# ДЕКЛАРАЦИЯ ЗА ЕКСПЛОАТАЦИОННИ ПОКАЗАТЕЛИ

## DoP 0357

за fischer Superbond dynamic (Предварително монтирано укрепване в напукан или ненапукан бетон) BG

1. Уникален идентификационен код на типа продукт: **DoP 0357**

2. Предвидена употреба/употреби: **Крепежни елементи за проходен монтаж, за използване в бетон при циклично натоварване от умора, виж Приложението, по-специално Приложения B1 - B16.**

3. Производител: **fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Германия**

4. Упълномощен представител: **–**

5. Система/системи за оценяване и проверка на постоянството на експлоатационните показатели: **1**

6. Европейски документ за оценяване: **EAD 330250-01-0601, Edition 10/2023**
   Европейска техническа оценка: **ETA-19/0501; 2024-06-11**
   Орган за техническа оценка: **DIBt- Deutsches Institut für Bautechnik**
   Нотифициран орган/органи: **2873 TU Darmstadt**

7. Декларирани експлоатационни показатели:

**EAD 330250-01-0601; Table 2.1.3**
**Метод за оценка C: Линеаризирана функция**
**Механична устойчивост и здравина (BWR 1)**

1 Характерна устойчивост на умора на стоманата при натоварване на опън: Приложения C1, C3, C4

2 Характерен бетонен конус, устойчивост на издърпване, разцепване и издухване при натоварване на опън: Приложения C1, C3, C4

3 Характерна устойчивост на издърпване или комбинирано издърпване/бетонен конус при натоварване на опън: Приложения C1, C3, C4

4 Характерна устойчивост на умора, на стоманата при натоварване на срязване: Приложения C2, C3, C4

5 Характерна устойчивост на умора на ръба на бетона при натоварване на срязване: Приложения C2, C3, C4

6 Характерна устойчивост на издърпване от бетон при натоварване на срязване: Приложения C2, C3, C4

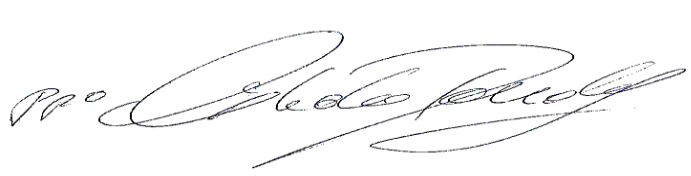
7 Характерна устойчивост на умора на стомана при опън и срязване: Приложения C1-C4

8 Коефициент на пренос на натоварване, за натоварване на опън и срязване: Приложения C1-C4

8. Подходяща техническа документация и/или специфична техническа документация: **-**

Експлоатационните показатели на продукта, посочени по-горе, са в съответствие с декларираните експлоатационни показатели. Настоящата декларация за експлоатационни показатели се издава в съответствие с Регламент (ЕС) № 305/2011, като отговорността за нея се носи изцяло от посочения по-горе производител.

Подписано за и от името на производителя от:



Dr.Ronald Mihala, Ръководител на отдел „Развойна дейност и управление на производството



Dieter Pfaff, Ръководител на Международната федерация по производство и управление на ка

Tumlingen, 2026-02-20

Тази Декларация за съответствие е изготвена на различни езици. В случай, че възникне спор, относно интерпретирането, трябва да се вземе предвид английската версия.
Приложението съдържа доброволна и допълнителна информация на английски език в обем и съдържание, надхвърлящи (независимо от езика) законовите изисквания.

EAD 330250-01-0601; Table 2.1.3; Assessment Method C: Linearized function

**EAD 330250-01-0601; Table 2.1.3; Метод за оценка C: Линеаризирана функция**

| | | |
|---|---|---|
| Mechanical resistance and stability (BWR 1)<br>**Механична устойчивост и здравина (BWR 1)** | | |
| 1 | Characteristic steel fatigue resistance under tension loading:<br><br>**Характерна устойчивост на умора на стоманата при натоварване на опън:** | $\Delta N_{Rk,s,0,n}$ (n=1 to n=∞) |
| 2 | Characteristic concrete cone, pull-out, splitting and blow out fatigue resistance under tension loading:<br>**Характерен бетонен конус, устойчивост на издърпване, разцепване и издухване при натоварване на опън:** | $\Delta N_{Rk,c,0,n;}$ $\Delta N_{Rk,sp,0,n}$ (n=1 to n=∞) |
| 3 | Characteristic pull-out or combined pull-out /concrete cone fatigue resistance under tension loading:<br>**Характерна устойчивост на издърпване или комбинирано издърпване/бетонен конус при натоварване на опън:** | $\Delta\tau_{Rk,p,0,n;}$ (n=1 to n=∞)<br>$\Delta\tau_{Rk,p,0,n;}$ (n=1 to n=$10^8$)<br>$\Delta N_{Rk,p,0,n;}$ (n=1 to n=∞) |
| 4 | Characteristic steel fatigue resistance under shear loading:<br><br>**Характерна устойчивост на умора, на стоманата при натоварване на срязване:** | $\Delta V_{Rk,s,0,n}$ (n=1 to n=∞) |
| 5 | Characteristic concrete edge fatigue resistance under shear loading:<br><br>**Характерна устойчивост на умора на ръба на бетона при натоварване на срязване:** | $\Delta V_{Rk,c,0,n}$ (n=1 to n=∞) |
| 6 | Characteristic concrete pry-out fatigue resistance under shear loading:<br><br>**Характерна устойчивост на издърпване от бетон при натоварване на срязване:** | $\Delta V_{Rk,cp,0,n}$ (n=1 to n=∞) |
| 7 | Characteristic steel fatigue resistance under tension and shear:<br><br>**Характерна устойчивост на умора на стомана при опън и срязване:** | $\alpha_s$ |
| 8 | Load transfer factor for tension and shear loading:<br><br>**Коефициент на пренос на натоварване, за натоварване на опън и срязване:** | $\Psi_{FN,}$ $\Psi_{FV}$ |

**Specific Part**

## 1 Technical description of the product

The fischer superbond dynamic is a bonded anchor consisting of a cartridge with injection mortar FIS SB or FIS SB High Speed or mortar capsule RSB and a steel element according to Annex A3.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The resin capsule is placed into the hole and the steel element is driven by machine with simultaneous hammering and turning. The anchor rod is anchored via the bond between steel element, chemical mortar and concrete.

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)

| **Essential characteristic (Assessment method C: Linearized function)** | **Performance** |
|---|---|
| Characteristic fatigue resistance under cyclic tension loading | |
| Characteristic steel fatigue resistance $\Delta N_{Rk,s,0,n}$ ($n$ = 1 to $n$ = ∞) | See Annex C1, C3 and C4 |
| Characteristic concrete cone and splitting fatigue resistance $\Delta N_{Rk,c,0,n}$ $\Delta N_{Rk,sp,0,n}$ ($n$ = 1 to $n$ = ∞) | |
| Characteristic combined pull-out /concrete cone fatigue resistance $\Delta\tau_{Rk,p,0,n}$ ($n$ = 1 to $n$ = ∞) | |
| Characteristic fatigue resistance under cyclic shear loading | |
| Characteristic steel fatigue resistance $\Delta V_{Rk,s,0,n}$ ($n$ = 1 to $n$ = ∞) | See Annex C2, C3 and C4 |
| Characteristic concrete edge fatigue resistance $\Delta V_{Rk,c,0,n}$ ($n$ = 1 to $n$ = ∞) | |
| Characteristic concrete pry out fatigue resistance $\Delta V_{Rk,cp,0,n}$ ($n$ = 1 to $n$ = ∞) | |

| **Essential characteristic**<br>**(Assessment method C: Linearized function)** | **Performance** |
|---|---|
| Characteristic fatigue resistance under cyclic combined tension and shear loading | |
| Characteristic steel fatigue resistance<br>$a_s$ ($n$ = 1 to $n$ = ∞) | See Annex C1 to C4 |
| Load transfer factor for cyclic tension and shear loading | |
| Load transfer factor $\psi_{FN}, \psi_{FV}$ | See Annex C1 to C4 |

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

In accordance with European Assessment Document No. 330250-01-0601, the applicable European legal act is: [96/582/EC].

