Deutsches Institut für Bautechnik

Anstalt des öffentlichen Rechts

Kolonnenstr. 30 L
10829 Berlin
Germany

Tel.: +49(0)30 787 30 0
Fax: +49(0)30 787 30 320
E-mail: dibt@dibt.de
Internet: www.dibt.de

Authorised and notified according to Article 10 of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products (89/106/EEC)

DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-08/0010

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung *Trade name*	fischer Reaktionsanker R *fischer Resin anchor R*
Zulassungsinhaber *Holder of approval*	fischerwerke GmbH & Co. KG Otto-Hahn-Straße 15 79211 Denzlingen DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck *Generic type and use of construction product*	Verbunddübel in den Größen M8 bis M30 zur Verankerung im ungerissenen Beton *Bonded anchor in the size of M8 to M30 for use in non-cracked concrete*
Geltungsdauer: vom *Validity: from*	27 November 2008
bis *to*	26 March 2013
Herstellwerk *Manufacturing plant*	fischerwerke

Diese Zulassung umfasst *This Approval contains*	21 Seiten einschließlich 13 Anhänge *21 pages including 13 annexes*
Diese Zulassung ersetzt *This Approval replaces*	ETA-08/0010 mit Geltungsdauer vom 26.03.2008 bis 26.03.2013 *ETA-08/0010 with validity from 26.03.2008 to 26.03.2013*

I LEGAL BASES AND GENERAL CONDITIONS

1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
- Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998[4], zuletzt geändert durch Gesetz vom 06.01.2004[5];
- Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC[6];
- Guideline for European technical approval of "Metal anchors for use in concrete - Part 5: Bonded anchors", ETAG 001-05.

2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.

3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.

4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.

6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

---

1 Official Journal of the European Communities L 40, 11.02.1989, p. 12
2 Official Journal of the European Communities L 220, 30.08.1993, p. 1
3 Official Journal of the European Union L 284, 31.10.2003, p. 25
4 Bundesgesetzblatt I, p. 812
5 Bundesgesetzblatt I, p.2, 15
6 Official Journal of the European Communities L 17, 20.01.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the construction product and intended use

1.1 Definition of the product

The fischer Resin anchor R is a bonded anchor consisting of a mortar capsule FEB RM and a steel element. The steel element is an anchor rod with hexagon nut and washer in the range of M8 to M30 or an internal threaded anchor in the range of M8 to M20. The steel elements are made of zinc plated steel, hot-dip galvanised steel, stainless steel or high corrosion resistant steel.

The mortar capsule is placed in the hole and the anchor rod or the internal threaded anchor is driven by machine with simultaneous hammering and turning. The steel elements are anchored via the bond between anchor rod or internal threaded anchor, mortar and the concrete.

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences. Safety in case of fire (Essential Requirement 2) is not covered in this European technical approval. The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206:2000-12.

The anchor may be used in non-cracked concrete only.

The anchor may be used in dry or wet concrete and flooded holes excepting sea water. The anchor size M30 with standard cleaning may be used in dry or wet concrete; it must not to be installed in flooded holes.

The anchor may be used in the following temperature range:

Temperature range I:	-40 °C to +80 °C	(max long term temperature +50 °C and max short term temperature +80 °C)
Temperature range II:	-40 °C to +120 °C	(max long term temperature +72 °C and max short term temperature +120 °C)

Zinc plated or hot-dip galvanised steel:

The steel elements made of zinc plated or hot-dip galvanised steel may only be used in structures subject to dry internal conditions.

Stainless steel:

The steel elements made of stainless steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

High corrosion resistant steel:

The steel elements made of high corrosion resistant steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure, in permanently damp internal conditions or in other particular aggressive conditions. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European technical approval 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 right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

The anchor corresponds to the drawings and provisions given in Annexes 1 to 3. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 1 to 3 shall correspond to the respective values laid down in the technical documentation[7] of this European technical approval.

The characteristic values for the design of anchorages are given in Annexes 5 to 13.

Each mortar capsule is marked with the identifying mark of the producer, the commercial name and the diameter of the corresponding anchor rod or internal thread anchor according to Annex 2, Table 1a and 1b.

Each fischer-anchor rod is marked with the identifying mark of the producer, the anchor size and marking of anchorage depth. Each fischer-anchor rod made of stainless steel is marked with additional letter "A4". Each fischer-anchor rod made of high corrosion resistant steel is marked with additional letter "C" in accordance with Annex 2.

Each internal threaded anchor RG MI is marked with the identifying mark of the producer and the anchor size. Each internal threaded anchor RG MI made of stainless steel is marked with additional letter "A4". Each internal threaded anchor RG MI made of high corrosion resistant steel is marked with additional letter "C" in accordance with Annex 2.

2.2 Methods of verification

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 Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Part 1 "Anchors in general" and Part 5 "Bonded anchors", on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, 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 Directive, these requirements need also to be complied with, when and where they apply.

---

7 The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision 96/582/EG of the European Commission[8] the system 2(i) (referred to as System 1) of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

(a) Tasks for the manufacturer:

(1) factory production control;

(2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

(b) Tasks for the approved body:

(3) initial type–testing of the product;

(4) initial inspection of factory and of factory production control;

(5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan of March 2008 which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.[9]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2 For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

---

8 Official Journal of the European Communities L 254 of 08.10.1996

9 The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1, Option 7),
- size.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European technical approval using the automated manufacturing process as identified in the inspection of the plant by the Deutsches Institut für Bautechnik and the approved body and laid down in the technical documentation.

