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European Technical Assessment

ETA 22/0629 of 30/01/2025

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

Trade name of the construction product:

WDI2, WDI2L, WDI2 SSt, WDI2L SSt, WDI2R

Product family to which the construction product belongs:

Deformation controlled anchor made of galvanized steel or stainless steel or stainless steel of sizes M6, M8, M10, M12, M16 and M20 for use in concrete for redundant non-structural systems

Manufacturer:

J. van Walraven holding B.V.
Industrieweg 5
3641 RK Mijdrecht
The Netherlands
website: www.walraven.com

Manufacturing plant:

Walraven factory 3

This European Technical Assessment contains:

15 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 330747-00-0601, "Fasteners for use in concrete for redundant non-structural systems", ed. May 2018.

This version replaces

ETA 22/0629 version 0 issued on 30/09/2022



English translation prepared by IETcc

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FIRMANTE(1) : ANGEL CASTILLO TALAVERA | FECHA : 02/02/2025 10:29 | Sin acción específica



SPECIFIC PART

1. Technical description of the product

The Walraven WDI2, WDI2L, WDI2R, in the range of M6 to M20, is an anchor made of galvanised steel. The Walraven WDI2 SSt, WDI2L SSt, in the range of M6 to M20, is an anchor made of stainless steel. They are placed into a drilled hole and anchored by deformation-controlled expansion. The anchorage is characterised by friction between the sleeve and concrete.

Product and installation descriptions are given in annexes A1 and A2.

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 mean to 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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for class A1 according to EN 13501-1
Resistance to fire	See annex C7

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Essential characteristics under static or quasi static loading	See annexes C3 to C6

4. Assessment and Verification of Constancy of Performances (hereinafter AVCP) system applied, with reference to its legal base

The applicable European legal act for the system of Assessment and Verification of Constancy of Performances (see annex V to Regulation (EU) No 305/2011) is 97/161/EC.

The system to be applied is 2+.



English translation prepared by IETcc

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

The technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de Ciencias de la Construcción Eduardo Torroja.

Prepared by: PhD Julián Rivera (Innovative Products Assessment Unit, IETcc-CSIC)

Issued in Madrid on 30th of January 2025

Mr. Ángel Castillo Talavera
Director

on behalf of Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc – CSIC)

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Product



WDI2 anchor



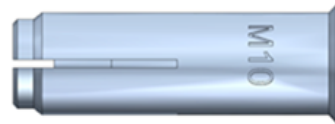
WDI2L anchor



WDI2R anchor



WDI2 SSt anchor



WDI2L SSt anchor

Identification on sleeve: Walraven logo + “WDI2 (WDI2L, WDI2R, WDI2 SSt, WDI2L SSt)” + Metric; e.g: “**W** WDI2 M6”

Table A1: Dimensions

Anchor dimensions		M6	M8	M10	M12	M12D	M16	M20
WDI2, WDI2L								
∅D: External diameter	[mm]	8	10	12	15	16	20	25
∅d: internal diameter	[mm]	M6	M8	M10	M12	M12	M16	M20
L: total length	[mm]	25	30	40	50	50	65	80
WDI2R								
∅D: External diameter	[mm]	--	10	12	15	--	--	--
∅d: internal diameter	[mm]	--	M8	M10	M12	--	--	--
L: total length	[mm]	--	25	25	25	--	--	--
WDI2 SSt, WDI2L SSt								
∅D: External diameter	[mm]	8	10	12	15	--	20	25
∅d: internal diameter	[mm]	M6	M8	M10	M12	--	M16	M20
L: total length	[mm]	25	30	40	50	--	65	80

Table A2: Materials

Item	Designation	Material for WDI2, WDI2L, WDI2R	Material for WDI2 SSt, WDI2L SSt
1	Sleeve	Carbon steel, zinc plated ≥ 5 µm ISO 4042 Zn5/An/T0	Stainless steel, grade A4
2	Cone	Carbon steel, zinc plated ≥ 5 µm ISO 4042 Zn5/An/T0	Stainless steel, grade A4
3	Retention disc	Plastic	Plastic

WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor

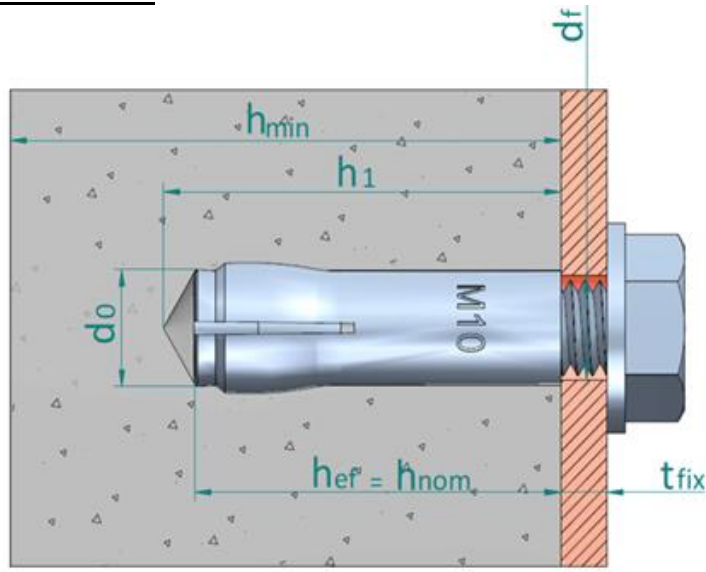
Product description

Product and materials

Annex A1



Installed condition in concrete



- h_{ef}: Effective anchorage depth
- h₁: Depth of drilled hole
- h_{nom}: Overall anchor embedment depth in the concrete
- h_{min}: Minimum thickness of concrete member
- t_{fix}: Thickness of fixture
- d₀: Nominal diameter of drill bit
- d_f: Fixture clearance hole diameter

Setting tool



Setting tool can be assembled with a plastic handle for hand protection purposes

Table A3: Setting tool dimensions

Setting tool dimensions	M6	M8	M10	M12	M16	M20
WDI2, WDI2L, WDI2 SSt, WDI2L SSt						
Ø D ₁ [mm]	8.0	10.0	12.0	15.0	20.0	25.0
Ø D ₂ [mm]	4.9	6.4	8.2	10.0	13.5	17.0
L _s [mm]	15.0	18.0	21.0	30.0	36.0	48.0
WDI2R						
Ø D ₁ [mm]	--	10.0	12.0	15.0	--	--
Ø D ₂ [mm]	--	6.4	8.2	10.0	--	--
L _s [mm]	--	15.0	16.0	10.4	--	--

WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor

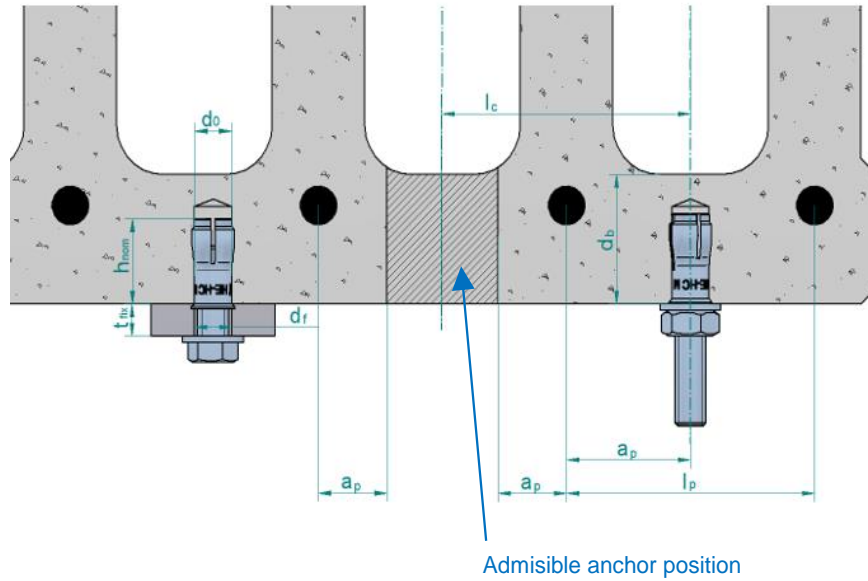
Product description

Installed condition in concrete and setting tool

Annex A2



Installed condition in precast prestressed hollow core concrete slabs



- d₀: Nominal diameter of drill bit
- d_r: Fixture clearance hole diameter
- d_b: Bottom flange thickness
- a_p: Distance between anchor position and prestressing steel ≥ 50 mm
- l_c: Core distance ≥ 100 mm
- l_p: Prestressing steel distance ≥ 100 mm
- t_{fix}: Fixture thickness
- c: Edge distance

WDI2R anchor	Annex A3
Product description	
Installed condition in precast prestressed hollow core concrete slabs	



Specifications of intended use

Anchorage subjected to:

- Static or quasi static loads for redundant non-structural systems.
- Use for anchorages with requirements related to resistance of fire (not for using in prestressed hollow core slabs).
- The anchor may only be used if in the design and installation specifications for the fixture the excessive slip or failure of one anchor will not result in a significant violation of the requirements on the fixture in the serviceability and ultimate state.