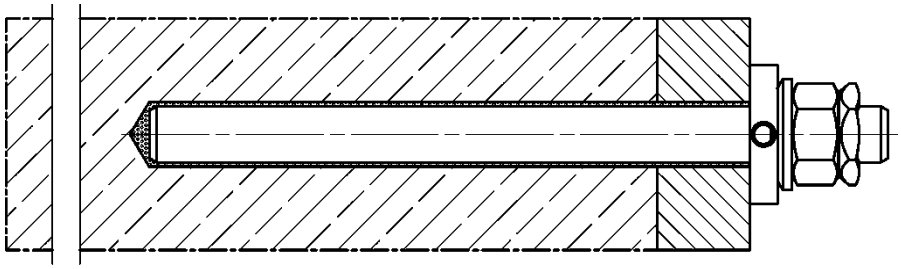
The system to be applied is: 1

## Installation conditions

**fischer anchor rod FIS A or RG M with fischer injection system FIS SB**

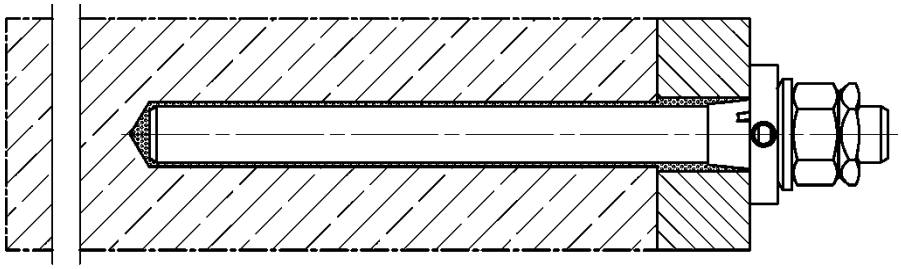
**Pre-positioned installation with dynamic set** (annular gap filled with mortar)

Size: M12, M16, M20, M24



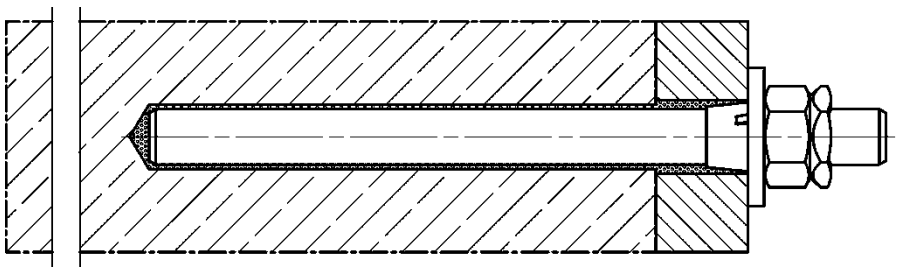
**Push through installation with dynamic set** (annular gap filled with mortar)

Size: M12, M16, M20, M24



**Push through installation with washer and centering sleeve** (annular gap filled with mortar)

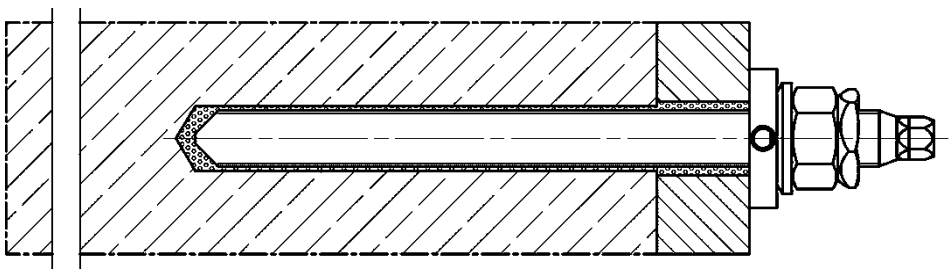
Size: M12, M16, M20, M24



**fischer anchor rod RG M with fischer mortar capsule system RSB**

**Pre-positioned or push through installation the dynamic set** (annular gap filled with mortar)

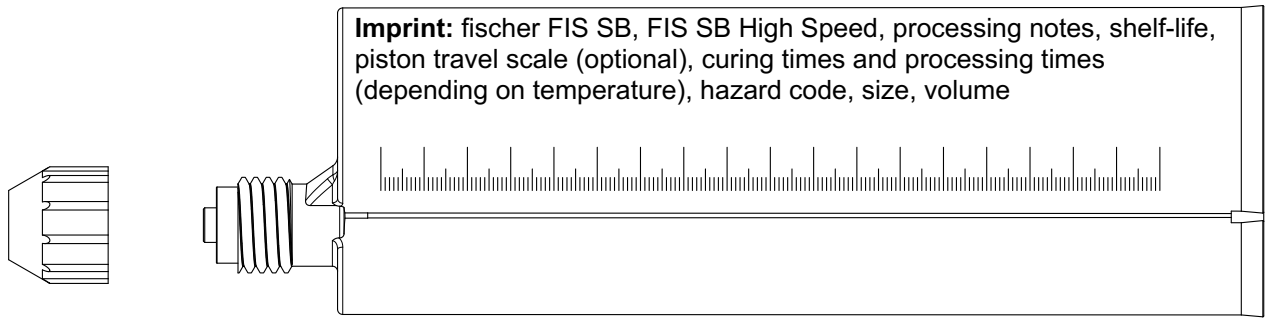
Size: M12, M16, M20, M24



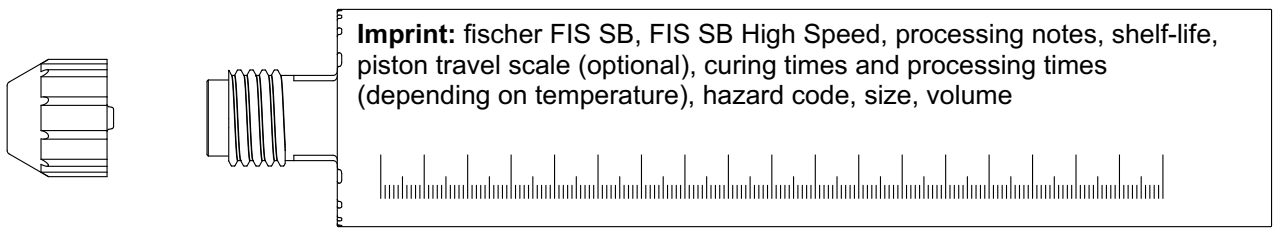
Figures not to scale

## Overview system components Part 1

**Mortar cartridge (shuttle cartridge) with sealing cap; Size: 390 ml, 585 ml, 1100 ml, 1500 ml**




**Mortar cartridge (coaxial cartridge) with sealing cap; Size: 150 ml, 300 ml ,380 ml, 410 ml**

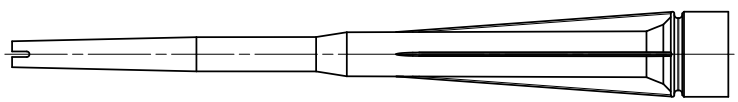



**Mortar capsule**

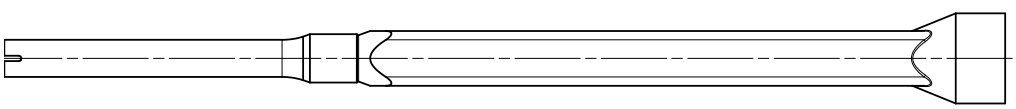
Size: 12 mini, 12, 16 mini, 16, 20, 20 E /24



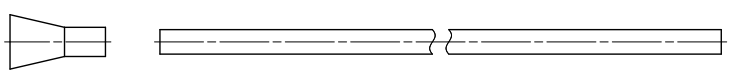

**Static mixer FIS MR Plus for injection cartridges up to 410 ml**



**Static mixer FIS UMR for injection cartridges from 585 ml**



**Injection adapter and extension tube Ø 9 for static mixer FIS MR Plus;**
**Injection adapter and extension tube Ø 9 or Ø 15 for static mixer FIS UMR**

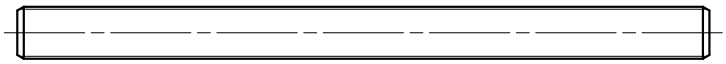


Figures not to scale

## Overview system components Part 2

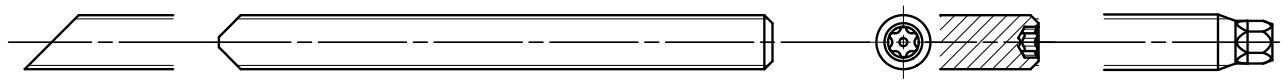
**fischer anchor rod FIS A**

Size: M12, M16, M20, M24

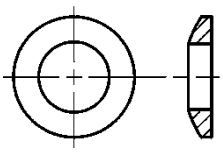


**fischer anchor rod RG M**

Size: M12, M16, M20, M24

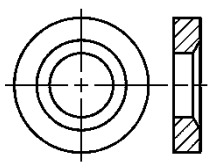


**spherical washer**

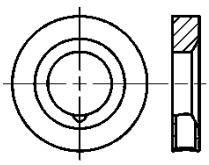


**conical washer (various versions; partly fillable)**

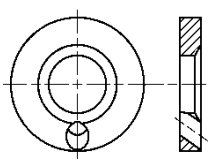
without drill hole



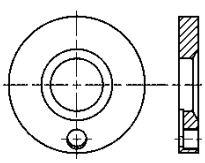
radial



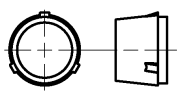
angular



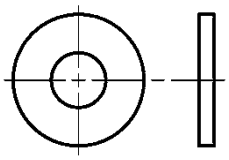
axial



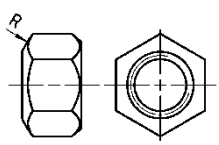
**centering sleeve**
(only push through installation)



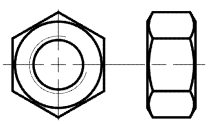
**washer**



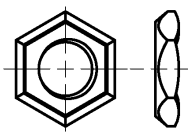
**hexagonal nut with spherical contact surface**



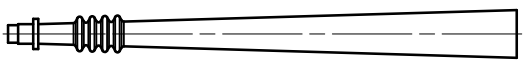

**hexagon nut**



**lock nut**



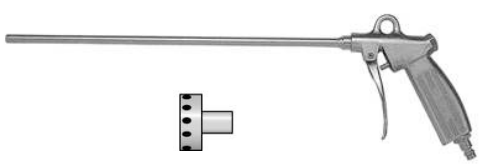
**Injection adapter**



**Cleaning brush BS**



**Compressed-air cleaning tool ABP or ABG**






Figures not to scale

**fischer Superbond dynamic**

**System description**
Overview system components part 2;
Steel components / injection adapter / cleaning brush / blow-out pump