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the European technical approval and consequently the validity of the CE marking on the basis of the European technical approval and if so whether further assessment or alterations to the European technical approval shall be necessary.

4.2 Installation

4.2.1 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the EOTA Technical Report TR 029 "Design of bonded anchors"[10] under the responsibility of an engineer experienced in anchorages and concrete work.

Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored.

The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).

4.2.2 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- 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 the components of an anchor,
- anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval,
- checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply,
- check of concrete being well compacted, e.g. without significant voids,
- keeping the effective anchorage depth,
- Edge distance and spacing not less than the specified values without minus tolerances,
- positioning of the drill holes without damaging the reinforcement,
- in case of aborted drill hole: the drill hole shall be filled with mortar,
- cleaning the drill hole and anchor installation in accordance with manufacturers installation instructions given in Annex 3

  standard cleaning:

  At least four times blowing operations with manual blow-out tool.

  premium cleaning:

  At least four times blowing operations, four times brushing operations and again four times blowing operations. Blowing with manual blow-out tool; brushing operations by using the steel brush supplied by the manufacturer. Before brushing cleaning the brush and checking whether the brush diameter according to Annex 4, Table 4 is still sufficient,
- the mortar capsule is placed into the drilled hole; connecting the anchor rod with the percussion drill by using a corresponding adapter; driving the anchor rod or the internal threaded anchor into the mortar capsule by simultaneous hammering and turning of the drill; if the anchorage depth is achieved the drill must stopped immediately by using some pressure; if the anchor is proper installed mortar must be visible at the member surface.
- The anchor component installation temperature shall be at least +5 °C; during curing of the injection mortar the temperature of the concrete must not fall below -5 °C; observing the curing time according to Annex 4 , Table 3 until the anchor may be loaded,
- installation torque moments are not required for functioning of the anchor. However, the torque moments given in Annex 4, Table 4 must not be exceeded.
- fastening screws or threaded rods (including nut and washer) for the internal threaded anchor must be made of appropriate steel grade and property class according to Annex 3, Table 2.

---

10 The Technical Report TR 029 "Design of Bonded Anchors" is published in English on EOTA website www.eota.eu.

5 Recommendations concerning packaging, transport and storage

5.1 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2.1 and 4.2.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- drill bit diameter,
- hole depth,
- diameter of anchor rod,
- minimum effective anchorage depth,
- maximum thickness of the fixture,
- information on the installation procedure, including cleaning of the hole with the cleaning equipments, preferably by means of an illustration,
- material and property class of metal parts acc. to Annex 3, Table 2,
- anchor component installation temperature,
- ambient temperature of the concrete during installation of the anchor,
- curing time until the anchor may be loaded as a function of the ambient temperature in the concrete during installation,
- maximum torque moment,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

5.2 Packaging, transport and storage

The mortar capsules shall be protected against sun radiation and shall be stored according to the manufacture's installation instructions in dry condition at temperatures of at least +5 °C to not more than +25 °C.

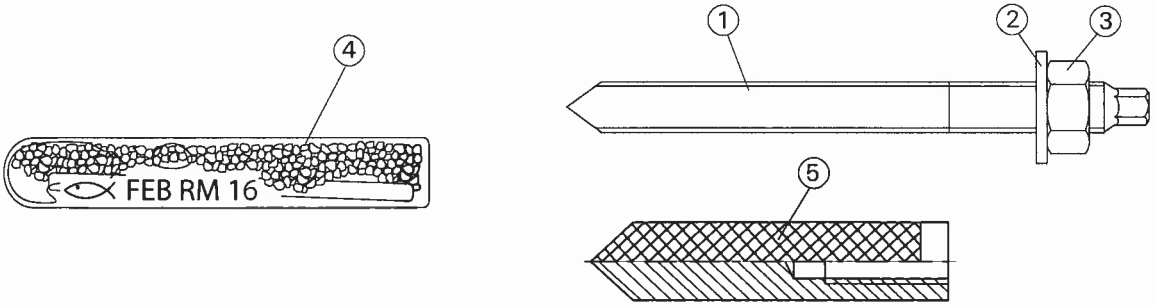
Mortar capsules with expired shelf life must no longer be used.

The anchor shall only be packaged and supplied as a complete unit. Mortar capsules may be packed separately from anchor rod (hexagon nut and washer) respectively internal threaded anchor.

