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Authorised and notified according
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-18/0101 of 2018/07/16

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:

fischer Bolt Anchor FBN II HDG Torque controlled expansion anchor

Product family to which the above construction product belongs:

Mechanical fasteners of sizes M8, M10, M12, M16 and M20 for use in uncracked concrete

Manufacturer:

fischerwerke GmbH & Co. KG
Klaus-Fischer-Straße 1
D-72178 Waldachtal

Manufacturing plant:

fischerwerke

This European Technical Assessment contains:

15 pages including 3 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 331612-00-0601 Torque controlled mechanical wedge anchor with variable working life

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.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (except the confidential Annexes referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

The Fischer Bolt anchor FBN II HDG is an anchor made of zinc plated, hot-dip galvanised steel which is placed into a drilled hole and anchored by torque controlled expansion. The thickness of the corrosion protection layer is minimum 40 µm with a batch average of minimum 50 µm

Product and product description 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 as given in Annex B depending on the corrosion protection.

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):

No Performance assessed.

Hygiene, health and the environment (BWR3):

Regarding the dangerous substances contained in this European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

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 determined

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 and EAD 331612-00-0601 Torque controlled mechanical wedge anchor with variable working life.

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

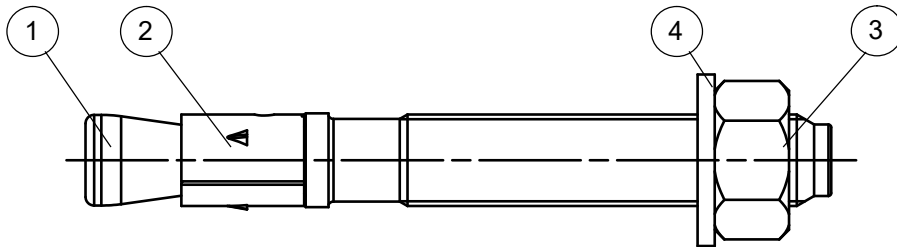
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2018-07-16 by

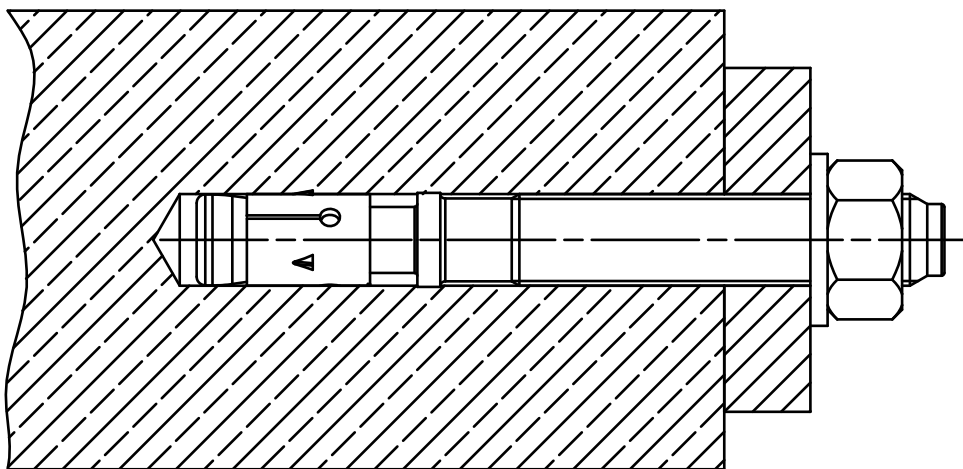
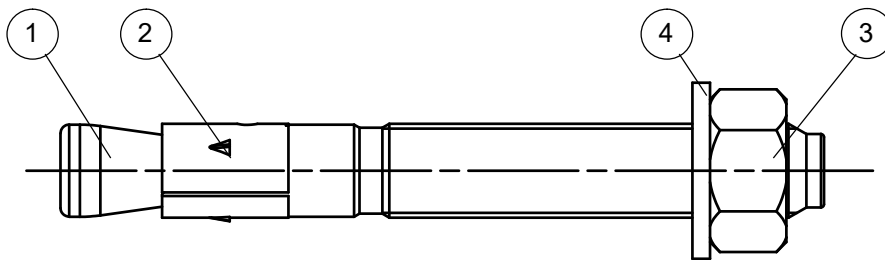