Base materials:

- Reinforced or unreinforced normal weight concrete without fibres according to EN 206-1:2013+A1:2016.
- Strength classes C12/15 to C50/60 according to EN 206-1:2013+A1:2016: WDI2 / WDI2L anchors.
- Strength classes C20/25 to C50/60 according to EN 206-1:2013+A1:2016: WDI2R / WDI2 SSt / WDI2L SSt anchors.
- Cracked or uncracked concrete.
- Precast, prestressed hollow core concrete slabs, strength C30/37 to C50/60 according to EN 206:2013+A1:2016: WDI2R.

Use conditions (environmental conditions):

- WDI2, WDI2L, WDI2R: anchorages subjected to dry internal conditions.
- WDI2 SSt, WDI2L SSt: anchorages subjected to dry internal conditions, to external atmospheric exposure (including industrial and marine environment) or to permanent internal damp conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used). Atmospheres under Corrosion Resistance Class CRC III according to EN 1993-1-4:2006+A1:2015 annex A.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete.
- Verifiable calculation rules and drawings are prepared taking into account of the loads to be anchored. 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 or quasi-static actions are designed for design method B in accordance with EN 1992-4:2018
- Anchorages under fire exposure are designed in accordance to EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

Installation:

- Hole drilling by rotary plus hammer mode.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- WDI2, WDI2L, WDI2R: the bolt or threaded rod to be used shall be property class 4.6, 5.6, 5.8, 6.8 or 8.8 according to ISO 898-1.
- WDI2 SSt, WDI2L SSt: the bolt or threaded rod to be used shall be property class A4-50, A4-70 or A4-80 according to EN 3506-1:2009
- The length of the bolt shall be determined as:
 - Minimum bolt length = $t_{fix} + l_{s,min}$
 - Maximum bolt length = $t_{fix} + l_{s,max}$

WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor

Intended use

Specifications

Annex B1



Table C1: Installation parameters in concrete for WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor

Installation parameters			Performances						
			M6	M8	M10	M12	M12D	M16	M20
d ₀	Nominal diameter of drill bit:	[mm]	8	10	12	15	16	20	25
D	Thread diameter:	[mm]	M6	M8	M10	M12	M12	M16	M20
d _f	Fixture clearance hole diameter ≤	[mm]	7	9	12	14	14	18	22
T _{inst}	Maximum installation torque:	[Nm]	4	11	17	38	38	60	100
WDI2, WDI2L			M6 x 25 φ8	M8 x 30 φ10	M10 x 40 φ12	M12 x 50 φ15	M12 x 50 φ16	M16 x 65 φ20	M20 x 80 φ25
l _{s,min}	Minimum screwing depth:	[mm]	6	8	10	12	12	16	20
l _{s,max}	Maximum screwing depth:	[mm]	10	13	17	21	21	27	34
h ₁	Depth of drilled hole:	[mm]	27	33	43	54	54	70	86
h _{nom}	Overall anchor embedment depth:	[mm]	25	30	40	50	50	65	80
h _{ef}	Effective anchorage depth:	[mm]	25	30	40	50	50	65	80
h _{min}	Minimum thickness of concrete member:	[mm]	100	100	100	100	100	130	160
s _{min}	Minimum allowable spacing:	[mm]	60	60	80	100	100	130	160
c _{min}	Minimum allowable distance:	[mm]	105	105	140	175	130	230	280
WDI2R			-	M8 x 25 φ10	M10 x 25 φ12	M12 x 25 φ15	-	-	-
l _{s,min}	Minimum screwing depth:	[mm]	--	7	8	10	--	--	--
l _{s,max}	Maximum screwing depth:	[mm]	--	12	13	13	--	--	--
h ₁	Depth of drilled hole:	[mm]	--	28	28	29	--	--	--
h _{nom}	Overall anchor embedment depth:	[mm]	--	25	25	25	--	--	--
h _{ef}	Effective anchorage depth:	[mm]	--	25	25	25	--	--	--
h _{min}	Minimum thickness of concrete member:	[mm]	--	80	80	80	--	--	--
s _{min}	Minimum allowable spacing:	[mm]	--	75	75	75	--	--	--
c _{min}	Minimum allowable distance:	[mm]	--	60	60	60	--	--	--
WDI2 SSt, WDI2L SSt			M6 x 25 φ8	M8 x 30 φ10	M10 x 40 φ12	M12 x 50 φ15	---	16 x 65 φ20	M20 x 80 φ25
l _{s,min}	Minimum screwing depth:	[mm]	6	8	10	12	--	16	20
l _{s,max}	Maximum screwing depth:	[mm]	10	13	17	21	--	27	34
h ₁	Depth of drilled hole:	[mm]	27	33	43	54	--	70	86
h _{nom}	Overall anchor embedment depth:	[mm]	25	30	40	50	--	65	80
h _{ef}	Effective anchorage depth:	[mm]	25	30	40	50	--	65	80
h _{min}	Minimum thickness of concrete member:	[mm]	80	80	80	100	--	130	160
s _{min}	Minimum allowable spacing:	[mm]	60	60	100	100	--	130	160
c _{min}	Minimum allowable distance:	[mm]	65	80	100	130	--	175	210
WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor							Annex C1		
Performances									
Installation parameters in concrete									

