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European Technical Assessment

**ETA 17/0344
of 12/04/2017**

Technical Assessment Body issuing the ETA: Technical and Test Institute
for Construction Prague

Trade name of the construction product

Walraven Throughbolt anchor
WTB7

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

Product area code: 33
Torque controlled expansion anchor
for use in uncracked concrete

Manufacturer

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

Manufacturing plant

Walraven Factory A2

**This European Technical Assessment
contains**

10 pages including 8 Annexes which form
an integral part of this assessment

**This European Technical Assessment is
issued in accordance with regulation
(EU) No 305/2011, on the basis of**

EAD 330232-00-0601

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1. Technical description of the product

The Walraven Throughbolt anchor WTB7 are through-fixing torque-controlled expansion anchors in sizes of M8, M10, M12, M16 and M20. Each type comprises a nut, bolt, washer and expansion sleeve. The anchors are made from zinc-plated and passivated steel.

The anchor is installed in a drilled hole; tightening the nut draws the cone into the sleeve. The expansion of this sleeve applies the anchorage.

The installed anchor is shown in Annex 1.

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 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, but are to be regarded only as a means for choosing the 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 resistance (static and quasi-static loading) | See Annex C 1 and C 2 |
| Displacement | See Annex C 1 and C 2 |

3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|--------------------------|----------------------------------|
| Reaction to fire | Class A1 according to EN 13501-1 |
| Resistance to fire | No performance assessed |

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

According to the Decision 97/463/EC of the European Commission¹, the system 1 of assessment verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) apply.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Technical and Test Institute for Construction Prague.