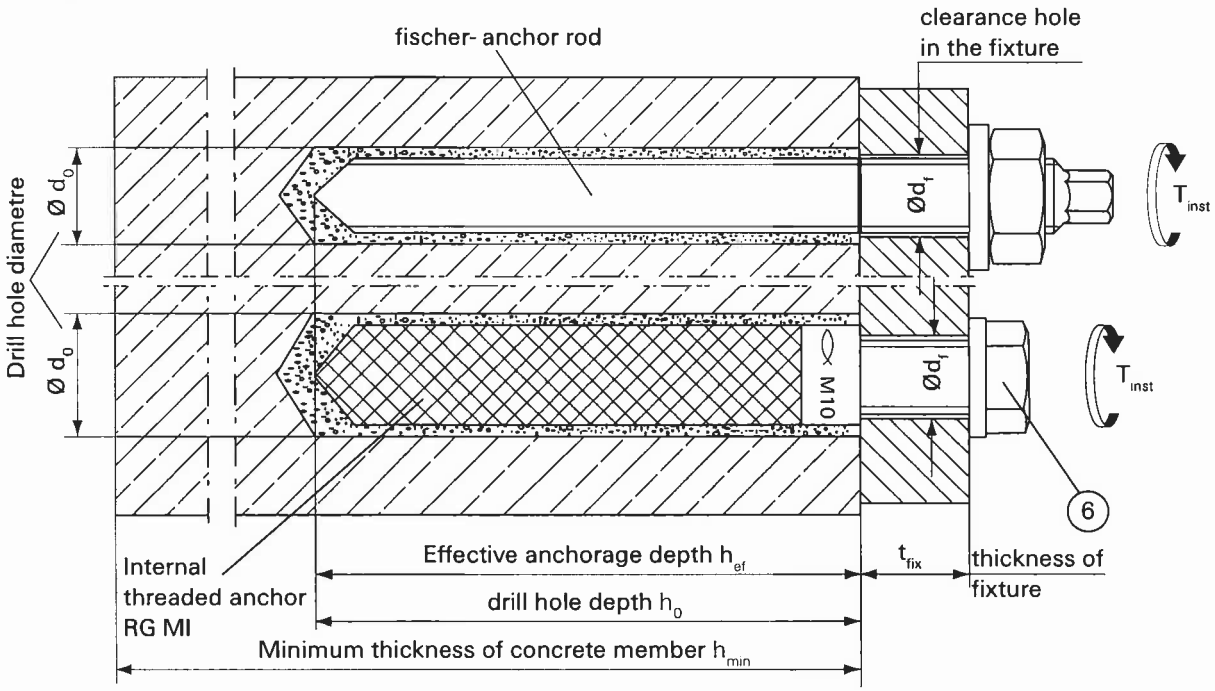
The manufacturer's installation instruction shall indicate that the mortar capsules shall be used with the anchor rod or internal threaded anchor according to Annex 1 to 3.

Dipl.-Ing. E. Jasch
President of Deutsches Institut für Bautechnik
Berlin, 27 November 2008

beglaubigt:
Müller



1 fischer anchor- rod
2 Washer
3 Hexagon nut
4 Capsule RM
5 Internal threaded anchor RG MI
6 Screw



Temperature ranges:

Temperature range I: -40°C to +80°C (max. long term temp. +50°C and max. short term temp. +80°C)
Temperature range II: -40°C to +120°C (max. long term temp. +72°C and max. short term temp. +120°C)

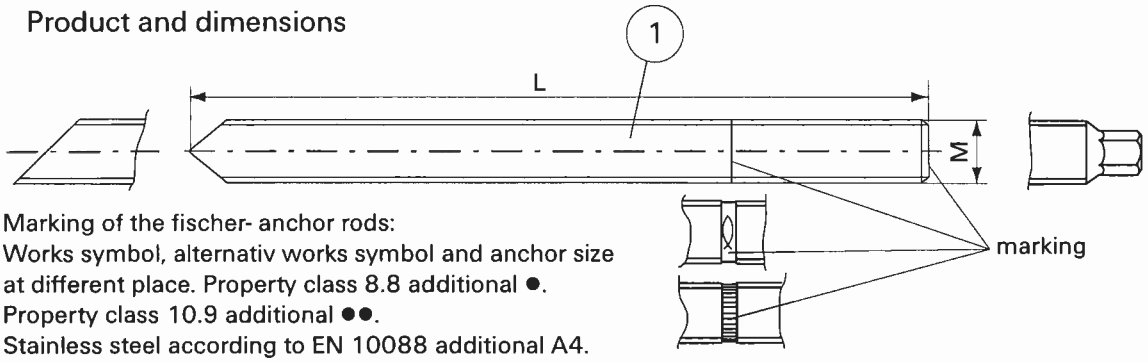
Table 1: Intended use

Use category[1)]	I	II
fischer- anchor rod		
Cleaning process		
Standard	M8 - M30	M8 - M27
Premium		M8 - M30
Internal threaded anchor		
only premium cleaning process	M8 - M20	

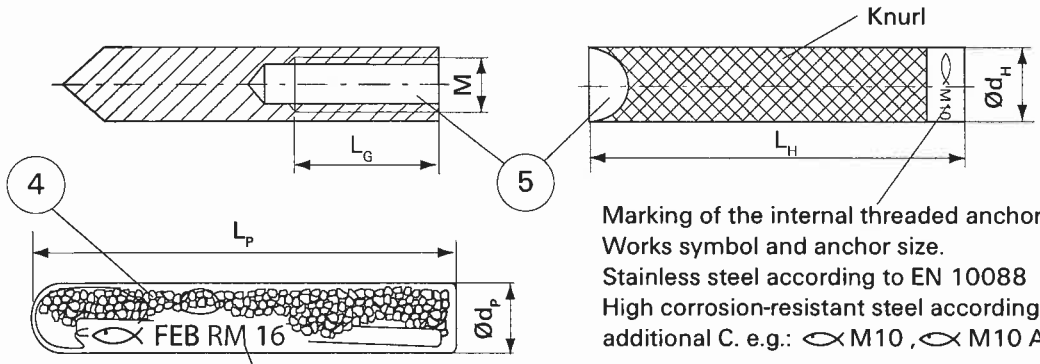
[1)] Use category I: dry and wet concrete.
Use category II: dry and wet concrete and flooded hole

fischer Resin anchor R	**Annex 1** of European Technical Approval ETA-08/0010
Product and intended use	

Product and dimensions



Marking of the fischer- anchor rods:
Works symbol, alternativ works symbol and anchor size at different place. Property class 8.8 additional ●.
Property class 10.9 additional ●●.
Stainless steel according to EN 10088 additional A4.
High corrosion-resistant steel according to EN 10088 additional C.
e.g.: ; ● ; ●● ; A4; C
or M10; ● M10; ●● M10; M10 A4; M10 C



Marking of the internal threaded anchors RG MI:
Works symbol and anchor size.
Stainless steel according to EN 10088 additional A4.
High corrosion-resistant steel according to EN 10088 additional C. e.g.: M10 , M10 A4 , M10 C.