**Annex A3**

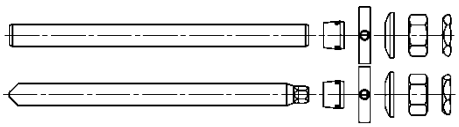
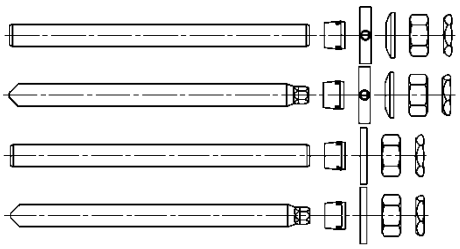
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**Table A4.1:** Materials

| Part | Designation | Material | |
|---|---|---|---|
| 1 | Injection cartridge | Mortar, hardener, filler | |
| 2 | Resin capsule | Mortar, hardener, filler | |
| | Steel grade | Steel | Stainless steel R |
| | | zinc plated | acc. to EN 10088-1:2023<br>Corrosion resistance class CRC III<br>acc. to EN 1993-1-4:2006+A1:2015 |
| 3 | fischer anchor rod<br>FIS A or RG M | Property class 8.8;<br>EN ISO 898-1:2013<br>zinc plated ≥ 5 µm<br>EN ISO 4042:2022<br>$f_{uk}$ ≤ 1000 N/mm² | Property class 70<br>EN ISO 3506-1:2020<br>1.4401 (M12 to M24)<br>1.4062 (M12 and M16)<br>1.4362 (M12 and M16)<br>EN 10088-1:2023<br>$f_{uk}$ ≤ 1000 N/mm² |
| 4 | Centering sleeve | Plastic | |
| 5a | Washer<br>ISO 7089:2000 | --- | 1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>EN 10088-1:2023 |
| 5b | Fillable conical washer<br>similar to DIN 6319-G | zinc plated ≥ 5 µm,<br>EN ISO 4042:2022 | 1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>EN 10088-1:2023 |
| 6 | Spherical washer | zinc plated ≥ 5 µm,<br>EN ISO 4042:2022 | 1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>EN 10088-1:2023 |
| 7a | Hexagon nut | Property class 8;<br>EN ISO 898-2:2022<br>zinc plated ≥ 5 µm,<br>EN ISO 4042:2022 | Property class 80<br>EN ISO 3506-1:2020<br>1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>EN 10088-1:2023 |
| 7b | Hexagonal nut with<br>spherical contact surface | | |
| 8 | Lock nut | zinc plated ≥ 5 µm,<br>EN ISO 4042:2022 | 1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>EN 10088-1:2023 |

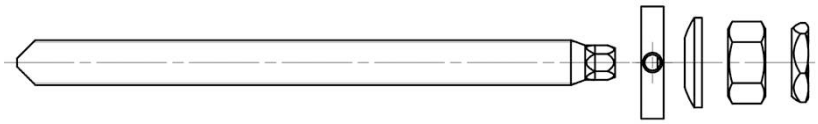
## Specifications of intended use part 1

**Table B1.1:** Overview use and performance categories injection motar system

| | | FIS SB with | |
|---|---|---|---|
| | | fischer anchor rod FIS A or fischer anchor rod RG M | |
| | | Steel, zinc plated<br>M12 + M16  | Stainless steel R<br>M12 - M24  |
| Hammer drilling with standard drill bit  | | Nominal drill bit diameter ($d_0$)<br>14 mm to 18 mm | Nominal drill bit diameter ($d_0$)<br>14 mm to 28 mm |
| Hammer drilling with hollow drill bit <br>(fischer “FHD”, Heller "Duster Expert"; Bosch “Speed Clean”; Hilti “TE-CD, TE-YD"; DreBo „D-Plus“; DreBo „D-Max“) | | | |
| Diamond drilling  | | no performance assessed | |
| Fatigue load, in | uncracked concrete | Steel, zinc plated:<br>M12 and M16 | Stainless steel R:<br>M12, M16, M20 and M24 |
| | cracked concrete | | |
| Design method I acc. to EOTA TR 061:2023 | | n = 1 to n = ∞ | |
| Design method II acc. to EOTA TR 061:2023 | | n = ∞ | |
| Use category I1 dry or wet concrete | | M12, M16, M20 and M24 | |
| Installation direction | | D3<br>Downwards, horizontal and upwards (overhead) installation | |
| Installation method | | pre-positioned or push through installation | |
| Installation temperature | | FIS SB: $T_{i,min}$ = -15 °C to $T_{i,max}$ = +40 °C<br>FIS SB High Speed: $T_{i,min}$ = -20 °C to $T_{i,max}$ = +30 °C | |
| In-service temperature | Temperature range I: | -40 °C to +40 °C | (max. short term temperature +40 °C; max. long term temperature +24 °C) |
| | Temperature range II: | -40 °C to +80 °C | (max. short term temperature +80 °C; max. long term temperature +50 °C) |

## Specifications of intended use part 2

**Table B2.1:** Overview use and performance categories resin capsule system

| | RSB with | |
|---|---|---|
| | fischer anchor rod RG M  | |
| Hammer drilling with standard drill bit  | Nominal drill bit diameter ($d_0$) 14 mm to 18 mm | Nominal drill bit diameter ($d_0$) 14 mm to 28 mm |
| Hammer drilling with hollow drill bit  (fischer “FHD”, Heller "Duster Expert"; Bosch „Speed Clean“; Hilti "TE-CD, TE-YD"; DreBo „D-Plus“; DreBo „D-Max“) | | |
| Diamond drilling  | Nominal drill bit diameter ($d_0$) 18 mm | Nominal drill bit diameter ($d_0$) 18 mm to 28 mm |
| Fatigue load, in uncracked concrete / cracked concrete | Steel, zinc plated: M12 and M16 | Stainless steel R: M12, M16, M20 and M24 |
| Design method I acc. to EOTA TR 061:2023 | n = 1 to n = ∞ | |
| Design method II acc. to EOTA TR 061:2023 | n = ∞ | |
| Use category I1 dry or wet concrete | M12, M16, M20 and M24 | |
| Installation direction | D3 Downward, horizontal and upwards (overhead) installation | |
| Installation method | pre-positioned or push through installation | |
| Installation temperature | RSB: $T_{i,min}$ = -30 °C to $T_{i,max}$ = +40 °C | |
| In-service temperature – Temperature range I: | -40 °C to +40 °C | (max. short term temperature +40 °C; max. long term temperature +24 °C) |
| In-service temperature – Temperature range II: | -40 °C to +80 °C | (max. short term temperature +80 °C; max. long term temperature +50 °C) |

## Specifications of intended use part 3

**Base materials:**

- Compacted reinforced or unreinforced normal weight concrete without fibers of strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021.

**Use conditions (Environmental conditions):**

- Structures subject to dry internal conditions
  (zinc plated steel, stainless steel R).
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance classes to Annex A4 Table A4.1.

**Design:**

- Fastenings have to be designed by a responsible engineer with experience of concrete anchor design.
- 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.).
- Anchorages have to be designed in accordance with:
  - EN 1992-4:2018 and
  - EOTA Technical Report TR 061 "Design method for fasteners in concrete under fatigue cyclic loading", Edition 2023.
- Static and quasi-static loading see ETA-12/0258 of 24.10.2023. Centering sleeve and lock nut are additional parts for fatigue loading, which are not part of ETA-12/0258 of 24.10.2023.
- Fastenings shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure.
- Fastenings in stand-off installation or with a grout layer are not covered by this European Technical Assessment (ETA).

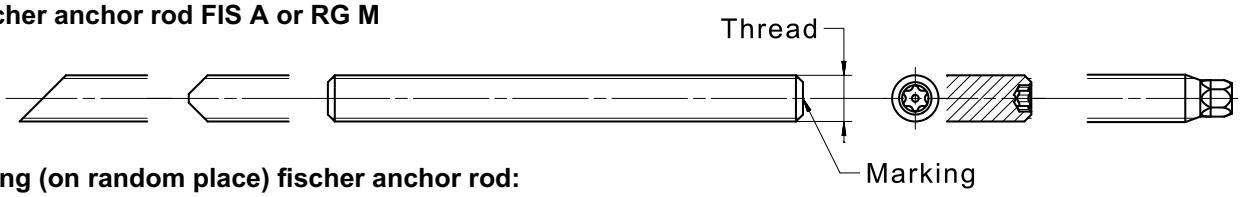
**Installation:**

- Anchor installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: The hole shall be filled with mortar.
- Fastening depth should be marked and adhered to on installation.
- If only tension loads are involved in the application, the annular gap does not need to be filled.
- Overhead installation is allowed.
- Setting the fastener with clearance between concrete and anchor plate (only if the fastener is loaded in axial direction)