Issued in Prague on 12.04.2017

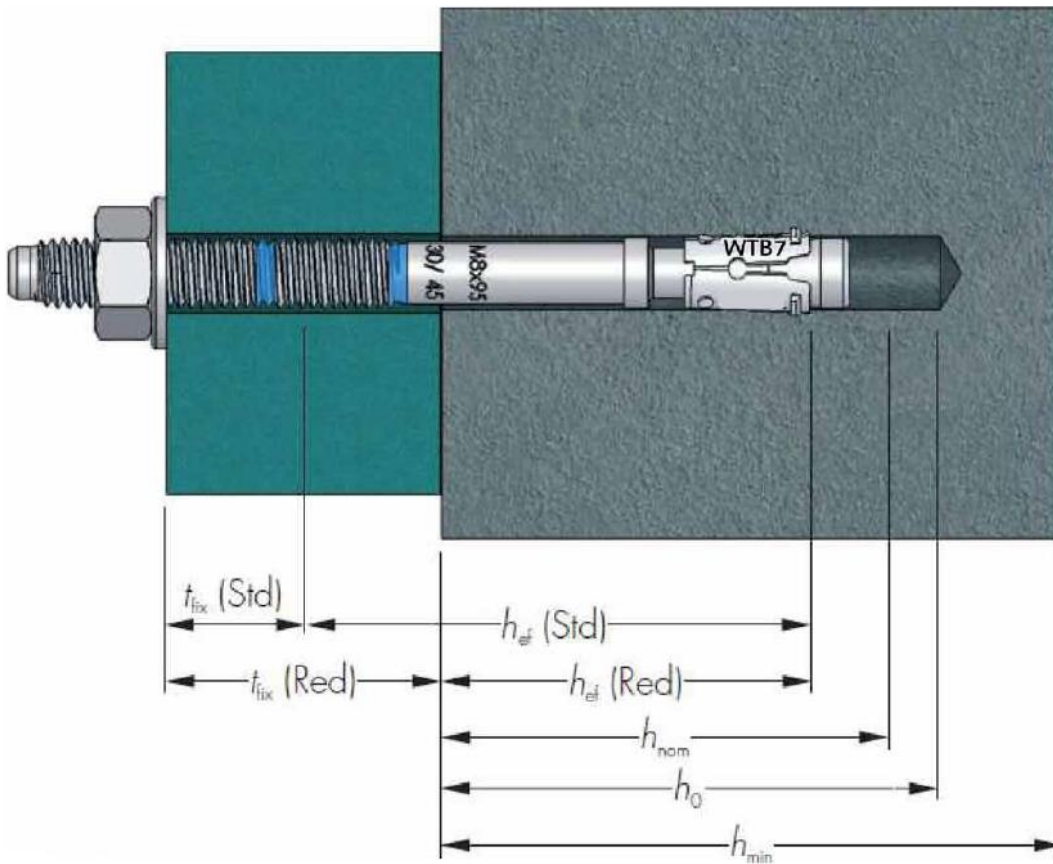
By

Ing. Mária Schaan

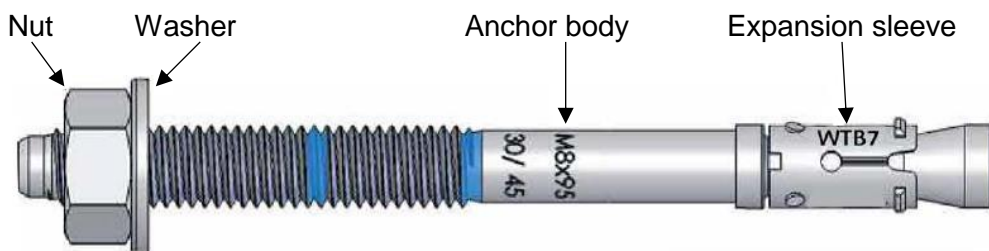
Head of the Technical Assessment Body

¹ Official Journal of the European Communities L 198/31 25.7.1997

Walraven Throughbolt anchor WTB7 - Installed anchor



Walraven Throughbolt anchor WTB7 - components



Walraven Throughbolt anchor WTB7

Product description
Installed conditions and components

Annex A 1

Table A1 - Materials

| Component | Material | Coating |
|------------------|---|--|
| Anchor body | Steel grade C17C, EN 10263-2 | Electroplated $\geq 5 \mu\text{m}$ and clear chromate film Cr3 |
| Expansion sleeve | Steel grade DC03, EN 10139 M8-M12 C590 M16-M20 C490 | |
| Hexagonal nut | according DIN 934 | |
| Washer | according DIN 125A or DIN 9021 | |

Table A2 – Material properties

| Component | M8 – M16 | M20 |
|--|-----------|-----------|
| Anchor body – ultimate tensile strength [N/mm ²] | 400 - 480 | 480 - 530 |
| | M8 – M12 | M16 – M20 |
| Expansion sleeve – hardness [HV] | 185 - 215 | 155 - 185 |

Table A3 – Marking

| M8 | | | | | | | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|---------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Bolt length [mm] | 60 | 65 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 115 | 120 | 140 | 150 | 160 | | | | |
| Head marking | B | b | C | d | D | e | E | F | f | G | H | K | L | M | | | | |
| Bolt marking | -/10 | -/15 | 10/25 | 15/30 | 20/35 | 25/40 | 30/45 | 35/50 | 40/55 | 50/65 | 55/70 | 75/90 | 85/100 | 95/110 | | | | |
| M10 | | | | | | | | | | | | | | | | | | |
| Bolt length [mm] | 65 | 80 | 85 | 90 | 95 | 115 | 120 | 130 | 140 | 150 | 180 | | | | | | | |
| Head marking | B | D | d | e | E | G | H | J | K | L | P | | | | | | | |
| Bolt marking | -/5 | 10/20 | 15/25 | 20/30 | 25/35 | 45/55 | 50/60 | 60/70 | 70/80 | 80/90 | 110/120 | | | | | | | |
| M12 | | | | | | | | | | | | | | | | | | |
| Bolt length [mm] | 80 | 100 | 105 | 110 | 115 | 120 | 125 | 135 | 140 | 150 | 160 | 180 | 200 | 220 | 240 | 250 | 260 | 280 |
| Head marking | D | F | f | G | g | h | H | J | K | L | M | P | R | S | T | U | V | X |
| Bolt marking | -/5 | 5/25 | 10/30 | 15/35 | 20/40 | 25/45 | 30/50 | 40/60 | 45/65 | 55/75 | 65/85 | 85/105 | 105/125 | 125/145 | 145/165 | 155/175 | 165/185 | 185/205 |
| M16 | | | | | | | | | | | | | | | | | | |
| Bolt length [mm] | 100 | 105 | 125 | 130 | 140 | 150 | 160 | 180 | 200 | 220 | 250 | 280 | 300 | | | | | |
| Head marking | F | f | H | J | K | L | M | P | R | S | U | X | Y | | | | | |
| Bolt marking | -/5 | -/10 | 5/25 | 10/30 | 20/40 | 30/50 | 40/60 | 60/80 | 80/100 | 100/120 | 130/150 | 160/180 | 180/200 | | | | | |
| M20 | | | | | | | | | | | | | | | | | | |
| Bolt length [mm] | 125 | 140 | 160 | 165 | 180 | 200 | 250 | 300 | | | | | | | | | | |
| Head marking | H | K | M | m | P | R | U | Y | | | | | | | | | | |
| Bolt marking | -/5 | -/20 | 20/40 | 25/45 | 40/60 | 60/80 | 110/130 | 160/180 | | | | | | | | | | |

