete decks, shear connector orientation perpendicular to beam axis.	Vedere allegato C1 dell'ETA-18/0355 See annex C1 of ETA-18/0355
Resistenza caratteristica nei solai compositi – nervature perpendicolari all'asse della trave – connettore a taglio orientato perpendicolarmente all'asse della trave. Characteristic resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis.	Vedere allegato C2 dell'ETA-18/0355 See annex C2 of ETA-18/0355
Resistenza caratteristica nei solai compositi – nervature parallele all'asse della trave – connettore a taglio orientato parallalamente all'asse della trave. Characteristic resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis	Vedere allegato C3 dell'ETA-18/0447 See annex C3 of ETA-18/0447
Resistenza caratteristica nei solai compositi – nervature parallele all'asse della trave – connettore a taglio orientato perpendicolarmente all'asse della trave. Characteristic resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation perpendicular to beam axis	Vedere allegato C4 dell'ETA-18/0447 See annex C4 of ETA-18/0447
Resistenza caratteristica per l'utilizzo nelle aree sismiche con azioni antisismiche ai sensi della norma EB 1998-1. Characteristic resistance for use in seismic areas under seismic actions according to EN 1998-1.	Vedere punto 2 della DoP See point 2 of present DoP
Resistenza caratteristica in soletta piena di calcestruzzo in applicazioni di ristrutturazione con materiale in vecchio ferro metallico o acciaio con un carico di snervamento effettivo inferiore a 235 MPa. Characteristic resistance in solid concrete decks in renovation application with old metallic iron or steel material with an actual yield strength less than 235 MPa.	Vedere allegato C5 dell'ETA-18/0355 See annex C5 of ETA-18/ 0355
Limite di applicazione Application limit	Vedere allegato B3 dell'ETA-15/0355 See annex B3 of ETA-18/0355
Reazione al fuoco Reaction to fire	Gli ancoraggi sono realizzati in acciaio classificato come Euroclasse A1 in conformità alla norma EN 13501-1 e al regolamento delegato 2016/364 della Commissione. The anchors are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364

Table C1 Characteristic and design resistance in solid concrete decks, shear connector orientation perpendicular to beam axis [1) and 2)]

Concrete class	Characteristic Resistance P_{rk} [kN]	Design resistance P_{Rd} [kN]	Minimum base material thickness [mm]	Tecnaria Diapason positioning	Ductility assessment
C20/25	57.6	46.1	8	Transversal to the axis of the beam	Ductile according to EN 1994-1-1
C25/30	57.6	46.1	8		
C30/37	67.3	53.8	8		
C32/40	76.6	61.3	8		
C35/45	76.6	61.3	8		
C40/50	76.6	61.3	8		
LC20/22	57.6	46.1	8		
LC25/28	57.6	46.1	8		
LC30/33	57.6	46.1	8		
LC35/38	57.6	46.1	8		
LC40/44	57.6	46.1	8		
LC45/50	57.6	46.1	8		
LC 50/55	57.6	46.1	8		

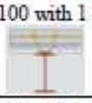
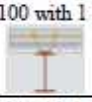
1) in the absence of other national regulation, a partial safety factor of $\gamma_V = 1{,}25$ applies
2) Lightweight concrete with a minimum density $\rho = 1400$ kg/m^3

If base material thickness less than 8 mm see page 18.

Tecnaria DIAPASON Nailed Shear Connector	**Annex C1**
Characteristic and design resistance in solid concrete decks, shear connector orientation perpendicular to beam axis	of European Technical Assessment ETA-18/0355

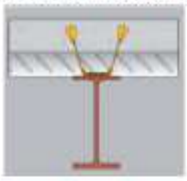
Annesso C2 / Annex C2:

Table C2 Design resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis

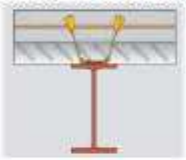
Diapason positioning		Concrete class	Design resistance P_{Rd} [kN] (3)	Ductility assessment
Type of connector (1)	type of metal deck			
Diapason 100 without rebar 	According to the conditions of (2)	C25/30 or LC20/22-LC50/55	34.9	Ductile according to EN 1994-1-1
		C30/37	40.7	
		C35/45	40.7	
Diapason 100 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	36.4	
		C30/37	40.2	
		C35/45	40.2	
Diapason 100 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	37.8	
		C30/37	43.6	
		C35/45	43.6	
Diapason 125 without rebar 		C25/30 or LC20/22-LC50/55	38.2	
		C30/37	43.2	
		C35/45	43.2	
Diapason 125 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	40.6	
		C30/37	48.1	
		C35/45	48.1	
Diapason 125 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	39.2	
		C30/37	45.2	
		C35/45	45.2	
Diapason 100 without rebar 	Not according to conditions of (2)	C25/30 or LC20/22-LC50/55	$= k_t \times 49{,}0$	
		C30/37	$= k_t \times 57{,}1$	
		C35/45	$= k_t \times 57{,}1$	
Diapason 100 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	$= k_t \times 51{,}1$	
		C30/37	$= k_t \times 56{,}4$	
		C35/45	$= k_t \times 56{,}4$	
Diapason 100 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	$= k_t \times 53{,}1$	
		C30/37	$= k_t \times 61{,}2$	
		C35/45	$= k_t \times 61{,}2$	
Diapason 125 without rebar 		C25/30 or LC20/22-LC50/55	$= k_t \times 44{,}9$	
		C30/37	$= k_t \times 50{,}8$	
		C35/45	$= k_t \times 50{,}8$	
Diapason 125 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	$= k_t \times 47{,}8$	
		C30/37	$= k_t \times 56{,}6$	
		C35/45	$= k_t \times 56{,}6$	
Diapason 125 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	$= k_t \times 46{,}1$	
		C30/37	$= k_t \times 53{,}2$	
		C35/45	$= k_t \times 53{,}2$	

Tecnaria DIAPASON Nailed Shear Connector	Annex C2 of European Technical Assessment ETA-18/0355
Design resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis	

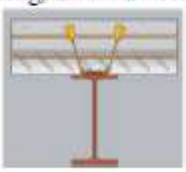
(1) Connector without rebar:



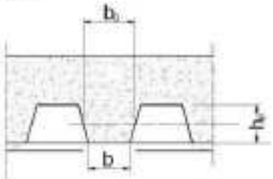
Connector with one rebar: fixed with 1 transversely placed Ø10 mm reinforcement bar, 600mm long.



Connector with two rebars: fixed with 2 transversely placed Ø 10 mm reinforcement bars, the upper 600mm long, the lower 780mm long



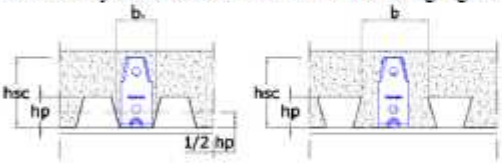
(2) Conditions (2) of the table above. Metal deck with:
- Height of rib (h_p): maximum 60 mm
- Base width (b): 55 mm or more
- Width b_0 of rib (at mid-point for open trough decking or at the top for re-entrant trough decking): minimum 70 mm.



(3) $$k_t = \frac{0.7}{\sqrt{n_r}} \cdot \frac{b_0}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq k_{t,max}$$

nr = 1 if one connector per rib,
nr = 2 if two ore more connectors per rib.

The other symbols are defined in the following figure:

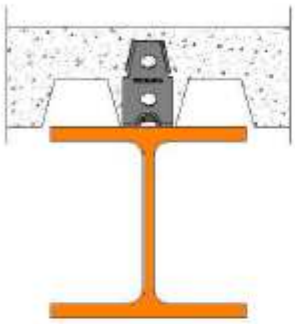


Open trough profile Re-entrant trough profile

Nr	Thickness of metal decking (mm)	Kt,max
1	≤ 1.0	0.85
1	> 1.0	1.00
≥2	≤ 1.0	0.70
≥2	> 1.0	0.80

Tecnaria DIAPASON Nailed Shear Connector	**Annex C2** of European Technical Assessment ETA-18/0355
Characteristic resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis	

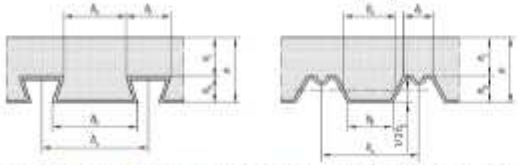
Table C3. Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis

Diapason positioning	Type of connector	Concrete class	Design resistance Prd [kN] (1)	Ductility assessment
	Diapason 100 without rebar	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 69.8 ≤ 46.1	Ductile according to EN 1994-1-1
		C30/37	$=k_{ll}$ x 81.4 < 53.8	
		C35/45	$=k_{ll}$ x 81.4 < 61.3	
	Diapason 100 with 1 rebar Ø10	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 72.8≤ 46.1	
		C30/37	$=k_{ll}$ x 80.4 < 53.8	
		C35/45	$=k_{ll}$ x 80.4 < 61.3	
	Diapason 100 with 2 rebars Ø10	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 75.6≤ 46.1	
		C30/37	$=k_{ll}$ x 87.2 < 53.8	
		C35/45	$=k_{ll}$ x 87.2 < 61.3	
	Diapason 125 without rebar	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 47.8≤ 46.1	
		C30/37	$=k_{ll}$ x 54.0 < 53.8	
		C35/45	$=k_{ll}$ x 54.0 < 61.3	
	Diapason 125 with 1 rebar Ø10	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 50.8≤ 46.1	
		C30/37	$=k_{ll}$ x 60.1 < 53.8	
		C35/45	$=k_{ll}$ x 60.1 < 61.3	
	Diapason 125 with 2 rebars Ø10	C25/30 or LC20/22-LC50/55	$=k_{ll}$ x 49.0≤ 46.1	
		C30/37	$=k_{ll}$ x 56.5 < 53.8	
		C35/45	$=k_{ll}$ x 56.5 < 61.3	

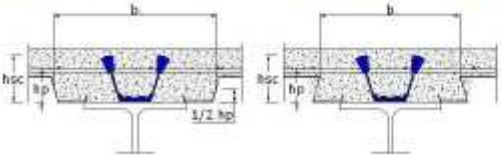
(1)

$$k_{ll} = 0.6 \cdot \frac{b_0 - 54.5}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1 \quad \text{(measures in mm)}$$

When the steel decking is continuous with the passage of the beam, the width of the haunch b_0 is equal to the width of the rib as shown in the following figures:



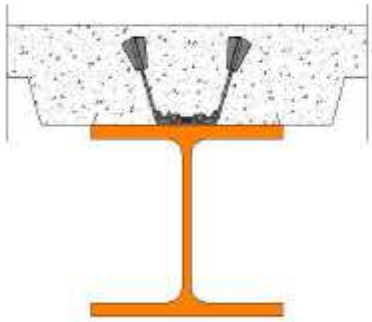
When the steel decking is not continuous, b_0 is defined as indicated in the following figure:



The height of the haunch should be equal to h_p, total height of the decking excluding projections.

Tecnaria DIAPASON Nailed Shear Connector	Annex C3 of European Technical Assessment ETA-18/0355
Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis	

Table C4. Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation perpendicular to beam axis

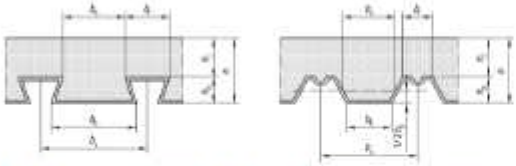
Diapason positioning	Type of connector	Concrete class	Design resistance Prd [kN] (1)	Ductility assessment
	Diapason 100 without rebar	C25/30 or LC20/22-LC50/55	$=k_{t2} \times 69.8 \leq 46.1$	Ductile according to EN 1994-1-1
		C30/37	$=k_{t2} \times 81.4 < 53.8$	
		C35/45	$=k_{t2} \times 81.4 < 61.3$	
	Diapason 100 with 1 rebar d10	C25/30 or LC20/22-LC50/55	$=k_{t2} \times 72.8 \leq 46.1$	
		C30/37	$=k_{t2} \times 80.4 < 53.8$	
		C35/45	$=k_{t2} \times 80.4 < 61.3$	
	Diapason 100 with 2 rebars d10	C25/30 or LC20/22-LC50/55	$=k_{t2} \times 75.6 \leq 46.1$	
		C30/37	$=k_{t2} \times 87.2 < 53.8$	
		C35/45	$=k_{t2} \times 87.2 < 61.3$	
	Diapason 125 without rebar	C25/30 or LC20/22-LC50/55	$=k_{t3} \times 47.8 \leq 46.1$	
		C30/37	$=k_{t3} \times 54.0 < 53.8$	
		C35/45	$=k_{t3} \times 54.0 < 61.3$	
	Diapason 125 with 1 rebar d10	C25/30 or LC20/22-LC50/55	$=k_{t3} \times 50.8 \leq 46.1$	
		C30/37	$=k_{t3} \times 60.1 < 53.8$	
		C35/45	$=k_{t3} \times 60.1 < 61.3$	
	Diapason 125 with 2 rebars d10	C25/30 or LC20/22-LC50/55	$=k_{t3} \times 49.0 \leq 46.1$	
		C30/37	$=k_{t3} \times 56.5 < 53.8$	
		C35/45	$=k_{t3} \times 56.5 < 61.3$	

