

1. Codice identificativo unico del prodotto tipo / Unique identification code of the product-type:

CONNETTORE CHIODATO A TAGLIO TECNARIA CTF
TECNARIA CTF NAILED SHEAR CONNECTOR

2. Uso previsto / Intended use:

L'uso previsto per i connettori a taglio chiodati Tecnaria CTF 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'uso previsto comprende strutture composte con carichi statici e quasi statici.

In tutte le configurazioni in cui il connettore è duttile, il carico sismico è ammesso se il connettore CTF 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 CTF 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.

In all the configurations in which the connectors are ductile, seismic loading is covered if the CTF 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. Rappresentante 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-18/0447 of 2018/06/27

Organismo di Valutazione Tecnica / Technical Assessment Body:

ETA-Danmark A/S

Organismo Notificato / Notified body:

TZUS n 1020

DICHIARAZIONE DI PRESTAZIONE N. 18/0447

In accordo al regolamento UE n 305/2011

DECLARATION OF PERFORMANCE N. 18/0447

According to Regulation EU n. 305/211

**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-18/0447 See annex C1 of ETA-18/0447
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 e C3 dell'ETA-18/0447 See annex C2 and 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 C6 dell'ETA-18/0447 See annex C6 of ETA-18/0447
Limite di applicazione Application limit	Vedere allegato B3 dell'ETA-15/0447 See annex B3 of ETA-18/0447
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

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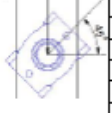
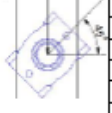
In accordo al regolamento UE n 305/2011

DECLARATION OF PERFORMANCE N. 18/0447

According to Regulation EU n. 305/211

Annesso C1 / Annex C1:

Table C1 Characteristic and design resistance in solid concrete decks, shear connector orientation perpendicular to beam axis ¹⁾ and ²⁾. Minimum base material thickness 8 mm. For base material thickness less than 8 mm, see page 18

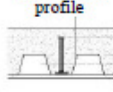

Shear connector	Concrete class	Characteristic Resistance P_{Rk} [kN]	Design resistance P_{Rd} [kN]	Tecnaria CTF positioning	Ductility assessment according to EN 1994-1-1
CTF 020	C20/25	14,2	11,4	Perpendicular to the axis of the beam 	Non-ductile
CTF 025		17,8	14,2		Non-ductile
CTF 030		21,4	17,1		Non-ductile
CTF 040 CTF 060 CTF 070		28,5	22,8		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		38,1	30,5		Ductile
CTF 020	C25/30	17,1	13,7		Non-ductile
CTF 025		21,4	17,1		Non-ductile
CTF 030		25,6	20,5		Non-ductile
CTF 040 CTF 060 CTF 070		34,2	27,3		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		45,8	36,6		Ductile
CTF 020	C30/37	19,3	15,5		Non-ductile
CTF 025		24,1	19,3		Non-ductile
CTF 030		29,0	23,2		Non-ductile
CTF 040 CTF 060 CTF 070		38,6	30,9		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		46,4	37,1		Ductile
CTF 020	C35/45 or greater	26,7	21,4		Non-ductile
CTF 025		33,4	26,7		Non-ductile
CTF 030		40,1	32,1		Non-ductile
CTF 040 CTF 060 CTF 070		46,4	37,1		Ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		46,4	37,1		Ductile
CTF 020	LC20/22 LC25/28	19,5	15,6	At 45° to the axis of the beam 	Non-ductile
CTF 025		24,3	19,5		Non-ductile
CTF 030		29,2	23,3		Non-ductile
CTF 040 CTF 060 CTF 070		38,9	31,1		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		38,9	31,1		Ductile
CTF 020	LC30/33 LC40/44	18,7	15,0		Non-ductile
CTF 025		23,4	18,7		Non-ductile
CTF 030		28,1	22,4		Non-ductile
CTF 040 CTF 060 CTF 070		37,4	29,9		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		37,4	29,9		Ductile
CTF 020	C20/25	22,4	18,0		Non-ductile
CTF 025		28,1	22,4		Non-ductile
CTF 030		33,7	26,9		Non-ductile
CTF 040 CTF 060 CTF 070		44,9	35,9		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		44,9	35,9		Ductile
CTF 020	C25/30	24,4	19,5		Non-ductile
CTF 025		30,5	24,4		Non-ductile
CTF 030		36,5	29,2		Non-ductile
CTF 040 CTF 060 CTF 070		46,4	37,1		Ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		46,4	37,1		Ductile
CTF 020	C30/37	20,1	16,1		Non-ductile
CTF 025		25,1	20,1		Non-ductile
CTF 030		30,1	24,1		Non-ductile
CTF 040 CTF 060 CTF 070		40,1	32,1		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		40,1	32,1		Ductile
CTF 020	LC20/22 LC25/28	20,1	16,1	At 45° to the axis of the beam 	Non-ductile
CTF 025		25,1	20,1		Non-ductile
CTF 030		30,1	24,1		Non-ductile
CTF 040 CTF 060 CTF 070		40,1	32,1		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		40,1	32,1		Ductile
CTF 020	LC30/33 LC40/44	20,1	16,1		Non-ductile
CTF 025		25,1	20,1		Non-ductile
CTF 030		30,1	24,1		Non-ductile
CTF 040 CTF 060 CTF 070		40,1	32,1		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		40,1	32,1		Ductile
CTF 020	LC45/50 LC50/55	20,1	16,1		Non-ductile
CTF 025		25,1	20,1		Non-ductile
CTF 030		30,1	24,1		Non-ductile
CTF 040 CTF 060 CTF 070		40,1	32,1		Non-ductile
CTF 080 CTF 090 CTF 105 CTF 125 CTF 135		40,1	32,1		Ductile