Marking: Works symbol, name, size; e.g.: FEB RM 16

Table1a: Dimensions of fischer- anchor rods and capsules FEB RM

Size		**M8**	**M10**	**M12**	**M12E**	**M16**	**M16E**	**M20**	**M20E**	**M24**	**M24E**	**M27**	**M30**
M	[mm]	8	10	12		16		20		24		27	30
$L^{1)}$	[mm]	90	100	130	170	150	215	195	270	240	320	280	315
h_{ef}	[mm]	80	90	110	150	125	190	170	240	210	290	250	280
Capsule FEB RM		**8**	**10**	**12**	**12E**	**16**	**16E**	**20**	**20E**	**24**	**24E**	**27**	**30**
Ø d_p	[mm]	8	10.5	12.5		16.5		23				27.5	
L_p	[mm]	85	90	97	120	95	123	160	215	190	250	210	260

[1] Minimum length of the anchor rods. Different lengths are possible.

Table1b: Dimensions of internal threaded anchor RG MI and capsules FEB RM

Size (M)		**M8**	**M10**	**M12**	**M16**	**M20**
Ø d_H	[mm]	12	16	18	22	28
$L_H = h_{ef}$	[mm]	90		125	160	200
L_G	[mm]	25	30	35	45	55
Capsule FEB RM		**12**	**14**	**16E**		**20**
Ø d_p	[mm]	12.5	14.5	16.5		23
L_p	[mm]	97		123		160

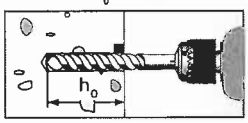
fischer Resin anchor R	**Annex 2** of European Technical Approval ETA-08/0010
Dimensions	

Table 2: Materials

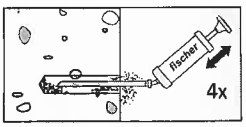
Part	Designation	Materials		
4	Capsule	Glas capsule, filled with vinylester-resin, styrene free, hardener dibenzoyl peroxide and quarz sand/ corund		
		Steel, zinc plated	**Stainless steel**	
1	Anchor rod	Property class 5.8 or 8.8; EN ISO 898-1 zinc plated ≥ 5µm, EN ISO 4042 A2K or hot-dip galvanised ≥ 45 µm, EN ISO 10684 Property class 10.9 EN ISO 10684	EN ISO 3506-1 Materials according to EN 10 088 A4	High corrosion-resistance steel according to EN 10 088 C
2	Washer	EN ISO 898-1 zinc plated ≥ 5µm, EN ISO 4042 A2K or hot-dip galvanised ≥ 45 µm, EN ISO 10684	Materials according to EN 10 088	
3	Hexagon nut according to EN 24 032	Property class 5.8 or 8.8; EN ISO 898-1 zinc plated ≥ 5µm, EN ISO 4042 A2K or hot-dip galvanised ≥ 45 µm, EN ISO 10684	EN ISO 3506-1 Materials according to EN 10 088 A4	
5	Internal threaded anchor	Property class 5.8 or 8.8; EN ISO 898-1 zinc plated ≥ 5µm, EN ISO 4042 A2K or hot-dip galvanised ≥ 45 µm, EN ISO 10684	EN ISO 3506-1 Materials according to EN 10 088 A4	
6	Screw for internal threaded anchor			

Mounting of the anchor rod and the internal threaded anchor

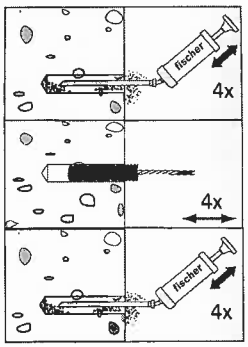
1.) Drill hole (h_o see Table 4)



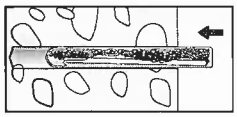
2.) Clean the hole **Standard**



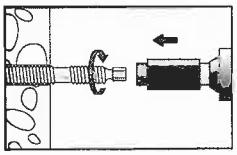
2.) Clean the hole **Premium**

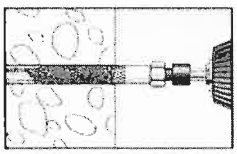


3.) Put the mortar capsule into the cleaned drill hole.

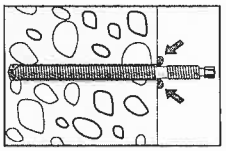


4.) Mounting the anchor rod/the internal threaded anchor with a electric drilling mashine by using impact and rotation with toll holder RA-SDS. Switch off drill immediately when reaching the drill hole base.



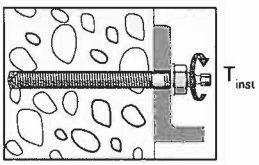


5.) When reaching the effective anchorage depth, surplus resin must be expelled.