Walraven Throughbolt anchor WTB7

Product description
Materials
Marking

Annex A 2

Specifications of intended use

Anchorage subject to:

- Static and quasi-static load.

Base materials

- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206-1:2000-12.

Use conditions (Environmental conditions)

- Structures subject to dry internal conditions.

Design:

- The 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.
- Anchorages under static or quasi-static actions are designed for design method A in accordance with FprEN 1992-4:2016

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any components of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings using the appropriate tools.
- Effective anchoring depth, edge distance and spacing not less than the specified values without minus tolerance.
- In case of aborted drill 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 in the direction of load application.

Walraven Throughbolt anchor WTB7

Intended use
Specifications

Annex B 1

Table B1 - Installation parameters

| Size | Drill hole diameter d_0 [mm] | Bolt length l [mm] | Thread length l_G [mm] | Hole diameter in fixture d_f [mm] | Standard embedment | | | Reduced embedment | | | Installation torque T_{inst} [N.m] |
|------|-----------------------------------|-------------------------|-----------------------------|--|-------------------------------|--|--|-------------------------------|--|--|---|
| | | | | | Min. hole depth h_0 [mm] | Effective embedment depth h_{ef} [mm] | Max. fixture thickness t_{fix} [mm] | Min. hole depth h_0 [mm] | Effective embedment depth h_{ef} [mm] | Max. fixture thickness t_{fix} [mm] | |
| M8 | 8 | 60 | 25 | 9 | - | - | - | 40 | 32 | 10 | 15 |
| | | 65 | 30 | 9 | - | - | - | 40 | 32 | 15 | |
| | | 75 | 35 | 9 | 55 | 47 | 10 | 40 | 32 | 25 | |
| | | 80 | 40 | 9 | 55 | 47 | 15 | 40 | 32 | 30 | |
| | | 85 | 45 | 9 | 55 | 47 | 20 | 40 | 32 | 35 | |
| | | 90 | 50 | 9 | 55 | 47 | 25 | 40 | 32 | 40 | |
| | | 95 | 55 | 9 | 55 | 47 | 30 | 40 | 32 | 45 | |
| | | 100 | 60 | 9 | 55 | 47 | 35 | 40 | 32 | 50 | |
| | | 105 | 65 | 9 | 55 | 47 | 40 | 40 | 32 | 55 | |
| | | 115 | 75 | 9 | 55 | 47 | 50 | 40 | 32 | 65 | |
| | | 120 | 80 | 9 | 55 | 47 | 55 | 40 | 32 | 70 | |
| 140 | 100 | 9 | 55 | 47 | 75 | 40 | 32 | 90 | | | |
| 150 | 100 | 9 | 55 | 47 | 85 | 40 | 32 | 100 | | | |
| 160 | 100 | 9 | 55 | 47 | 95 | 40 | 32 | 110 | | | |
| M10 | 10 | 65 | 21 | 11 | - | - | - | 49 | 39 | 5 | 30 |
| | | 80 | 31 | 11 | 59 | 49 | 10 | 49 | 39 | 20 | |
| | | 85 | 36 | 11 | 59 | 49 | 15 | 49 | 39 | 25 | |
