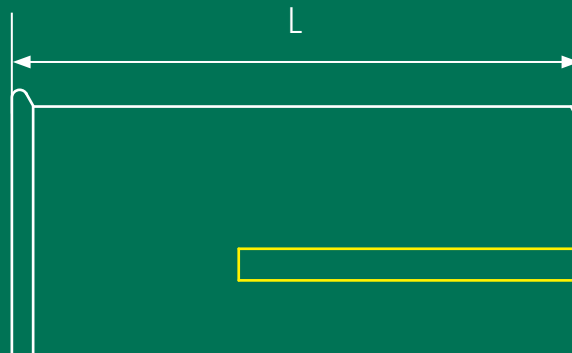
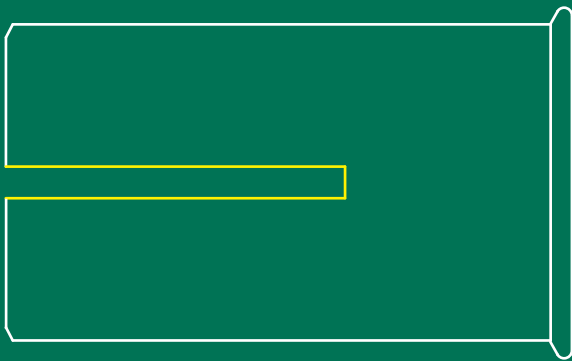
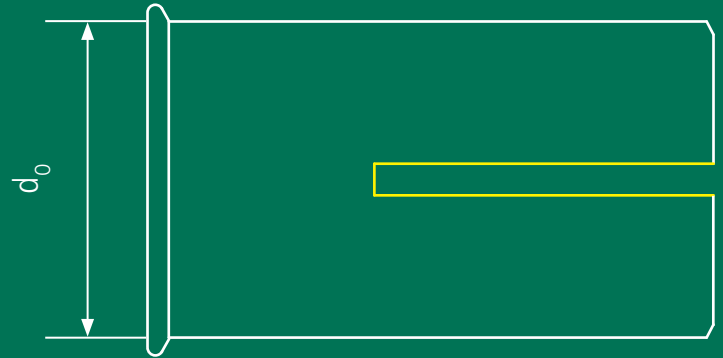


## Approval

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# WDI1R Drop-in Anchor

ETA-17/0623

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-17/0623**  
**of 7 September 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

Drop in anchor WDI1 / WDI1L / WDI1R

Product family  
to which the construction product belongs

Deformation-controlled expansion anchor  
for multiple use for non-structural  
applications in concrete

Manufacturer

J. van Walraven Holding B.V.  
Industrieweg 5  
3641 RK Mijdrecht  
NIEDERLANDE

Manufacturing plant

Walraven factory A5

This European Technical Assessment  
contains

20 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

ETAG 001 Part 6: "Anchors for multiple use for non-  
structural applications", January 2011,  
used as EAD according to Article 66 Paragraph 3 of  
Regulation (EU) No 305/2011.

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**Specific Part**

**1 Technical description of the product**

The Drop-in Anchor Walraven WDI1, WDI1L and WDI1R is an anchor made of zinc-plated steel, of stainless steel or high corrosion resistant steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

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)**

The essential characteristics regarding Mechanical resistance and stability are included under the Basic Works Requirement Safety in use.

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

| Essential characteristic | Performance                                 |
|--------------------------|---|
| Reaction to fire         | Anchorage satisfy requirements for Class A1 |
| Resistance to fire       | See Annex C 4 to C 5                        |

**3.3 Safety in use (BWR 4)**

| Essential characteristic                                   | Performance          |
|--|----------------------|
| Characteristic values for static and quasi- static actions | See Annex C 1 to C 3 |

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

In accordance with guideline for European technical approval ETAG 001, January 2011 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

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

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

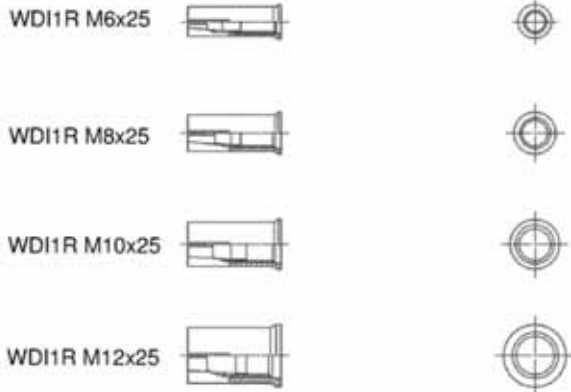
Issued in Berlin on 7 September 2017 by Deutsches Institut für Bautechnik