**Table B4.1:** Installation parameters for fischer anchor rods in combination with injection mortar system FIS SB

| **fischer anchor rods** | | | **Thread** | **M12** | **M16** | **M20** | **M24** |
|---|---|---|---|---|---|---|---|
| Material | | | | zinc plated steel or stainless steel R | | stainless steel R | |
| Nominal drill hole diameter | | $d_0$ | | 14 | 18 | 24 | 28 |
| Drill hole depth | | $h_0$ | | $h_0 = h_{ef}$ | | | |
| Effective embedment depth Design method I | | $h_{ef,\,min}$ | | 70 | 80 | 90 | 96 |
| | | $h_{ef,\,max}$ | | 240 | 320 | 400 | 480 |
| Effective embedment depth Design method II | | $h_{ef,\,min}$ | | 95 | 125 | 160 | 190 |
| | | $h_{ef,\,max}$ | | 240 | 320 | 400 | 480 |
| Minimum spacing and minimum edge distance | | $s_{min}$ = $c_{min}$ | [mm] | 55 | 65 | 85 | 105 |
| Diameter of the clearance hole of the fixture | pre-positioned installation | $d_f$ | | 14-16 | 18-20 | 22-26 | 26-30 |
| | push through installation | $d_f$ | | 15-16 | 19-20 | 25-26 | 29-30 |
| Fixture thickness | | $t_{fix,min}$ | | 6 | 8 | 10 | 12 |
| | | $t_{fix,max}$ | | 200 | | | |
| Minimum thickness of concrete member | | $h_{min}$ | | $h_{ef}$ + 30 | $h_{ef}$ + $2d_0$ | $h_{ef}$ + $2d_0$ | $h_{ef}$ + $2d_0$ |
| **Installation with dynamic set** | | | | | | | |
| Protrusion anchor rod FIS A or RG M without hexagon head | | $h_{p,min}$ | [mm] | 25 + $t_{fix}$ | 30 + $t_{fix}$ | 36 + $t_{fix}$ | 43 + $t_{fix}$ |
| Protrusion anchor rod RG M (with hexagon head) | | $h_{p,min}$ | | 32 + $t_{fix}$ | 38 + $t_{fix}$ | 43 + $t_{fix}$ | --- |
| **Installation with washer (only with stainless steel R)** | | | | | | | |
| Protrusion anchor rod FIS A or RG M without hexagon head | | $h_{p2,min}$ | [mm] | 19 + $t_{fix}$ | 23 + $t_{fix}$ | 27 + $t_{fix}$ | 32 + $t_{fix}$ |
| Protrusion anchor rod RG M (with hexagon head) | | $h_{p2,min}$ | | 26 + $t_{fix}$ | 31 + $t_{fix}$ | 34 + $t_{fix}$ | --- |
| Required installation torque | | $T_{inst}$ | [Nm] | 40 | 60 | 120 | 150 |

**fischer anchor rod FIS A or RG M**




**Marking (on random place) fischer anchor rod:**

Property class 8.8: **+**

**Installation conditions see Annex B5**

Figures not to scale

**fischer Superbond dynamic**

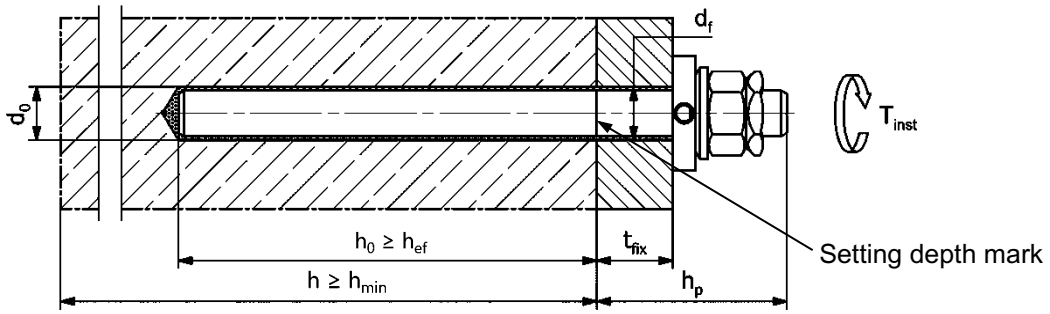
**Intended use**
Installation parameters fischer anchor rods FIS A and RG M in combination with injection mortar system FIS SB

**Annex B4**

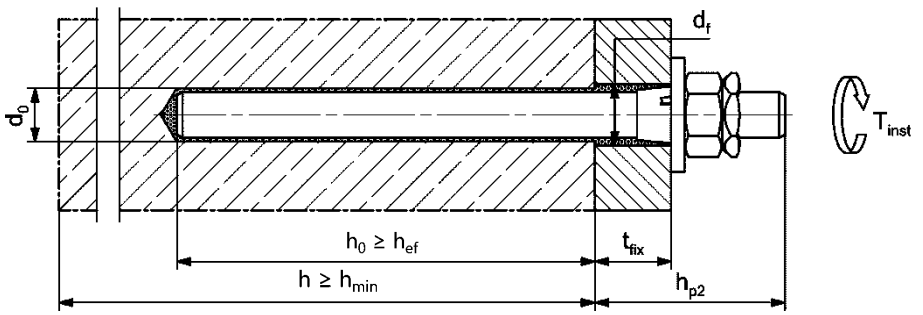
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## Installation conditions FIS A or RG M with dynamic set or washer with centering sleeve

Installation conditions FIS A or RG M **with dynamic set**




Installation conditions FIS A R or RG M R **with washer and centering sleeve**




Installation conditions for RG M see **Annex B6**

Figures not to scale

**fischer Superbond dynamic**

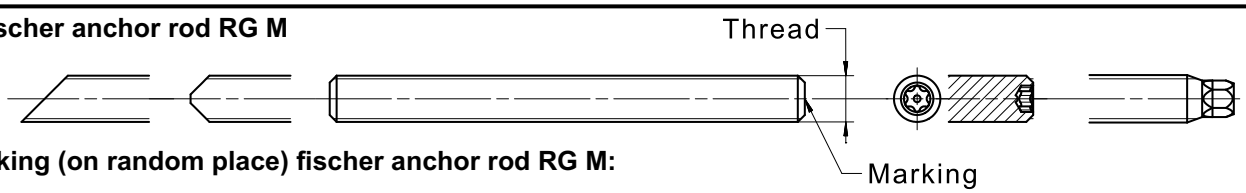
**Intended use**
Installation conditions FIS A or RG M with dynamic set or washer with centering sleeve

**Annex B5**

**Table B6.1:** Installation parameters for fischer anchor rods RG M in combination with resin capsule system RSB

| **fischer anchor rod RG M** | | **Thread** | | **M12** | **M16** | **M20** | **M24** |
|---|---|---|---|---|---|---|---|
| **Material** | | | | zinc plated steel or stainless steel R | | stainless steel R | |
| Nominal drill hole diameter | | $d_0$ | [mm] | 14 | 18 | 25 | 28 |
| Drill hole depth | | $h_0$ | | $h_0 = h_{ef}$ | | | |
| Effective embedment depth | | $h_{ef,1}$ | | 75 | 95 | --- | --- |
| | | $h_{ef,2}$ | | 110 | 125 | 170 | 210 |
| | | $h_{ef,3}$ | | 150 | 190 | 210 | --- |
| Minimum spacing and minimum edge distance | | $s_{min}$ = $c_{min}$ | | 55 | 65 | 85 | 105 |
| Diameter of the clearance hole of the fixture | pre-positioned installation | $d_f$ | | 14-16 | 18-20 | 22-26 | 26-30 |
| | push through installation | $d_f$ | | 15-16 | 19-20 | 26 | 29-30 |
| Fixture thickness | | $t_{fix,min}$ | | 6 | 8 | 10 | 12 |
| | | $t_{fix,max}$ | | 200 | | | |
| Minimum thickness of concrete member | | $h_{min}$ | | $h_{ef} + 30$ | $h_{ef} + 2d_0$ | $h_{ef} + 2d_0$ | $h_{ef} + 2d_0$ |
| **Installation with dynamic set** | | | | | | | |
| Protrusion anchor rod RG M | | $h_{p,min}$ | [mm] | $32 + t_{fix}$ | $38 + t_{fix}$ | $43 + t_{fix}$ | --- |
| Protrusion anchor rod RG M without hexagon head | | $h_{p,min}$ | | --- | --- | --- | $43 + t_{fix}$ |
| Required installation torque | | $T_{inst}$ | [Nm] | 40 | 60 | 120 | 150 |

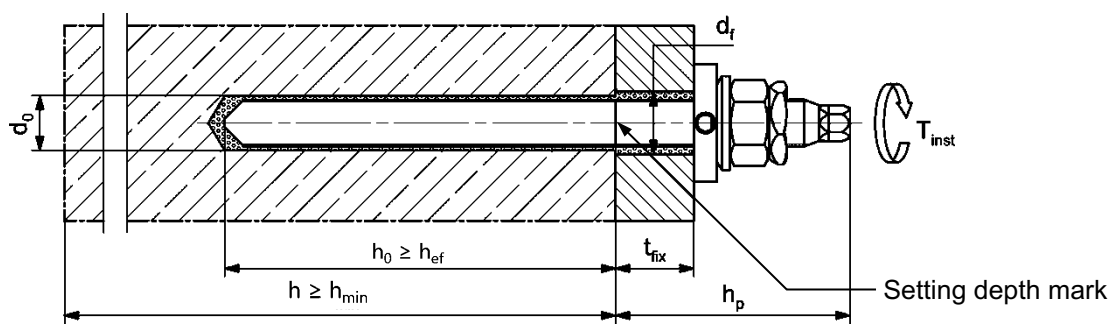
**fischer anchor rod RG M**




**Marking (on random place) fischer anchor rod RG M:**

Property class 8.8: **+**

**Installation conditions:**




Figures not to scale

**fischer Superbond dynamic**

**Intended use**
Installation parameters fischer anchor rod RG M in combination with resin capsule system RSB

**Annex B6**

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**Table B7.1:** Dimension of resin capsule RSB

| Resin capsule RSB | | | 12 mini | 12 | 16 mini | 16 | 20 | 20 E / 24 |
|---|---|---|---|---|---|---|---|---|
| Capsule diameter | $d_P$ | [mm] | 12,5 | | 16,5 | | 23,0 | |
| Capsule length | $L_P$ | | 72 | 97 | 72 | 95 | 160 | 190 |