| | | 90 | 41 | 11 | 59 | 49 | 20 | 49 | 39 | 30 | |
| | | 95 | 46 | 11 | 59 | 49 | 25 | 49 | 39 | 35 | |
| | | 115 | 66 | 11 | 59 | 49 | 45 | 49 | 39 | 55 | |
| | | 120 | 71 | 11 | 59 | 49 | 50 | 49 | 39 | 60 | |
| | | 130 | 81 | 11 | 59 | 49 | 60 | 49 | 39 | 70 | |
| | | 140 | 91 | 11 | 59 | 49 | 70 | 49 | 39 | 80 | |
| | | 150 | 101 | 11 | 59 | 49 | 80 | 49 | 39 | 90 | |
| 180 | 100 | 11 | 59 | 49 | 110 | 49 | 39 | 120 | | | |
| M12 | 12 | 80 | 30 | 13 | - | - | - | 60 | 48 | 5 | 50 |
| | | 100 | 40 | 13 | 80 | 68 | 5 | 60 | 48 | 25 | |
| | | 105 | 45 | 13 | 80 | 68 | 10 | 60 | 48 | 30 | |
| | | 110 | 50 | 13 | 80 | 68 | 15 | 60 | 48 | 35 | |
| | | 115 | 55 | 13 | 80 | 68 | 20 | 60 | 48 | 40 | |
| | | 120 | 60 | 13 | 80 | 68 | 25 | 60 | 48 | 45 | |
| | | 125 | 65 | 13 | 80 | 68 | 30 | 60 | 48 | 50 | |
| | | 135 | 75 | 13 | 80 | 68 | 40 | 60 | 48 | 60 | |
| | | 140 | 80 | 13 | 80 | 68 | 45 | 60 | 48 | 65 | |
| | | 150 | 90 | 13 | 80 | 68 | 55 | 60 | 48 | 75 | |
| | | 160 | 100 | 13 | 80 | 68 | 65 | 60 | 48 | 85 | |
| | | 180 | 100 | 13 | 80 | 68 | 85 | 60 | 48 | 105 | |
| | | 200 | 100 | 13 | 80 | 68 | 105 | 60 | 48 | 125 | |
| | | 220 | 100 | 13 | 80 | 68 | 125 | 60 | 48 | 145 | |
| | | 240 | 100 | 13 | 80 | 68 | 145 | 60 | 48 | 165 | |
| 250 | 100 | 13 | 80 | 68 | 155 | 60 | 48 | 175 | | | |
| 260 | 100 | 13 | 80 | 68 | 165 | 60 | 48 | 185 | | | |
| 280 | 100 | 13 | 80 | 68 | 185 | 60 | 48 | 205 | | | |
| M16 | 16 | 100 | 30 | 18 | - | - | - | 80 | 65 | 5 | 100 |
| | | 105 | 35 | 18 | - | - | - | 80 | 65 | 10 | |
| | | 125 | 45 | 18 | 100 | 85 | 5 | 80 | 65 | 25 | |
| | | 130 | 50 | 18 | 100 | 85 | 10 | 80 | 65 | 30 | |
| | | 140 | 60 | 18 | 100 | 85 | 20 | 80 | 65 | 40 | |
| | | 150 | 70 | 18 | 100 | 85 | 30 | 80 | 65 | 50 | |
| | | 160 | 80 | 18 | 100 | 85 | 40 | 80 | 65 | 60 | |
| | | 180 | 100 | 18 | 100 | 85 | 60 | 80 | 65 | 80 | |
| | | 200 | 100 | 18 | 100 | 85 | 80 | 80 | 65 | 100 | |
| | | 220 | 100 | 18 | 100 | 85 | 100 | 80 | 65 | 120 | |
| | | 250 | 100 | 18 | 100 | 85 | 130 | 80 | 65 | 150 | |
| | | 280 | 100 | 18 | 100 | 85 | 160 | 80 | 65 | 180 | |
| 300 | 100 | 18 | 100 | 85 | 180 | 80 | 65 | 200 | | | |
| M20 | 20 | 125 | 50 | 22 | - | - | - | 100 | 80 | 5 | 200 |
| | | 140 | 50 | 22 | - | - | - | 100 | 80 | 20 | |
| | | 160 | 61 | 22 | 119 | 99 | 20 | 100 | 80 | 40 | |
| | | 165 | 66 | 22 | 119 | 99 | 25 | 100 | 80 | 45 | |
| | | 180 | 81 | 22 | 119 | 99 | 40 | 100 | 80 | 60 | |
| | | 200 | 100 | 22 | 119 | 99 | 60 | 100 | 80 | 80 | |
| | | 250 | 100 | 22 | 119 | 99 | 110 | 100 | 80 | 130 | |
| 300 | 100 | 22 | 119 | 99 | 160 | 100 | 80 | 180 | | | |