Andreas Kummerow  
Head of Department

*beglaubigt:*  
Baderschneider

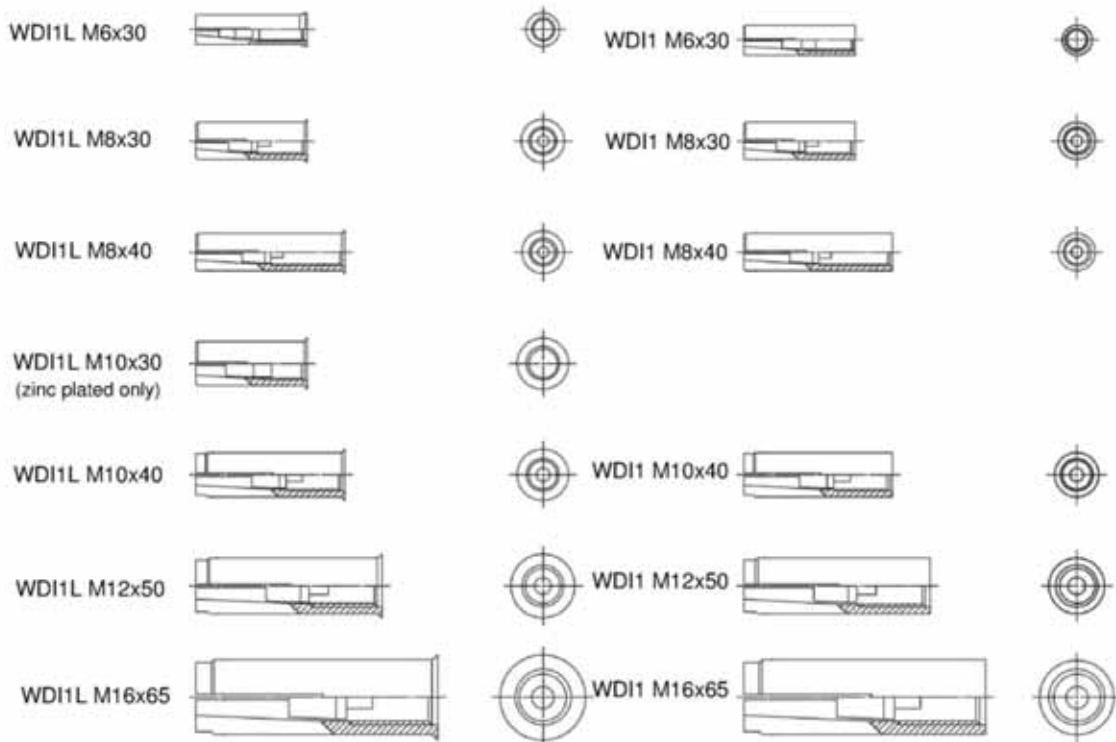
### Drop-in Anchor WDI1R

Anchorage depth  $h_{ef} = 25$  mm (zinc plated)



### Drop-in Anchor WDI1 and WDI1L

Anchorage depth  $h_{ef} \geq 30$  mm (zinc plated, A4 or HCR)

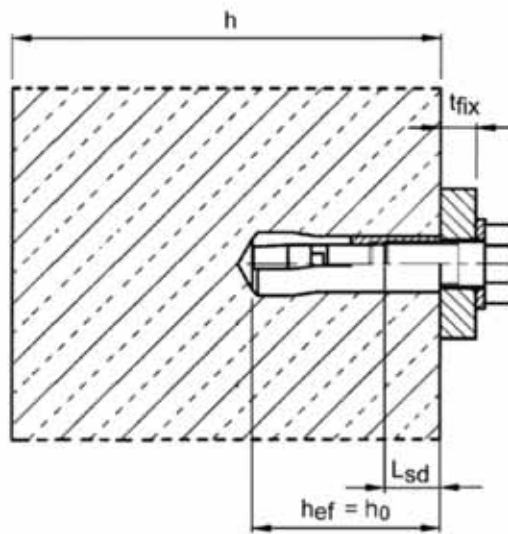


### Drop-in Anchor Walraven WDI1, WDI1L and WDI1R

Product description  
Anchor size

Annex A1

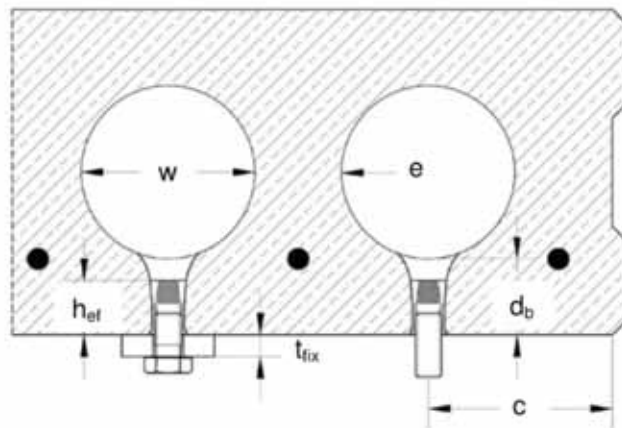
**Installation situation in concrete**



**Installation situation in precast pre-stressed hollow core slabs for  $h_{ef} = 25\text{ mm}$**

$w / e \leq 4,2$

- w core width
- e web thickness
- $d_b$  flange thickness  $\geq 35\text{mm}$  (or  $\geq 30\text{mm}$ , see Annex C3)
- $h_{ef}$  embedment depth
- $t_{fix}$  thickness of fixture
- c edge distance



**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

Product description  
Installation situation

**Annex A2**

**Table A1: Designation and Material Drop-in Anchor WDI1, WDI1L and WDI1R**

| Part | Designation   | Steel, zinc plated  | Stainless steel A4   | High corrosion resistant steel HCR  |
|------|---------------|---|--|---|
| 1    | Anchor sleeve | Cold formed or machining steel, zinc plated, EN ISO 4042:1999 | Stainless steel (e.g. 1.4401, 1.4404, 1.4571, 1.4362) EN 10088:2014, Property class 70, EN ISO 3506:2010 | Stainless steel, 1.4529, 1.4565, EN 10088:2014, Property class 70, EN ISO 3506:2010 |
| 2    | Cone          | Cold formed or machining steel                                | Stainless steel (e.g. 1.4401, 1.4404, 1.4571, 1.4362) EN 10088:2014                                      |   |

**Requirements on the fastening screw or the threaded rod and nut according to the engineering documents:**

- Minimum screw-in depth  $L_{s\text{dmin}}$  see Table B1 and B2
- The length of screw or the threaded rod shall be determined depending on the thickness of fixture  $t_{\text{fix}}$ , available thread length  $L_{\text{th}}$  (= maximum screw-in depth) and the minimum screw-in depth  $L_{s\text{dmin}}$ .
- $A_5 > 8\%$  Ductility