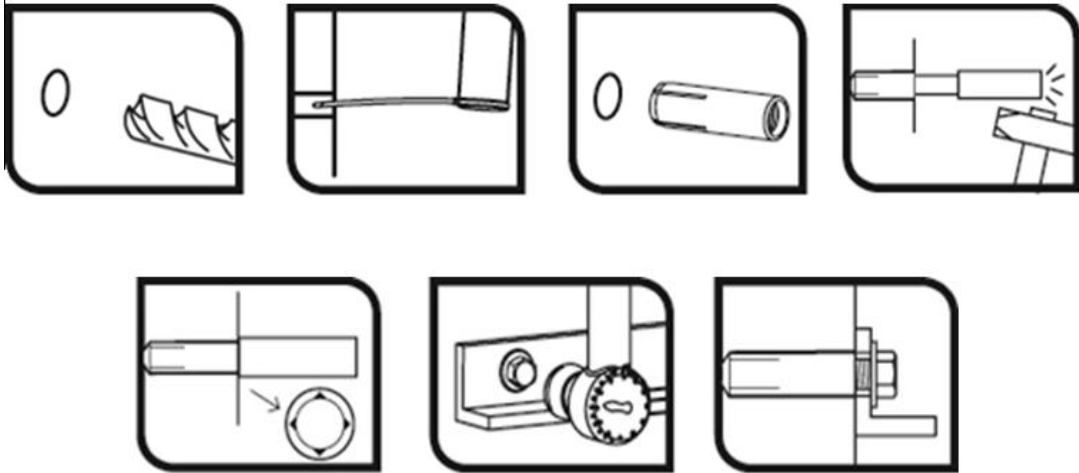


Table C2: Installation parameters in prestressed hollow core concrete slabs for WDI2R anchor

Installation parameters in prestressed hollow core concrete slabs			Performances						
			-	M8 x 25 φ10	M10 x 25 φ12	M12 x 25 φ15	-	-	-
WDI2R									
$l_{s,min}$	Minimum screwing depth:	[mm]	--	7	8	10	--	--	--
$l_{s,max}$	Maximum screwing depth:	[mm]	--	12	13	13	--	--	--
h_1	Depth of drilled hole:	[mm]	--	28	28	29	--	--	--
h_{nom}	Overall anchor embedment depth:	[mm]	--	25	25	25	--	--	--
h_{ef}	Effective anchorage depth:	[mm]	--	25	25	25	--	--	--
d_b	Minimum bottom flange thickness	[mm]	--	35	35	35	--	--	--
s_{min}	Minimum allowable spacing:	[mm]	--	200	200	200	--	--	--
c_{min}	Minimum allowable distance:	[mm]	--	150	150	150	--	--	--
WDI2R anchor			Annex C2						
Performances									
Installation parameters in prestressed hollow core concrete slabs									



