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to Article 29 of the Regulation (EU)  
No 305/2011 of the European  
Parliament and of the Council of 9  
March 2011

MEMBER OF EOTA



## European Technical Assessment ETA-20/0418 of 2020/04/28

### 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:**

Walraven anchor type WDI2 and WDI2-L

**Product family to which the above construction product belongs:**

Mechanical fasteners for use in non-cracked concrete

**Manufacturer:**

J. van Walraven Holding B.V.  
Industrieweg 5  
3641 RK Mijdrecht  
Netherlands  
Tel. + 31 297 23 30 00  
Fax + 31 297 28 64 09  
Internet [www.walraven.com](http://www.walraven.com)

**Manufacturing plant:**

Walraven Factory A3

**This European Technical Assessment contains:**

14 pages including 9 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:**

EAD 330232-00-0601; Mechanical fasteners for use in concrete

**This version replaces:**

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product and intended use**

#### **Technical description of the product**

Walraven anchor type WDI2 and WDI2-L is a drop-in deformation-controlled expansion anchor made of galvanized steel. The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

An illustration of the product is given in Annex A.

The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation of this European Technical Assessment.

The anchors are intended to be used with embedment depth given in Annex B, Table B1. The intended use specifications of the product are detailed in the Annex B1.

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

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 provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 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**

#### **3.1 Characteristics of product**

##### **Mechanical resistance and stability (BWR 1):**

The essential characteristics are detailed in the Annex from C1 to C2.

##### **Safety in case of fire (BWR 2):**

The essential characteristics are detailed in the Annex from C3.

##### **Hygiene, health and the environment (BWR3):**

No performance assessed

##### **Safety in use (BWR4):**

For basic requirement Safety in use the same criteria are valid for Basic Requirement Mechanical resistance and stability (BWR1).

##### **Sustainable use of natural resources (BWR7)**

No performance assessed

Other Basic Requirements are not relevant.

#### **3.2 Methods of assessment**

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 has been made in accordance with EAD 330232-00-0601; Mechanical fasteners for use in concrete.

## **4 Assessment and verification of constancy of performance (AVCP)**

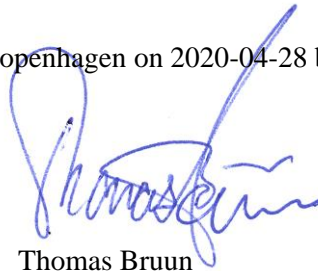
### **4.1 AVCP system**

According to the decision 1996/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

## **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

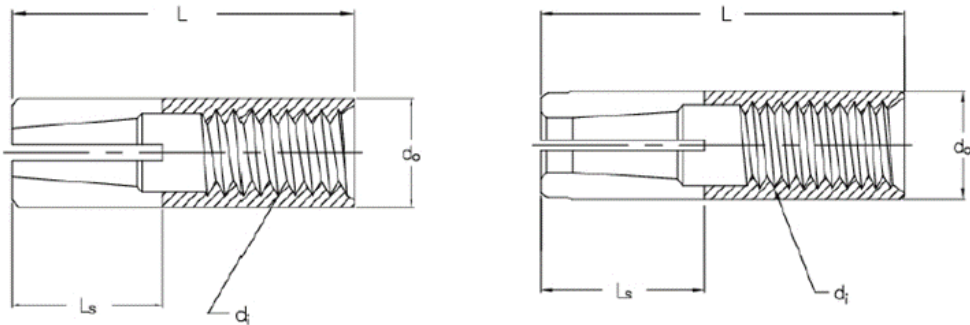
Issued in Copenhagen on 2020-04-28 by



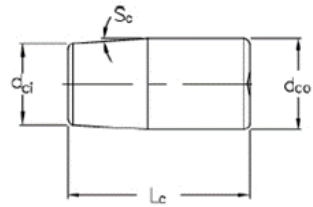
Thomas Bruun  
Managing Director, ETA-Danmark

