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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

European Technical Assessment ETA-20/0440 of 2020/05/06

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:	STABEKO VFuse Nailed Shear Connector
Product family to which the above construction product belongs:	Nailed Shear Connector
Manufacturer:	Elascon GmbH Am Rosengarten 4F D-79183 Waldkirch Tel.: +49 (0) 7681 / 47 47 35-0 Internet: www.elascon.de
Manufacturing plant:	Elascon GmbH Manufacturing Plant I
This European Technical Assessment contains:	18 pages including 12 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) 200033-00-0602 Nailed Shear Connector
This version replaces:	

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
The nailed shear connector STABEKO VFuse (VF) is a mechanically attached shear connector for use in steel-to-concrete composite beams and in composite decks with profiled sheeting as an alternate to welded headed studs.

The nailed shear connector consists of an V-shaped cold-formed metal connector made from steel sheeting with a thickness of 3 mm which is folded and pressed into a "V" shaped form which is nailed to the supporting beam. The upstanding "wings" ensure contact with the integrated concrete slab. The 70 x 55 mm ribbed base plate has 4 holes into which high strength nails are placed to fix the connector to the metal structure. The holes in the wings are to be used to insert horizontally placed steel reinforcement bars. The connector is made of galvanized steel type DC03-ZE according to EN10152.

VFuse connectors are attached to the metal support by means of four SPIT HSBR14 nails inserted into the four holes in the base plate. They are fixed using a Spitfire Spit P560 Nailer fitted with a special kit made for this purpose. The anchorage wings embed in the concrete deck of the composite beam. The nailed shear connector can be used for composite beams with and without profiled composite decking.

The height of the anchorage is 100 mm or 125 mm in order to take the different thicknesses of the concrete slab as well as the different heights of composite deck into account.

The different models of the STABEKO VFuse are:
STABEKO VFuse 100 (VF 100) and STABEKO VFuse 125 (VF 125). The number in the product designation refers to the height of the wings.

The powder-actuated fasteners SPIT HSBR14 are made of zinc plated carbon steel with ultimate tensile strength = 2300 N/mm^2. The fasteners comprise of a pin with a shank diameter of 4.5 mm and they are assembled with one metal washer. The washer serves to guide the fastener while it is being driven into the base material and it contributes to the shear resistance. The powder-actuated fastening tools Spitfire Spit P560 Nailer is used in order to install the SPIT HSBR14 together with the STABEKO VFuse shear connector. The driving force of the fastening tool is provided by the power load of the cartridge. The application limit of the powder-actuated fastening system depends on the strength and thickness of the base material. The fastening tools (incl. cartridges) are an integral part of this assessment with regard to the capacity of the nailed shear connector STABEKO VFuse and the application of the respective system.

The nailed shear connectors can be placed in one or more rows along the length of the composite beams.

The shear connectors STABEKO VFuse and the powder-actuated fastener SPIT HSBR14 are detailed in Annexes A1 and A2.

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

The nailed shear connector STABEKO VFuse is intended to be used as connection device between steel and concrete in composite beams and composite decks according to EN 1994-1-1. The nailed shear connector can either be used in new buildings or for the renovation of existing buildings with the aim to increase the bearing capacity of aged floor constructions.

Shear connections of composite structures subject to static and quasi-static loading.

As the STABEKO VFuse is a ductile shear connector according to EN 1994-1-1, section 6.6, seismic loading is covered if the STABEKO VFuse 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.

The intended use is also specified in Annex A1 and B1 to B4.

Positioning of the connectors follows Annexes B5 to B8.

The installation is only carried out according to the manufacturer's instructions.

In combination with composite decking the steel sheeting is in direct contact with the steel base material in the area of the connection.

Cartridge selection and tool energy settings in order to match the application limit diagram are taken into account.
Installation tests are carried out (e.g. check of nail head standoff h_{nail}), provided the fitness of the recommended cartridge cannot be checked otherwise.