Walraven Throughbolt anchor WTB7

Intended use
Installation parameters

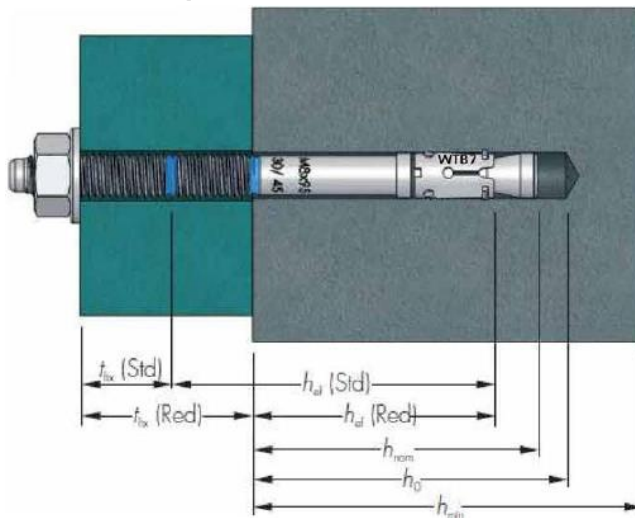
Annex B 2

Table B2 - Installation parameters – Minimum spacing and edge distance

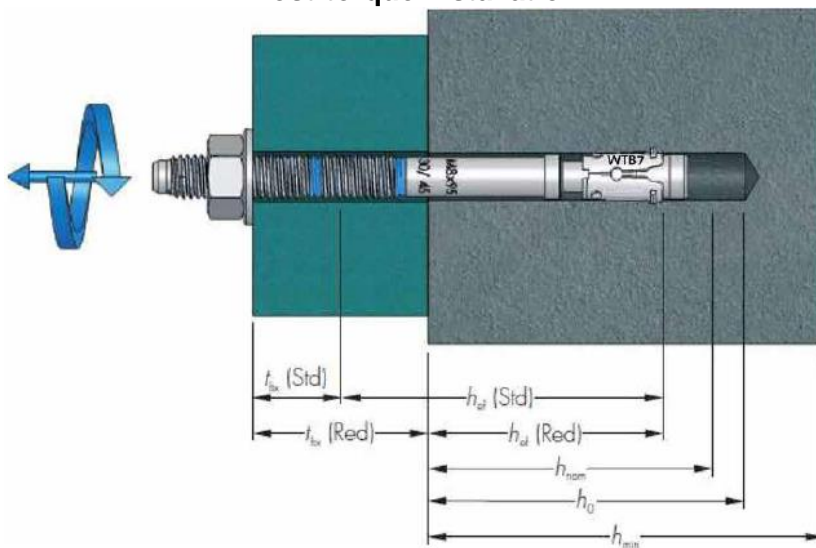
| Size | M8 | | M10 | | M12 | | M16 | | M20 | |
|--|-------------------|-----|-------------------|-----|-----|-----|-----|-----|-----|-----|
| | Red ¹⁾ | Std | Red ¹⁾ | Std | Red | Std | Red | Std | Red | Std |
| Minimum thickness of concrete member h_{min} | [mm] | 100 | 100 | 100 | 100 | 136 | 130 | 170 | 158 | 198 |
| Minimum spacing for edge distance $c \geq$ | s_{min} [mm] | 45 | 50 | 55 | 55 | 100 | 75 | 100 | 90 | 125 |
| | [mm] | 50 | 55 | 65 | 65 | 100 | 90 | 100 | 105 | 125 |
| Minimum edge distance for spacing $s \geq$ | c_{min} [mm] | 40 | 40 | 65 | 50 | 100 | 65 | 100 | 80 | 125 |
| | [mm] | 100 | 100 | 55 | 90 | 100 | 100 | 100 | 150 | 200 |

