Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment ETA-16/0430 of 26 March 2018

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 Herstellwerke
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	EAD 330084-00-0601
This version replaces	ETA-16/0430 issued on 28 August 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, method 135 and method 138 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	Anchorages 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

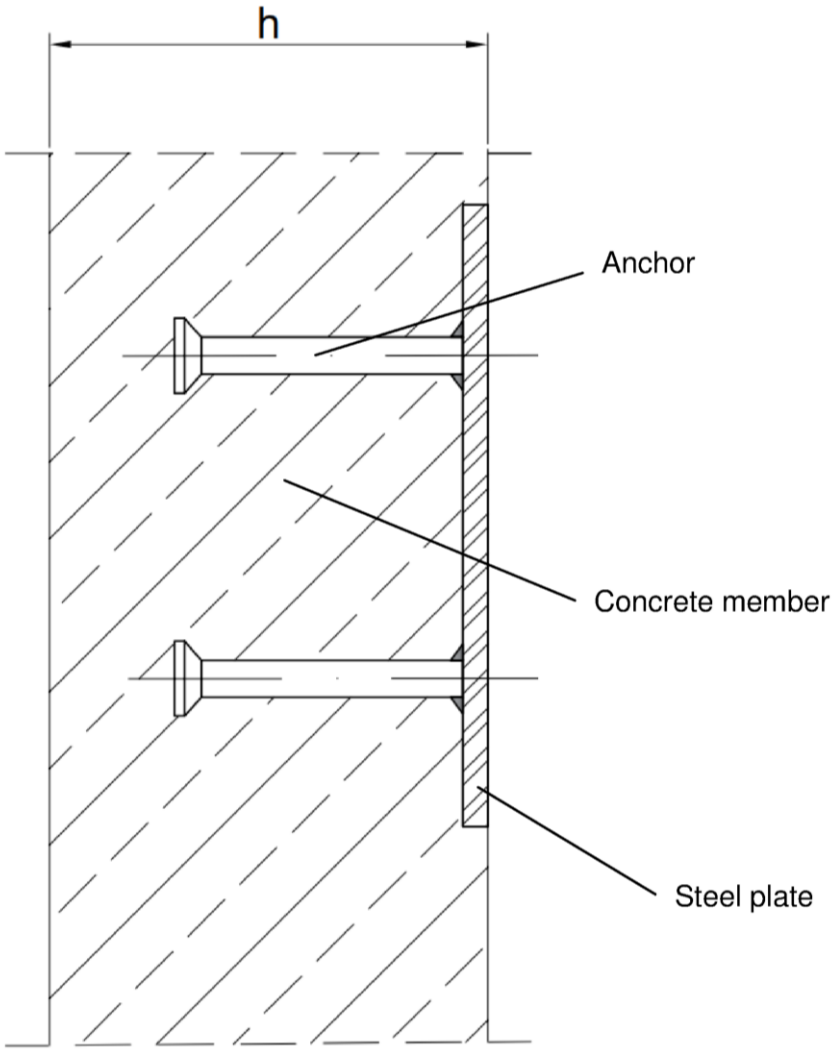
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 26 March 2018 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt
p. p. Head of Department

beglaubigt:
Müller

Deutsches Institut für Bautechnik DIBt



h = **thickness of concrete member**

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

WELDA®	**Annex A1**
Product description Installation condition	

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Table 1: Materials, welding processes

	Part	Designation	Type	Material	Mechanical properties
WELDA®	Plate	Steel plate see below	P1	Steel S235JR, S235J0 S235J2, S355JR, S355J0,S355J2, S355K2 EN 10025-2:2005	according to EN 10025-2:2005
			P2	Stainless steel 1.4301 1.4303, 1.4306, 1.4307 EN 10088-1:2014	according to EN 10088-1:2014
			P3	Stainless steel 1.4401, 1.4404, 1.4432, 1.4436, 1.4439, 1.4571 EN 10088-1:2014	according to EN 10088-1:2014
	Anchor	Headed studs EN ISO 13918 Types SD1, SD3 Welding process 783 according to EN ISO 4063:2002	W1	SD1, Material group 1 with the limits: C ≤ 0,2 %; CEV ≤ 0,35; Al ≥ 0,02 % ISO/TR 15608:2013	$f_{uk} \geq 450$ N/mm² $f_{yk} \geq 350$ N/ mm²
			W2	SD3, Stainless steel 1.4301, 1.4303 EN 10088-1:2014	$f_{uk} \geq 500$ N/mm² $f_{yk} \geq 350$ N/ mm²
		Anchor bolts with smooth shaft provided with an anchor head Welding process 135 and 138 according to EN ISO 4063:2002	W3	Steel S235J2, S355J2 EN 10025:2011	$f_{uk} \geq 450$ N/mm² $f_{yk} \geq 350$ N/ mm²
			W4	Stainless steel 1.4301 1.4303, 1.4306, 1.4307 EN 10088-1:2014	$f_{uk} \geq 450$ N/mm² $f_{yk} \geq 350$ N/ mm²
			W5	Stainless steel 1.4401, 1.4404, 1.4432, 1.4436, 1.4439, 1.4571 EN 10088-1:2014	$f_{uk} \geq 450$ N/mm² $f_{yk} \geq 350$ N/ mm²
		Anchor bolts of ribbed reinforcing steel provided with an anchor head Welding process 135 and 138 according to EN ISO 4063:2002	W6	Reinforcing steel B500B EN 1992-1-1:2004 +AC:2010, Annex C	$f_{uk} \geq 550$ N/mm² $f_{yk} \geq 500$ N/ mm²

