

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-16/0430**  
**of 15 May 2017**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

WELDA ®

Product family  
to which the construction product belongs

Steel plate with cast-in anchors

Manufacturer

PEIKKO GROUP CORPORATION  
Voimakatu 3  
15101 Lahti  
FINNLAND

Manufacturing plant

Peikko Group Corporation  
Voimakatu 3  
15101 Lahti

This European Technical Assessment  
contains

14 pages including 3 annexes which form an integral part  
of this assessment

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

European Assessment Document (EAD)  
330084-00-0601

**European Technical Assessment**

**ETA-16/0430**

English translation prepared by DIBt

**Page 2 of 14 | 15 May 2017**

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## Specific Part

### 1 Technical description of the product

The WELDA steel plate with welded on anchors consist of steel and stainless steel.

The anchors have a diameter of the shaft of 10, 12, 13, 16, 19, 20, 22 and 25 mm. At one end a head is formed by upsetting. The other end is prepared for drawn arc stud welding with ceramic ferrule or shielding gas (method 783 according to EN ISO 4063:2002-02).

The steel plates with welded on anchors are embedded surface-flush in the concrete.

The product description is given in Annex A.

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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

#### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistances under static and quasi-static loads and displacements	See Annex C1 to C2

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1

### 4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 330084-00-0601, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

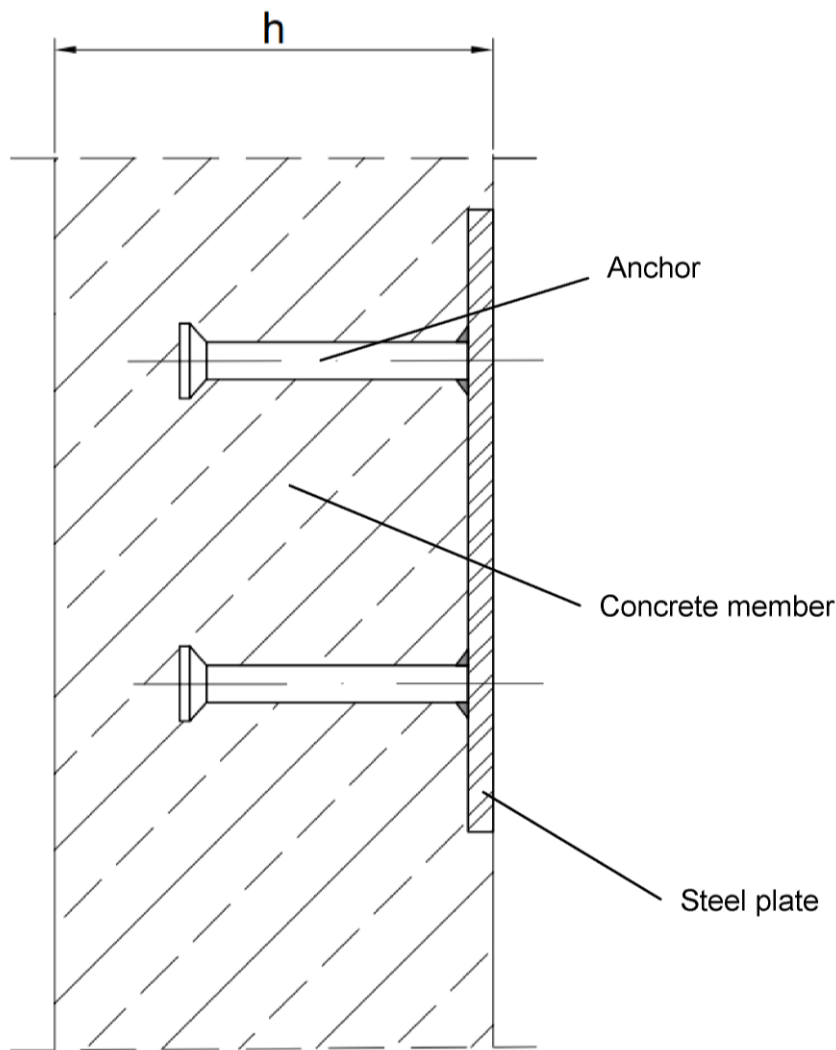
**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 15 May 2017 by Deutsches Institut für Bautechnik

Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Müller



**h** = thickness of concrete member

**WELDA®** = Steel plate with welded on anchors  
made of steel or stainless steel

**WELDA®**

Product description  
Installation condition

**Annex A1**

**Table 1: Materials**

	Part	Designation	Type	Material	Mechanical properties
WELDA®	Plate	Steel plate	P1	Steel S235JR, S235J0 S235J2, S355JR, S355J0, S355J2, S355K2 EN 10025-2:2005	EN 10025-2:2005
			P2	Stainless steel 1.4301 1.4303, 1.4306, 1.4307 EN 10088-1:2014	EN 10088-1:2014
			P3	Stainless steel 1.4401, 1.4404, 1.4432, 1.4436, 1.4439, 1.4571 EN 10088-1:2014	EN 10088-1:2014
	Anchor	Headed studs EN ISO 13918 Types SD1, SD3	W1	SD1, Material group 1 with the limits: C ≤ 0,2 %; CEV ≤ 0,35; Al ≥ 0,02 % ISO/TR 15608:2013	$f_{uk} \geq 450 \text{ N/mm}^2$ $f_{yk} \geq 350 \text{ N/mm}^2$
			W2	SD3, Stainless steel 1.4301, 1.4303 EN 10088-1:2014	$f_{uk} \geq 500 \text{ N/mm}^2$ $f_{yk} \geq 350 \text{ N/mm}^2$
		Anchor bolts with smooth shaft provided with an anchor head	W3	Steel S235J2, S355J2 EN 10025:2011	$f_{uk} \geq 450 \text{ N/mm}^2$ $f_{yk} \geq 350 \text{ N/mm}^2$
			W4	Stainless steel 1.4301 1.4303, 1.4306, 1.4307 EN 10088-1:2014	$f_{uk} \geq 450 \text{ N/mm}^2$ $f_{yk} \geq 350 \text{ N/mm}^2$
			W5	Stainless steel 1.4401, 1.4404, 1.4432, 1.4436, 1.4439, 1.4571 EN 10088-1:2014	$f_{uk} \geq 450 \text{ N/mm}^2$ $f_{yk} \geq 350 \text{ N/mm}^2$
		Anchor bolts of ribbed reinforcing steel provided with an anchor head	W6	Reinforcing steel B500B EN 1992-1-1:2004 +AC:2010, Annex C	$f_{uk} \geq 550 \text{ N/mm}^2$ $f_{yk} \geq 500 \text{ N/mm}^2$

**Table 2: Dimensions**

WELDA® Anchor Type		W1 – W5								W6		
Nominal size diameter of shafts	d [mm]	10	12	13	16	19	20	22	25	16	20	25
Minimum nominal diameter of anchor head	min $d_h$ [mm]	19	24	25	32	40	40	35	40	38	46	55
Thickness of the anchor head (Headed studs)	$t_h$ [mm]	7	8	8	8	10	10	10	12	-	-	-
Thickness of the anchor head (Anchor bolts)	$t_h$ [mm]	3	3	-	4	-	5	-	-	4	4	4
Nominal length of anchor	min $h_{nom}$ [mm]	50	50	50	50	75	75	75	75	50	75	75
	max $h_{nom}$ [mm]	200	200	400	525	525	525	525	525	800	800	1000

**WELDA®**

Product description  
Dimensions, materials

**Annex A2**

**Table 3: Steel plate and anchor combinations**

	Product name	Plate	Anchors
1	WELDA <sup>®</sup>	P1	W1/W3
2	WELDA <sup>®</sup> R	P2	W1/W3
3	WELDA <sup>®</sup> Rr	P2	W2/W4
4	WELDA <sup>®</sup> A	P3	W1/W3
5	WELDA <sup>®</sup> Ar	P3	W2/W4
6	WELDA <sup>®</sup> Aa	P3	W5
7	WELDA <sup>®</sup> Strong	P1	W6
8	WELDA <sup>®</sup> Strong R	P2	W6
9	WELDA <sup>®</sup> Strong A	P3	W6

### Marking of product

Products are marked with identifying mark of producer with a product name on the visible face of steel plate.