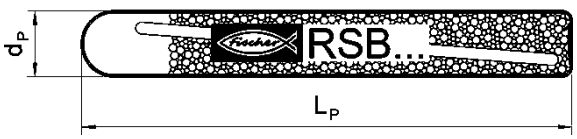


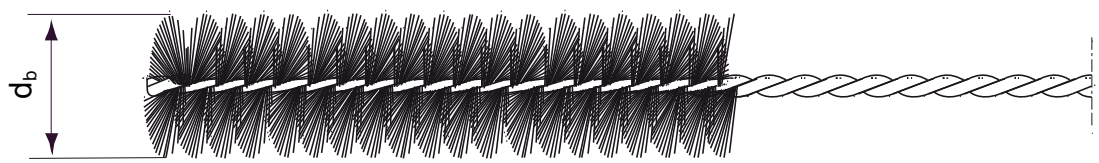

**Table B7.2:** Assignment of resin capsule RSB to fischer anchor rod RG M

| Anchor rod RG M | | | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef,1}$ | [mm] | 75 | 95 | --- | --- |
| Related capsule RSB | | [-] | 12 mini | 16 mini | --- | --- |
| Effective anchorage depth | $h_{ef,2}$ | [mm] | 110 | 125 | 170 | 210 |
| Related capsule RSB | | [-] | 12 | 16 | 20 | 20 E / 24 |
| Effective anchorage depth | $h_{ef,3}$ | [mm] | 150 | 190 | 210 | --- |
| Related capsule RSB | | [-] | 2x 12 mini | 2x 16 mini | 20 E / 24 | --- |

**Table B7.3:** Parameters of the cleaning brush BS (steel brush with steel bristles)

The size of the cleaning brush refers to the drill hole diameter

| Nominal drill hole diameter | $d_0$ | [mm] | 14 | 18 | 24 | 25 | 28 |
|---|---|---|---|---|---|---|---|
| Steel brush diameter | $d_b$ | | 16 | 20 | 26 | 27 | 30 |




**fischer Superbond dynamic**

**Intended use**
Dimensions of the capsules; Assignment of the capsule to the anchor rod RG M;
Cleaning brush (steel brush)

**Annex B7**

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**Table B8.1:** Conditions for use **static mixer** without an **extension tube**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $d_0$ | [mm] | 14 | 18 | 24 | 25 | 28 |
| Drill hole depth $h_0$ by using | FIS MR Plus | [mm] | ≤ 120 | ≤ 150 | ≤ 190 | ≤ 210 | |
| | FIS UMR | [mm] | ≤ 90 | ≤ 180 | ≤ 220 | | ≤ 250 |

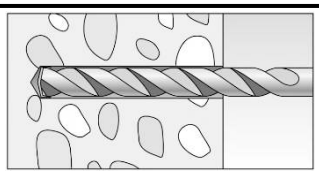
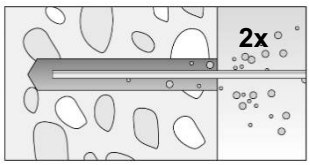
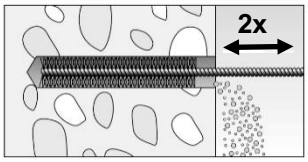
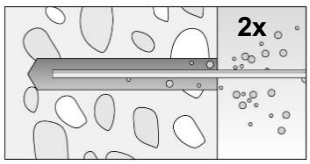
**Table B8.2:** **Maximum processing time** of the mortar and **minimum curing time**

During the curing time of the mortar the concrete temperature may not fall below the listed minimum temperature.
Minimal cartridge temperature +5 °C; minimal resin capsule temperature -15 °C

| Temperature at anchoring base [°C] | Maximum processing time $t_{work}$ | | Minimum curing time $t_{cure}$ | | |
|---|---|---|---|---|---|
| | FIS SB | FIS SB High Speed | FIS SB | FIS SB High Speed | RSB |
| -30 to -20 | --- | --- | --- | --- | 120 h |
| > -20 to -15 | --- | 60 min | --- | 24 h | 48 h |
| > -15 to -10 | 60 min | 30 min | 36 h | 8 h | 30 h |
| > -10 to -5 | 30 min | 15 min | 24 h | 3 h | 16 h |
| > -5 to ±0 | 20 min | 10 min | 8 h | 2 h | 10 h |
| > ±0 to +5 | 13 min | 5 min | 4 h | 1 h | 45 min |
| > +5 to +10 | 9 min | 3 min | 2 h | 45 min | 30 min |
| > +10 to +20 | 5 min | 2 min | 1 h | 30 min | 20 min |
| > +20 to +30 | 4 min | 1 min | 45 min | 15 min | 5 min |
| > +30 to +40 | 2 min | --- | 30 min | --- | 3 min |

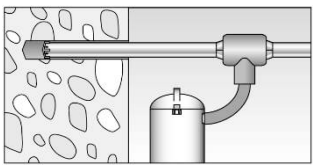
## Installation instructions part 1; injection mortar system FIS SB

### Drilling and cleaning the hole (hammer drilling with standard drill bit)

| | | |
|---|---|---|
| **1** |  | Drill the hole.<br>Nominal drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$<br>see **Table B4.1**. |
| **2** |  | Clean the drill hole:<br>Blow out the drill hole twice, with oil free compressed air ($p \geq 6$ bar).<br>In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: $d_0 < 18$ mm and $h_{ef} < 10d$).<br> |
| **3** |  | Brush the drill hole twice.<br>For deep holes use an extension.<br>Corresponding brushes see **Table B7.3**. |
| **4** |  | Clean the drill hole:<br>Blow out the drill hole twice, with oil free compressed air ($p \geq 6$ bar).<br>In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: $d_0 < 18$ mm and $h_{ef} < 10d$).<br> |

Go to step 5 **Annex B10**.

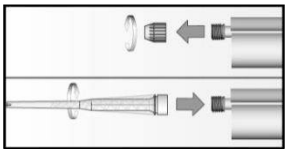
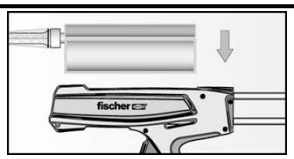
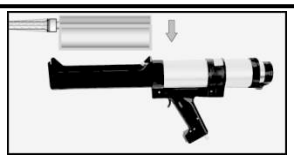
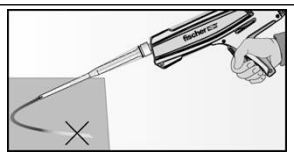
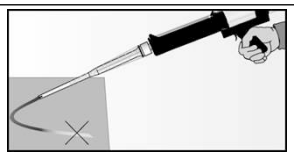
### Drilling and cleaning the hole (hammer drilling with hollow drill bit)

| | | |
|---|---|---|
| **1** |  | Check a suitable hollow drill (see **Table B1.1**) for correct operation of the dust extraction. |
| **2** |  | Use a suitable dust extraction system, e.g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.<br>Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power.<br>Nominal drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Table B4.1**. |

Go to step 5 **Annex B10**.

## Installation instructions part 2; injection mortar system FIS SB

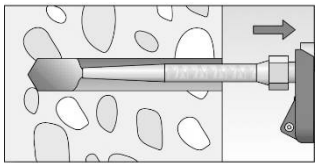
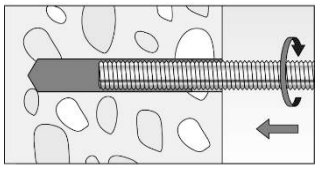
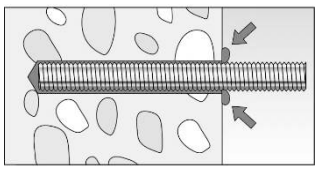
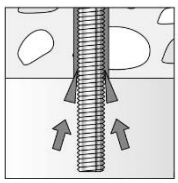
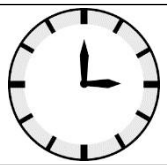
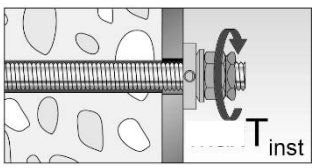
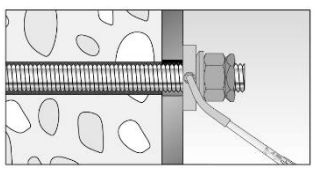
Preparing the cartridge

| | | |
|---|---|---|
| **5** |  | Remove the sealing cap.<br>Screw on the static mixer<br>(the spiral in the static mixer must be clearly visible). |
| **6** |   | Place the cartridge into the dispenser. |
| **7** |   | Extrude approximately 10 cm of material out until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey. |

Go to step 8 (pre-positioned installation **Annex B11** or push through installation **Annex B12**).