1) in the absence of other national regulation, a partial safety factor of $\gamma_v = 1,25$ applies2) Lightweight concrete with a minimum density $\rho = 1750 \text{ kg/m}^3$ **Tecnaria CTF Nailed Shear Connector**

Characteristic resistance in solid concrete decks, shear connector orientation perpendicular to beam axis

Annex C1of European
Technical Assessment
ETA-18/0447

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

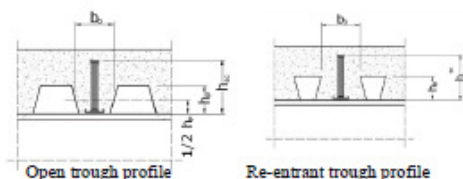
CTF positioning			Concrete class	Design resistance PRd [kN] (3)	Ductility assessment according to EN 1994-1-1
Type of connector	nr (1)	type of metal deck (2)			
CTF 080	1	 Open trough profile	C25/30 or LC20/22-LC50/55	$= k_t \times 31.9$	Non-ductile
CTF 090 CTF 105	1				Ductile
CTF 125 CTF 135	1				Ductile
CTF 080	1		C30/37	$= k_t \times 33.4$	Non-ductile
CTF 090 CTF 105	1				Ductile
CTF 125 CTF 135	1				Ductile
CTF 080	1		C35/45	$= k_t \times 34.6$	Non-ductile
CTF 090 CTF 105	1				Ductile
CTF 125 CTF 135	1				Ductile
CTF 080 CTF 090 CTF 105	2 or plus	 Re-entrant trough profile	C25/30 or LC20/22-LC50/55	$= k_t \times 31.9$	Non-ductile
CTF 125 CTF 135	2 or plus				Ductile
CTF 080 CTF 090 CTF 105	2 or plus		C30/37	$= k_t \times 33.4$	Non-ductile
CTF 125 CTF 135	2 or plus				Ductile
CTF 080 CTF 090 CTF 105	2 or plus		C35/45	$= k_t \times 34.6$	Non-ductile
CTF 125 CTF 135	2 or plus				Ductile
CTF 080 CTF 090 CTF 105	any		C25/30 or LC20/22-LC50/55	$= k_t \times 31.9$	Non-ductile
CTF 125 CTF 135	any				Non-ductile
CTF 080 CTF 090 CTF 105	any		C30/37	$= k_t \times 33.4$	Non-ductile
CTF 125 CTF 135	any				Non-ductile
CTF 080 CTF 090 CTF 105	any		C35/45	$= k_t \times 34.6$	Non-ductile
CTF 125 CTF 135	any				Non-ductile

(1) nr = 1 if one connector per rib,
nr = 2 if two or more connectors per rib.

(2) Open trough profile has $b < b_0$
Re-entrant profile has $b > b_0$

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

The symbols are defined in the following figure:



Nr	Thickness of metal decking (mm)	$k_{t,max}$
1	≤ 1.0	0.85
1	> 1.0	1.00
≥ 2	≤ 1.0	0.70
≥ 2	> 1.0	0.80

The connectors are arranged in ribs having a height h_p not exceeding 85 mm and a width b_0 of at least h_p .

Tecnaria CTF Nailed Shear Connector	Annex C2
Design resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis	of European Technical Assessment ETA-18/0447

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Annesso C3 / Annex C3:

Table C3 Floor with steel decking with ribs laid perpendicular to the beam and C35/45 class concrete:

Type	Metal deck:	Connectors per rib – nr	Design resistance Prd – kN	Ductility
CTF080	Cofraplus 40 Arcelor Mittal	1	34.84	Non-ductile
CTF125	Cofraplus 77 Arcelor Mittal	1	25.01	Ductile


Tecnaria CTF Nailed Shear Connector

Design resistance in composite decks - Floor with steel decking with ribs laid perpendicular to the beam and C35/45 class concrete

**Annex C3
of European
Technical Assessment
ETA-18/0447**

Annesso C4 / Annex C4:

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

CTF positioning	Design resistance $PR_{d,l}$ [kN] (1)	Ductility assessment according to EN 1994-1-1
	$PR_{d,l} = k_l \cdot PR_d$	Ductility same as table C1 for solid concrete slab ductility

(1)

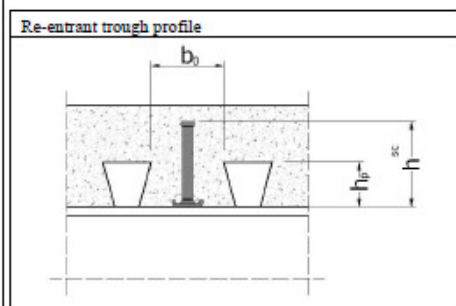
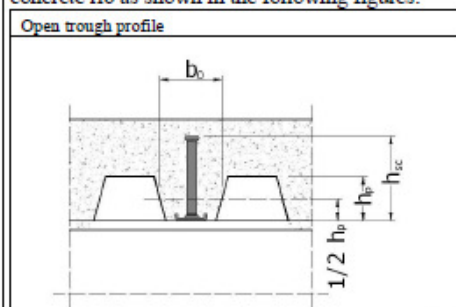
$$k_l = 0,6 \cdot \frac{b_0}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1 \quad (\text{measures in mm})$$

PR_d is the design resistance for solid concrete slabs according to Annex C1, table C1

h_{sc} is the overall height of the connector, but not greater than $h_p + 75$ mm.

CTF connectors are to be positioned perpendicular to the beam or at 45°

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



Tecnaria CTF Nailed Shear Connector	Annex C4 of European Technical Assessment ETA-18/0447
Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis	

When the steel decking is not continuous over the beam, b_0 is defined as indicated in the following figures:

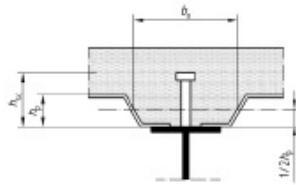


Figure 7.4a

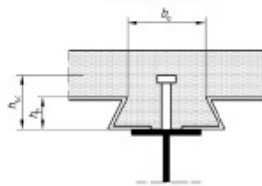


Figure 7.4b

It is necessary to take the haunch height equal to h_p , total height of the steel deck (cf. figures).

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

Tecnaria CTF Nailed Shear Connector	Annex C5 of European Technical Assessment ETA-18/0447
Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation perpendicular to beam axis, continued	

Design resistance: Effect of reduced base material thickness for CTF Connectors

Reduction of design resistance P_{Rd} with the factor $(t_{II,act} / 8)$ 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 CTF connectors for actual base material thickness $t_{II,act} < 8$ mm and a minimum thickness of 6 mm.

P_{Rd} = design resistance of the connectors

No extrapolation of above formula for base material thickness $t_{II,act} > 8$ 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 minimum yield strength of the old construction steel is less than 235 N/mm²

- minimum 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

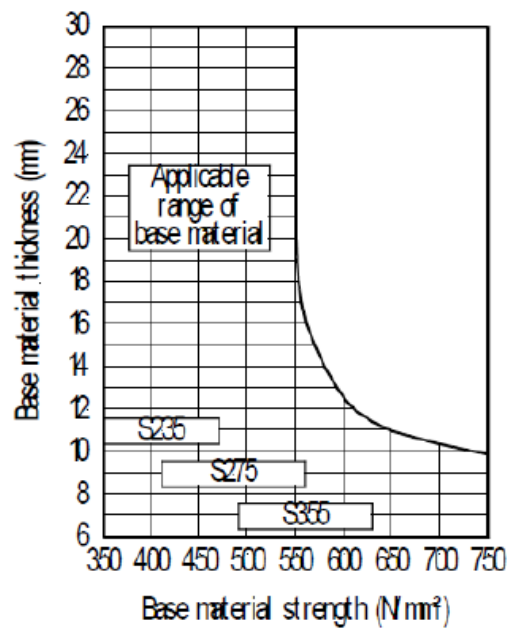
This reduction of resistance is not added to the possible reduction of resistance due to metal decking. The factor resulting in the largest reduction is used.

Tecnaria CTF Nailed Shear Connector

Effect of reduced base material thickness for Tecnaria CTF
Effect of reduced base material strength

**Annex C6
of European
Technical Assessment
ETA-18/0447**

Applicable range of base material



Base material:

Structural steel S235, S275 and S355 according to

EN 10025-1:2004; minimum thickness = 6 mm

DICHIARAZIONE DI PRESTAZIONE N. 18/0447

In accordo al regolamento UE n 305/2011

DECLARATION OF PERFORMANCE N. 18/0447

According to Regulation EU n. 305/211



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 20/3/2019

The logo for TECNARIA S.p.A. with a stylized signature in blue ink below it.

TECNARIA S.p.A. con unico azionista

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