Do not touch. t_{cure} see Table 3

6.) Mounting the fixture. Torque moment T_{inst} see table 4.



fischer Resin anchor R	**Annex 3** of European Technical Approval ETA-08/0010
Materials Istallation instructions	

Table 3: Curing times

Concrete temperature	Minimum curing time t_{cure} [1)]
- 5°C to - 1°C	4 h
0°C to +9°C	45 min
+10°C to +20°C	20 min
> +20°C	10 min

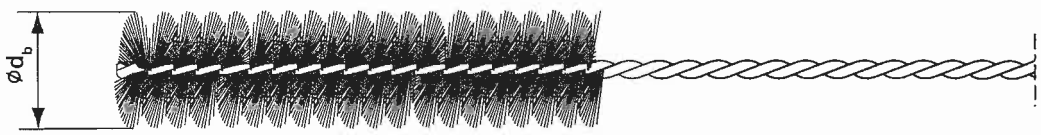
[1)] For wet concrete and flooded holes the curing time must be doubled.

Table 4: Installation parameters

fischer- anchor rods													
Size of anchor		**M8**	**M10**	**M12**	**M12 E**	**M16**	**M16 E**	**M20**	**M20 E**	**M24**	**M24 E**	**M27**	**M30**
Nominal drill hole diameter	d_0 =[mm]	10	12	14		18		25		28		32	35
Cutting diameter of drill bit	d_{cut}= [mm]	10,5	12,5	14,5		18,5		25,55		28,55		32,7	35,7
Depth of drill hole	h_0= [mm]	80	90	110	150	125	190	170	240	210	290	250	280
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	9	12	14		18		22		26		30	33
Diameter of steel brush	d_b= [mm]	11	13	16		20		27		30		40	40
Torque moment	T_{inst}= [Nm]	10	20	40		60		120		150		200	300
Thickness of fixture	t_{fix} min = [mm]	0											
	t_{fix} max = [mm]	1500											

Internal threaded anchor RG MI						
Size of anchor		**M8**	**M10**	**M12**	**M16**	**M20**
Nominal drill hole diameter	d_0 =[mm]	14	18	20	24	32
Cutting diameter of drill bit	d_{cut}= [mm]	14,5	18,5	20,55	24,55	32,7
Depth of drill hole	h_0= [mm]	90	90	125	160	200
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	9	12	14	18	22
Diameter of steel brush	d_b= [mm]	16	20	21,5	26	40
Torque moment	T_{inst}= [Nm]	10	20	40	60	120
Min. screw-in depth	[mm]	12	15	18	24	30
Max. screw-in depth	[mm]	18	23	26	35	45

Steel brush



fischer Resin anchor R	**Annex 4** of European Technical Approval ETA-08/0010
Curing times Installation parameters	

Table 5: Minimum distance and minimum member thickness

fischer- anchor rod						
Anchor size		**M8**	**M10**	**M12**	**M12 E**	**M16**	**M16E**
effective anchorage depth	h_{ef} [mm]	80	90	110	150	125	190
minimum thickness of concrete member	h_{min} [mm]	110	120	150	200	160	250
minimum edge distance and spacing	min s = min c [mm]	40	45	55	75	65	95
Anchor size		**M20**	**M20E**	**M24**	**M24E**	**M27**	**M30**
effective anchorage depth	h_{ef} [mm]	170	240	210	290	250	280
minimum thickness of concrete member	h_{min} [mm]	220	300	280	380	330	370
minimum edge distance and spacing	min s = min c [mm]	85	120	105	145	125	140

Internal threaded anchor RG MI						
Anchor size		**M8**	**M10**	**M12**	**M16**	**M20**
effective anchorage depth	h_{ef} [mm]	90	90	125	160	200
minimum thickness of concrete member	h_{min} [mm]	120	120	170	220	270
minimum edge distance and spacing	min s = min c [mm]	45	45	60	80	100

Table 6: Characteristic value of resistance to tension load for fischer- anchor rod Design of Bonded Anchors acc. to TR 029 **(Standard cleaning process)**

Steel failure																
Anchor size			**M8**	**M10**	**M12**	**M12 E**	**M16**	**M16 E**	**M20**	**M20 E**	**M24**	**M24 E**	**M27**	**M30**
Characteristic resistance	$N_{Rk,s}$	property class 5.8 [kN]	19	30	44		82		127		183		239	292
		property class 8.8 [kN]	29	46	67		126		196		282		367	449
		property class 10.9 [kN]	37	58	84		157		245		353		459	561
		A4 [kN]	26	41	59		110		172		247		322	393
		C [kN]	26	41	59		110		172		247		322	393
Partial safety factor	γ_{Ms} [1]	property class 5.8 [-]	1.49											
		property class 8.8 [-]	1.50											
		property class 10.9 [-]	1.40											
		A4 [-]	1.87											
		C [-]	1.50											
Combined pull- out and concrete cone failure														
Diameter for calculation		d [mm]	8	10	12		16		20		24		27	30
Effective anchorage depth		h_{ef} [mm]	80	90	110	150	125	190	170	240	210	290	250	280
Temperature range I (-40°C/+80°C) use category I and II														
Characteristic bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$	[N/mm²]	8	7.5			6.5							6.5[3]
Temperature range II (-40°C/+120°C) use category I and II														
Characteristic bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$	[N/mm²]	6	7			6							6[3]
Increasing factors for non-cracked concrete	Ψ_c	C25/30 [-]	1.06											
		C30/37 [-]	1.14											
		C35/45 [-]	1.22											
		C40/50 [-]	1.27											
		C45/55 [-]	1.31											
		C50/60 [-]	1.35											
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1]	[-]	1.80[2]											

[1] In absence of other national regulations.
[2] The partial safety factor $\gamma_2 = 1.2$ is included.
[3] Only use category I.

Spacing and edge distance must be calculated according to TR 029, equation (5.2c) and (5.3d).