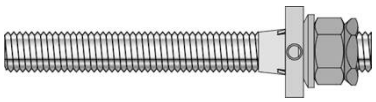
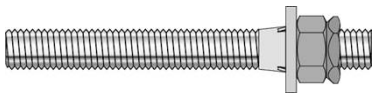
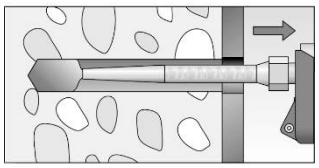
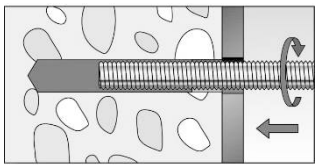
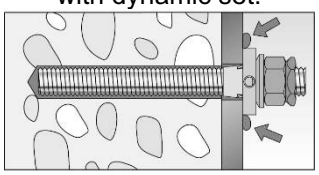
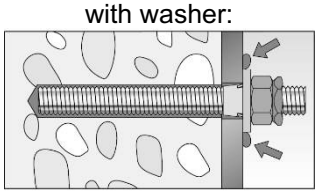
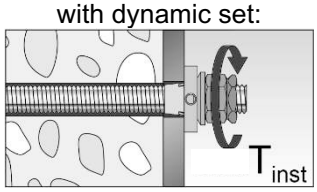
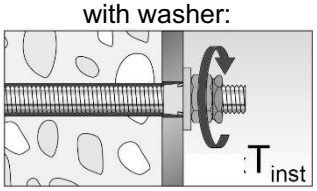
## Installation instructions part 3, injection mortar system FIS SB

Pre-positioned installation

| | | |
|---|---|---|
| **8** |  | Fill approximately 2/3 of the drill hole with mortar. Always begin from the bottom of the hole and avoid bubbles.<br>For drill hole depth ≥ 150 mm use an extension tube see **Table B8.1**. For overhead installation or deep holes $h_0$ > 250mm use an injection adapter. |
| **9** |  | Only use clean and oil-free metal parts.<br>Mark the setting depth of the anchor rod. Push the fischer anchor rod down to the bottom of the hole, turning it slightly while doing so. |
| |  | After inserting the anchor rod, excess mortar must be emerged around the anchor element. If not, pull out the anchor element immediately and reinject mortar. |
| |  | For overhead installations support the anchor rod with wedges (e.g. fischer centering wedges) until the mortar begins to harden. |
| **10** |  | Wait for the specified curing time $t_{cure}$<br>see **Table B8.2**. |
| **11** |  | Attach the component and install the washer and nuts - without centering sleeve.<br>Tighten the hexagon nut with torque wrench, $T_{inst}$ see **Table B4.1**. Tighten lock nut manually, then use wrench to give another quarter or half turn. |
| **12** |  | The gap between anchor and fixture (annular clearance) has to be filled with mortar (FIS SB, FIS SB High Speed, FIS V Plus or FIS EM Plus) via the fillable conical washer.<br>If only tension loads are involved in the application, the annular gap does not necessarily have to be filled. |

## Installation instructions part 4, injection mortar system FIS SB

Push through installation

| | | |
|---|---|---|
| **8** |  or  | **Pre-assemble the anchor!**<br>(Position of the conical washer or washer = embedment depth + fixture thickness). |
| **9** |  | Fill approximately 2/3 of the drill hole incl. fixture with mortar. Always begin from the bottom of the hole and avoid bubbles.<br>For drill hole depth ≥ 150 mm use an extension tube see **Table B8.1**. For overhead installation, deep holes $h_0$ > 250 mm use an injection adapter. |
| **10** |  | Only use clean and oil-free metal parts.<br>Push the pre-assembled fischer anchor rod into the drill hole until the conical washer or washer is in full contact with the surface, turning it slightly while doing so. |
| | with dynamic set:<br><br>with washer:<br> | After inserting the anchor rod with pre-assembled components, excess mortar must be emerged around the anchor element (minimum on one point of the conical washer or washer).<br>If not, pull out the anchor element immediately and reinject mortar. |
| **11** |  | Wait for the specified curing time $t_{cure}$<br>see **Table B8.2**. |
| **12** | with dynamic set:<br><br>with washer:<br> | Tighten the hexagon nut with torque wrench, $T_{inst}$ see **Table B4.1**. Tighten lock nut manually, then use wrench to give another quarter or half turn. |

**fischer Superbond dynamic**

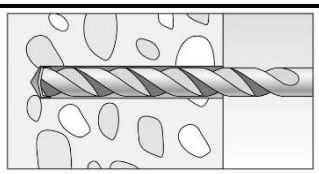
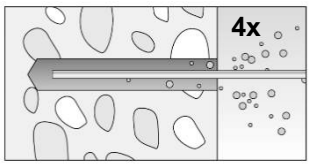
**Intended use**
Installation instructions part 4; push through installation;
injection mortar system FIS SB

**Annex B12**

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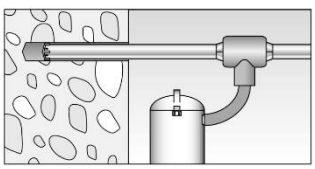
## Installation instructions part 5; resin capsule RSB

### Drilling and cleaning the hole (hammer drilling with standard drill bit)

| | | |
|---|---|---|
| **1** |  | Drill the hole.<br>Nominal drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$<br>see **Table B6.1**. |
| **2** |  | Clean the drill hole:<br>Blow out the drill hole four times, with oil free compressed air ($p \geq 6$ bar).<br><br>In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters:<br>$d_0 < 18$ mm and $h_{ef} < 10d$).<br> |

Go to step 6 (pre-positioned installation **Annex B15** or push through installation **Annex B16**).

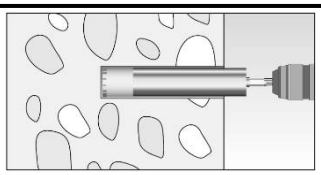
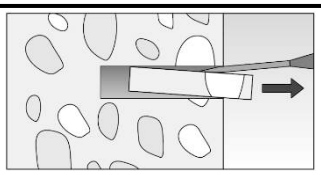
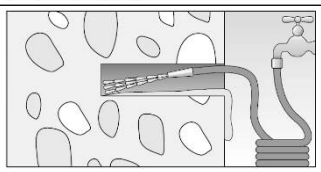
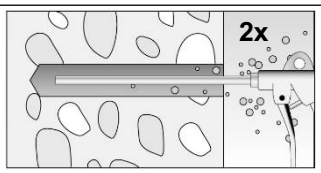
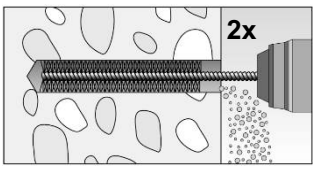
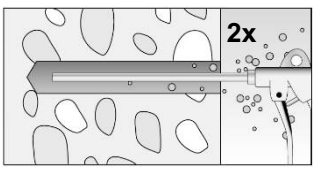
### Drilling and cleaning the hole (hammer drilling with hollow drill bit)

| | | |
|---|---|---|
| **1** |  | Check a suitable hollow drill (see **Table B2.1**) for correct operation of the dust extraction. |
| **2** |  | Use a suitable dust extraction system, e.g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.<br><br>Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power.<br>Nominal drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Table B6.1**. |

Go to step 6 (pre-positioned installation **Annex B15** or push through installation **Annex B16**).

## Installation instructions part 6; resin capsule RSB

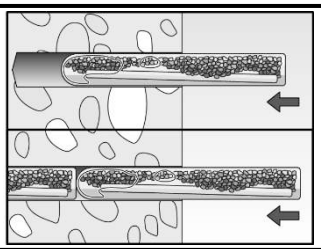
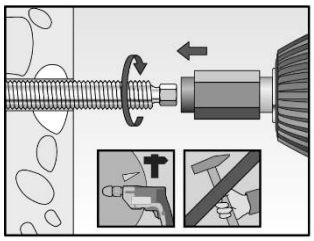
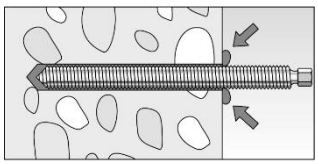
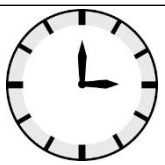
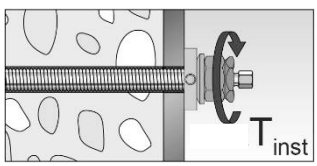
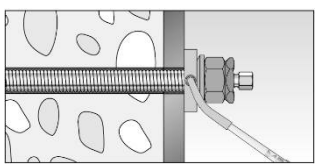
Drilling and cleaning the hole (wet drilling with diamond drill bit)

| | | | | |
|---|---|---|---|---|
| **1** |  | Drill the hole.<br>Drill hole diameter $\mathbf{d_0}$ and nominal drill hole depth $\mathbf{h_0}$ see **Table B6.1**. |  | Break the drill core and remove it. |
| **2** |  | Flush the drill hole, until clear water emerges from the drill hole. | | |
| **3** |  | Blow out the drill hole twice, using oil-free compressed air (p > 6 bar). | | |
| **4** |  | Brush the drill hole twice using a power drill.<br>Corresponding brushes see **Table B7.3**. | | |
| **5** |  | Blow out the drill hole twice, using oil-free compressed air (p > 6 bar). | | |

Go to step 6 (pre-positioned installation **Annex B15** or push through installation **Annex B16**).