The performances given in Section 3 are only valid if the nailed shear connector is used in compliance with the specifications and conditions given in Annexes B1 to B8.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the nailed shear connector of at least 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 resistance in solid concrete decks, shear connector orientation parallel to beam axis	No Performance assessed
	Characteristic resistance in solid concrete decks, shear connector orientation perpendicular to beam axis	See annex C1
	Characteristic resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis	See annex C2
	Characteristic resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation parallel to beam axis	No Performance assessed
	Characteristic resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis	See annex C3
	Characteristic resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation perpendicular to beam axis	See annex C4
	Characteristic resistance of end anchorage of composite decks	No performance assessed
	Characteristic resistance for use in seismic areas under seismic actions according to EN 1998-1	See annex B1
	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	See annex C5
	Application limit	See annex B3
3.4	**Safety in case of fire (BWR2)**	
	Reaction to fire	The anchors are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364
	Resistance to fire	No Performance assessed

4 Attestation and verification of constancy of performance (AVCP)

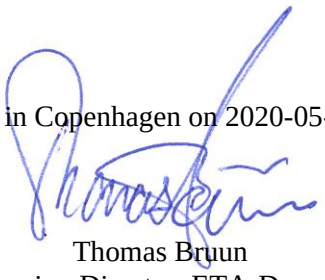
4.1 AVCP system

According to the decision 1998/214/EC the European Commission, 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

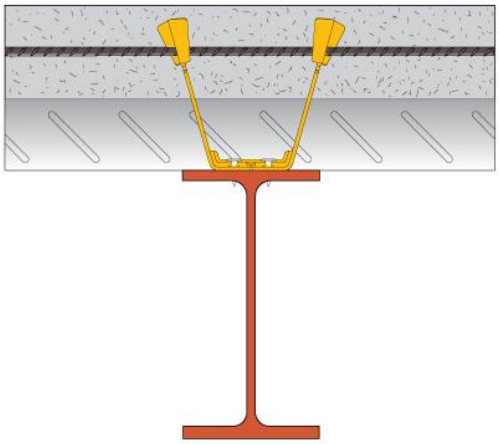
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2020-05-06 by

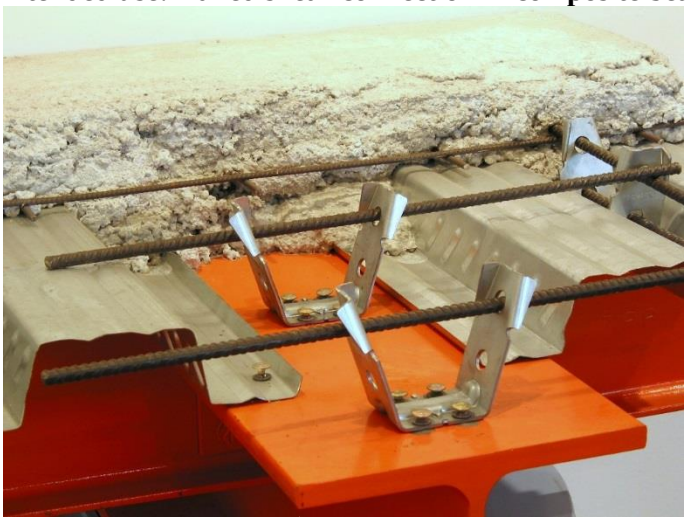


Thomas Bruun
Managing Director, ETA-Danmark

Nailed shear connector STABEKO VFuse with powder actuated fastener SPIT HSBR14



Example of intended use: Nailed shear connection in composite beam



STABEKO VFuse Nailed Shear Connector	**Annex A1** of European Technical Assessment ETA-20/0440
Product and intended use	