**Steel, zinc plated**

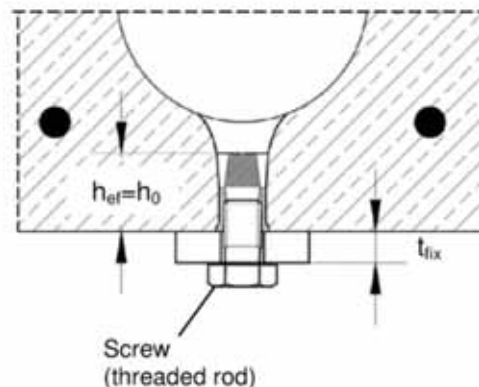
- Property class 4.6 / 4.8 / 5.6 / 5.8 or 8.8 according to EN ISO 898-1:2013 or EN ISO 898-2:2012

**Stainless steel A4**

- Material 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 EN 10088:2014
- Property class 70 or 80 according to EN ISO 3506:2010

**High corrosion resistant steel (HCR)**

- Material 1.4529; 1.4565, according to EN 10088:2014
- Property class 70 or 80 according to EN ISO 3506:2010



**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Product description**

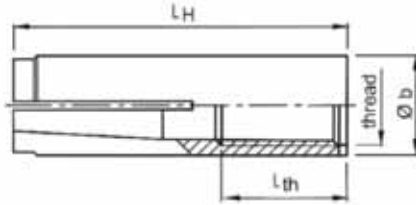
Material and requirements on the fastening screw or the threaded rod and nut

**Annex A3**



### Anchor sleeve

Anchor version without shoulder (WDI1)

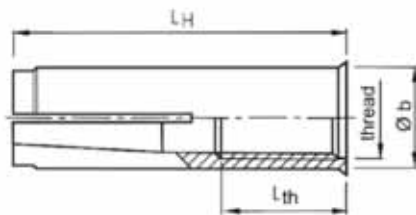


Marking: see Table A2

e.g.:  $\diamond$  E M8x40

$\diamond$  Identifying mark of manufacturing plant  
E Anchor identity (version without shoulder)  
ES Anchor identity (version with shoulder)  
M8 Size of thread  
40 Anchorage depth

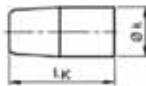
Anchor version with shoulder (WDI1L / WDI1R)



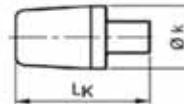
A4 additional marking of stainless steel A4

HCR additional marking of high corrosion resistant steel

Cone



Size M6x25 to M12x25,  
M6x30 and M10x30



Remaining sizes

**Table A2: Dimensions and marking**

| Anchor size | Anchor sleeve |      |                |                 | Cone |                | Marking             |                       |                     |
|-------------|---------------|------|----------------|-----------------|------|----------------|---------------------|-----------------------|---------------------|
|             | thread        | Ø b  | L <sub>H</sub> | L <sub>th</sub> | Ø k  | L <sub>k</sub> | version WDI1        | version WDI1L / WDI1R | alternatively       |
| M6x25       | M6            | 8    | 25             | 12              | 4,6  | 9              | -                   | $\diamond$ ES M6x25   | -                   |
| M6x30       | M6            | 8    | 30             | 13              | 5,0  | 13             | $\diamond$ E M6x30  | $\diamond$ ES M6x30   | $\diamond$ E M6     |
| M8x25       | M8            | 10   | 25             | 12              | 6,3  | 9              | -                   | $\diamond$ ES M8x25   | -                   |
| M8x30       | M8            | 10   | 30             | 13              | 6,5  | 12             | $\diamond$ E M8x30  | $\diamond$ ES M8x30   | $\diamond$ E M8     |
| M8x40       | M8            | 10   | 40             | 20              | 6,5  | 12             | $\diamond$ E M8x40  | $\diamond$ ES M8x40   | $\diamond$ E M8x40  |
| M10x25      | M10           | 12   | 25             | 12              | 8,2  | 9              | -                   | $\diamond$ ES M10x25  | -                   |
| M10x30      | M10           | 12   | 30             | 12              | 8,2  | 12             | -                   | $\diamond$ ES M10x30  | $\diamond$ E M10x30 |
| M10x40      | M10           | 12   | 40             | 15              | 8,2  | 16             | $\diamond$ E M10x40 | $\diamond$ ES M10x40  | $\diamond$ E M10    |
| M12x25      | M12           | 15   | 25             | 12              | 9,7  | 10,7           | -                   | $\diamond$ ES M12x25  | -                   |
| M12x50      | M12           | 15   | 50             | 18              | 10,3 | 20             | $\diamond$ E M12x50 | $\diamond$ ES M12x50  | $\diamond$ E M12    |
| M16x65      | M16           | 19,7 | 65             | 23              | 13,8 | 29             | $\diamond$ E M16x65 | $\diamond$ ES M16x65  | $\diamond$ E M16    |

Dimensions in mm

### Drop-in Anchor Walraven WDI1, WDI1L and WDI1R

Product description  
Dimensions and marking

**Annex A4**

### Setting tool for marking

Marking: see Table A3  
e.g. ◊ M E/ES M8x40

Machine setting tool

View A

visible marking

Verification of correct installation with setting tool for marking  
The setting tool leaves a visible marking after correct installation.