Thomas Bruun
Managing Director, ETA-Danmark

Cone bolt manufactured by cold - forming:



Cone bolt manufactured by turning:



- ① Cone bolt (cold – formed or turned)
- ② Expansion sleeve
- ③ Hexagon nut
- ④ Washer

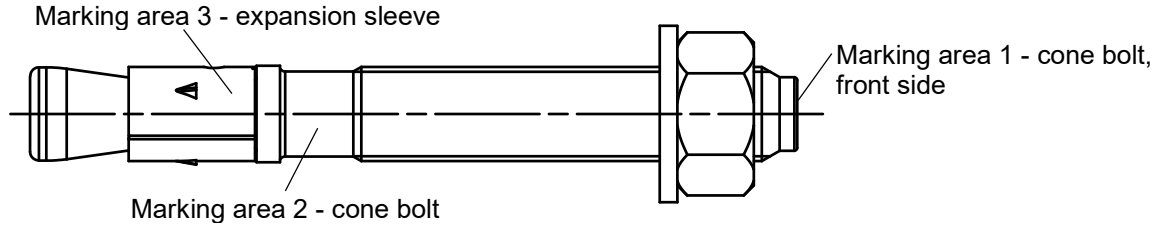
(Fig. not to scale)

fischer Bolt Anchor hot-dip galvanised FBN II HDG

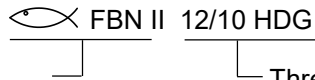
Product description
Installed condition

Annex A1
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FBN II HDG for use with standard and reduced embedment depth ($h_{ef, sta}$ and $h_{ef, red}$)



Product label, example:



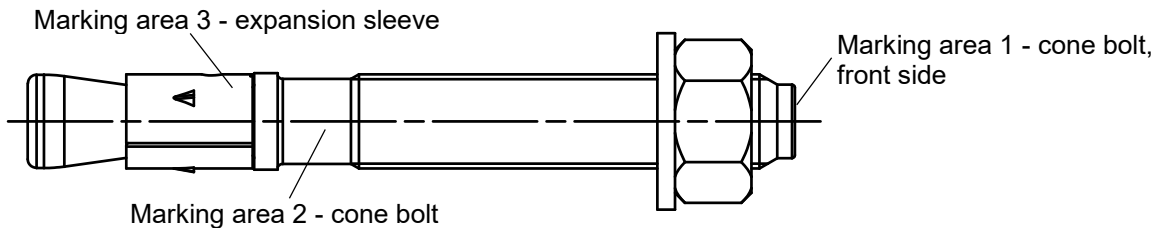
Brand | type of fastener placed at marking area 2 or marking area 3

Thread Size / max. thickness of fixture (t_{fix}) for $h_{ef, sta}$ placed at marking area 2

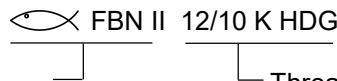
Table A2.1: Letter-code on marking area 1 and maximum thickness of fixture t_{fix} :

| Marking | | A | B | C | D | E | F | G | H | I | K | L | M | N | O | P | R | S | T | U | V | W | X | Y | Z |
|----------------------------------|----------|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Max. t_{fix} for $h_{ef, sta}$ | M8-M20 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |
| Max. t_{fix} for $h_{ef, red}$ | M8, M10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 70 | 80 | 90 | 100 | 110 | 130 | 150 | 170 | 190 | 210 | 260 | 310 | 360 | 410 |
| | M12, M16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 75 | 85 | 95 | 105 | 115 | 135 | 155 | 175 | 195 | 215 | 265 | 315 | 365 | 415 |
| | M20 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 85 | 95 | 105 | 115 | 125 | 145 | 165 | 185 | 205 | 225 | 275 | 325 | 375 | 425 |