Example from marking



WELDA<sup>®</sup> 150 x 150 Aa

**WELDA<sup>®</sup>**

Product description  
Steel plate and anchor combinations, Product Marking

**Annex A3**

## Specifications of intended use

### Loading of steel plate with welded on anchors subject to:

- Static and quasi-static loads in tension and shear.

### Base materials:

- Reinforced normal weight concrete according to EN 206.
- Strength classes C20/25 to C90/105 according to EN 206.
- Cracked or non-cracked concrete.

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions:  
=> steel plates and anchors acc. Annex A3, Table 3, Lines 1-9
- Structures subject to external atmospheric exposure or damp internal conditions if no particular aggressive conditions such as permanent or alternate immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulfurization plants or road tunnels, where de-icing materials are used) exist.  
=> steel plates and anchors acc. Annex A3, Table 3, Line 6

### Design:

- Steel plate with cast-in anchors are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchors are indicated on the design drawings (e.g. position of the anchor relative to the reinforcement or to supports).
- For static and quasi-static loading the steel plate with cast-in anchors are designed in accordance with CEN/TS 1992-4-2:2009.
- It is generally assumed that the concrete is cracked and that the occurring splitting forces are resisted by the reinforcement. The required cross section of the minimum reinforcement is determined according CEN/TS 1992-4-2:2009 section 6.2.6.2 b).

### Installation:

#### Placing steel plates into concrete

- The installation of anchors is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the product only as supplied by the manufacturer.
- Installation in accordance with the manufacturer's specifications given in Annexes B4 and B5.
- The anchorages are fixed on the formwork, reinforcement or auxiliary construction such that no movement of the product will occur during the time of laying the reinforcement and of placing and compacting the concrete.
- The concrete under the head of the anchors are properly compacted.
- For large fixtures (steel plate > 400 mm x 400 mm) vent openings are provided, specified in the design drawings.

WELDA®

Intended use  
Specifications

Annex B1



**Table 4: Installation parameters**

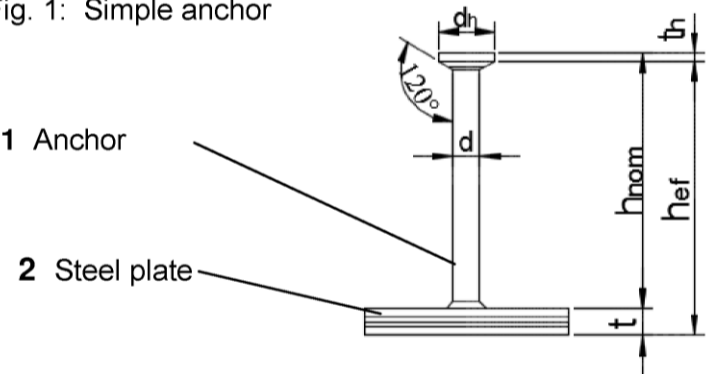
WELDA® Anchor Type Nominal size d [mm]		W1 – W5								W6		
		10	12	13	16	19	20	22	25	16	20	25
Anchorage depth	min h <sub>ef</sub> mm	50	50	50	50	75	75	75	75	50	75	75
Minimum spacing	s <sub>min</sub> [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum edge distance	c <sub>min</sub> [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum thickness of concrete member	h <sub>min</sub> [mm]	h <sub>ef</sub> + t <sub>h</sub> + c <sub>nom</sub> <sup>1)</sup>										
<sup>1)</sup> c <sub>nom</sub> = required concrete cover according to national regulations												