Types of STABEKO VFuse

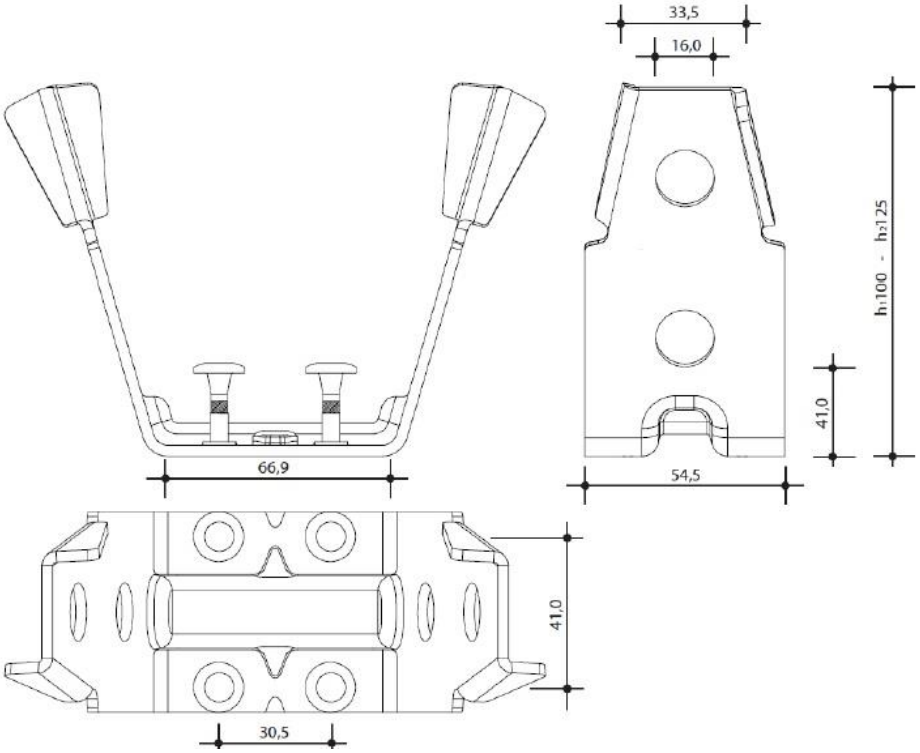
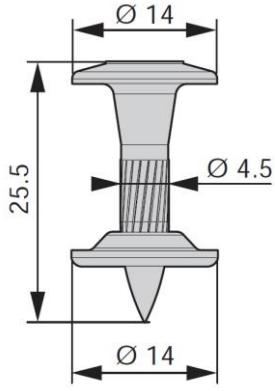


Table 1: Materials

Designation	Material
Shear connector STABEKO VFuse	Galvanised steel type DC03-ZE according to with thickness 3 mm according to EN EN 10152
Powder actuated fastener SPIT HSBR14 according to ETA-08/0040	Nail: Carbon steel Ultimate tensile strength: 2300 N/mm^2 Yield strength: 1600 N/mm^2 Mechanical zinc plating, min zinc coating 10 µm Hardness > 57 HRC Knurled shank Washer: min 8 µm zinc coating



STABEKO VFuse Nailed Shear Connector	Annex A2 of European Technical Assessment ETA-20/0440
Dimensions and materials	

Use:
The nailed shear connector STABEKO VFuse is intended to be used as connection device between steel and concrete in composite beams and composite decks according to EN 1994-1-1. The nailed shear connector can either be used in new buildings or for the renovation of existing buildings with the aim to increase the bearing capacity of aged floor constructions.

Shear connections of composite structures subject to:
- Static and quasi-static loading.
- As the STABEKO VFuse is a ductile shear connector according to EN 1994-1-1, section 6.6, seismic loading is covered if the STABEKO VFuse 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.

Base materials:
- Structural steel S235, S275 and S355 in qualities JR, JO, J2, K2 according to EN 10025-2. Minimum thickness of the beam flange: where nails are fixed, the steel thickness must be at least 6 mm
- Old steels which cannot be classified accordingly are still applicable provided these are made of unalloyed carbon steel with minimum yield strength f_y of 170 N/mm².

Concrete:
- Normal weight concrete C20/25 – C50/60 according to EN 206.
- Lightweight concrete LC20/22 - LC45-50 according to EN 206.

Composite decking:
- Steel for profiled sheeting follows EN 1993-1-3 and the material codes given there. The decking must be manufactured according to EN 10346 and have a yield strength between 220 and 355 N/mm².

Design:
- Design of the composite beams with STABEKO VFuse shear connectors is made according to EN 1994-1-1.
- The STABEKO VFuse shear connectors are ductile shear connectors according to EN 1994-1-1, section 6.6.
- The partial safety factor of $\gamma_V = 1.25$ is used provided no other values are given in national regulations of the member states.