Spacing $$s_{cr,Np} = 20 \cdot d \left(\frac{\tau_{Rk,ucr}}{7,5} \right)^{0,5} \leq 3 \cdot h_{ef} \quad [mm]$$

Edge distance $$c_{cr,Np} = \frac{s_{cr,Np}}{2} \quad [mm]$$

fischer Resin anchor R	**Annex 6** of European Technical Approval ETA-08/0010
Characteristic value to tension load fischer- anchor rod (Standard cleaning process) Spacing and edge distance	

Table 7: Characteristic value of resistance to tension load for fischer- anchor rod Design of Bonded Anchors acc. to TR 029 **(Premium cleaning process)**

Steel failure																		
Anchor size			**M8**	**M10**	**M12**		**M12 E**	**M16**		**M16 E**	**M20**		**M20 E**	**M24**		**M24 E**	**M27**	**M30**
Characteristic resistance	$N_{Rk,s}$ property class	5.8 [kN]	19	30	44			82			127			183			239	292
		8.8 [kN]	29	46	67			126			196			282			367	449
		10.9 [kN]	37	58	84			157			245			353			459	561
		A4/C [kN]	26	41	59			110			172			246			322	393
Partial safety factor	γ_{Ms} [1] property class	5.8 [-]	1,49															
		8.8 [-]	1,50															
		10.9 [-]	1,40															
		A4/C [-]	1,87/ 1,50															
Combined pullout and concrete failure																		
Diameter for calculation	d [mm]		8	10	12			16			20			24			27	30
Effective anchorage depth	h_{ef} [mm]		80	90	110		150	125		190	170		240	210		290	250	280
Temperature range I (-40°C/+80°C) **Use category I**																		
Charact. bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$ [N/mm²]		11,0		10,0			9,5			9,0			8,5				8,0
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1] [-]		1,80[2]		1,50[3]													
Temperature range I (-40°C/+80°C) **Use category II**																		
Charact. bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$ [N/mm²]		9.0		10.0						9.5			9.0				8.5
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1] [-]		2.10[4]															
Temperature range II (-40°C/+120°C) **Use category I**																		
Charact. bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$ [N/mm²]		10	9.5	8			7.5			7			6.5				
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1] [-]		1,80[2]		1.50[3]													
Temperature range II (-40°C/+120°C) **Use category II**																		
Charact. bond resistance in non-cracked concrete C20/25	$\tau_{Rk,ucr}$ [N/mm²]		8.0		9.0						8.5			8.0				7.5
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1] [-]		2.10[4]															
Increasing factors for non-cracked concrete	ψ_c	C25/30 [-]	1.06															
		C30/37 [-]	1.14															
		C35/45 [-]	1.22															
		C40/50 [-]	1.27															
		C50/55 [-]	1.31															
		C50/60 [-]	1.35															

[1] In absence of other national regulations.
[2] The partial safety factor $\gamma_2 = 1.2$ is included.
[3] The partial safety factor $\gamma_2 = 1.0$ is included.
[4] The partial safety factor $\gamma_2 = 1.4$ is included.

Spacing and edge distance must be calculated according to TR 029, equation (5.2c) and (5.3d).

Spacing $$s_{cr,Np} = 20 \cdot d \left(\frac{\tau_{Rk,ucr}}{7,5} \right)^{0,5} \leq 3 \cdot h_{ef} \quad [mm]$$

Edge distance $$c_{cr,Np} = \frac{s_{cr,Np}}{2} \quad [mm]$$

fischer Resin anchor R	**Annex 7** of European Technical Approval **ETA-08/0010**
Characteristic value to tension load fischer- anchor rod (Premium cleaning process) Spacing and edge distance	

Table 8: Characteristic value of splitting failure (anchor rods)
Design of Bonded Anchors acc. to TR 029

Anchor size	M8	M10	M12	M12E	M16	M16E	M20	M20E	M24	M24E	M27	M30
h_{ef} [mm]	80	90	110	150	125	190	170	240	210	290	250	280
h_{min} [1)3)] [mm]	110	120	150	200	160	250	220	300	280	380	330	370
$c_{cr,sp}$ [mm]	175	210	240	280	290	360	370	460	430	520	480	540
$s_{cr,sp}$ [mm]	350	420	480	560	580	720	740	920	860	1040	960	1080
h [2)] [mm]	160	180	220	300	250	380	340	480	420	580	500	560
$c_{cr,sp}$ [mm]	140	160	190	230		290		350		410	380	430
$s_{cr,sp}$ [mm]	280	320	380	460		580		700		820	760	860

[1] $h_{min} = h_{ef} + \Delta h \geq 100mm$; $\Delta h \geq \max\{2d_0; 30mm\}$

[2] $h \geq 2h_{ef}$

[3] For member thickness $h_{min} \geq h = 2h_{ef}$ the characteristic edge distances can be derived by linear interpolation.

