

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

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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

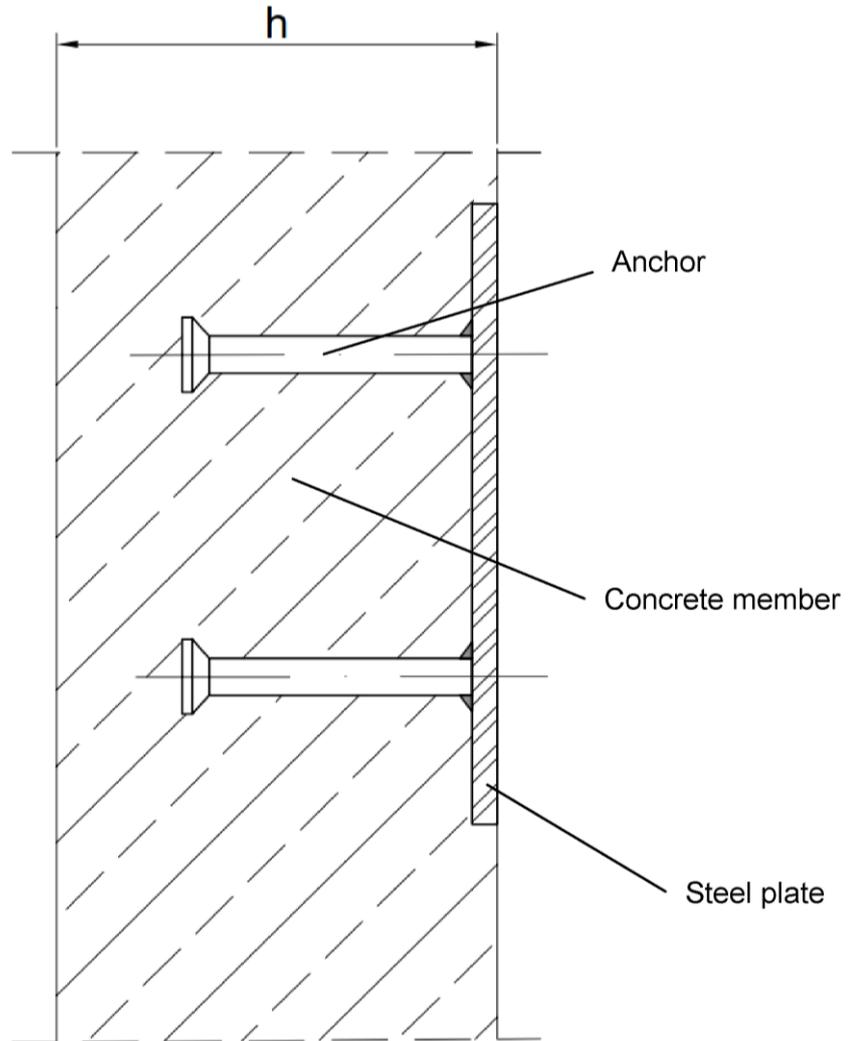
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

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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 [®]	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



WELDA[®] 150 x 150 Aa

WELDA[®]

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

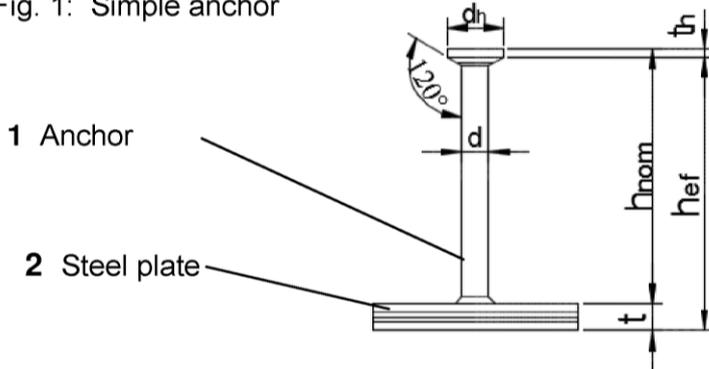
WELDA® Anchor Type Nominal size d [mm]		W1 – W5								W6		
		10	12	13	16	19	20	22	25	16	20	25
Anchorage depth	min h_{ef} [mm]	50	50	50	50	75	75	75	75	50	75	75
Minimum spacing	s_{min} [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum edge distance	c_{min} [mm]	50	50	50	50	70	70	70	70	50	70	70
Minimum thickness 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

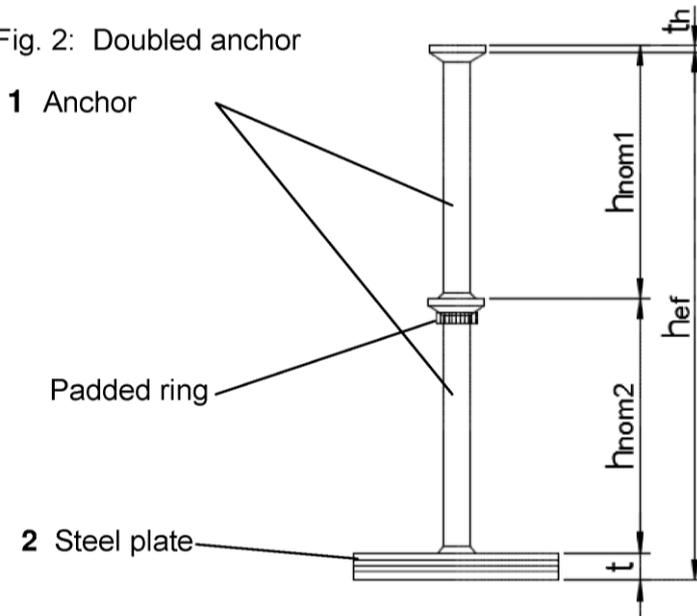
Annex B2

Fig. 1: Simple anchor



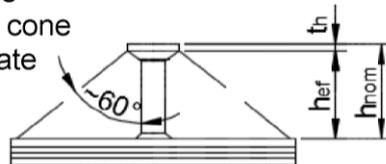
$$h_{ef} = h_{nom} - t_h + t \quad (1)$$