Installation:
- The installation is only carried out according to the manufacturer's instructions.
- In combination with composite decking the steel sheeting is in direct contact with the steel base material in the area of the connection.
- Cartridge selection in order to match the application limit diagram are taken into account, see Annex B3.
- Installation tests are carried out (e.g. check of nail head standoff h_{nail}), provided the fitness of the recommended cartridge cannot be checked otherwise.

STABEKO VFuse Nailed Shear Connector	**Annex B1** of European Technical Assessment ETA-20/0440
Intended use - Specification	

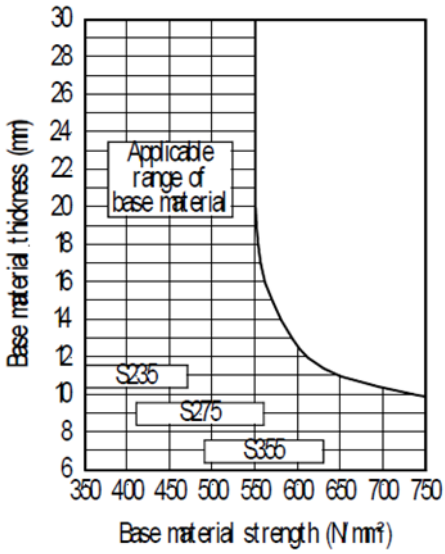
Powder-actuated fastening tools and cartridge, Spitfire P560 nail gun

Pin drive for VFuse connectors (Code 013955) Technical characteristics: Weight: 0.400 kg Total length: 102 mm	
Piston for VFuse connectors (Code 014137) Technical characteristics: Weight: 0.165 kg Total length: 180 mm **Ring stop** (Code 014136) Weight: 0.210 kg Diameter: 22 mm	

Safety cartridge calibre 6.3/16 M
Circular disc cartridges
Disc with 10 cartridges
Power: according to Standards NF E 71.100

- Yellow: medium load(ref. 031240)
- Blue: strong load (ref. 031230)
- Red: very strong load (ref. 031220)
- Black: extra strong load (ref. 031210)

Applicable range of base material



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

Cartridge selection

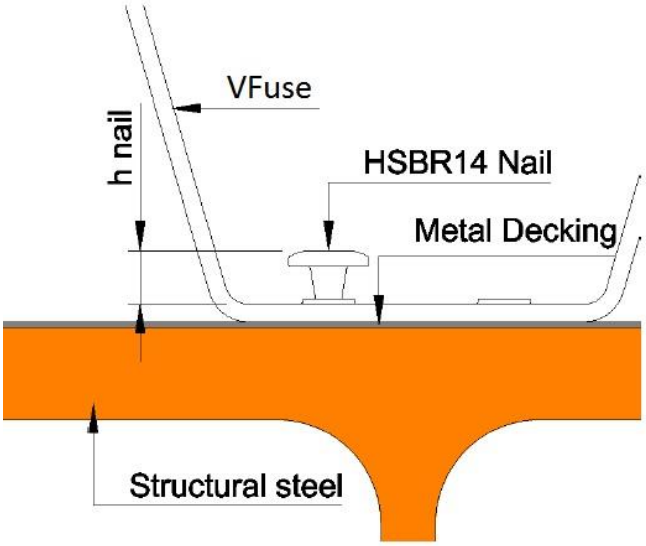
The type of cartridge to be used depends upon the thickness of the flange onto which the connectors are to be fixed and the steel grade of the profile. Consult the diagram below.

Flange thickness	S235	S275	S355
6.0	Yellow	Blue	Blue
6.5	Yellow	Blue	Blue
7.0	Yellow	Blue	Blue
7.5	Yellow	Blue	Blue
8.0	Yellow	Blue	Blue
8.5	Blue	Blue	Blue
9.0	Blue	Blue	Red
10.00	Blue	Blue	Red
10.20	Blue	Blue	Red
10.70	Blue	Blue	Red
11.50	Blue	Red	Black
12.70	Blue	Red	Black
13.50	Blue	Red	Black
14.60	Blue	Red	Black
16.00	Red	Black	Black
17.50	Red	Black	Black
19.00	Red	Black	Black

Table II

*Table II shows **indicative** values: we recommend carrying out tests on site to confirm the choice*