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	32	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, welding processes, materials

Annex A2

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Table 3: Steel plate and anchor combinations

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

peikko® group

WELDA® 150 x 150 Aa

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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 206:1-2000.
- Strength classes C20/25 to C90/105 according to EN 206:1-2000.
- 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®	Annex B1
Intended use Specifications	

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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_{ef} mm]	50	50	50	50	75	75	75	75	50	75	75
Minimum spacing	s_{min} [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum edge distance	c_{min} [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum thickness of concrete member	h_{min} [mm]	$h_{ef} + t_h + c_{nom}$ [1)]										

[1)] c_{nom} = required concrete cover according to national regulations

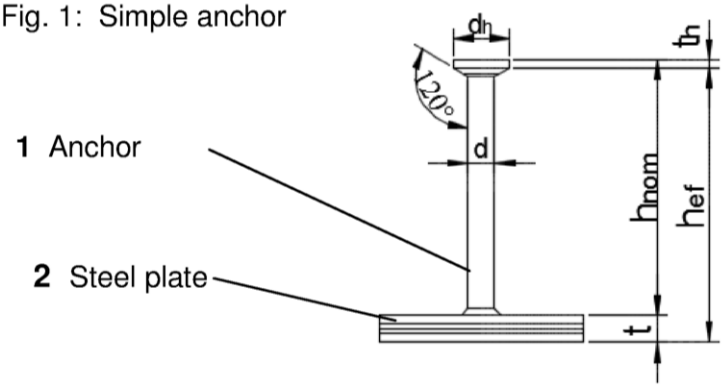
WELDA®

Intended use
Installation parameters

Annex B2

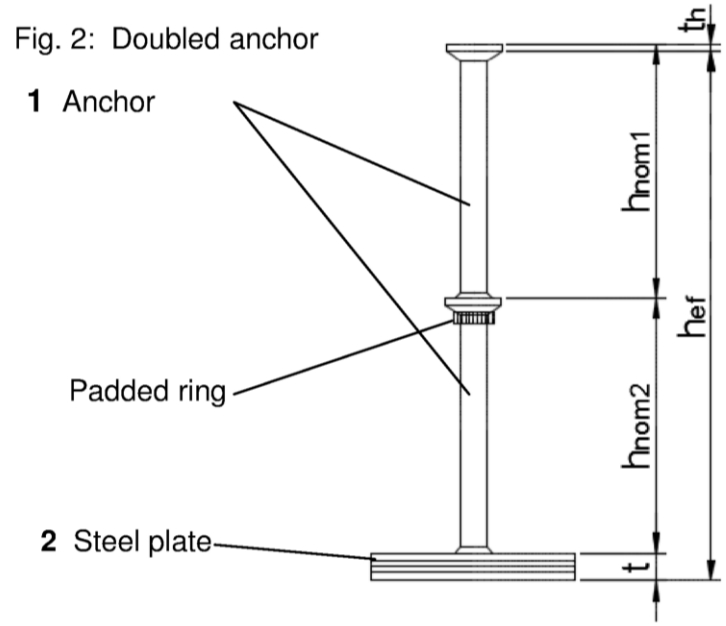
Deutsches Institut für Bautechnik DIBt

Fig. 1: Simple anchor



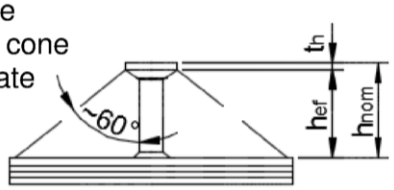
$$h_{ef} = h_{nom} - t_h + t \qquad (1)$$

Fig. 2: Doubled anchor



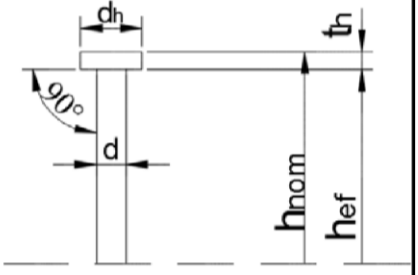
$$h_{ef} = h_{nom1} + h_{nom2} - t_{h2} + t \qquad (2)$$

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



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

Alternative head form:



d = diameter of shaft
d_h = diameter of head
h_{ef} = effective embedment depth
h_{nom} = nominal length of the anchor (after welding)
t_h = thickness of the head
t = thickness of the steel plate