FBN II K HDG for use with reduced embedment depth only ($h_{ef, red}$):



Product label, example:



Brand | type of fastener placed at marking area 2 or marking area 3

Thread Size / max. thickness of fixture (t_{fix}) identification K for $h_{ef, red}$ placed at marking area 2

Table A2.2: Letter-code on marking area 1 and maximum thickness of fixture t_{fix} :

| Marking | | -A- | -B- | -C- | -D- | -E- | -F- | -G- | -H- | -I- | -K- | -L- | -M- | -N- | -O- | -P- | -R- | -S- | -T- | -U- | -V- | -W- | -X- | -Y- | -Z- |
|----------------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Max. t_{fix} for $h_{ef, red}$ | M8-M20 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |

(Fig. not to scale)

| | |
|---|---|
| fischer Bolt Anchor hot-dip galvanised FBN II HDG | Annex A2 of European Technical Assessment ETA-18/0101 |
| Product description Anchor types | |

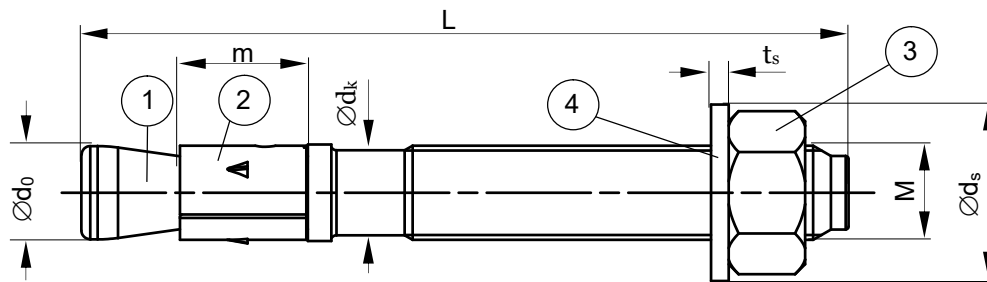


Table A3.1: Anchor dimensions [mm]

| Part | Designation | M8 | M10 | M12 | M16 | M20 | |
|------|------------------|------------------------|------|------|------|------|------|
| 1 | Cone bolt | $\varnothing d_0$ | 7,9 | 9,9 | 11,9 | 15,9 | 19,6 |
| | | $\varnothing d_k$ | 7,1 | 8,9 | 10,8 | 14,5 | 18,2 |
| | | $L_{min} \geq$ | 56 | 71 | 86 | 120 | 139 |
| | | $L_{max} \leq$ | 261 | 316 | 396 | 520 | 654 |
| 2 | Expansion sleeve | m | 11,5 | 13,5 | 16,5 | 21,5 | 33,5 |
| 3 | Hexagon nut | Wrench Size | 13 | 17 | 19 | 24 | 30 |
| 4 | Washer | $t_s \geq$ | 1,4 | 1,8 | 2,3 | 2,7 | 2,7 |
| | | $\varnothing d_s \geq$ | 15 | 19 | 23 | 29 | 36 |

Table A3.2: Materials

| Part | Designation | Material |
|------|------------------|---|
| 1 | Cone bolt | Cold form steel or free cutting steel ¹⁾ |
| 2 | Expansion sleeve | Stainless steel acc. to EN 10088 |
| 3 | Hexagon nut | Steel, property class 8 ¹⁾ |
| 4 | Washer | Cold strip ^{1) 2)} |

¹⁾ Hot-dip galvanised $\geq 50 \mu\text{m}$, according to EN ISO 10684: 2011

²⁾ Alternative mechanical plated $\geq 53 \mu\text{m}$, according to EN ISO 12683: 2005