¹⁾ Use restricted to anchoring statically indeterminate structural components

Pre-torque installation



Post-torque installation




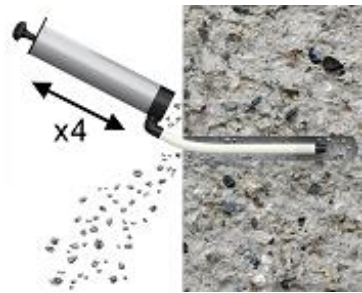
Walraven Throughbolt anchor WTB7


Intended use
Installation parameters

Annex B 2

Installation instructions

1.  Drill a hole of required diameter and depth

2.  Clear the hole of drilling dust and debris (using blowpump or equivalent method)

3.  Lightly tap the throughbolt through the fixture into hole until fixing depth is reached

4.  Tighten to the recommended torque

5.  Assembled condition of anchor

Walraven Throughbolt anchor WTB7

Intended use
Installation instructions

Annex B 3

Table C1 – Characteristic resistance under tension load

| Steel failure | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|---------------------------|---------------|------|-------------------|------|-------------------|------|-------|-----|-----|-----|-----|-----|
| | | | Red ¹⁾ | Std | Red ¹⁾ | Std | Red | Std | Red | Std | Red | Std |
| Size | | | | | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 15,8 | 25,2 | 37,3 | 66,1 | 101,0 | | | | | |
| Partial safety factor | γ_{Ms} | [-] | 1,4 | 1,4 | 1,4 | 1,4 | 1,4 | | | | | |

| Pull-out failure | | | | | | | | | | | | |
|--|---|----------|------|------|------|------|------|------|------|------|------|------|
| Characteristic resistance in uncracked concrete C20/25 | $N_{Rk,p}$ | [kN] | 9,0 | 12,0 | 9,0 | 12,0 | 16,0 | 25,0 | 30,0 | 40,0 | 35,0 | 40,0 |
| Installation safety factor | $\gamma_2^{(2)} = \gamma_{inst}^{(3)(4)}$ | [-] | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |
| Increasing factor | | | | | | | | | | | | |
| Cracked and uncracked concrete | C30/37 | | 1,25 | 1,10 | 1,36 | 1,37 | 1,20 | 1,16 | 1,12 | 1,17 | 1,18 | 1,30 |
| | C40/50 | ψ_c | 1,50 | 1,21 | 1,72 | 1,74 | 1,40 | 1,33 | 1,23 | 1,34 | 1,36 | 1,59 |
| | C50/60 | | 1,76 | 1,32 | 2,08 | 2,10 | 1,60 | 1,49 | 1,34 | 1,50 | 1,54 | 1,89 |

| Concrete cone failure | | | | | | | | | | | | |
|-------------------------------|---|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Factor for uncracked concrete | $k_1^{(2)} = k_{ucr}^{(3)}$ | [-] | 10,1 | | | | | | | | | |
| | $k_{ucr,N}^{(4)}$ | [-] | 11,0 | | | | | | | | | |
| Installation safety factor | $\gamma_2^{(2)} = \gamma_{inst}^{(3)(4)}$ | [-] | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |
| Effective anchorage depth | h_{ef} | [mm] | 32 | 47 | 39 | 49 | 48 | 68 | 65 | 85 | 79 | 99 |
| Spacing | $s_{cr,N}$ | [mm] | 96 | 141 | 117 | 147 | 144 | 204 | 195 | 255 | 237 | 297 |
| Edge distance | $c_{cr,N}$ | [mm] | 48 | 71 | 59 | 74 | 72 | 102 | 98 | 128 | 119 | 149 |

| Splitting failure | | | | | | | | | | | | |
|----------------------------|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Spacing | $s_{cr,sp}$ | [mm] | 160 | 240 | 200 | 260 | 250 | 370 | 360 | 430 | 410 | 530 |
| Edge distance | $c_{cr,sp}$ | [mm] | 80 | 120 | 100 | 130 | 125 | 185 | 180 | 215 | 205 | 265 |
| Installation safety factor | $\gamma_2^{(2)} = \gamma_{inst}^{(3)(4)}$ | [-] | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |

- ¹⁾ Use restricted to anchoring statically indeterminate structural components
- ²⁾ parameter for design according to EOTA ETAG 001 Annex C
- ³⁾ parameter for design according to CEN/TS 1992-4-4:2009
- ⁴⁾ parameter for design according to FprEN 1992-4:2016