Table 9: Characteristic value of resistance to shear load (anchor rods)
Design of Bonded Anchors, acc. to TR 029

Anchor size			M8	M10	M12	M12 E	M16	M16 E	M20	M20 E	M24	M24 E	M27	M30
Effective anchorage depth	h_{ef}	[mm]	80	90	110	150	125	190	170	240	210	290	250	280
Steel failure without lever arm														
Characteristic resistance	$V_{Rk,s}$ property class 5.8	[kN]	7.4	13.3	19.3		35.9		56.0		80.7		105.1	128.3
	8.8	[kN]	11.4	20.4	29.7		55.2		86.2		124.1		161.7	197.3
	10.9	[kN]	14.3	25.5	37.1		68.9		107.7		155.1		202.1	246.7
	A4/C	[kN]	12.8	20.3	29.5		54.8		85.7		123.4		160.8	196.2
Partial safety factor	γ_{Ms} [1] property class 5.8	[-]	1.25											
	8.8	[-]	1.25											
	10.9	[-]	1.50											
	A4	[-]	1.56											
	C	[-]	1.25											
Steel failure with lever arm														
Charc-teristic resistance	$M^0_{Rk,s}$ property class 5.8	[Nm]	19.5	38.9	68.1		172.6		337.1		582.5		866.6	1168.3
	8.8	[Nm]	30.0	59.8	104.7		265.5		518.6		896.1		1333.2	1797.4
	10.9	[Nm]	37.5	74.8	130.9		331.9		648.3		1120.1		1666.6	2246.7
	A4/C	[Nm]	26.2	52.3	91.6		232.4		453.8		784.1		1166.6	1572.7
Partial safety factor	γ_{Ms} [1] property class 5.8	[-]	1.25											
	8.8	[-]	1.25											
	10.9	[-]	1.50											
	A4	[-]	1.56											
	C	[-]	1.25											
Concrete pryout														
Factor in Equation (5.7) of TR 029, section 5.2.3.3	k	[-]	2.0											
Partial safety factor	γ_{Mcp} [1]	[-]	1.5 [2]											
Concrete edge failure														
Effective length of anchor in shear load	l_f	[mm]	80	90	110	150	125	190	170	240	210	290	250	280
Eff. diameter of anchor	d_{nom}	[mm]	8	10	12		16		20		24		27	30
Partial safety factor	$\gamma_{Mcp} = \gamma_{Mc}$ [1]	[-]	1.5 [2]											

[1] In absence of other national regulations

[2] The partial safety factor $\gamma_2 = 1.0$ is included

Table 10: Characteristic values of resistance to tension load and splitting failure (internal threaded anchor). Design of bonded Anchor acc. to TR 029. (Premium Cleaning Process)

Anchor size				M8	M10	M12	M16	M20
Effective anchorage depth			h_{ef} [mm]	90	90	125	160	200
Steel failure								
Characteristic resistance	$N_{Rk,s}$	property class 5.8	[kN]	19	30	44	82	127
		8.8	[kN]	29	46	68	109	182
		A4	[kN]	26	41	59	110	171
		C	[kN]	26	41	59	110	171
Partial safety factor	γ_{Ms} [1]	property class 5.8	[-]	1.49				
		8.8	[-]	1.50				
		A4	[-]	1.87				
		C	[-]	1.50				
Combined Pullout and concrete con failure								
Temperature range I (-40°C/+80°C)	**Use category I**							
Characteristic resistance		$N_{Rk,p}$	[kN]	30	35	50	75	115
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	1,5[2]				
Edge distance		$c_{cr,Np}$	[mm]	145	195	210	250	305
Spacing		$s_{cr,Np}$	[mm]	290	390	420	500	610
Temperature range I (-40°C/+80°C)	**Use category II**							
Characteristic resistance		$N_{Rk,p}$	[kN]	30	40	50	75	115
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	2.1[3]				
Edge distance		$c_{cr,Np}$	[mm]	145	195	210	250	305
Spacing		$s_{cr,Np}$	[mm]	290	390	420	500	610
Temperature range II (-40°C/+120°C)	**Use category I**							
Characteristic resistance		$N_{Rk,p}$	[kN]	20	30	40	60	95
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	1.5[2]				
Edge distance		$c_{cr,Np}$	[mm]	130	165	180	220	265
Spacing		$s_{cr,Np}$	[mm]	260	330	360	440	530
Temperature range II (-40°C/+120°C)	**Use category II**							
Characteristic resistance		$N_{Rk,p}$	[kN]	25	35	50	60	115
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	2.1[3]				
Edge distance		$c_{cr,Np}$	[mm]	145	185	200	235	295
Spacing		$s_{cr,Np}$	[mm]	290	370	400	470	590
Splitting failure								
Minimum member thickness		h_{min}	[mm]	120	120	170	220	270
		$s_{cr,sp}$	[mm]	360	380	440	480	660
		$c_{cr,sp}$	[mm]	180	190	220	240	330
Minimum spacing		h_{min}	[mm]	≥ $2h_{ef}$				
		$s_{cr,sp}$	[mm]	280	300	360	380	500
		$c_{cr,sp}$	[mm]	140	150	180	190	250
Increasing factors for non-cracked concrete	Ψ_c	C25/30	[-]	1.06				
		C30/37	[-]	1.14				
		C35/45	[-]	1.22				
		C40/50	[-]	1.27				
		C45/55	[-]	1.31				
		C50/60	[-]	1.35				

[1] In absence of other national regulations.

[2] The partial safety factor $\gamma_2 = 1.0$ is included.

[3] The partial safety factor $\gamma_2 = 1.4$ is included.

Table 11: Characteristic values of resistance to shear loads for internal threaded anchor. Design of Bonded Anchor acc. to TR 029.