**Figure A1 – anchor without flange head**

Anchor Sleeve

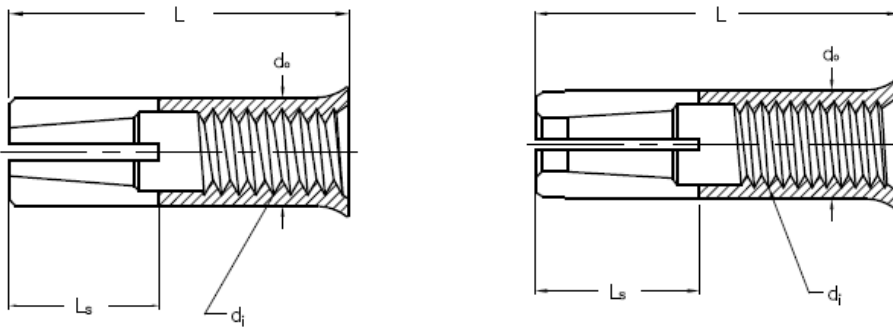


Anchor Plug

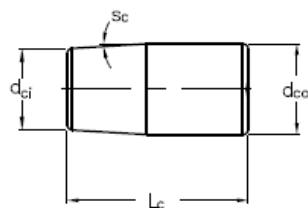


**Figure A1.1 – anchor with flange head**

Anchor Sleeve



Anchor Plug



**WDI2 AND WDI2-L**

Product description  
Characteristics of the product

**Annex A1**  
of European  
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**Table A1. Dimensions of the anchor**

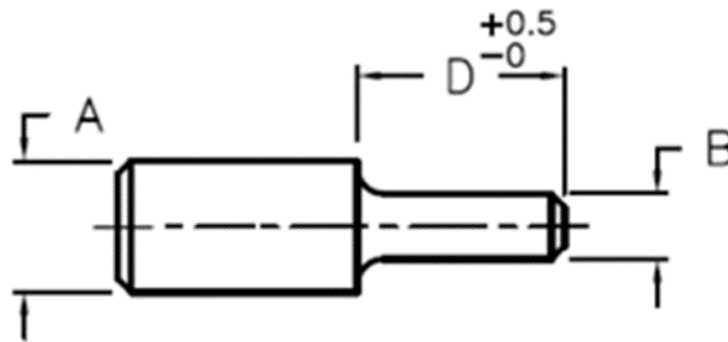
Diameter inside	d <sub>i</sub> [mm]	M6x25	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
Length	L [mm]	24.90 ± 0.30	29.90 ± 0.30	39.60 ± 0.40	29.60 ± 0.40	39.60 ± 0.40	50.50 ± 0.50	65.00 ± 0.50
Length 2	L <sub>s</sub> [mm]	11.60 ± 0.60	13.80 ± 0.60	14.70 ± 0.60	15.00 ± 0.60	18.35 ± 0.75	22.75 ± 0.75	29.35 ± 0.75
Diameter outside	d <sub>o</sub> [mm]	7.94 ± 0.07	9.94 ± 0.07	9.94 ± 0.07	11.94 ± 0.07	11.94 ± 0.07	14.94 ± 0.07	19.80 ± 0.20
Cone length	L <sub>c</sub> [mm]	10.00 ± 0.20	11.90 ± 0.30	11.90 ± 0.30	13.60 ± 0.30	15.70 ± 0.30	20.70 ± 0.30	28.10 ± 0.30
Cone Outside Diameter	d <sub>co</sub> [mm]	5.05 ± 0.25	6.25 ± 0.25	6.25 ± 0.25	7.85 ± 0.25	7.85 ± 0.25	10.05 ± 0.25	13.85 ± 0.25
Cone Inside Diameter	d <sub>ci</sub> [mm]	3.95 ± 0.25	4.50 ± 0.25	4.50 ± 0.30	6.70 ± 0.30	6.30 ± 0.30	8.50 ± 0.30	11.70 ± 0.30
Expansion Cone Angle	s <sub>c</sub> [°]	5.00 ± 2.00	6.00 ± 2.00	6.00 ± 2.00	3.5 ± 2.00	6.00 ± 2.00	4.00 ± 2.00	3.50 ± 2.00

**Table A2. Materials**

Member	Material
Sleeve and Plug	Coldformed steel grade C8C in accordance with table 2 in EN 10263-2 or coldformed steel grade 1008 in accordance with table 3 in ASTM A510. Galvanized or Austenitic stainless steel grade 1.4578 in EN 10088-3 or Austenitic stainless steel grade SUS 304J3 in JIS G 4308 with minimum tensile strength 450 N/mm <sup>2</sup> and minimum yield strength 175 N/mm <sup>2</sup>

<b>WDI2 AND WDI2-L</b>	<b>Annex A2</b> of European Technical Assessment ETA-20/0418
Product description Materials	