### Setting tool

Marking: see Table A3  
e.g. ◊ E/ES M8x40

Machine setting tool

View B

### Table A3: Dimensions and marking of setting tools

| Anchor size | Ø m  | f    | Setting tool for marking |               | Setting tool  |               |
|-------------|------|------|--------------------------|---------------|---------------|---------------|
|             |      |      | Marking                  | alternatively | Marking       | alternatively |
| M6x25       | 4,9  | 17   | ◊ M ES M6x25             | -             | ◊ ES M6x25    | -             |
| M6x30       | 4,9  | 17   | ◊ M E/ES M6x30           | ◊ M E M6      | ◊ E/ES M6x30  | ◊ E M6        |
| M8x25       | 6,4  | 17   | ◊ M ES M8x25             | -             | ◊ ES M8x25    | -             |
| M8x30       | 6,4  | 18   | ◊ M E/ES M8x30           | ◊ M E M8      | ◊ E/ES M8x30  | ◊ E M8        |
| M8x40       | 6,4  | 28   | ◊ M E/ES M8x40           | ◊ M E M8x40   | ◊ E/ES M8x40  | ◊ E M8x40     |
| M10x25      | 8,0  | 18   | ◊ M ES M10x25            | -             | ◊ ES M10x25   | -             |
| M10x30      | 8,0  | 18   | ◊ M ES M10x30            | ◊ M E M10x30  | ◊ ES M10x30   | ◊ E M10x30    |
| M10x40      | 8,0  | 24   | ◊ M E/ES M10x40          | ◊ M E M10     | ◊ E/ES M10x40 | ◊ E M10       |
| M12x25      | 10,0 | 15,5 | ◊ M ES M12x25            | -             | ◊ ES M12x25   | -             |
| M12x50      | 10,0 | 30   | ◊ M E/ES M12x50          | ◊ M E M12     | ◊ E/ES M12x50 | ◊ E M12       |
| M16x65      | 13,5 | 36   | ◊ M E/ES M16x65          | ◊ M E M16     | ◊ E/ES M16x65 | ◊ E M16       |

Dimensions in mm

|  |  |                 |
|--|--|-----------------|
| <b>Drop-in Anchor Walraven WDI1, WDI1L and WDI1R</b>         |  | <b>Annex A5</b> |
| Product description<br>Setting tools, dimensions and marking |  |                 |

### Specifications of intended use

| Drop-in Anchor  |       |       |        |        |        |        |        |
|---|-------|-------|--------|--------|--------|--------|--------|
| Anchorage depth $h_{ef} \geq 30$ mm                       | M6x30 | M8x30 | M8x40  | M10x30 | M10x40 | M12x50 | M16x65 |
| Steel, zinc plated  |       |       |        | ✓      |        |        |        |
| Stainless steel A4 and high corrosion resistant steel HCR |       | ✓     |        | -      |        | ✓      |        |
| Static and quasi-static loads                             |       |       |        | ✓      |        |        |        |
| Fire exposure   |       |       |        | ✓      |        |        |        |
| Cracked and uncracked concrete                            |       |       |        | ✓      |        |        |        |
| Solid concrete <b>C20/25 to C50/60</b>                    |       |       |        | ✓      |        |        |        |
| Anchorage depth $h_{ef} = 25$ mm                          | M6x25 | M8x25 | M10x25 | M12x25 |        |        |        |
| Steel, zinc plated  |       | ✓     |        |        |        |        |        |
| Stainless steel A4 and high corrosion resistant steel HCR |       |       | -      |        |        |        |        |
| Static and quasi-static loads                             |       | ✓     |        |        |        |        |        |
| Fire exposure (solid concrete, C20/25 to C50/60)          |       | ✓     |        |        |        |        |        |
| Cracked and uncracked concrete                            |       | ✓     |        |        |        |        |        |
| Solid concrete <b>C12/15 to C50/60</b>                    |       | ✓     |        |        |        |        |        |
| Precast pre-stressed hollow core slabs (C30/37 to C50/60) |       | ✓     |        |        |        |        |        |

#### Base materials:

- reinforced or unreinforced normal weight concrete according to EN 206-1:2000

#### Use conditions:

- Structures subject to dry internal conditions (zinc plated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) or exposure to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions (high corrosion resistant steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used.)

### Drop-in Anchor Walraven WDI1, WDI1L and WDI1R

Intended use  
Specifications

Annex B1

### Specifications of intended use

#### Design:

- 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 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.).
- The strength class and the length of the fastening screw or threaded rod shall be defined by the designing engineer
- Anchorages under static or quasi-static actions for multiple use for non-structural applications are designed in accordance with:
  - ETAG 001, Annex C, design method B, Edition August 2010 or
  - CEN/TS 1992-4:2009, design method B
- Anchorages under static or quasi-static actions for precast pre-stressed hollow core slabs:
  - ETAG 001, Annex C, design method C, Edition August 2010.
  - CEN/TS 1992-4:2009, design method C
- Anchorages under fire exposure are designed in accordance with:
  - ETAG 001, Annex C, design method B, Edition August 2010 and EOTA Technical Report TR 020, Edition May 2004 or
  - CEN/TS 1992-4:2009, Annex D
  - It must be ensured that local spalling of the concrete cover does not occur.

#### Installation:

- 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,
- Drill hole by hammer drilling only (use of vacuum drill bits is admissible),
- Positioning of the drill holes without damaging the reinforcement.

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Intended use  
Specifications**