(Fig. not to scale)

fischer Bolt Anchor hot-dip galvanised FBN II HDG

Product description
Anchor dimensions
Materials

Annex A3
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Specifications of intended use

| fischer Bolt Anchor hot-dip galvanised FBN II HDG | M8 | M10 | M12 | M16 | M20 |
|---|----|-----|-----|-----|-----|
| Static and quasi-static loads | | | ✓ | | |
| Standard embedment depth | | | ✓ | | |
| Reduced embedment depth | | | ✓ | | |
| Uncracked concrete | | | ✓ | | |

Base materials:

- Normal weight concrete (uncracked) according to EN 206-1: 2000
- Strength classes C20/25 to C50/60 according to EN 206-1: 2000

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions and to external atmospheric Classification of atmospheric corrosivity, determination and estimation C1 – CX according to EAD 331612-00-0601

Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are to be 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.)
- Design of fastenings according to FprEN 1992-4: 2016 and EOTA Technical Report TR 055

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Hammer or hollow drilling according to Annex B5

Durability:

- Variable working life according to EAD 331612-00-0601

Table B1.1: Durability of hot dip galvanised **coatings** according to EN ISO 10684: 2011-09 for coatings with mean thickness of minimum 50 µm

| Corrosivity category | Corrosivity | Durability |
|----------------------|-------------|---|
| | | Thickness according to EN ISO 10684: 2011 chapter 8.3 ≥ 50µm in average Durability [years] |
| C1 | Very low | 500 ¹⁾ |
| C2 | Low | 75 ¹⁾ |
| C3 | Medium | 25 |
| C4 | High | 12,5 |
| C5 | Very high | 5 |
| CX | Extreme | 2 |

¹⁾ Durability of coating thickness. Working life of fastener according to EAD 330232-00-0601 section 1.2.2

| | |
|---|---|
| fischer Bolt Anchor hot-dip galvanised FBN II HDG | Annex B1 of European Technical Assessment ETA-18/0101 |
| Intended use Specification | |

Table B2.1 Description of typical atmospheric environments **indoor** related to the estimation of corrosivity categories according to ISO 9223-2012-02 Table C.1 and the corresponding durability categories according to EAD-330232-00-0601 chapter 2.2.12 a (1) – (3)

| Corrosivity category | Corrosivity | Typical environments – Examples | |
|----------------------|-------------|--|-----------------------------|
| | | Indoor | EAD-330232 chapter 2.2.12 a |
| C1 | Very low | Heated spaces with low relative humidity and insignificant pollution, e.g. offices, schools, museums | (1) |
| C2 | Low | Unheated spaces with varying temperature and relative humidity. Low frequency of condensation and low pollution, e.g. storage, sport halls | (1) |
| C3 | Medium | Spaces with moderate frequency of condensation and moderate pollution from production process, e.g. food-processing plants, laundries, breweries, dairies | (2) |
| C4 | High | Spaces with high frequency of condensation and high pollution from production process, e.g. industrial processing plants, swimming pools | (2) |
| C5 | Very high | Spaces with very high frequency of condensation and/or high pollution from production process, e.g. mines, caverns for industrial purposes, unventilated sheds in subtropical and tropical zones | (3) |
| CX | Extreme | Spaces with almost permanent condensation or extensive periods of exposure to extreme humidity effects and/or high pollution from production process, e.g. unventilated sheds in humid tropical zones with penetration of outdoor pollution including airborne chlorides and corrosion-stimulating particulate matter | (3) |

fischer Bolt Anchor hot-dip galvanised FBN II HDG

Intended use
Specification

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Table B3.1 Description of typical atmospheric environments **outdoor** related to the estimation of corrosivity categories according to ISO9223-2012-02 Table C.1 and the corresponding durability categories according to EAD-330232-00-0601 chapter 2.2.12 a (1) – (3)