## Installation instructions part 7; resin capsule RSB

Pre-positioned installation fischer anchor rod RG M

| | | | | |
|---|---|---|---|---|
| **6** |  | Insert the resin capsule into the drill hole by hand.<br>Suitable resin capsule RSB or RSB mini see **Table B7.2**. |  | Depending on the metal part, use a suitable setting tool / adapter. |
| **7** |  | Only use clean and grease-free metal parts. Drive the fischer anchor rod RG M into the capsule using suitable adapter and hammer drill set on rotary hammer action. Stop when the metal part reaches the bottom of the hole and the correct embedment depth is reached. | | |
| **8** |  | When the correct embedment depth is reached, excess mortar must emerge from the mouth of the drill hole.<br>If not, the metal part must be pulled out directly and another resin capsule must be pushed into the drill hole. Setting process (Step 7) must be repeated. | | |
| **9** |  | Wait for the specified curing time $t_{cure}$<br>see **Table B8.2**. | | |
| **10** |  | Attach the component and install the washer and nuts - without centering sleeve.<br>Tighten the hexagon nut with torque wrench, $T_{inst}$ see **Table B6.1**.<br>Tighten lock nut manually, then use wrench to give another quarter or half turn. | | |
| **11** |  | The gap between anchor and fixture (annular clearance) has to be filled with mortar (FIS SB, FIS SB High Speed, FIS V Plus or FIS EM Plus) via the fillable conical washer.<br>If only tension loads are involved in the application, the annular gap does not necessarily have to be filled. | | |

## Installation instructions part 8; resin capsule RSB

Push through installation fischer anchor rod RG M

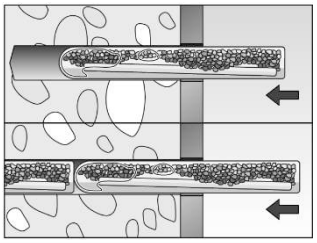
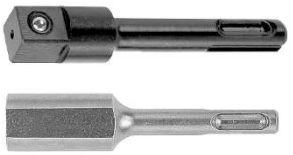
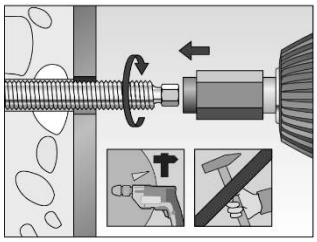
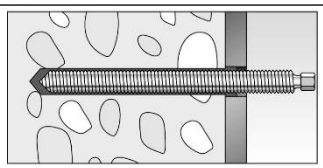
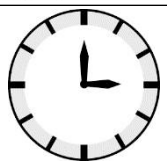
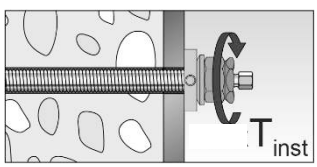
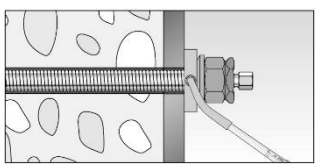
| | | | | |
|---|---|---|---|---|
| **6** |  | Insert the resin capsule through the fixture into the drill hole by hand. Suitable resin capsule RSB or RSB mini see **Table B7.2**. |  | Depending on the metal part, use a suitable setting tool / adapter. |
| **7** |  | Only use clean and grease-free metal parts. Drive the fischer anchor rod RG M into the capsule using suitable adapter and hammer drill set on rotary hammer action. Stop when the metal part reaches the bottom of the hole and the correct embedment depth is reached. | | |
| **8** |  | When the correct embedment depth is reached, excess mortar must be visible in the mounting part. If not, the metal part must be pulled out directly and another resin capsule must be pushed into the drill hole. Setting process (Step 7) must be repeated. | | |
| **9** |  | Wait for the specified curing time $t_{cure}$ see **Table B8.2**. | | |
| **10** |   | Install the washer and nuts - without centering sleeve. Tighten the hexagon nut with torque wrench, $T_{inst}$ see **Table B6.1**. Tighten lock nut manually, then use wrench to give another quarter or half turn. | | |
| **12** |  | The gap between anchor and fixture (annular clearance) has to be filled with mortar (FIS SB, FIS SB High Speed, FIS V Plus or FIS EM Plus) via the fillable conical washer. If only tension loads are involved in the application, the annular gap does not necessarily have to be filled. | | |

**Table C1.1: Essential characteristics** under tension fatigue loading for FIS SB / RSB; **Design method I** according to **TR 061**

| **Required evidence** | | | |
|---|---|---|---|
| Number of load cycles (n) | | | |
| $n \leq 10^4$ | $10^4 < n \leq 5 \cdot 10^6$ | $5 \cdot 10^6 < n \leq 10^8$ | $n > 10^8$ |
| **Tension loading** | | | |
| **Characteristic steel fatigue resistance (zinc plated steel 8.8) $\Delta N_{Rk,s,0,n}$ (8.8) [kN]** | | | |
| $0{,}75 \cdot N_{Rk,s,(8.8)} \cdot 0{,}33$ | $0{,}75 \cdot N_{Rk,s,(8.8)} \cdot 10^{(-0{,}12 \cdot \log(n))} \leq 0{,}75 \cdot N_{Rk,s,(8.8)} \cdot 0{,}33$ | $0{,}75 \cdot N_{Rk,s,(8.8)} \cdot 10^{(-0{,}438 - 0{,}057 \cdot \log(n))}$ | $0{,}75 \cdot N_{Rk,s,(8.8)} \cdot 0{,}12$ |
| **Characteristic steel fatigue resistance (stainless steel R, property class 70) $\Delta N_{Rk,s,0,n}$ (R-70) [kN]** | | | |
| $0{,}75 \cdot N_{Rk,s,(R\text{-}70)} \cdot 0{,}33$ | $0{,}75 \cdot N_{Rk,s,(R\text{-}70)} \cdot 10^{(-0{,}16 - 0{,}09 \cdot \log(n))}$ | $0{,}75 \cdot N_{Rk,s,(R\text{-}70)} \cdot 10^{(-0{,}469 - 0{,}043 \cdot \log(n))}$ | $0{,}75 \cdot N_{Rk,s,(R\text{-}70)} \cdot 0{,}15$ |
| **Characteristic combined pull-out / concrete cone fatigue resistance, in uncracked and cracked concrete** | | | |
| **Characteristic bond strength in uncracked concrete $\Delta\tau_{Rk,p,ucr,0,n}$ [N/mm²]** | | | |
| $\tau_{Rk,ucr} \cdot 0{,}575$ | $\tau_{Rk,ucr} \cdot 10^{(-0{,}06 \cdot \log(n))}$ | $\tau_{Rk,ucr} \cdot 10^{(-0{,}207 - 0{,}029 \cdot \log(n))}$ | $\tau_{Rk,ucr} \cdot 0{,}35$ |
| **Characteristic bond strength in cracked concrete $\Delta\tau_{Rk,p,cr,0,n}$ [N/mm²]** | | | |
| $\tau_{Rk,cr} \cdot 0{,}575$ | $\tau_{Rk,cr} \cdot 10^{(-0{,}06 \cdot \log(n))}$ | $\tau_{Rk,cr} \cdot 10^{(-0{,}207 - 0{,}029 \cdot \log(n))}$ | $\tau_{Rk,cr} \cdot 0{,}35$ |
| **Characteristic concrete cone and splitting fatigue resistance** | | | |
| **Characteristic concrete fatigue resistance in uncracked concrete $\Delta N_{Rk,c/sp,ucr,0,n}$ [kN]** | | | |
| $N_{Rk,c/sp,ucr} \cdot 0{,}66$ | $N_{Rk,c/sp,ucr} \cdot 1{,}1 \cdot n^{-0{,}055} \geq N_{Rk,c/sp,ucr} \cdot 0{,}50$ | | $N_{Rk,c/sp,ucr} \cdot 0{,}50$ |
| **Characteristic concrete fatigue resistance in cracked concrete $\Delta N_{Rk,c/sp,cr,0,n}$ [kN]** | | | |
| $N_{Rk,c/sp,cr} \cdot 0{,}66$ | $N_{Rk,c/sp,cr} \cdot 1{,}1 \cdot n^{-0{,}055} \geq N_{Rk,c/sp,cr} \cdot 0{,}50$ | | $N_{Rk,c/sp,cr} \cdot 0{,}50$ |

**Exponents and load transfer factor**

Exponent for combined loading

| | | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|
| $\alpha_s = \alpha_{sn}$ | [–] | 0,5 | 0,7 | | |

Load transfer factor

| | | |
|---|---|---|
| $\psi_{FN}$ | [–] | 0,5 |

$N_{Rk,s}$, $\tau_{Rk,ucr}$ , $\tau_{Rk,cr}$ see ETA-12/0258 of 24.10.2023, for $\tau_{Rk}$ (M24-R-70) ≤ 0,85 · $\tau_{Rk}$ (M20-R-70)
$N_{Rk,c/sp,ucr}$ , $N_{Rk,c/sp,cr}$ see ETA-12/0258 of 24.10.2023 and EN 1992-4:2018