WELDA®

Intended use
Effective embedment depth

Annex B3

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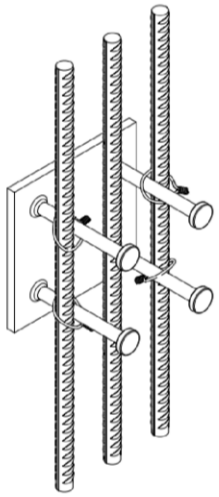
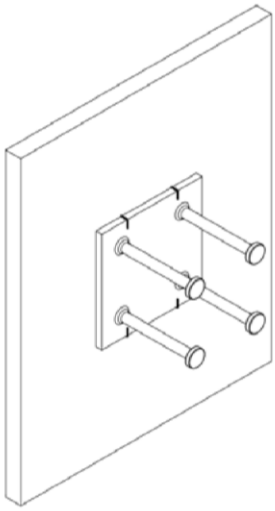
Installation instruction

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®	**Annex B4**
Intended use Installation instruction	

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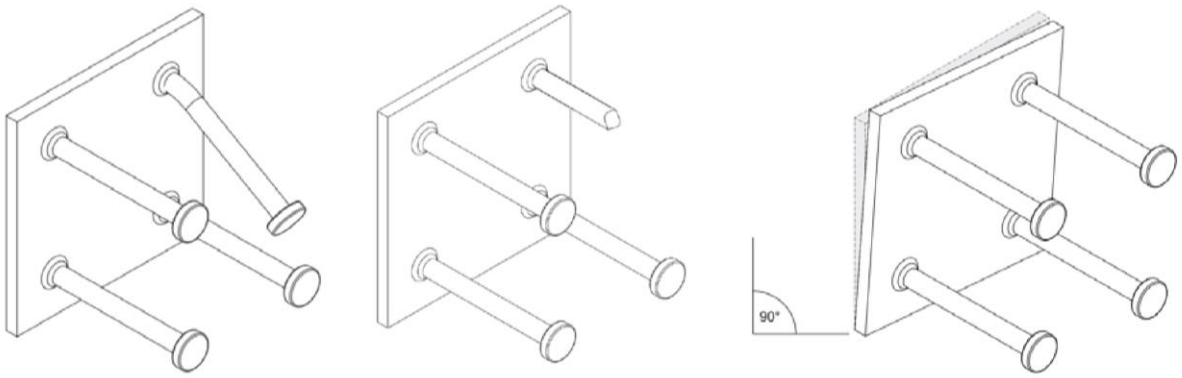
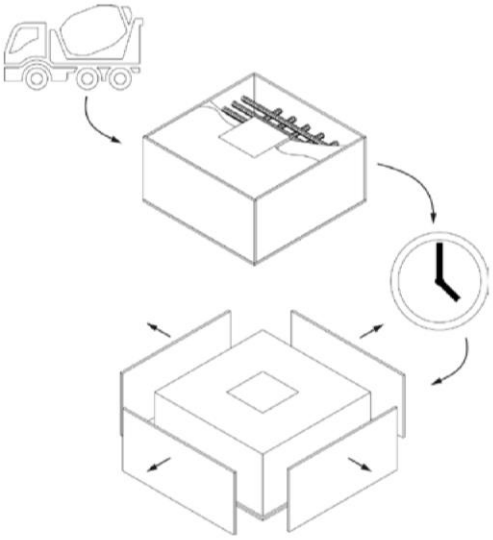
2 Check WELDA® after installation



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®	Annex B5
Intended use Installation instruction	

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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	$N_{Rk,s}$ [kN]	**35**	**51**	**60**	**90**	**128**	**141**	**171**	**221**	**111**	**173**	**270**
Partial safety factor	γ_{Ms} [1)]	1,54								1,4		
Pull-out failure (C20/25) for cracked concrete												
diameter of anchor head	d_h [mm]	19	24	25	32	32	40	35	40	38	46	55
Characteristic resistance	$N_{Rk,p}$ [kN]	**31**	**51**	**54**	**90**	**78**	**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_{Mp} [1)]	1,5										
Concrete cone failure / splitting due to loading												
Effective embedment depth	h_{ef} [mm]	$h_{nom} - t_h + t$ [3)]										
Characteristic spacing	$s_{cr,N} = s_{cr,sp}$ [mm] [2)]	3 h_{ef}										
Characteristic edge distance	$c_{cr,N} = c_{cr,sp}$ [mm] [2)]	1,5 h_{ef}										
factor for cracked concrete	k_{cr} [-]	8,5										
factor for non-cracked concrete	k_{ucr} [-]	11,9										
Partial safety factor	γ_{Mc} [1)]	1,5										
Blow-out failure												
Partial safety factor	γ_{Mcb} [1)]	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 [1)] 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
Caracteristic resistances and displacements under tension load

Annex C1

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

1) In absence of other national regulations
2) In case of supplementary reinforcement the factor k_3 should be multiplied with 0.75
3) 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 [1)] 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