| Corrosivity category | Corrosivity | Typical environments – Examples | |
|----------------------|-------------|--|-----------------------------|
| | | Outdoor | EAD-330232 chapter 2.2.12 a |
| C1 | Very low | Dry or cold zone, atmospheric environment with very low pollution and time of wetness, e.g. certain deserts, Central Arctic/Antarctica | (2) |
| C2 | Low | Temperate zone, atmospheric environment with low pollution ($\text{SO}_2 < 5 \mu\text{g}/\text{m}^3$), e.g. rural areas, small towns Dry or cold zone, atmospheric environment with short time of wetness, e.g. deserts, subarctic areas | (2) |
| C3 | Medium | Temperate zone, atmospheric environment with medium pollution ($\text{SO}_2: 5 \mu\text{g}/\text{m}^3$ to $30 \mu\text{g}/\text{m}^3$) or some effect of chlorides, e.g. urban areas, coastal areas with low deposition of chlorides Subtropical and tropical zone, atmosphere with low pollution | (2) |
| C4 | High | Temperate zone, atmospheric environment with high pollution ($\text{SO}_2: 30 \mu\text{g}/\text{m}^3$ to $90 \mu\text{g}/\text{m}^3$) or substantial effect of chlorides, e.g. polluted urban areas, industrial areas, coastal areas without spray of salt water or, exposure to strong effect of de-icing salts Subtropical and tropical zone, atmosphere with medium pollution | (2) |
| C5 | Very high | Temperate and subtropical zone, atmospheric environment with very high pollution ($\text{SO}_2: 90 \mu\text{g}/\text{m}^3$ to $250 \mu\text{g}/\text{m}^3$) and/or significant effect of chlorides, e.g. industrial areas, coastal areas, sheltered positions on coastline | (3) |
| CX | Extreme | Subtropical and tropical zone (very high time of wetness), atmospheric environment with very high SO_2 pollution (higher than $250 \mu\text{g}/\text{m}^3$) including accompanying and production factors and/or strong effect of chlorides, e.g. extreme industrial areas, coastal and offshore areas, occasional contact with salt spray | (3) |

fischer Bolt Anchor hot-dip galvanised FBN II HDG

Intended use
Specification

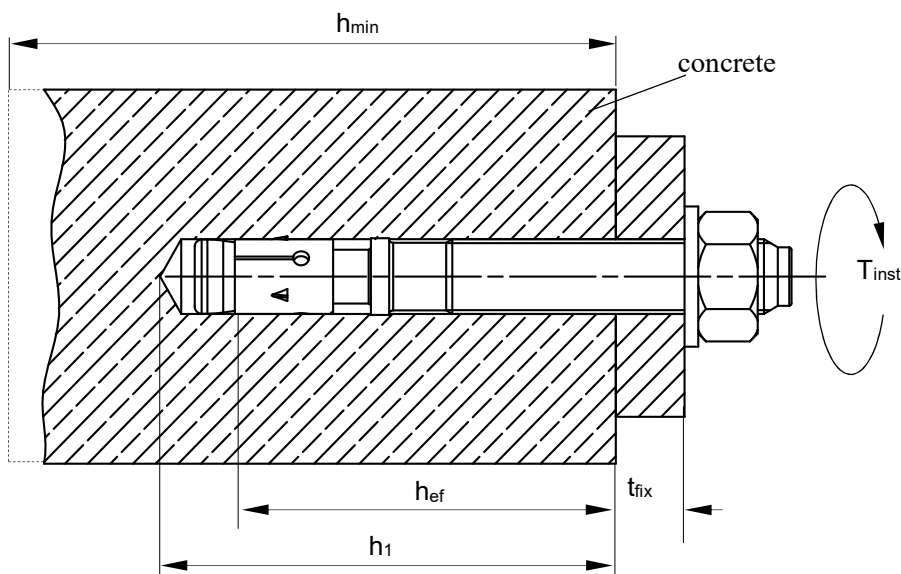
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Table B5.1: Installation parameters