**Annex B2**

English translation prepared by DIBt

**Table B1: Installation parameters for  $h_{ef} \geq 30$  mm**

| Anchor size                               |                      | M6x30 | M8x30 | M8x40 | M10x30 | M10x40 | M12x50 | M16x65 |
|---|----------------------|-------|-------|-------|--------|--------|--------|--------|
| Depth of drill hole                       | $h_0 =$ [mm]         | 30    | 30    | 40    | 30     | 40     | 50     | 65     |
| Drill hole diameter                       | $d_0 =$ [mm]         | 8     | 10    | 10    | 12     | 12     | 15     | 20     |
| Cutting diameter of drill bit             | $d_{cut} \leq$ [mm]  | 8,45  | 10,45 | 10,45 | 12,5   | 12,5   | 15,5   | 20,55  |
| Max. recommended installation torque      | $T_{inst} \leq$ [Nm] | 4     | 8     | 8     | 15     | 15     | 35     | 60     |
| Diameter of clearance hole in the fixture | $d_f \leq$ [mm]      | 7     | 9     | 9     | 12     | 12     | 14     | 18     |
| Available thread length                   | $L_{th}$ [mm]        | 13    | 13    | 20    | 12     | 15     | 18     | 23     |
| Minimum screw-in depth                    | $L_{smin}$ [mm]      | 7     | 9     | 9     | 10     | 11     | 13     | 18     |
| <b>Steel, zinc plated</b>                 |                      |       |       |       |        |        |        |        |
| Minimum thickness of member               | $h_{min}$ [mm]       | 100   | 100   | 100   | 120    | 120    | 130    | 160    |
| Minimum spacing                           | $s_{min}$ [mm]       | 55    | 60    | 80    | 100    | 100    | 120    | 150    |
| Minimum distance                          | $c_{min}$ [mm]       | 95    | 95    | 95    | 115    | 135    | 165    | 200    |
| <b>Stainless steel A4, HCR</b>            |                      |       |       |       |        |        |        |        |
| Minimum thickness of member               | $h_{min}$ [mm]       | 100   | 100   | 100   | -      | 130    | 140    | 160    |
| Minimum spacing                           | $s_{min}$ [mm]       | 50    | 60    | 80    | -      | 100    | 120    | 150    |
| Minimum distance                          | $c_{min}$ [mm]       | 80    | 95    | 95    | -      | 135    | 165    | 200    |

**Table B2: Installation parameters for  $h_{ef} = 25$  mm**

| Anchor size  |                      | M6x25      | M8x25 | M10x25 | M12x25 |
|--|----------------------|------------|-------|--------|--------|
| Depth of drill hole  | $h_0 =$ [mm]         | 25         | 25    | 25     | 25     |
| Drill hole diameter  | $d_0 =$ [mm]         | 8          | 10    | 12     | 15     |
| Cutting diameter of drill bit  | $d_{cut} \leq$ [mm]  | 8,45       | 10,45 | 12,5   | 15,5   |
| Max. recommended installation torque   | $T_{inst} \leq$ [Nm] | 4          | 8     | 15     | 35     |
| Diameter of clearance hole in the fixture                                      | $d_f \leq$ [mm]      | 7          | 9     | 12     | 14     |
| Available thread length  | $L_{th}$ [mm]        | 12         | 12    | 12     | 12     |
| Minimum screw-in depth   | $L_{smin}$ [mm]      | 6          | 8     | 10     | 12     |
| Minimum thickness of member  | $h_{min,1}$ [mm]     | <b>80</b>  |       |        |        |
| Minimum spacing  | $s_{min}$ [mm]       | 30         | 70    | 70     | 100    |
| Minimum edge distance  | $c_{min}$ [mm]       | 60         | 100   | 100    | 130    |
| Standard thickness of member   | $h_{min,2}$ [mm]     | <b>100</b> |       |        |        |
| Minimum spacing  | $s_{min}$ [mm]       | 30         | 50    | 60     | 100    |
| Minimum edge distance  | $c_{min}$ [mm]       | 60         | 100   | 100    | 110    |
| <b>Installation in precast pre-stressed hollow core slabs C30/37 to C50/60</b> |                      |            |       |        |        |
| Spacing  | $s_{min}$ [mm]       |            |       |        | 200    |
| Edge distance  | $c_{min}$ [mm]       |            |       |        | 150    |

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

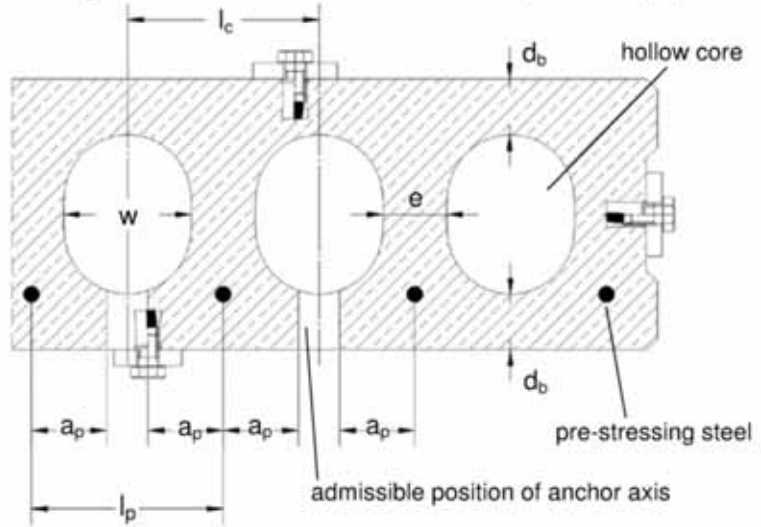
**Intended use**  
Installation parameters

**Annex B3**

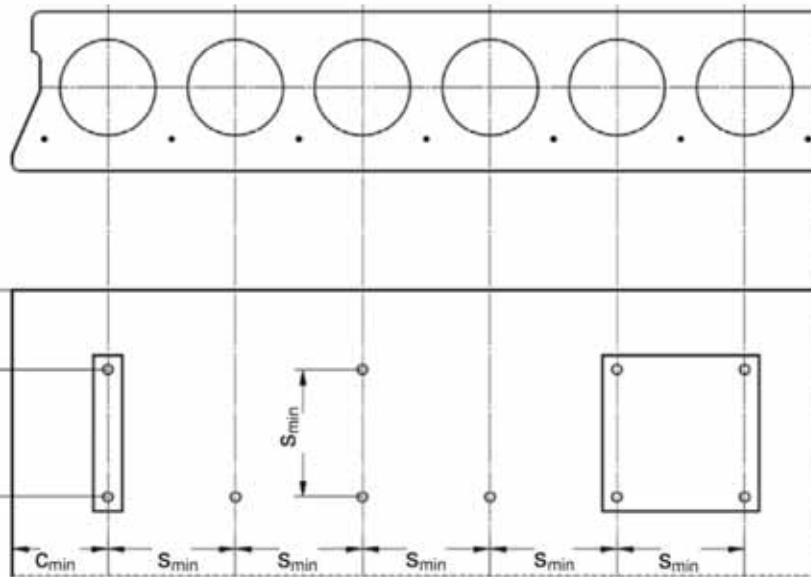
English translation prepared by DIBt

**Admissible anchor positions in precast pre-stressed hollow core slabs ( $w / e \leq 4,2$ )**

- core distance:  
 $l_c \geq 100 \text{ mm}$
- pre-stressing steel distance:  
 $l_p \geq 100 \text{ mm}$
- distance between anchor position and pre-stressing steel:  
 $a_p \geq 50 \text{ mm}$