**WELDA®**

Intended use  
Installation parameters

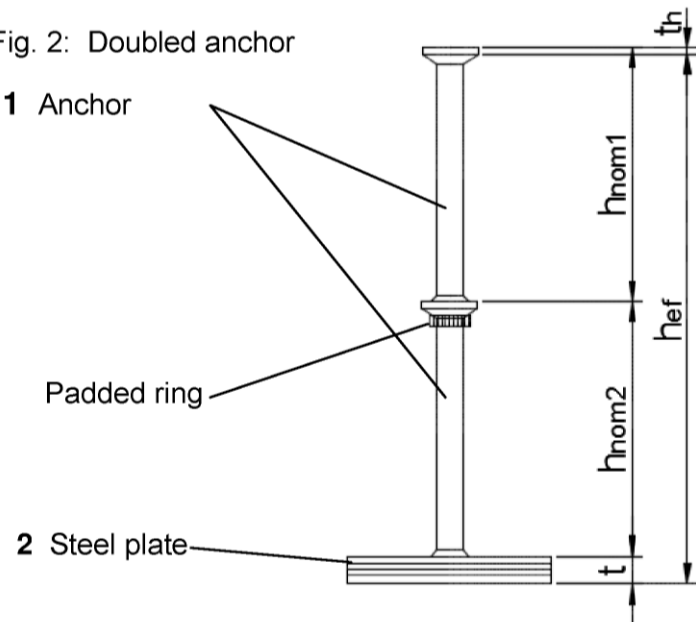
**Annex B2**

Fig. 1: Simple anchor



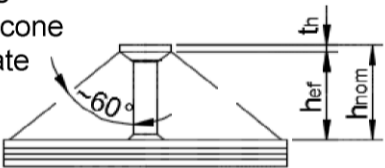
$$h_{ef} = h_{nom} - t_h + t \quad (1)$$

Fig. 2: Doubled anchor



$$h_{ef} = h_{nom1} + h_{nom2} - t_{h2} + t \quad (2)$$

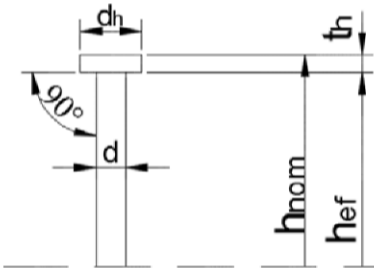
Fig. 3: Short anchor, if the  
theoretic concrete cone  
meets the steel plate  
at angle of  $\sim 60^\circ$   
or  $t \geq 0,2h_{nom}$



$$h_{ef} = h_{nom} - t_h \quad (3)$$

- d** = diameter of shaft  
**d<sub>h</sub>** = diameter of head  
**h<sub>ef</sub>** = effective embedment depth  
**h<sub>nom</sub>** = nominal length of the anchor (after welding)  
**t<sub>h</sub>** = thickness of the head  
**t** = thickness of the steel plate

Alternative head form:



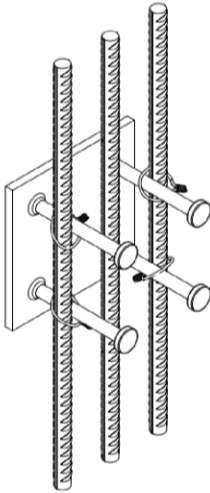
**WELDA®**

Intended use  
Effective embedment depth

**Annex B3**

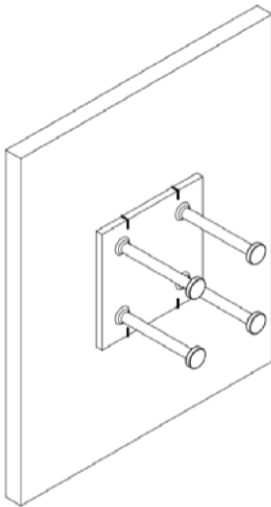
## Installation instruction

### 1a Fixing WELDA® to reinforcement



- Fix WELDA® to reinforcement or to mounting bars by using wire bindings
- Pay attention strong fixing to avoid moving during pouring