| Size | M8 | M10 | M12 | M16 | M20 |
|--|---------------------------|------------------------|------------------------|-------------------------|--------------------------|
| Nominal drill hole diameter d_0 | 8 | 10 | 12 | 16 | 20 |
| Maximum diameter of drill bit $d_{cut} \leq$ | 8,45 | 10,45 | 12,5 | 16,5 | 20,55 |
| Effective embedment depth $h_{ef} \geq$ [mm] | 40 (30 ^{1) 2)}) | 50 (40 ¹⁾) | 65 (50 ¹⁾) | 80 (65 ¹⁾) | 105 (80 ¹⁾) |
| Depth of drill hole to deepest point $h_1 \geq$ | 56 (46 ^{1) 2)}) | 68 (58 ¹⁾) | 85 (70 ¹⁾) | 104 (89 ¹⁾) | 135 (110 ¹⁾) |
| Diameter of clearance hole in the fixture $d_f \leq$ | 9 | 12 | 14 | 18 | 22 |
| Required setting torque T_{inst} [Nm] | 15 | 30 | 40 | 70 | 200 |

¹⁾ Only for reduced embedment depth

²⁾ Use restricted to anchoring of structural components which are statically indeterminate



- h_{ef} = Effective embedment depth
- t_{fix} = Thickness of fixture
- h_1 = Depth of drill hole to deepest point
- h_{min} = Minimum thickness of concrete member
- T_{inst} = Required setting torque

(Fig. not to scale)

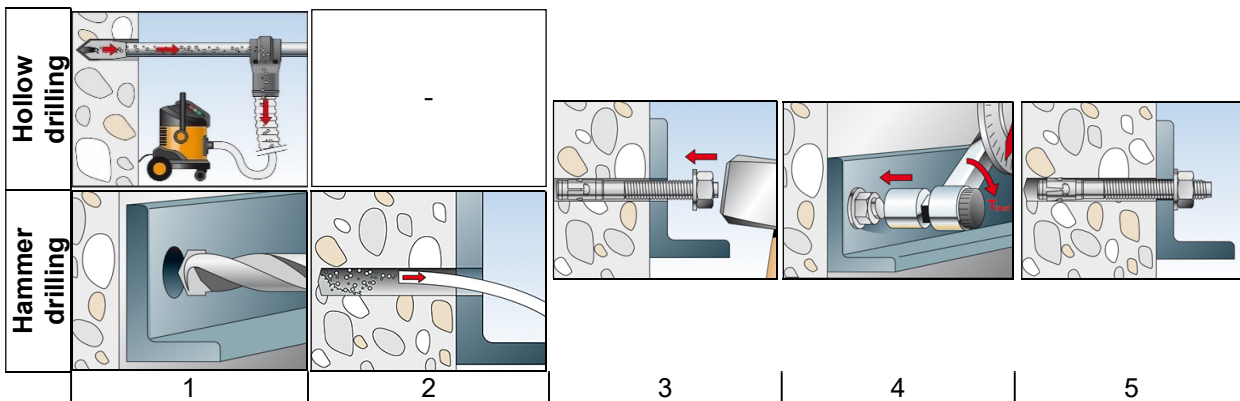
| | |
|---|---|
| fischer Bolt Anchor hot-dip galvanised FBN II HDG | Annex B4 of European Technical Assessment ETA-18/0101 |
| Intended use Installation parameters | |

Table B6.1: Minimum thickness of concrete members, minimum spacing and minimum edge distance