**Figure A2**



**Table A3 –Dimensions of hand setting tool and mechanical setting tool**

Anchor Size	A [mm]	B [mm]	D [mm]
M6x25	10.00	4.70	15.00
M8x25	10.00	6.35	16.75
M8x30	10.00	6.35	17.90
M8x40	10.00	6.35	27.70
M10x30	13.00	7.90	16.00
M10x40	13.00	7.90	23.80
M12x50	16.00	9.80	29.70
M16x65	22.00	13.50	36.80

<b>WDI2 AND WDI2-L</b>	<b>Annex A3</b> of European Technical Assessment ETA-20/0418
Product description Materials	



**Use:**

The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

**Anchors subject to:**

- Static and quasi-static loads: sizes M6, M8, M10, M12 and M16.

**Base materials:**

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.
- Non-cracked concrete: sizes M6, M8, M10, M12 and M16.

**Temperature range:**

The anchors may be used in the following temperature range:

- Normal internal temperature ranges

**Use conditions (Environmental conditions):**

- The anchors may be used in structures subject to dry internal conditions only.

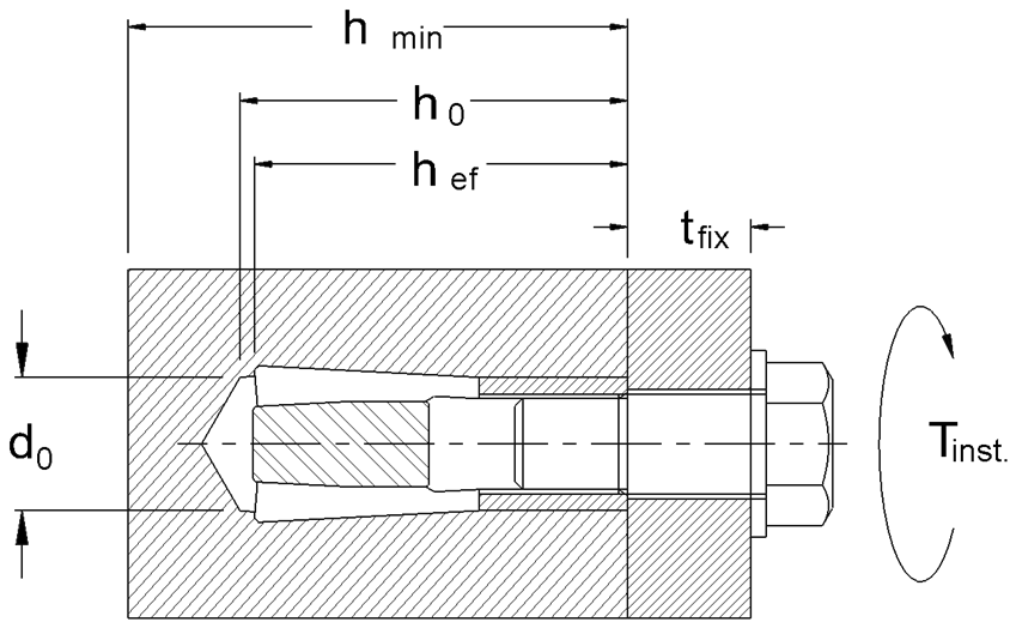
**Installation:**

- The anchors may be installed in:
  - Dry concrete: sizes M6, M8, M10, M12 and M16.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check before placing the anchor to ensure that the strength class of the concrete, in which the anchor is to be placed, is identical with the values which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of load application.
- Hole shall be clear.
- Anchor installation such that the effective anchorage depth is complied with; the compliance is ensured if the thickness of the fixture is not larger than the maximum values given in Annex B2.
- Anchor expansion by impact on the wedge of the anchor; the anchor is properly set if the wedge is fully dropped in.

**Proposed design methods:**

- Anchorages 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 transmitted. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static loads are designed in accordance with EN 1992-4

<b>WDI2 AND WDI2-L</b>	<b>Annex B1</b> of European Technical Assessment ETA-20/0418
Intended use – Specification	



**Table B1. Installation parameters**

Anchor size		M6x25	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
Nominal drill hole diameter	$\varnothing d_0$ [mm] =	8	10	10	12	12	15	20
Max. cutting drill bit diameter	$\varnothing d_{cut}$ [mm] $\leq$	8.45	10.45	10.45	12.45	12.45	15.50	20.50
Depth of drill hole	$h_1$ [mm] $\geq$	25	30	40	30	40	50	65
Effective anchorage depth	$h_{ef}$ [mm] $\geq$	25	30	40	30	40	50	65
Installation moment	$T_{inst}$ [Nm] =	4	8	8	15	15	35	60
Minimum thickness of member	$h_{min}$ [mm] =	100	100	100	100	120	140	160
Minimum edge distance	$c_{min}$ [mm] =	110	140	80	90	90	140	125
Minimum spacing	$s_{min}$ [mm] =	120	130	120	150	120	130	140