**Minimum spacing and edge distance of anchors and distance between anchor groups in precast pre-stressed hollow core slabs**




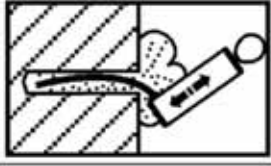
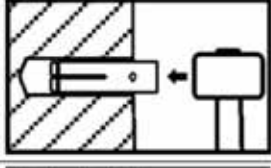
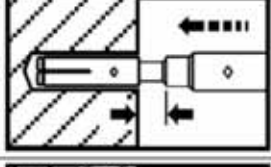
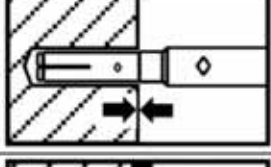
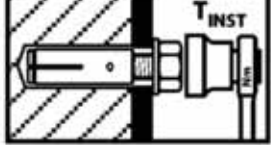
- Minimum edge distance  
 $c_{min} \geq 150 \text{ mm}$
- Minimum anchor spacing  
 $s_{min} \geq 200 \text{ mm}$

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Intended use**  
Installation in precast pre-stressed hollow core slabs

**Annex B4**

**Installation instructions for solid concrete slabs**

|   |   |   |
|---|---|---|
| 1 |    | <p>Drill hole perpendicular to concrete surface. When using vacuum drill bit proceed with step 3.</p> |
| 2 |    | <p>Blow out dust. Alternatively vacuum-clean down to the bottom of the hole.</p>                      |
| 3 |    | <p>Drive in anchor.</p>   |
| 4 |   | <p>Drive in cone by using setting tool.</p>   |
| 5 |  | <p>Shoulder of setting tool must fit on anchor rim.</p>   |
| 6 |  | <p>Apply installation torque <math>T_{inst}</math> by using calibrated torque wrench.</p>             |

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Intended use**  
Installation instructions for solid concrete slabs

**Annex B5**

English translation prepared by DIBt

**Table C1: Characteristic resistance for  $h_{ef} \geq 30$  mm in solid concrete slabs**

| Anchor size   |                            | M6x30 | M8x30 | M8x40 | M10x30 | M10x40 | M12x50 | M16x65 |
|---|----------------------------|-------|-------|-------|--------|--------|--------|--------|
| <b>Load in any direction</b>                                  |                            |       |       |       |        |        |        |        |
| Characteristic resistance in concrete <b>C20/25 to C50/60</b> | $F_{Rk}^0$                 | [kN]  | 3     | 5     | 6      | 6      | 6      | 16     |
| Partial safety factor   | $\gamma_M$                 | [-]   | 1,8   | 2,16  |        | 2,1    | 2,16   | 1,8    |
| Spacing   | $s_{cr}$                   | [mm]  | 130   | 180   | 210    | 230    | 170    | 400    |
| Edge distance   | $c_{cr}$                   | [mm]  | 65    | 90    | 105    | 115    | 85     | 200    |
| <b>Shear load with lever arm, Steel zinc plated</b>           |                            |       |       |       |        |        |        |        |
| Characteristic resistance <b>(Steel 4.6)</b>                  | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 6,1   | 15    | 15     | 30     | 30     | 52     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,67  |       |        |        |        |        |
| Characteristic resistance <b>(Steel 4.8)</b>                  | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 6,1   | 15    | 15     | 30     | 30     | 52     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,25  |       |        |        |        |        |
| Characteristic resistance <b>(Steel 5.6)</b>                  | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 7,6   | 19    | 19     | 37     | 37     | 65     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,67  |       |        |        |        |        |
| Characteristic resistance <b>(Steel 5.8)</b>                  | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 7,6   | 19    | 19     | 37     | 37     | 65     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,25  |       |        |        |        |        |
| Characteristic resistance <b>(Steel 8.8)</b>                  | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 12    | 30    | 30     | 59     | 60     | 105    |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,25  |       |        |        |        |        |
| <b>Shear load with lever arm, Stainless steel A4 / HCR</b>    |                            |       |       |       |        |        |        |        |
| Characteristic resistance <b>(Property class 70)</b>          | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 11    | 26    | 26     | -      | 52     | 92     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,56  |       |        |        |        |        |
| Characteristic resistance <b>(Property class 80)</b>          | $M_{Rk,S}^0$ <sup>1)</sup> | [Nm]  | 12    | 30    | 30     | -      | 60     | 105    |
| Partial safety factor   | $\gamma_{Ms}$              | [-]   | 1,33  |       |        |        |        |        |

1) Characteristic bending moment  $M_{Rk,S}^0$  for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Performance**  
Characteristic resistance for  $h_{ef} \geq 30$  mm in solid concrete