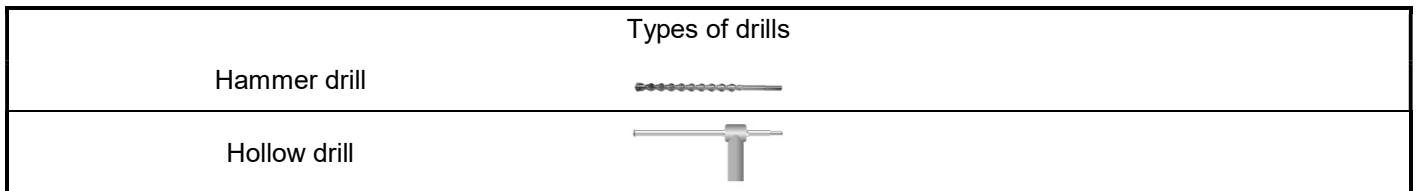
| Size | | M8 | M10 | M12 | M16 | M20 |
|--------------------------|---|------------------|-----|-----|-----|-----|
| Standard embedment depth | Effective embedment depth $h_{ef, sta}$ | 40 | 50 | 65 | 80 | 105 |
| | Minimum thickness of member h_{min} | 100 | 100 | 120 | 160 | 200 |
| | Minimum spacing s_{min} | 40 | 50 | 70 | 90 | 120 |
| | Minimum edge distance c_{min} | 40 | 50 | 70 | 90 | 120 |
| Reduced embedment depth | Effective embedment depth $h_{ef, red}$ | 30 ¹⁾ | 40 | 50 | 65 | 80 |
| | Minimum thickness of member h_{min} | 100 | 100 | 100 | 120 | 160 |
| | Minimum spacing s_{min} | 40 | 50 | 70 | 90 | 120 |
| | Minimum edge distance c_{min} | 40 | 80 | 100 | 120 | 120 |

¹⁾ Use restricted to anchoring of structural components which are statically indeterminate

Installation instructions



| No. | Description |
|-----|--|
| 1 | Create drill hole with hammer drill Create drill hole with hollow drill and vacuum cleaner |
| 2 | Clean bore hole - |
| 3 | Set anchor |
| 4 | Expand anchor with prescribed installation torque T_{inst} |
| 5 | Finished installation |



(Fig. not to scale)

| | |
|---|---|
| fischer Bolt Anchor hot-dip galvanised FBN II HDG | <p>Annex B5 of European Technical Assessment ETA-18/0101</p> |
| <p>Intended use Minimum thickness of member, minimum spacing and edge distance Installation instructions</p> | |

Table C1.1: Characteristic values of **tension** resistance for **standard and reduced embedment depth** under static and quasi-static loads

| Size | | | M8 | M10 | M12 | M16 | M20 |
|---|-----------------------------------|--------|------------------|-----------------|------|------|-----|
| Steel failure for standard and reduced embedment depth | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 16,5 | 27,2 | 41,6 | 77,9 | 107 |
| Partial safety factor | γ_{Ms} | [-] | 1,4 | 1,4 | 1,4 | 1,5 | 1,5 |
| Pullout failure for standard embedment depth | | | | | | | |
| Characteristic resistance C20/25 | $N_{Rk,p}$ | [kN] | - ¹⁾ | | | | |
| Pullout failure for reduced embedment depth | | | | | | | |
| Characteristic resistance C20/25 | $N_{Rk,p}$ | [kN] | 6 ²⁾ | - ¹⁾ | | | |
| Increasing factors for $N_{Rk,p}$ | ψ_c | C25/30 | 1,12 | | | | |
| | | C30/37 | 1,23 | | | | |
| | | C35/45 | 1,32 | | | | |
| | | C40/50 | 1,41 | | | | |
| | | C45/55 | 1,50 | | | | |
| | | C50/60 | 1,58 | | | | |
| Installation safety factor | γ_{inst} | [-] | 1,0 | | | | |
| Concrete cone and splitting failure for standard and reduced embedment depth | | | | | | | |
| Effective embedment depth | $\frac{h_{ef, sta}}{h_{ef, red}}$ | [mm] | 40 | 50 | 65 | 80 | 105 |
| | | | 30 ²⁾ | 40 | 50 | 65 | 80 |
| Factor k_1 for uncracked concrete | $k_{ucr,N}$ | [-] | 11,0 | | | | |
| Spacing | $s_{cr,N}$ | [mm] | 3 h_{ef} | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | 1,5 h_{ef} | | | | |
| Spacing (splitting failure) | $s_{cr,sp}$ | [mm] | 190 | 200 | 290 | 350 | 370 |
| Edge distance (splitting failure) | $c_{cr,sp}$ | [mm] | 95 | 100 | 145 | 175 | 185 |