Checking nail penetration

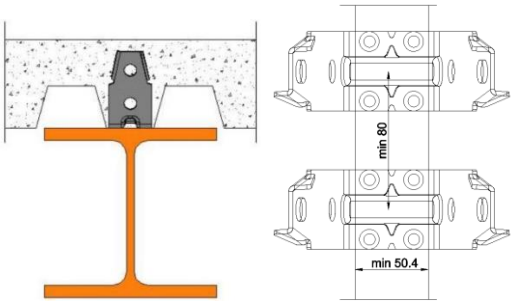


4.5 mm ≤ h nail ≤ 8.5 mm

STABEKO VFuse Nailed Shear Connector	**Annex B3** of European Technical Assessment ETA-20/0440
Application limit, cartridge selection and fastener inspection	

Composite beams without steel decking

As a rule, it is preferable to arrange the connectors transversely to the axis of the beam



Minimum thickness of the profile flange where the nails are to be fixed: 8 mm.

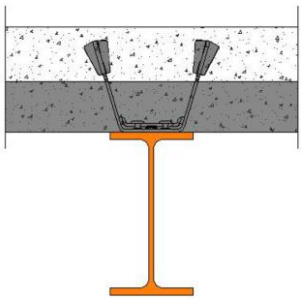
- Maximum longitudinal spacing of the connectors: 6 times the slab thickness or 800 mm
- Minimum spacing: 80 mm

Composite beams with steel decking

VF connectors must be fixed as in one of the following 3 ways.

- Pattern 1:

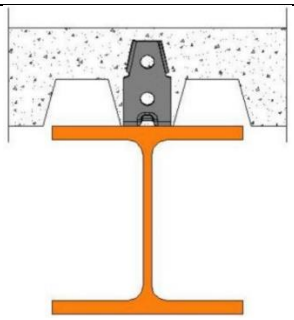
The connector is placed parallel to the ribs of the decking and perpendicular to the beam when the decking is positioned with the ribs perpendicular to the beam.



- Pattern 2:

The connector is placed parallel to the ribs of the decking and the beam when the decking is positioned with the ribs parallel to the beam and runs unbrokenly over the beam (the sheet is continuous).

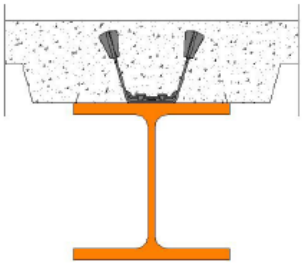
This direction of installation is possible even if the decking is not continuous.



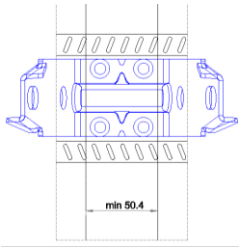
- Pattern 3:

The connector is placed perpendicular to the ribs of the sheet decking and perpendicular to the beam.

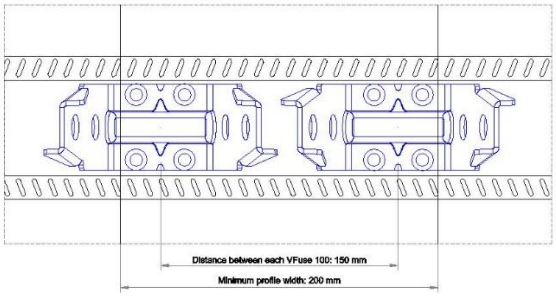
- Maximum longitudinal spacing of the connectors: 6 times the slab thickness or 800 mm
- Minimum spacing: 80 mm



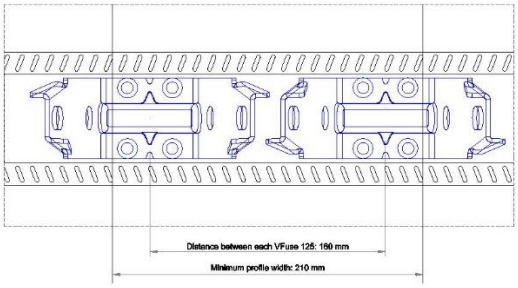
Minimum width of the beam for VF 100 and 125:



Minimum width of the beam for two VF 100:



Minimum width of the beam for two VF 125:



STABEKO VFuse Nailed Shear Connector	**Annex B4** of European Technical Assessment ETA-20/0440
Positioning in composite beams with solid concrete slabs	

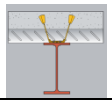
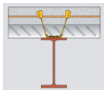
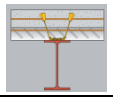
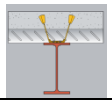
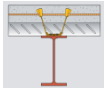
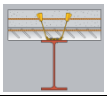
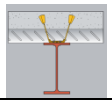
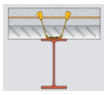
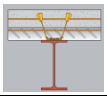
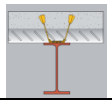
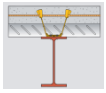
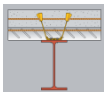
Table C1 Characteristic and design resistance in solid concrete decks, shear connector orientation perpendicular to beam axis [1) and 2)]

Concrete class	Characteristic Resistance P_{rk} [kN]	Design resistance P_{Rd} [kN]	Minimum base material thickness [mm]	STABEKO VFuse 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		

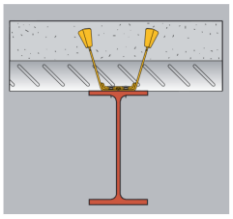
1) in the absence of other national regulation, a partial safety factor of $\gamma_V = 1{,}25$ applies
2) Lightweight concrete with a minimum density $\rho = 1750$ kg/m^3

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

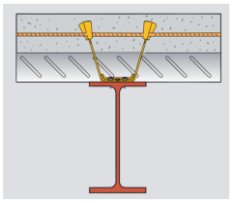
Table C2 Design resistance in composite decks – decking ribs perpendicular to beam axis – shear connector orientation perpendicular to beam axis

VF positioning		Concrete class	Design resistance P_{Rd} [kN] (3)	Ductility assessment
Type of connector (1)	type of metal deck			
VF 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	
VF 100 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	36.4	
		C30/37	40.2	
		C35/45	40.2	
VF 100 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	37.8	
		C30/37	43.6	
		C35/45	43.6	
VF 125 without rebar 		C25/30 or LC20/22-LC50/55	38.2	
		C30/37	43.2	
		C35/45	43.2	
VF 125 with 1 rebar Ø10 		C25/30 or LC20/22-LC50/55	40.6	
		C30/37	48.1	
		C35/45	48.1	
VF 125 with 2 rebars Ø10 		C25/30 or LC20/22-LC50/55	39.2	
		C30/37	45.2	
		C35/45	45.2	
VF 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	$= k_t \times 57{,}1$	
VF 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	$= k_t \times 56{,}4$	
VF 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	$= k_t \times 61{,}2$	
VF 125 without rebar 		C25/30 or LC20/22-LC50/55	$= k_t \times 44{,}9$	
		C30/37	$= k_t \times 50{,}8$	
		C35/45	$= k_t \times 50{,}8$	
VF 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	$= k_t \times 56{,}6$	
VF 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	$= k_t \times 53{,}2$	

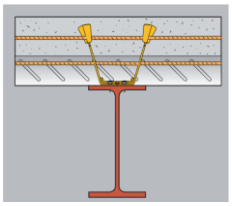
(1) Connector without rebar:



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

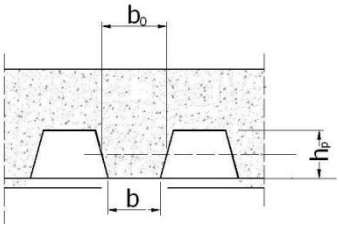


Connector with two rebars: fixed with 2 transversely placed Ø 10 mm reinforcement bars, the upper 600mm long, the lower 780mm long



(2) Conditions (2) of the table above. Metal deck with:

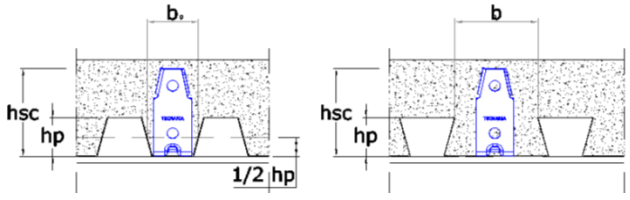
- Height of rib (h_p): maximum 60 mm
- Base width (b): 55 mm or more
- Width b_0 of rib (at mid-point for open trough decking or at the top for re-entrant trough decking): minimum 70 mm.