**Annex C1**



**Table C2: Characteristic resistance for  $h_{ef} = 25$  mm in solid concrete slabs**

| Anchor size  |                            |      | M6x25 | M8x25 | M10x25 | M12x25 |
|--|----------------------------|------|-------|-------|--------|--------|
| <b>Load in any direction</b>                                   |                            |      |       |       |        |        |
| Characteristic resistance in concrete <b>C12/15 and C16/20</b> | $F_{Rk}^0$                 | [kN] | 2,5   | 2,5   | 3,5    | 3,5    |
| Characteristic resistance in concrete <b>C20/25 to C50/60</b>  | $F_{Rk}^0$                 | [kN] | 3,5   | 4,0   | 4,5    | 4,5    |
| Partial safety factor  | $\gamma_M$                 | [-]  | 1,5   |       |        |        |
| Spacing  | $s_{Cr}$                   | [mm] | 75    | 75    | 75     | 75     |
| Edge distance  | $c_{Cr}$                   | [mm] | 38    | 38    | 38     | 38     |
| <b>Shear load with lever arm</b>                               |                            |      |       |       |        |        |
| Characteristic resistance <b>(Steel 4.6)</b>                   | $M_{Rk,s}^0$ <sup>1)</sup> | [Nm] | 6,1   | 15    | 30     | 52     |
| Partial safety factor  | $\gamma_{Ms}$              | [-]  | 1,67  |       |        |        |
| Characteristic resistance <b>(Steel 4.8)</b>                   | $M_{Rk,s}^0$ <sup>1)</sup> | [Nm] | 6,1   | 15    | 30     | 52     |
| Partial safety factor  | $\gamma_{Ms}$              | [-]  | 1,25  |       |        |        |
| Characteristic resistance <b>(Steel 5.6)</b>                   | $M_{Rk,s}^0$ <sup>1)</sup> | [Nm] | 7,6   | 19    | 37     | 65     |
| Partial safety factor  | $\gamma_{Ms}$              | [-]  | 1,67  |       |        |        |
| Characteristic resistance <b>(Steel 5.8)</b>                   | $M_{Rk,s}^0$ <sup>1)</sup> | [Nm] | 7,6   | 19    | 37     | 65     |
| Partial safety factor  | $\gamma_{Ms}$              | [-]  | 1,25  |       |        |        |
| Characteristic resistance <b>(Steel 8.8)</b>                   | $M_{Rk,s}^0$ <sup>1)</sup> | [Nm] | 12    | 30    | 60     | 105    |
| Partial safety factor  | $\gamma_{Ms}$              | [-]  | 1,25  |       |        |        |

<sup>1)</sup> Characteristic bending moment  $M_{Rk,s}^0$  for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Performance**  
Characteristic resistance for  $h_{ef} = 25$  mm in solid concrete

**Annex C2**

**Table C3: Characteristic resistance for  $h_{ef} = 25$  mm in precast pre-stressed hollow core slabs**

| Anchor size   |                            |      | M6x25                        | M8x25 | M10x25 | M12x25 |
|---|----------------------------|------|------------------------------|-------|--------|--------|
| <b>Load in any direction</b>  |                            |      |                              |       |        |        |
| Flange thickness  | $d_b$                      | [mm] | $\geq 35$ (30) <sup>1)</sup> |       |        |        |
| Characteristic resistance in precast pre-stressed hollow core slabs <b>C30/37 to C50/60</b> | $F_{Rk}$                   | [kN] | 3,5                          | 4,0   | 4,5    | 4,5    |
| Partial safety factor   | $\gamma_M$                 | [-]  | 1,5                          |       |        |        |
| Spacing   | $s_{cr}$                   | [mm] | 200                          |       |        |        |
| Edge distance   | $c_{cr}$                   | [mm] | 150                          |       |        |        |
| <b>Shear load with lever arm</b>  |                            |      |                              |       |        |        |
| Characteristic resistance <b>(Steel 4.6)</b>  | $M^0_{Rk,s}$ <sup>2)</sup> | [Nm] | 6,1                          | 15    | 30     | 52     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]  | 1,67                         |       |        |        |
| Characteristic resistance <b>(Steel 4.8)</b>  | $M^0_{Rk,s}$ <sup>2)</sup> | [Nm] | 6,1                          | 15    | 30     | 52     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]  | 1,25                         |       |        |        |
| Characteristic resistance <b>(Steel 5.6)</b>  | $M^0_{Rk,s}$ <sup>2)</sup> | [Nm] | 7,6                          | 19    | 37     | 65     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]  | 1,67                         |       |        |        |
| Characteristic resistance <b>(Steel 5.8)</b>  | $M^0_{Rk,s}$ <sup>2)</sup> | [Nm] | 7,6                          | 19    | 37     | 65     |
| Partial safety factor   | $\gamma_{Ms}$              | [-]  | 1,25                         |       |        |        |
| Characteristic resistance <b>(Steel 8.8)</b>  | $M^0_{Rk,s}$ <sup>2)</sup> | [Nm] | 12                           | 30    | 60     | 105    |
| Partial safety factor   | $\gamma_{Ms}$              | [-]  | 1,25                         |       |        |        |

<sup>1)</sup> The anchor may be set in a flange thickness of 30 mm with identical characteristic loads, if the borehole cuts no hollow core.

<sup>2)</sup> Characteristic bending moment  $M^0_{Rk,s}$  for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Performance**

Characteristic resistance for  $h_{ef} = 25$  mm in precast pre-stressed hollow core slabs