### 1b Fixing WELDA® to formwork



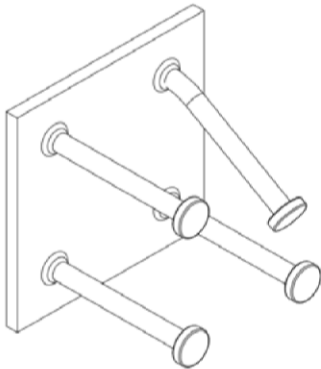
- Fix WELDA® directly to formwork by nails, screws, wire or magnets
- Control close contact between plate and formwork
- Pay attention strong fixing to avoid moving during pouring

**WELDA®**

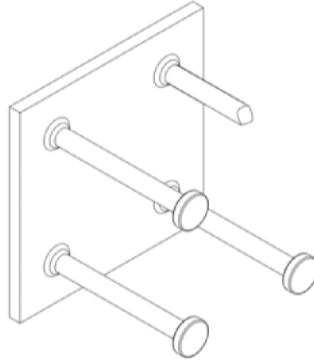
Intended use  
Installation instruction

**Annex B4**

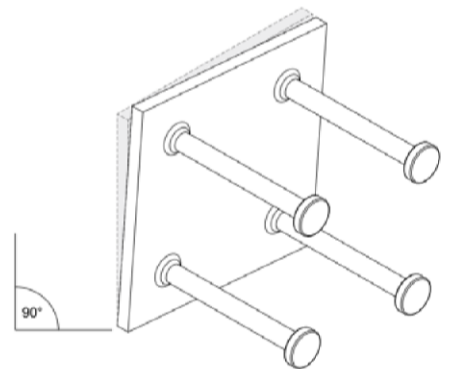
## 2 Check WELDA® after installation



Not allowed

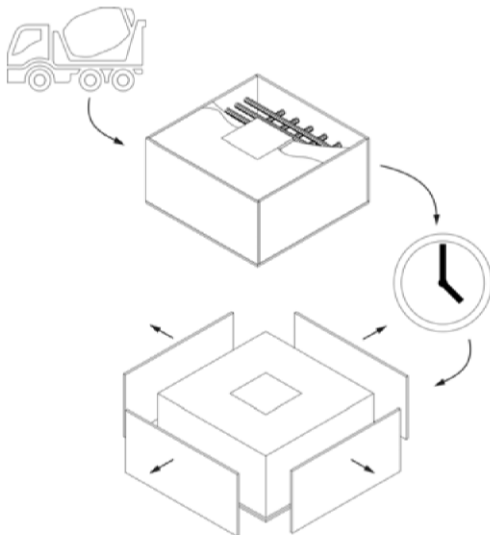


Not allowed



Not allowed

## 3 Pouring, compacting and curing concrete, remove formwork



- Compact concrete properly around and under the steel plate and anchors
- Avoid contact between the steel plate with anchor and the vibrator to avoid moving of the steel plate during compacting