Fig. 2: Doubled anchor



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

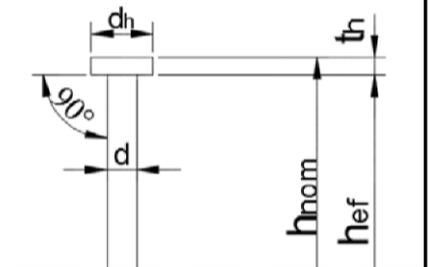
Fig. 3: Short anchor, if the theoretic concrete cone meets the steel plate at angle of $\sim 60^\circ$ or $t \geq 0,2h_{nom}$



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

- d** = diameter of shaft
- d_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

Alternative head form:



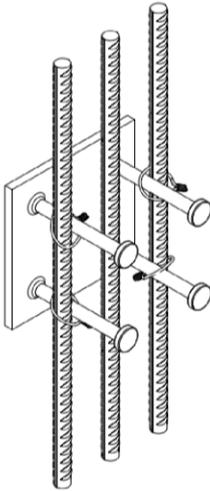
WELDA®

Intended use
Effective embedment depth

Annex B3

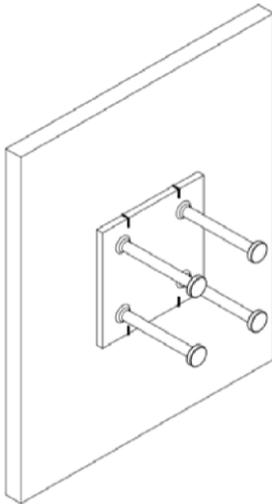
Installation instruction

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



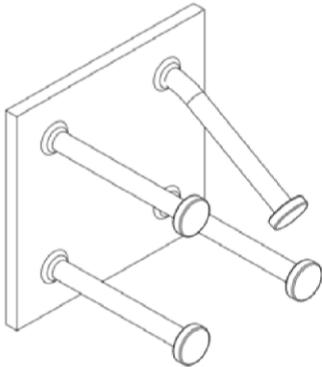
- Fix WELDA® directly to formwork by nails, screws, wire or magnets
- Control close contact between plate and formwork
- Pay attention strong fixing to avoid moving during pouring

WELDA®

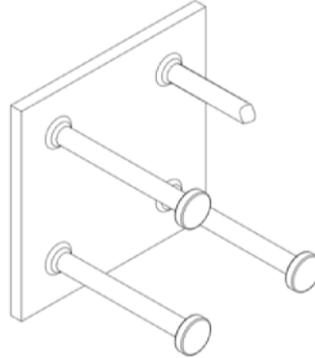
Intended use
Installation instruction

Annex B4

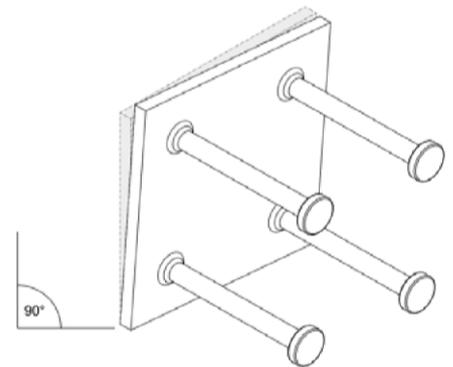
2 Check WELDA® after installation



Not allowed

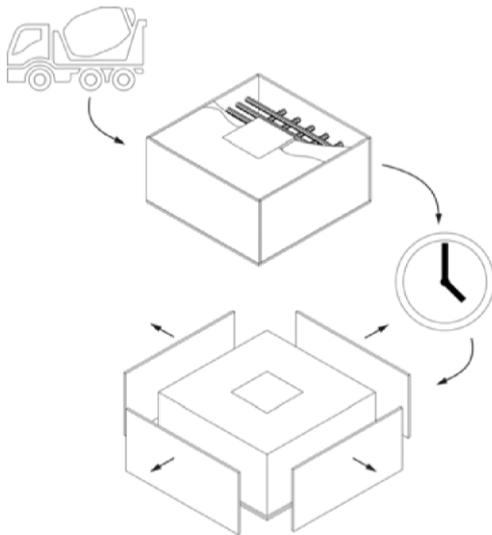


Not allowed



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	$N_{Rk,s}$ [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	40	40	35	40	38	46	55
Characteristic resistance	$N_{Rk,p}$ [kN]	31	51	54	90	146	141	87	115	140	202	283
Increasing factors Ψ for the characteristic pull-out resistance	C25/30	1,20										
	C30/37	1,48										
	C35/45	1,80										
	C40/50	2,00										
	C45/55	2,20										
	\geq 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
Characteristic 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
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