**fischer Superbond dynamic**

**Performance**
Essential characteristics under tension fatigue loading;
Design method I according to TR 061

**Annex C1**

**Table C2.1:** Essential characteristics under shear fatigue loading for FIS SB / RSB; **Design method I** according to **TR 061**

| **Required evidence** | | | |
|---|---|---|---|
| Number of load cycles (n) | | | |
| $n \leq 10^4$ | $10^4 < n \leq 5 \cdot 10^6$ | $5 \cdot 10^6 < n \leq 10^8$ | $n > 10^8$ |
| **Shear loading** | | | |
| **Characteristic steel fatigue resistance (zinc plated steel 8.8) $\Delta V_{Rk,s,0,n}$ (8.8) [kN]** | | | |
| $V_{Rk,s,(8.8)} \cdot 0{,}23$ | $V_{Rk,s,(8.8)} \cdot 10^{(-0{,}147 \cdot \log(n))} \leq V_{Rk,s,(8.8)} \cdot 0{,}23$ | $V_{Rk,s,(8.8)} \cdot 10^{(-0{,}573-0{,}068 \cdot \log(n))} \geq V_{Rk,s,(8.8)} \cdot 0{,}08$ | $V_{Rk,s,(8.8)} \cdot 0{,}08$ |
| **Characteristic steel fatigue resistance (stainless steel R, property class 70) $\Delta V_{Rk,s,0,n}$ (R-70) [kN]** | | | |
| $V_{Rk,s,(R-70)} \cdot 0{,}31$ | $V_{Rk,s,(R-70)} \cdot 10^{(-0{,}042-0{,}118 \cdot \log(n))}$ | $V_{Rk,s,(R-70)} \cdot 10^{(-0{,}461-0{,}056 \cdot \log(n))}$ | $V_{Rk,s,(R-70)} \cdot 0{,}12$ |
| **Characteristic concrete pry out fatigue resistance in cracked and uncracked concrete $\Delta V_{Rk,cp,0,n}$ [kN]** | | | |
| $V_{Rk,cp} \cdot 0{,}574$ | $V_{Rk,cp} \cdot 1{,}2 \cdot n^{-0{,}08} \geq V_{Rk,cp} \cdot 0{,}50$ | | $V_{Rk,cp} \cdot 0{,}50$ |
| **Characteristic concrete edge fatigue resistance in cracked and uncracked concrete $\Delta V_{Rk,c,0,n}$ [kN]** | | | |
| $V_{Rk,c} \cdot 0{,}574$ | $V_{Rk,c} \cdot 1{,}2 \cdot n^{-0{,}08} \geq V_{Rk,c} \cdot 0{,}50$ | | $V_{Rk,c} \cdot 0{,}50$ |

| **Exponents, load transfer factor** | | | | | |
|---|---|---|---|---|---|
| Exponent for combined loading, steel failure | | | | | |
| | | M12 | M16 | M20 | M24 |
| $\alpha_s = \alpha_{sn}$ | [-] | 0,5 | 0,7 | | |
| Exponent for combined loading, verification regarding failure modes other than steel failure | | | | | |
| $\alpha_c$ | [-] | 1,5 | | | |
| Load transfer factor | | | | | |
| $\psi_{FV}$ | [-] | 0,5 | | | |

$V_{Rk,s}$ see ETA-12/0258 of 24.10.2023

$V_{Rk,c}$, $V_{Rk,cp}$ see ETA-12/0258 of 24.10.2023 and EN 1992-4:2018

**Table C3.1:** Essential characteristics under tension and shear fatigue loading; **Design method II** according to **TR 061; zinc plated steel 8.8**

| **Size** | | | **M12** | **M16** |
|---|---|---|---|---|
| **Tension loading** | | | | |
| Effective embedment depth | $h_{ef,min}$ | [mm] | 95 | 125 |
| **Steel failure** | | | | |
| Characteristic steel fatigue resistance | $\Delta N_{Rk,s,0,\infty}$ | [kN] | 6,1 | 11,3 |
| Exponent for combined loading | $\alpha_s = \alpha_{sn}$ | [-] | 0,5 | 0,7 |
| **Combined pull-out / concrete cone failure** | | | | |
| Characteristic bond fatigue resistance | $\Delta\tau_{Rk,p,ucr,0,\infty}$ | [N/mm²] | $\tau_{Rk,ucr} \cdot 0{,}35$ | |
| | $\Delta\tau_{Rk,p,cr,0,\infty}$ | [N/mm²] | $\tau_{Rk,cr} \cdot 0{,}35$ | |
| **Concrete cone failure and concrete splitting failure** | | | | |
| Characteristic concrete fatigue resistance | $\Delta N_{Rk,c,0,\infty}$ | [-] | $0{,}5 \cdot N_{Rk,c}$ [1)] | |
| | $\Delta N_{Rk,sp,0,\infty}$ | [-] | $0{,}5 \cdot N_{Rk,sp}$ [1)] | |
| Exponent for combined loading | $\alpha_c$ | [-] | 1,5 | |
| Load transfer factor | $\psi_{FN}$ | [-] | 0,5 | |
| **Shear loading** | | | | |
| **Shear loading, steel failure without lever arm** | | | | |
| Characteristic steel fatigue resistance | $\Delta V_{Rk,s,0,\infty}$ | [kN] | 2,7 | 5,0 |
| Exponent for combined loading | $\alpha_s = \alpha_{sn}$ | [-] | 0,5 | 0,7 |
| **Concrete pryout failure** | | | | |
| Characteristic concrete fatigue resistance | $\Delta V_{Rk,cp,0,\infty}$ | [kN] | $0{,}5 \cdot V_{Rk,cp}$ [1)] | |
| **Concrete edge failure** | | | | |
| Characteristic concrete fatigue resistance | $\Delta V_{Rk,c,0,\infty}$ | [kN] | $0{,}5 \cdot V_{Rk,c}$ [1)] | |
| Effective length of fastener | $l_f$ | [mm] | $\min(h_{ef}; 12 \cdot d_{nom})$ | |
| Effective outside diameter of the anchor | $d_{nom}$ | [mm] | 12 | 16 |
| Exponent for combined loading | $\alpha_c$ | [-] | 1,5 | |
| Load transfer factor | $\psi_{FV}$ | [-] | 0,5 | |

[1)] $N_{Rk,c}$, $N_{Rk,sp}$, $V_{Rk,c}$ and $V_{Rk,cp}$ – Essential characteristics for concrete failure under static and quasi-static loading according to ETA-12/0258 of 24.10.2023 and EN 1992-4:2018.

**fischer Superbond dynamic**

**Performance**
Essential characteristics under tension / shear fatigue loading;
Design method II according to TR 061; zinc plated steel 8.8

**Annex C3**

**Table C4.1:** Essential characteristics under tension and shear fatigue loading; **Design method II** according to **TR 061; stainless steel R property class 70**

| **Size** | | | **M12** | **M16** | **M20** | **M24** |
|---|---|---|---|---|---|---|
| **Tension loading** | | | | | | |
| Effective embedment depth | $h_{ef,min}$ | [mm] | 95 | 125 | 170 | 220 |
| **Steel failure** | | | | | | |
| Characteristic steel fatigue resistance | $\Delta N_{Rk,s,0,\infty}$ | [kN] | 6,6 | 12,4 | 19,4 | 27,8 |
| Exponent for combined loading | $\alpha_s = \alpha_{sn}$ | [-] | 0,5 | 0,7 | | |
| **Combined pull-out / concrete cone failure** | | | | | | |
| Characteristic bond fatigue resistance | $\Delta\tau_{Rk,p,ucr,0,\infty}$ | [N/mm²] | $\tau_{Rk,ucr} \cdot 0{,}35$ | | | |
| | $\Delta\tau_{Rk,p,cr,0,\infty}$ | [N/mm²] | $\tau_{Rk,cr} \cdot 0{,}35$ | | | |
| **Concrete cone failure and concrete splitting failure** | | | | | | |
| Characteristic concrete fatigue resistance | $\Delta N_{Rk,c,0,\infty}$ | [-] | $0{,}5 \cdot N_{Rk,c}$ [1)] | | | |
| | $\Delta N_{Rk,sp,0,\infty}$ | [-] | $0{,}5 \cdot N_{Rk,sp}$ [1)] | | | |
| Exponent for combined loading | $\alpha_c$ | [-] | 1,5 | | | |
| Load transfer factor | $\psi_{FN}$ | [-] | 0,5 | | | |
| **Shear loading** | | | | | | |
| **Shear loading, steel failure without lever arm** | | | | | | |
| Characteristic steel fatigue resistance | $\Delta V_{Rk,s,0,\infty}$ | [kN] | 3,6 | 6,6 | 10,3 | 14,9 |
| Exponent for combined loading | $\alpha_s = \alpha_{sn}$ | [-] | 0,5 | 0,7 | | |
| **Concrete pryout failure** | | | | | | |
| Characteristic concrete fatigue resistance | $\Delta V_{Rk,cp,0,\infty}$ | [kN] | $0{,}5 \cdot V_{Rk,cp}$ [1)] | | | |
| **Concrete edge failure** | | | | | | |
| Characteristic concrete fatigue resistance | $\Delta V_{Rk,c,0,\infty}$ | [kN] | $0{,}5 \cdot V_{Rk,c}$ [1)] | | | |
| Effective length of fastener | $l_f$ | [mm] | $\min(h_{ef}; 12 \cdot d_{nom})$ | | | |
| Effective outside diameter of the anchor | $d_{nom}$ | [mm] | 12 | 16 | 20 | 24 |
| Exponent for combined loading | $\alpha_c$ | [-] | 1,5 | | | |
| Load transfer factor | $\psi_{FV}$ | [-] | 0,5 | | | |

[1)] $N_{Rk,c}$, $N_{Rk,sp}$, $V_{Rk,c}$ and $V_{Rk,cp}$ – Essential characteristics for concrete failure under static and quasi-static loading according to ETA-12/0258 of 24.10.2023 and EN 1992-4:2018, for $\tau_{Rk}$ (M24-R-70) ≤ 0,85 · $\tau_{Rk}$ (M20-R-70)