Installation process



WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor

Performances

Installation procedure

Annex C3



Table C3: Essential characteristics in concrete to loads of design method B according to EN 1992-4 for WDI2, WDI2L, WDI2R anchor

Essential characteristics of resistance to loads of design method B			Performances						
			M6	M8	M10	M12	M12D	M16	M20
Any load direction									
WDI2, WDI2L									
F_{Rk}^0	Characteristic resistance in C12/15 concrete:	[kN]	1.5	3.0	4.0	6.0	--	9.0	16.0
F_{Rk}^0	Characteristic resistance in C20/25 to C50/60 concrete:	[kN]	2.0	3.0	5.0	7.5	6.0	12.0	20.0
γ_{ins}	Installation safety factor:	[-]	1.2	1.2	1.4	1.4	1.4	1.4	1.4
S_{cr}	Critical spacing:	[mm]	75	90	120	150	200	195	240
C_{cr}	Critical edge distance:	[mm]	40	45	60	75	150	100	120
WDI2R									
F_{Rk}^0	Characteristic resistance in C20/25 to C50/60 concrete:	[kN]	--	2.5	4.0	4.0	--	--	--
γ_{ins}	Installation safety factor:	[-]	--	1.2	1.2	1.2	--	--	--
S_{cr}	Critical spacing:	[mm]	--	120	120	120	--	--	--
C_{cr}	Critical edge distance:	[mm]	--	60	60	60	--	--	--
Shear loads: steel failure with lever arm									
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.6	[Nm]	6.1	15.0	29.9	52.4	52.4	133.3	259.8
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.67						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.8	[Nm]	6.1	15.0	29.9	52.4	52.4	133.3	259.8
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.6	[Nm]	7.6	18.8	37.4	65.5	65.5	166.6	324.8
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.67						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.8	[Nm]	7.6	18.8	37.4	65.5	65.5	166.6	324.8
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 6.8	[Nm]	9.2	22.5	44.9	78.7	78.7	199.9	389.7
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 8.8	[Nm]	12.2	30.0	59.9	104.9	104.9	266.6	519.7
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25						

1) In absence of other national regulations

WDI2, WDI2L, WDI2R anchor

Performances

Essential characteristics in concrete

Annex C4



Table C4: Essential characteristics in concrete to loads of design method B according to EN 1992-4 for WDI2 SSt, WDI2L SSt anchor

Essential characteristic of resistance to loads of design method B		Performances					
		M6	M8	M10	M12	M16	M20
All load direction							
F_{Rk}^0	Characteristic resistance in C20/25 to C50/60 concrete: [kN]	2.5	3.5	3.5	6.5	12.5	16.5
γ_{ins}	Installation safety factor: [-]	1.4					
S_{cr}	Critical spacing: [mm]	200	200	200	200	260	320
C_{cr}	Critical edge distance: [mm]	150	150	150	150	195	240
Shear loads: steel failure with lever arm							
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-50 [Nm]	7.6	18.8	37.4	65.6	166.6	324.8
$\gamma_{Ms}^{(1)}$	Partial safety factor: [-]	2.38					
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-70 [Nm]	10.6	6.3	52.4	91.8	233.1	454.7
$\gamma_{Ms}^{(1)}$	Partial safety factor: [-]	1.56					
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-80 [Nm]	12.2	30.0	59.9	104.9	266.6	519.7
$\gamma_{Ms}^{(1)}$	Partial safety factor: [-]	1.34					

¹⁾ In absence of other national regulations

WDI2 SSt, WDI2L SSt anchor

Performances

Essential characteristic in concrete

Annex C5



Table C5: Essential characteristic in precast prestressed hollow core slabs to loads of design method B according to EN 1992-4 for WDI2R anchor