**Annex C3**

**Table C4:** Characteristic values under fire exposure in solid concrete slabs C20/25 to C50/60 for  $h_{ef} \geq 30$  mm

| Anchor size  |               |  | M6x30 | M8x30 | M8x40 | M10x30 | M10x40 | M12x50 | M16x65 |     |
|--|---------------|--|-------|-------|-------|--------|--------|--------|--------|-----|
| <b>Fire resistance class</b>   |               | <b>Load in any direction</b>               |       |       |       |        |        |        |        |     |
| Steel<br>4.6   | R 30          | Characteristic resistance<br>$F_{Rk,fi}^0$ | [kN]  | 0,4   | 0,6   | 0,6    | 0,9    | 0,9    | 1,5    | 3,1 |
|  | R 60          |  | [kN]  | 0,35  | 0,6   | 0,6    | 0,8    | 0,8    | 1,3    | 2,4 |
|  | R 90          |  | [kN]  | 0,30  | 0,6   | 0,6    | 0,6    | 0,6    | 1,1    | 2,0 |
|  | R 120         |  | [kN]  | 0,25  | 0,5   | 0,5    | 0,5    | 0,5    | 0,8    | 1,6 |
| Steel<br>4.8   | R 30          | Characteristic resistance<br>$F_{Rk,fi}^0$ | [kN]  | 0,4   | 0,9   | 1,1    | 0,9    | 1,5    | 1,5    | 4,0 |
|  | R 60          |  | [kN]  | 0,35  | 0,9   | 0,9    | 0,9    | 1,5    | 1,5    | 4,0 |
|  | R 90          |  | [kN]  | 0,3   | 0,6   | 0,6    | 0,9    | 1,1    | 1,5    | 3,0 |
|  | R 120         |  | [kN]  | 0,3   | 0,5   | 0,5    | 0,7    | 0,9    | 1,2    | 2,4 |
| Steel<br>$\geq 5.6$  | R 30          | Characteristic resistance<br>$F_{Rk,fi}^0$ | [kN]  | 0,8   | 0,9   | 1,5    | 0,9    | 1,5    | 1,5    | 4,0 |
|  | R 60          |  | [kN]  | 0,8   | 0,9   | 1,5    | 0,9    | 1,5    | 1,5    | 4,0 |
|  | R 90          |  | [kN]  | 0,4   | 0,9   | 0,9    | 0,9    | 1,5    | 1,5    | 3,7 |
|  | R 120         |  | [kN]  | 0,3   | 0,5   | 0,5    | 0,7    | 1,0    | 1,2    | 2,4 |
| A4 /<br>HCR  | R 30          | Characteristic resistance<br>$F_{Rk,fi}^0$ | [kN]  | 0,8   | 0,9   | 1,5    | -      | 1,5    | 1,5    | 4,0 |
|  | R 60          |  | [kN]  | 0,8   | 0,9   | 1,5    | -      | 1,5    | 1,5    | 4,0 |
|  | R 90          |  | [kN]  | 0,4   | 0,9   | 0,9    | -      | 1,5    | 1,5    | 3,7 |
|  | R 120         |  | [kN]  | 0,3   | 0,5   | 0,5    | -      | 1,0    | 1,2    | 2,4 |
| Partial safety factor $\gamma_{M,fi}$  |               |  | [-]   | 1,0   |       |        |        |        |        |     |
| <b>Steel zinc plated</b>   |               |  |       |       |       |        |        |        |        |     |
| R 30 – R 120   | Spacing       | $s_{cr,fi}$                                | [mm]  | 130   | 180   | 210    | 170    | 170    | 200    | 400 |
|  | Edge distance | $c_{cr,fi}$                                | [mm]  | 65    | 90    | 105    | 85     | 85     | 100    | 200 |
| If the fire attack is from more than one side, the edge distance shall be $\geq 300$ mm. |               |  |       |       |       |        |        |        |        |     |
| <b>Stainless steel A4, HCR</b>   |               |  |       |       |       |        |        |        |        |     |
| R 30 – R 120   | Spacing       | $s_{cr,fi}$                                | [mm]  | 130   | 180   | 210    | -      | 170    | 200    | 400 |
|  | Edge distance | $c_{cr,fi}$                                | [mm]  | 65    | 90    | 105    | -      | 85     | 100    | 200 |
| If the fire attack is from more than one side, the edge distance shall be $\geq 300$ mm. |               |  |       |       |       |        |        |        |        |     |

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Performance**  
Characteristic values under fire exposure for  $h_{ef} \geq 30$  mm

**Annex C4**

English translation prepared by DIBt

**Table C5:** Characteristic values under **fire exposure** in **solid concrete slabs C20/25 to C50/60** for  $h_{ef} = 25 \text{ mm}$

| Anchor size                           |   | M6x25   | M8x25 | M10x25 | M12x25 |     |     |
|---------------------------------------|---|---|-------|--------|--------|-----|-----|
| <b>Fire resistance class</b>          |   | <b>Load in any direction</b>                  |       |        |        |     |     |
| Steel<br>$\geq 4.6$                   | R 30  | Characteristic<br>resistance<br>$F_{Rk,fl}^D$ | [kN]  | 0,4    | 0,6    | 0,6 | 0,6 |
|                                       | R 60  |   | [kN]  | 0,35   | 0,6    | 0,6 | 0,6 |
|                                       | R 90  |   | [kN]  | 0,30   | 0,6    | 0,6 | 0,6 |
|                                       | R 120   |   | [kN]  | 0,25   | 0,5    | 0,5 | 0,5 |
| Partial safety factor $\gamma_{M,fl}$ |   | [-]   | 1,0   |        |        |     |     |
| R 30 – R 120                          | Spacing $s_{cr,fl}$   | [mm]  | 100   | 100    | 100    | 100 |     |
|                                       | Edge distance $c_{cr,fl}$   | [mm]  | 50    | 50     | 50     | 50  |     |
|                                       | If the fire attack is from more than one side, the edge distance shall be $\geq 300 \text{ mm}$ . |   |       |        |        |     |     |

**Drop-in Anchor Walraven WDI1, WDI1L and WDI1R**

**Performance**  
Characteristic values under **fire exposure** for  $h_{ef} = 25 \text{ mm}$

**Annex C5**

## Find out how we can support

Would you like to find out more about any of the solutions described in this brochure? Or would you like to discuss how we could support you find the best possible solution for your project? Get in touch today!

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#### Walraven International

P.O. Box 15  
3640 AA Mijdrecht (NL)  
Tel. +31 (0)297 23 30 00  
Fax +31 (0)297 23 30 99  
[export@walraven.com](mailto:export@walraven.com)

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