<b>WDI2 AND WDI2-L</b>	<b>Annex B2</b> of European Technical Assessment ETA-20/0418
Intended use – installation parameters	

**Table C1: Design method A, characteristic tension load values**

Anchor size			M6x25	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
<b>Steel failure</b>									
Resistance to steel failure	$N_{Rk,s}$	[kN]	9.92	14.13	14.62	14.13	15.24	15.24	15.24
Partial safety factor under tension load	$\gamma_{Ms}$	[-]	1.40	1.40	1.40	1.40	1.40	1.40	1.40
<b>Pull-out failure</b>									
Resistance to pull-out failure in non-cracked concrete C20/25	$N_{Rk,ucr}$	[kN]	5.0	3.5	6.0	5.5	7.0	10.0	12.0
Increasing factors for concrete C30/37, C40/50 and C50/60	$\psi_C$	[-]	1.55	1.53	1.41	1.00	1.55	1.55	1.55
<b>Concrete cone failure</b>									
Partial safety factor in non-cracked concrete	$k_{ucr,N}$	[mm]	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Effective embedment depth	$h_{ef}$	[mm]	25	30	40	30	40	50	65
Edge distance	$c_{cr,N}$	[mm]	1.5 x $h_{ef}$						
Spacing	$s_{cr,N}$	[mm]	3.0 x $h_{ef}$						
Partial safety factor	$\gamma_{Mp} = \gamma_{Mc}$	[-]	1.8	1.5	1.5	2.1	1.8	1.8	1.5
<b>Robustness</b>									
Installation safety factor	$\gamma_{inst}$	[-]	1.2	1.0	1.0	1.4	1.2	1.2	1.0
<b>Edge distance to prevent splitting under load</b>									
Edge distance to prevent splitting under load	$N^0_{Rk,sp}$	[kN]	4.5	3.0	6.0	5.5	6.5	9.5	11.0
Appropriate edge distance	$c_{cr,sp}$	[mm]	90	120	80	90	140	175	120
<b>Displacement under static and quasi-static loading</b>									
Short time tension displacement	$\delta_{N0}$	[mm]	0.09	0.07	0.04	0.04	0.17	0.16	0.02
Long-time tension displacement	$\delta_{N\infty}$	[mm]	0.18	0.18	0.07	0.07	0.18	0.18	0.18

WDI2, WDI2-L, WDI2 SSt and WDI2-L SSt

Performance for static and quasi-static loads: Resistances

Annex C1  
of European  
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**Table C2: Design method A, Characteristic shear load values**

Anchor size			M6x25	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
<b>Resistance to steel failure under shear load</b>									
Resistance to steel failure without lever arm	$V_{Rk,s}^0$	[kN]	2.5	5.5	5.5	6.5	7.0	7.5	18.0
Resistance to shear load with lever arm	$M_{Rk,s}^0$	[Nm]	18.0	34.0	34.7	46.4	46.0	110.0	240.0
Factor for group fasteners	$k_7$	[-]	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Resistance to pry-out failure</b>									
Factor for group fasteners	$k_8$	[-]	1.0	1.0	1.0	1.0	1.0	1.0	2.0
<b>Resistance to concrete edge failure</b>									
Outside diameter of the fastener relevant for shear loading	$d_{nom}$	[mm]	8	10	10	12	12	15	20
Effective length of the fastener for transfer of shear load	$l_f$	[mm]	25	30	40	30	40	50	65
<b>Displacements under static and quasi-static loading</b>									
Short time shear displacement	$\delta_{V0}$	[mm]	0.51	0.71	0.80	1.37	0.64	0.23	0.57
Long time shear displacement	$\delta_{V\infty}$	[mm]	0.77	1.07	1.20	2.06	0.96	0.35	0.86