Essential characteristics of resistance to loads of design method B		Performances							
		M6	M8	M10	M12	M12D	M16	M20	
Any load direction									
WDI2R									
F_{Rk}^0	Characteristic resistance in prestressed hollow core concrete slabs C30/37 to C50/60:	[kN]	--	5,5	6,0	6,5	--	--	--
γ_{ins}	Installation safety factor:	[-]	--	1.2	1.4	1.4	--	--	--
S_{cr}	Critical spacing:	[mm]	--	200	200	200	--	--	--
C_{cr}	Critical edge distance:	[mm]	--	150	150	150	--	--	--
Shear loads: steel failure with lever arm									
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.6	[Nm]	--	15.0	29.9	52.4	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.67			--	--	--
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.8	[Nm]	--	15.0	29.9	52.4	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.25			--	--	--
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.6	[Nm]	--	18.8	37.4	65.5	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.67			--	--	--
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.8	[Nm]	--	18.8	37.4	65.5	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.25			--	--	--
$M_{Rk,s}^0$	Characteristic bending moment, steel class 6.8	[Nm]	--	22.5	44.9	78.7	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.25			--	--	--
$M_{Rk,s}^0$	Characteristic bending moment, steel class 8.8	[Nm]	--	30.0	59.9	104.9	--	--	--
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	--	1.25			--	--	--

¹⁾ In absence of other national regulations

WDI2R anchor

Performances

Essential charact. in precast prestressed hollow core concrete slabs

Annex C6



Table C6: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for WDI2, WDI2L anchor

Essential characteristics under fire exposure in concrete C20/25 to C50/60 in any load direction				Performances						
				M6	M8	M10	M12	M12D	M16	M20
R30	Characteristic resistance:	$F_{Rk,fi30}^{0(1)}$	[kN]	0.2	0.4	0.9	1.7	1,7	3.1	4.9
R60	Characteristic resistance:	$F_{Rk,fi60}^{0(1)}$	[kN]	0.2	0.3	0.8	1.3	1,3	2.4	3.7
R90	Characteristic resistance:	$F_{Rk,fi90}^{0(1)}$	[kN]	0.1	0.3	0.6	1.1	1,1	2.0	3.2
R120	Characteristic resistance:	$F_{Rk,fi120}^{0(1)}$	[kN]	0.1	0.2	0.5	0.8	0,8	1.6	2.5
R30 to R120	Spacing	$S_{cr,fi}$	[mm]	4 x hef						
R30 to R120	Edge distance	$C_{cr,fi}$	[mm]	2 x hef						

¹⁾ in absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is $c \geq 300$ mm

Table C7: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for WDI2R anchor

Essential characteristics under fire exposure in concrete C20/25 to C50/60 in any load direction				Performances						
				M6	M8	M10	M12	M16	M20	
R30	Characteristic resistance:	$F_{Rk,fi30}^{0(1)}$	[kN]	--	0.54	0.54	0.54	--	--	--
R60	Characteristic resistance:	$F_{Rk,fi60}^{0(1)}$	[kN]	--	0.54	0.54	0.54	--	--	--
R90	Characteristic resistance:	$F_{Rk,fi90}^{0(1)}$	[kN]	--	0.44	0.54	0.54	--	--	--
R120	Characteristic resistance:	$F_{Rk,fi120}^{0(1)}$	[kN]	--	0.37	0.43	0.43	--	--	--
R30 to R120	Spacing	$S_{cr,fi}$	[mm]	--	4 x hef			--	--	--
R30 to R120	Edge distance	$C_{cr,fi}$	[mm]	--	2 x hef			--	--	--

¹⁾ in absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is $c \geq 300$ mm

Table C8: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for WDI2 SSt, WDI2L SSt anchor

Essential characteristics under fire exposure in concrete C20/25 to C50/60 in any load direction				Performances						
				M6	M8	M10	M12	M16	M20	
R30	Characteristic resistance:	$F_{Rk,fi30}^{0(1)}$	[kN]	0.20	0.73	0.87	1.63	3.19	4.12	4.12
R60	Characteristic resistance:	$F_{Rk,fi60}^{0(1)}$	[kN]	0.18	0.59	0.87	1.63	3.19	4.12	4.12
R90	Characteristic resistance:	$F_{Rk,fi90}^{0(1)}$	[kN]	0.14	0.44	0.87	1.63	3.14	4.12	4.12
R120	Characteristic resistance:	$F_{Rk,fi120}^{0(1)}$	[kN]	0.10	0.37	0.69	1.30	2.51	3.30	3.30
R30 to R120	Spacing	$S_{cr,fi}$	[mm]	4 x hef						
R30 to R120	Edge distance	$C_{cr,fi}$	[mm]	2 x hef						

¹⁾ in absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is $c \geq 300$ mm

WDI2, WDI2L, WDI2R, WDI2 SSt, WDI2L SSt anchor	Annex C7
Performances	
Essential characteristics under fire exposure	