**WELDA®**

Intended use  
Installation instruction

**Annex B5**

**Table 5: Characteristic resistances under tension load**

WELDA® Anchor Type		W1 – W5								W6		
Nominal size	d [mm]	10	12	13	16	19	20	22	25	16	20	25
Steel failure												
Characteristic resistance	N <sub>Rk,s</sub> [kN]	35	51	60	90	128	141	171	221	111	173	270
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	1,54								1,4		
Pull-out failure (C20/25) for cracked concrete												
diameter of anchor head	d <sub>h</sub> [mm]	19	24	25	32	40	40	35	40	38	46	55
Characteristic resistance	N <sub>Rk,p</sub> [kN]	31	51	54	90	146	141	87	115	140	202	283
Increasing factors Ψ for the	C25/30	1,20										
characteristic pull-out	C30/37	1,48										
resistance	C35/45	1,80										
	C40/50	2,00										
	C45/55	2,20										
	≥ C50/60	2,40										
Partial safety factor	γ <sub>Mp</sub> <sup>1)</sup>	1,5										
Concrete cone failure / splitting due to loading												
Effective embedment depth	h <sub>ef</sub> [mm]	h <sub>nom</sub> – t <sub>h</sub> + t <sup>3)</sup>										
Characteristic spacing	S <sub>cr,N</sub> = S <sub>cr,sp</sub> [mm] 2)	3 h <sub>ef</sub>										
Characteristic edge distance	C <sub>cr,N</sub> = C <sub>cr,sp</sub> [mm] 2)	1,5 h <sub>ef</sub>										
factor for cracked concrete	k <sub>cr</sub> [-]	8,5										
factor for non-cracked concrete	k <sub>ucr</sub> [-]	11,9										
Partial safety factor	γ <sub>Mc</sub> <sup>1)</sup>	1,5										
Blow-out failure												
Partial safety factor	γ <sub>Mcb</sub> <sup>1)</sup>	1,5										

1) In absence of other national regulations

2) Reinforcement resists the splitting forces and limits the crack width to  $w_w \leq 0.3$  mm

3) For simple anchors (For doubled anchors resp. short anchors see Fig. 2 resp. Fig. 3, Annex B3)

**Table 6: Displacement under tensile load**

WELDA® Anchor Type		W1 – W5								W6		
Nominal size	d [mm]	10	12	13	16	19	20	22	25	16	20	25
Displacements <sup>1)</sup> to 0,9 mm under following loads in [kN]	$N_{0,9mm}$ [kN]	13	19	20	33	50	52	65	85	52	82	128
1) The indicated displacements are valid for short term loading, the displacements may increase under long term loading to 1.8 mm												

**WELDA®**

Performance data  
Carasteristic resistances and displacements under tension load

**Annex C1**

**Table 7 Characteristic resistances under shear load**

WELDA® Anchor Type		W1 – W5								W6		
Nominal size	d [mm]	10	12	13	16	19	20	22	25	16	20	25
<b>Steel failure</b>												
Characteristic resistance	$V_{Rk,s}$ [kN]	21	31	36	54	77	85	103	133	66	104	162
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>	1,29								1,5		
<b>Concrete pry-out failure</b>												
Factor according CEN/TS 1992-4-2:2009, section 6.3.4 without supplementary reinforcement	$k_3$ <sup>2)</sup>	2,0										
Partial safety factor	$\gamma_{Mcp}$ <sup>1)</sup>	1,5										
<b>Concrete edge failure</b>												
Effective length of anchor	$l_f = h_{ef}$ [mm]	$h_{nom} - t_h + t$ <sup>3)</sup>										
Effective outside diameter	$d_{nom} = d$ [mm]	10	12	13	16	19	20	22	25	16	20	25
Partial safety factor	$\gamma_{Mc}$ <sup>1)</sup>	1,5										

<sup>1)</sup> In absence of other national regulations

<sup>2)</sup> In case of supplementary reinforcement the factor  $k_3$  should be multiplied with 0.75

<sup>3)</sup> For simple anchors (For doubled anchors resp. short anchors see Fig. 2 resp. Fig. 3, Annex B3)

**Table 8: Displacements under shear load**

WELDA® Anchor Type		W1 – W5								W6		
Nominal size	d [mm]	10	12	13	16	19	20	22	25	16	20	25
Displacements <sup>1)</sup> to 1,5 mm under following loads in [kN]	$V_{1,5mm}$ [kN]	11	16	20	29	40	45	54	70	30	45	72
1) The indicated displacements are valid for short term loading, the displacements can be increased under long term loading to 2.0 mm.												

Combined tension and shear load

The factor according CEN/TS 1992-4-2:2009 section 6.4.1.3:  $k_7 = 2/3$

**WELDA®**

Performance data  
Characteristic resistance and displacements under shear load, combined tension and shear load

**Annex C2**