WDI2, WDI2-L, WDI2 SSt and WDI2-L SSt

Performance for static and quasi-static loads: Resistances and Displacements

**Annex C3**  
of European  
Technical Assessment  
ETA-20/0418

**Table C3: Resistance to fire**

<b>Characteristic values for tension loading under fire exposure in accordance to EOTA TR020</b>										
<b>Anchor size</b>				<b>M6x25</b>	<b>M8x30</b>	<b>M8x40</b>	<b>M10x30</b>	<b>M10x40</b>	<b>M12x50</b>	<b>M12x65</b>
<b>Steel failure</b>										
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0.21	0.27	0.27	0.50	0.50	1.24	2.14
	R60			0.19	0.25	0.25	0.43	0.43	0.93	1.60
	R90			0.15	0.19	0.19	0.33	0.33	0.81	1.39
	R120			0.11	0.14	0.14	0.27	0.27	0.62	1.07
<b>Pull-out failure</b>										
Characteristic resistance in concrete $\geq$ C20/C25	R30	$N_{Rk,p,fi}$	[kN]	1.25	0.88	1.50	1.38	1.75	2.50	3.00
	R60			1.00	0.70	1.20	1.10	1.40	2.00	2.40
	R90									
	R120									
<b>Concrete cone failure</b>										
Characteristic resistance in concrete $\geq$ C20/C25	R30	$N^0_{Rk,c,fi}$	[kN]	0.56	0.89	1.82	0.89	1.82	3.18	6.13
	R60			0.45	0.71	1.46	0.71	1.46	2.55	4.91
	R90									
	R120									
Spacing		$S_{cr,fi}$	[mm]	4 x $h_{ef}$						
		$S_{min}$	[mm]	100	90	120	150	160	200	260
Edge distance		$C_{cr,fi}$	[mm]	2 x $h_{ef}$						
		$C_{min}$	[mm]	Fire attach from one side: 2 x $h_{ef}$ Fire attach from more than 1 side: $\geq$ 300						
<b>Characteristic values for shear loading under fire exposure in accordance to EOTA TR020</b>										
<b>Anchor size</b>				<b>M6x25</b>	<b>M8x30</b>	<b>M8x40</b>	<b>M10x30</b>	<b>M10x40</b>	<b>M12x50</b>	<b>M62x65</b>
<b>Steel failure without lever arm</b>										
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	0.21	0.27	0.27	0.50	0.50	1.24	2.14
	R60			0.19	0.25	0.25	0.43	0.43	0.93	1.60
	R90			0.15	0.19	0.19	0.33	0.33	0.81	1.39
	R120			0.11	0.14	0.14	0.27	0.27	0.62	1.07
<b>Steel failure with lever arm</b>										
Characteristic resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	0.40	0.67	0.67	1.53	1.53	4.59	10.49
	R60			0.36	0.60	0.60	1.32	1.32	3.44	7.87
	R90			0.28	0.47	0.47	1.02	1.02	2.98	6.82
	R120			0.20	0.34	0.34	0.81	0.81	2.29	5.25
<b>Pryout failure</b>										
k-factor		$k=k_3$	[-]	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Characteristic resistance	R30	$V^0_{Rk,cp,fi}$	[kN]	0.56	0.89	1.82	0.89	1.82	3.18	12.26
	R60			0.45	0.71	1.46	0.71	1.46	2.55	9.81
	R90									
	R120									
<b>Concrete edge failure</b>										
The initial value $V^0_{Rk,s,fi}$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by: $V^0_{Rk,c} = 0.25 \times V^0_{Rk,c} (\leq R90)$ $V^0_{Rk,c} = 0.20 \times V^0_{Rk,c} (\leq R120)$ With $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature.										
<b>WDI2, WDI2-L, WDI2 SSt and WDI2-L SSt</b>								<b>Annex C4</b> of European Technical Assessment ETA-20/0418		
Performance for exposure to fire										

<b>Table C4: Reaction to fire</b>	
<b>ESSENTIAL CHARACTERISTICS</b>	<b>PERFORMANCE</b>
<b>Reaction to fire</b>	In the final application, the thickness of the mortar layer is about 1 to 2 mm and most of the mortar is material classified class A1 according to EC Decision 96/603/EC. Therefore, it may be assumed that the bonding material (synthetic mortar or a mixture of synthetic mortar and cementitious mortar) in connection with the metal anchor in the end use application do not contribute to fire growth or to the fully developed fire and they have no influence to the smoke hazard.
<b>WDI2, WDI2-L, WDI2 SSt and WDI2-L SSt</b>	<b>Annex C5</b> of European Technical Assessment ETA-20/0418
Performance for exposure to fire	