(1)

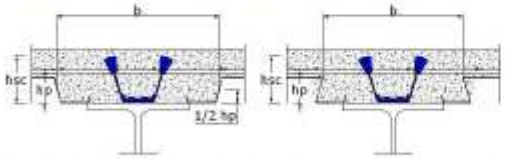
$$k_{t2} = 0.6 \cdot \frac{b_0 - 100}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1 \quad \text{(measures in mm)}$$

$$k_{t3} = 0.6 \cdot \frac{b_0 - 107}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1$$

When the steel decking is continuous with the passage of the beam, the width of the haunch b_0 is equal to the width of the rib as shown in the following figures:



When the steel decking is not continuous, b0 is defined as indicated in the following figure:



The height of the haunch should be equal to hp, total height of the decking excluding projections.

Tecnaria DIAPASON Nailed Shear Connector	Annex C4 of European Technical Assessment ETA-18/0355
Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation perpendicular to beam axis	

Design resistance: Effect of reduced base material thickness for Tecnaria DIAPASON 100 – 125

Reduction of design resistance P_{rd} with the factor (tII,act / 8) is required in case the actual base material thickness is less than 8 mm.

$$P_{Rd,red} = \frac{t_{II,act}}{8} P_{Rd}$$

With:

$P_{Rd,red}$ = reduced design resistance of DIAPASON 100 and DIAPASON 125 for actual base material thickness

tII,act <8 mm and a minimum thickness of 6 mm.

P_{Rd} = design resistance of the connectors

No extrapolation of above formula for base material thickness tII,act > 8 mm.

This reduction of resistance is not added to the possible reduction of resistance due to metal decking. The factor resulting in the largest reduction is used.

Design resistance: Effect of reduced base material strength

Reduction of design resistance P_{rd} with the factor $\alpha_{BM,red}$ is required in case the actual base material mininmum yield strength of the old construction steel is less than 235 N/mm²

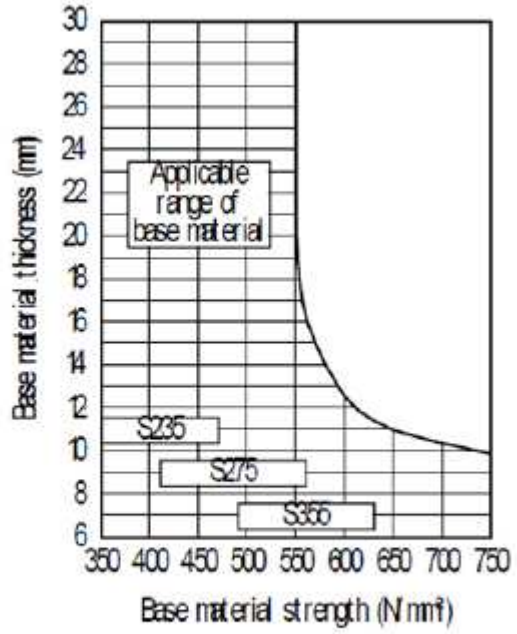
- mininmum yield strength f_y= 170 N/mm²
  $P_{Rd,red} = \alpha_{BM,red} \times P_{Rd}$
  $\alpha_{BM,red} = 0.81$
  with:
  $P_{Rd,red}$ = reduced design strength of the connector

This reduction of resistance is not added to the possible reduction of resistance due to metal decking. The factor resulting in the largest reduction is used.

Tecnaria DIAPASON Nailed Shear Connector	**Annex C5** of European Technical Assessment ETA-18/0355
Effect of reduced base material thickness for Tecnaria DIAPASON 100 – 125 Effect of reduced base material strength	

Estratto allegato B3 / Extract from annex B3:

Applicable range of base material



Base material:
Structural steel S235, S275 and S355 according to EN 10025-1:2004; minimum thickness = 6 mm

La prestazione del prodotto identificato al punto 1 è in conformità con le caratteristiche dichiarate al punto 7. Questa dichiarazione di prestazione è emessa in accordo al Regolamento UE N 305/2011 sotto la responsabilità esclusiva del produttore identificato al punto 3.

The performance of the product identified at point 1 is in conformity with the set of declared performances at point 7. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified at point 3.

Firmato per e in rappresentanza del produttore da: / Signed for and on behalf of the manufacturer by:

Marco Guazzo — Bassano del Grappa (Italy) on 05/07/2021

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