Anchor size				**M8**	**M10**	**M12**	**M16**	**M20**
Effective anchorage depth	h_{ef}		[mm]	90	90	125	160	200
Steel failure without lever arm RG MI property class 5.8								
Characteristic resistance	$V_{Rk,s}$	property class (screw)	5.8 [kN]	9.3	14.8	21.5	39.9	62.4
			8.8 [kN]	14.3	22.7	33.0	61.4	96.0
Partial safety factor	γ_{Ms} [1]	property class (screw)	5.8 [-]	1.25				
			8.8 [-]	1.25				
Steel failure without lever arm RG MI A4/ C								
Characteristic resistance	$V_{Rk,s}$		A4 [kN]	12.8	20.3	29.5	54.8	85.7
			C [kN]	12.8	20.3	29.5	54.8	85.7
Partial safety factor	γ_{Ms} [1]		A4 [-]	1.56				
			C [-]	1.25				
Steel failure with lever arm RG MI property class 5.8								
Characteristic resistance	$M_{Rk,s}$	property class (screw)	5.8 [Nm]	19.5	38.9	68.1	172.6	337.1
			8.8 [Nm]	30.0	59.8	104.7	265.5	518.6
Partial safety factor	γ_{Ms} [1]	property class (screw)	5.8 [-]	1.25				
			8.8 [-]	1.25				
Steel failure with lever arm RG MI A4/ C								
Characteristic resistance	$M_{Rk,s}$		A4 [Nm]	26.2	52.3	91.6	232.4	453.8
			C [Nm]	26.2	52.3	91.6	232.4	453.8
Partial safety factor	γ_{Ms} [1]		A4 [-]	1.56				
			C [-]	1.25				
Concrete pryout								
Factor in Equation (5.7) of TR 029, section 5.2.3.3	k [-]			2.0				
Partial safety factor	γ_{Mc} [1] [-]			1.5[2]				
Concrete edge distance								
Effective length of anchor	l_f [mm]			90	90	125	160	200
Effective diameter of anchor	d [mm]			12.5	16.5	18.5	22.5	28.5
Partial safety factor	γ_{Mc} [1] [-]			1.5[2]				

[1] In absence of other national regulations.

[2] The partial safety factor γ_2 = 1.0 is included.

Table 12: Displacement of fischer- anchor rods to tension load

Anchor size		M8	M10	M12	M12 E	M16	M16 E	M20	M20 E	M24	M24 E	M27	M30
Tension load in non-cracked concrete	N [kN]	10.5	14.8	19.7	26.9	29.9	45.5	48.3	68.2	67.9	93.7	90.9	106.8
Displacement	δ_{N0} [mm]	0.20					0.30						0.50
Displacement	$\delta_{N\infty}$ [mm]	0.50					0.75						1.25

Table 13: Displacement of fischer- anchor rods to shear load

Anchor size		M8	M10	M12	M12 E	M16	M16 E	M20	M20 E	M24	M24 E	M27	M30
Shear load in non-cracked concrete Property class 5	V [kN]	4.2	7.6	11		20.5		32		46.1		60.1	73.3
Displacement	δ_{v0} [mm]	1.9		2.0						2.4		2.5	2.6
Displacement	$\delta_{v\infty}$ [mm]	2.9		3.0						3.6		3.8	3.9
Shear load in non-cracked concrete Property class 8	V [kN]	6.5	11.7	17		31.5		49.3		70.9		92.4	112.7
Displacement	δ_{v0} [mm]	2.5		2.6						3.2		3.3	3.4
Displacement	$\delta_{v\infty}$ [mm]	3.8		3.9						4.8		5.0	5.1
Shear load in non-cracked concrete Property class 10	V [kN]	6.8	12.1	17.7		32.8		51.3		73.9		96.2	117.5
Displacement	δ_{v0} [mm]	1.9		2.0						2.4		2.5	2.6
Displacement	$\delta_{v\infty}$ [mm]	2.9		3.0						3.6		3.8	3.9
Shear load in non-cracked concrete A4	V [kN]	5.9	9.3	13.5		25.1		39.2		56.5		73.6	89.8
Displacement	δ_{v0} [mm]	2.3		2.4						2.9		3.0	3.1
Displacement	$\delta_{v\infty}$ [mm]	3.4		3.6						4.3		4.5	4.7
Shear load in non-cracked concrete C	V [kN]	7.3	11.6	16.9		31.3		49		70.5		91.9	112.1
Displacement	δ_{v0} [mm]	2.8		3.0						3.6		3.7	3.9
Displacement	$\delta_{v\infty}$ [mm]	4.3		4.5						5.4		5.6	5.8

Table 14 : Displacement of internal threaded anchors to tension load

Anchor size		M8	M10	M12	M16	M20
Tension load in non-cracked concrete	N [kN]	14.0	18.5	28.3	36.4	58.0
Displacement	δ_{N0} [mm]	0.2	0.30			
Displacement	$\delta_{N\infty}$ [mm]	0.5	0.75			

Table 15 : Displacement of internal threaded anchors to shear load

Anchor size		M8	M10	M12	M16	M20
Shear load in non-cracked concrete Property class 5	V [kN]	5.3	8.5	12.3	22.8	35.7
Displacement	δ_{v0} [mm]	2.4		2.2		
Displacement	$\delta_{v\infty}$ [mm]	3.6		3.3		
Shear load in non-cracked concrete Property class 8	V [kN]	8.2	13	18.9	35.1	51
Displacement	δ_{v0} [mm]	3.1	3.7	2.8		
Displacement	$\delta_{v\infty}$ [mm]	4.7		4.3		
Shear load in non-cracked concrete A4	V [kN]	5.9	9.3	13.5	25.1	39.2
Displacement	δ_{v0} [mm]	2.3			2.4	
Displacement	$\delta_{v\infty}$ [mm]	3.4			3.6	
Shear load in non-cracked concrete C	V [kN]	7.3	11.6	16.9	31.3	49
Displacement	δ_{v0} [mm]	2.8		3.0		
Displacement	$\delta_{v\infty}$ [mm]	4.3		4.5		