Table C2 – Displacement under tension load

| Size | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|------------------------------------|--------------------|------|-------------------|------|-------------------|------|------|------|------|------|------|------|
| | | | Red ¹⁾ | Std | Red ¹⁾ | Std | Red | Std | Red | Std | Red | Std |
| Tension load in uncracked concrete | N | [kN] | 3,6 | 4,8 | 3,6 | 4,8 | 6,3 | 9,9 | 11,9 | 15,9 | 13,9 | 15,9 |
| Displacement | δ_{N0} | [mm] | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 |
| | $\delta_{N\infty}$ | [mm] | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 |

- ¹⁾ Use restricted to anchoring statically indeterminate structural components

| | |
|---|------------------|
| Walraven Throughbolt anchor WTB7 | Annex C 1 |
| Performances | |
| Characteristic resistance under tension load Displacement under tension load | |

Table C3 – Characteristic resistance under shear load

| Steel failure without lever arm | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|---------------------------------|-------------------|--|-------------------|-----|-------------------|-----|------|-----|------|-----|------|-----|
| | | | Red ¹⁾ | Std | Red ¹⁾ | Std | Red | Std | Red | Std | Red | Std |
| Size | | | | | | | | | | | | |
| Characteristic resistance | $V_{Rk,s}^0$ [kN] | | 10,1 | | 16,0 | | 23,3 | | 43,0 | | 67,4 | |
| Ductility factor | k_7 [-] | | 0,8 | | 0,8 | | 0,8 | | 0,8 | | 0,8 | |
| Partial safety factor | γ_{Ms} [-] | | 1,25 | | 1,25 | | 1,25 | | 1,25 | | 1,25 | |

| Steel failure with lever arm | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|------------------------------|-------------------|--|------|--|------|--|------|--|------|--|------|--|
| Characteristic resistance | $M_{Rk,s}^0$ [Nm] | | 17 | | 35 | | 61 | | 154 | | 301 | |
| Partial safety factor | γ_{Ms} [-] | | 1,25 | | 1,25 | | 1,25 | | 1,25 | | 1,25 | |

| Concrete pry-out failure | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|---|---|--|-----|-----|------|-----|-----|-----|-----|-----|------|-----|
| Characteristic resistance concrete C20/25 | $V_{Rk,cp}$ [kN] | | - | - | 12,0 | - | - | - | - | - | 68,7 | - |
| Factor | k_8 [-] | | - | - | 1,0 | - | - | - | - | - | 2,0 | - |
| Installation safety factor | $\gamma_2^{(2)} = \gamma_{inst}^{(3)(4)}$ [-] | | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |

| Concrete edge failure | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|----------------------------|---|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Effective length of anchor | l_f [mm] | | 32 | 47 | 39 | 49 | 48 | 68 | 65 | 85 | 79 | 99 |
| Anchor diameter | d_{nom} [mm] | | 8 | | 10 | | 12 | | 16 | | 20 | |
| Installation safety factor | $\gamma_2^{(2)} = \gamma_{inst}^{(3)(4)}$ [-] | | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |

- ¹⁾ Use restricted to anchoring statically indeterminate structural components
- ²⁾ parameter for design according to EOTA ETAG 001 Annex C
- ³⁾ parameter for design according to CEN/TS 1992-4-4:2009
- ⁴⁾ parameter for design according to FprEN 1992-4:2016

Table C4 – Displacement under shear load

| Size | | | M8 | | M10 | | M12 | | M16 | | M20 | |
|------------------------------------|-------------------------|--|-------------------|-----|-------------------|-----|-----|-----|------|------|------|------|
| | | | Red ¹⁾ | Std | Red ¹⁾ | Std | Red | Std | Red | Std | Red | Std |
| Tension load in uncracked concrete | V [kN] | | 4,0 | 4,0 | 4,8 | 6,3 | 9,2 | 9,2 | 17,1 | 17,1 | 27,4 | 27,4 |
| Displacement | δ_{v0} [mm] | | 1,8 | 1,8 | 1,8 | 1,8 | 2,4 | 2,4 | 3,0 | 3,0 | 3,0 | 3,0 |
| | $\delta_{v\infty}$ [mm] | | 2,7 | 2,7 | 2,7 | 2,7 | 3,6 | 3,6 | 4,5 | 4,5 | 4,5 | 4,5 |

- ¹⁾ Use restricted to anchoring statically indeterminate structural components

Walraven Throughbolt anchor WTB7

Performances
 Characteristic resistance under shear load
 Displacement under shear load

Annex C 2