¹⁾ Pullout failure is not relevant

²⁾ Use restricted to anchoring of structural components which are statically indeterminate

fischer Bolt Anchor hot-dip galvanised FBN II HDG

Performances
Characteristic values of tension resistance for standard and reduced embedment

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Table C2.1: Characteristic values of **shear** resistance for **standard and reduced embedment depth** under static and quasi-static loads

| Size | | M8 | M10 | M12 | M16 | M20 |
|---|---------------------|--------------------|------|------|-------|-----|
| Steel failure without lever arm for standard and reduced embedment depth | | | | | | |
| Characteristic resistance | $V_{Rk,s}$ [kN] | 13,3 | 21,0 | 31,3 | 55,1 | 67 |
| Steel failure with lever arm for standard embedment depth | | | | | | |
| Characteristic bending moment | $M^0_{Rk,s}$ [Nm] | 26,2 | 52,3 | 91,6 | 232,2 | 422 |
| Steel failure with lever arm for reduced embedment depth | | | | | | |
| Characteristic bending moment | $M^0_{Rk,s}$ [Nm] | 19,9 ¹⁾ | 45,9 | 90,0 | 226,9 | 349 |
| Concrete pryout failure for standard and reduced embedment depth | | | | | | |
| Factor for pryout | k_8 [-] | 1,8 | 2,1 | 2,3 | 2,3 | 2,3 |
| Installation safety factor | γ_{inst} [-] | 1,0 | | | | |
| Concrete edge failure for standard and reduced embedment depth | | | | | | |
| Effective length of anchor | $l_{f,sta}$ | 40 | 50 | 65 | 80 | 105 |
| | $l_{f,red}$ [mm] | 30 ¹⁾ | 40 | 50 | 65 | 80 |
| Effective diameter of anchor | d_{nom} | 8 | 10 | 12 | 16 | 20 |
| Installation safety factor | γ_{inst} [-] | 1,0 | | | | |

¹⁾ Use restricted to anchoring of structural components which are statically indeterminate

Table C2.2: Displacements due to tension loads

| Size | | M8 | M10 | M12 | M16 | M20 |
|--------------------------|---|-----|-----|------|------|------|
| Standard embedment depth | $h_{ef, sta}$ [mm] | 40 | 50 | 65 | 80 | 105 |
| Tension load C20/25 | N [kN] | 6,1 | 8,5 | 12,6 | 17,2 | 25,8 |
| Displacements | $\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm] | 0,6 | 0,9 | 1,5 | 1,8 | 1,8 |
| | | 3,1 | | | | |
| Reduced embedment depth | $h_{ef, red}$ [mm] | 30 | 40 | 50 | 65 | 80 |
| Tension load C20/25 | N [kN] | 2,8 | 6,1 | 8,5 | 12,6 | 17,2 |
| Displacements | $\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm] | 0,4 | 0,7 | 0,7 | 0,9 | 1,0 |
| | | 1,6 | | | | |

Table C2.3: Displacements due to shear loads

| Size | | M8 | M10 | M12 | M16 | M20 |
|---------------|---|-----|------|------|------|------|
| Shear load | V [kN] | 7,6 | 12,0 | 17,9 | 31,5 | 38,2 |
| Displacements | $\frac{\delta_{V0}}{\delta_{V\infty}}$ [mm] | 1,5 | 1,6 | 2,0 | 3,0 | 2,6 |
| | | 2,3 | 2,4 | 3,0 | 4,5 | 3,9 |

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Performances
Characteristic values of shear resistance for standard and reduced embedment
depth
Displacements