(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.

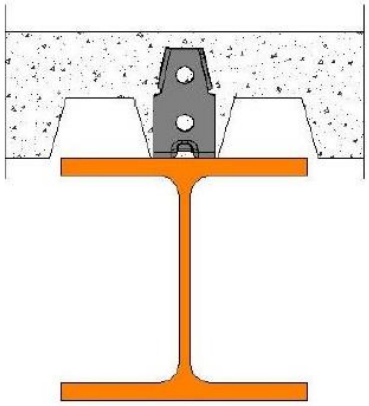
The other symbols are defined in the following figure:



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

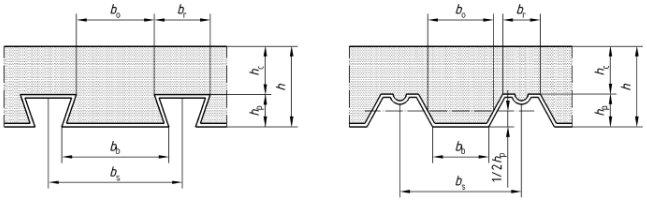
Table C3. Design resistance in composite decks – decking ribs parallel to beam axis – shear connector orientation parallel to beam axis

VF positioning	Type of connector	Concrete class	Design resistance Prd [kN] (1)	Ductility assessment
	VF 100 without rebar	C25/30 or LC20/22-LC50/55	= k_{l1} x 69.8 ≤ 46.1	Ductile according to EN 1994-1-1
		C30/37	= k_{l1} x 81.4 ≤ 53.8	
		C35/45	= k_{l1} x 81.4 ≤ 61.3	
	VF 100 with 1 rebar Ø10	C25/30 or LC20/22-LC50/55	= k_{l1} x 72.8≤ 46.1	
		C30/37	= k_{l1} x 80.4 ≤ 53.8	
		C35/45	= k_{l1} x 80.4 ≤ 61.3	
	VF 100 with 2 rebars Ø10	C25/30 or LC20/22-LC50/55	= k_{l1} x 75.6≤ 46.1	
		C30/37	= k_{l1} x 87.2 ≤ 53.8	
		C35/45	= k_{l1} x 87.2 ≤ 61.3	
	VF 125 without rebar	C25/30 or LC20/22-LC50/55	= k_{l1} x 47.8≤ 46.1	
		C30/37	= k_{l1} x 54.0 ≤ 53.8	
		C35/45	= k_{l1} x 54.0 ≤ 61.3	
	VF 125 with 1 rebar Ø10	C25/30 or LC20/22-LC50/55	= k_{l1} x 50.8≤ 46.1	
		C30/37	= k_{l1} x 60.1 ≤ 53.8	
		C35/45	= k_{l1} x 60.1 ≤ 61.3	
	VF 125 with 2 rebars Ø10	C25/30 or LC20/22-LC50/55	= k_{l1} x 49.0≤ 46.1	
		C30/37	= k_{l1} x 56.5 ≤ 53.8	
		C35/45	= k_{l1} x 56.5 ≤ 61.3	

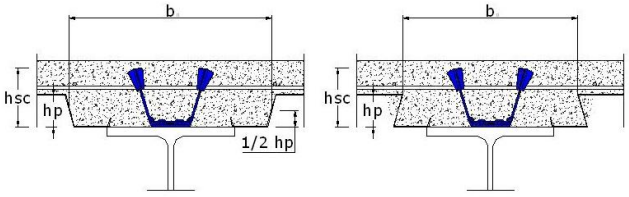
(1)

$$k_{l1} = 0.6 \cdot \frac{b_0 - 54.5}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1 \quad \text{(measures in mm)}$$

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:



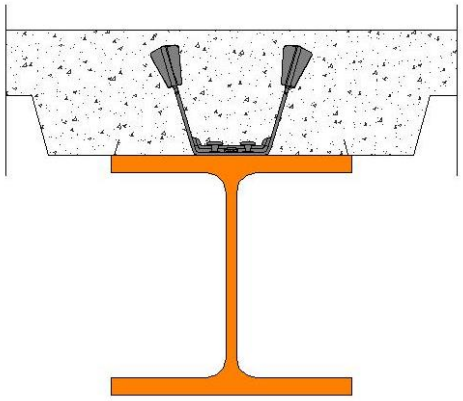
When the steel decking is not continuous, b_0 is defined as indicated in the following figure:



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

STABEKO VFuse Nailed Shear Connector	**Annex C3** of European Technical Assessment ETA-20/0440
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

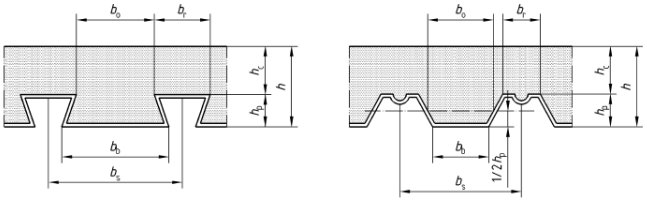
VF positioning	Type of connector	Concrete class	Design resistance Prd [kN] (1)	Ductility assessment
	VF 100 without rebar	C25/30 or LC20/22-LC50/55	= k_{l2} x 69.8 ≤ 46.1	Ductile according to EN 1994-1-1
		C30/37	= k_{l2} x 81.4 ≤ 53.8	
		C35/45	= k_{l2} x 81.4 ≤ 61.3	
	VF 100 with 1 rebar d10	C25/30 or LC20/22-LC50/55	= k_{l2} x 72.8 ≤ 46.1	
		C30/37	= k_{l2} x 80.4 ≤ 53.8	
		C35/45	= k_{l2} x 80.4 ≤ 61.3	
	VF 100 with 2 rebars d10	C25/30 or LC20/22-LC50/55	= k_{l2} x 75.6 ≤ 46.1	
		C30/37	= k_{l2} x 87.2 ≤ 53.8	
		C35/45	= k_{l2} x 87.2 ≤ 61.3	
	VF 125 without rebar	C25/30 or LC20/22-LC50/55	= k_{l3} x 47.8 ≤ 46.1	
		C30/37	= k_{l3} x 54.0 ≤ 53.8	
		C35/45	= k_{l3} x 54.0 ≤ 61.3	
	VF 125 with 1 rebar d10	C25/30 or LC20/22-LC50/55	= k_{l3} x 50.8 ≤ 46.1	
		C30/37	= k_{l3} x 60.1 ≤ 53.8	
		C35/45	= k_{l3} x 60.1 ≤ 61.3	
	VF 125 with 2 rebars d10	C25/30 or LC20/22-LC50/55	= k_{l3} x 49.0 ≤ 46.1	
		C30/37	= k_{l3} x 56.5 ≤ 53.8	
		C35/45	= k_{l3} x 56.5 ≤ 61.3	

(1)

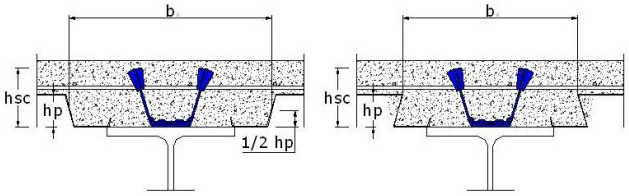
$$k_{l2} = 0.6 \cdot \frac{b_0 - 100}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1 \quad \text{(measures in mm)}$$

$$k_{l3} = 0.6 \cdot \frac{b_0 - 107}{h_p} \cdot \left(\frac{h_{sc}}{h_p} - 1 \right) \leq 1$$

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.

STABEKO VFuse Nailed Shear Connector	**Annex C4** of European Technical Assessment ETA-20/0440
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 STABEKO VFuse 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 VFuse 100 and VFuse 125 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/mm^2

- minimum yield strength f_y= 170 N/mm^2
  $P_{Rd,red} = \alpha_{BM,red} \times P_{Rd}$
  $\alpha_{BM,red} = 0.81$
  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.

STABEKO VFuse Nailed Shear Connector	**Annex C5** of European Technical Assessment ETA-20/0440
Effect of reduced base material thickness for STABEKO VFuse 100 – 125 Effect of reduced base material strength	