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European Technical Assessment ETA-01/0014 of 29/05/2017

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial *Trade name*	**FM753**
Famille de produit *Product family*	**Cheville métallique en acier galvanisé, à expansion par vissage à couple contrôlé, de fixation dans le béton non fissuré :** **diamètres M6, M8, M10, M12, M14 et M16** ***Torque-controlled expansion anchor, made of stainless steel, for use in uncracked concrete:*** ***sizes M6, M8, M10, M12, M14 and M16***
Titulaire *Manufacturer*	FRIULSIDER Via Trieste,1 I 33048 San Giovanni al Natisone (UDINE) ITALIE
Usine de fabrication *Manufacturing plants*	FRIULSIDER Via Trieste,1 I 33048 San Giovanni al Natisone (UDINE) ITALIE
Cette evaluation contient: *This Assessment contains*	13 pages incluant 10 annexes qui font partie intégrante de cette évaluation 13 *pages including 10 annexes which form an integral part of this assessment*
Base de l'ETE *Basis of ETA*	DEE 330232-00-0601 octobre 2016 EAD 330232-00-0601 October 2016
Cette evaluation remplace: *This Assessment replaces*	ATE 01/0014 du 29/01/2015 *ETA-01/0014 dated 29/01/2015*

Specific Part

1 Technical description of the product

The FRIULSIDER FM 753 anchor in the range of M6 to M16 is an anchor made of galvanised steel, which is placed into a drilled hole and anchored by torque-controlled expansion.

The illustration and the description of the product are given in Annexes A.

2 Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes B.

The provisions made in this European technical assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic tension resistance acc. ETAG001, Annex C	See Annex C1
Characteristic shear resistance acc. ETAG001, Annex C	See Annex C2
Characteristic tension resistance acc. CEN/TS 1992-4	See Annex C3
Characteristic shear resistance acc. CEN/TS 1992-4	See Annex C4
Displacements	See Annex C5

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European technical approval, there may be 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.

3.4 Safety in use (BWR 4)

For Basic requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources ((BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission[1], as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete.	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units.	—	1

5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

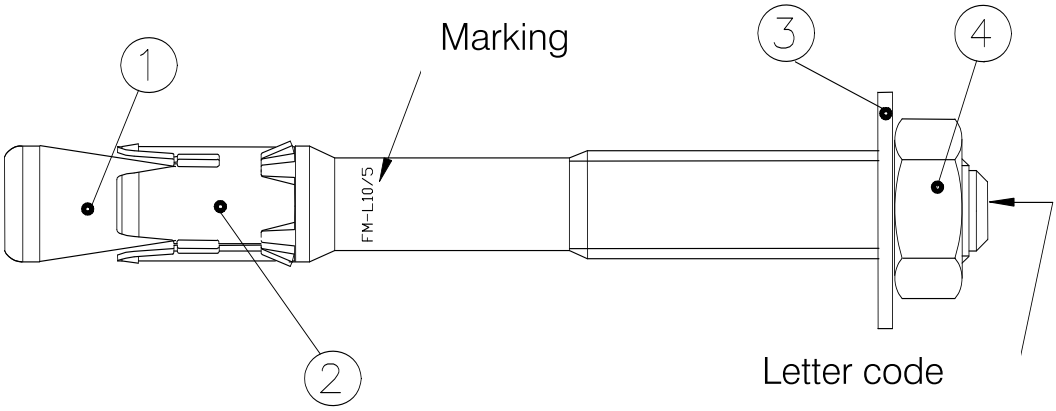
The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

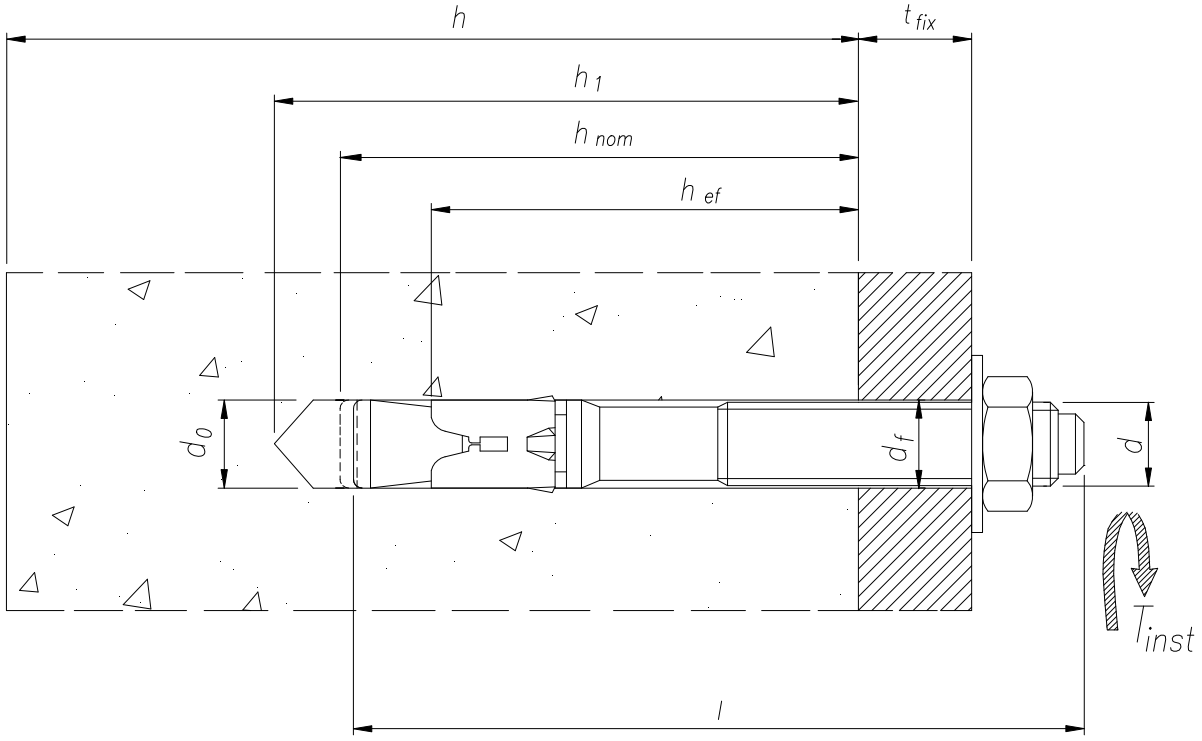
The original French version is signed by

Charles Baloche
Technical Director

1 Official Journal of the European Communities L 254 of 08.10.1996

Schemas of the assembled anchor and of the anchor in use:





h_{ef} : effective embedment depth
h_{nom} : embedment depth
h_1 : drilling hole depth
t_{fix} : fixture thickness

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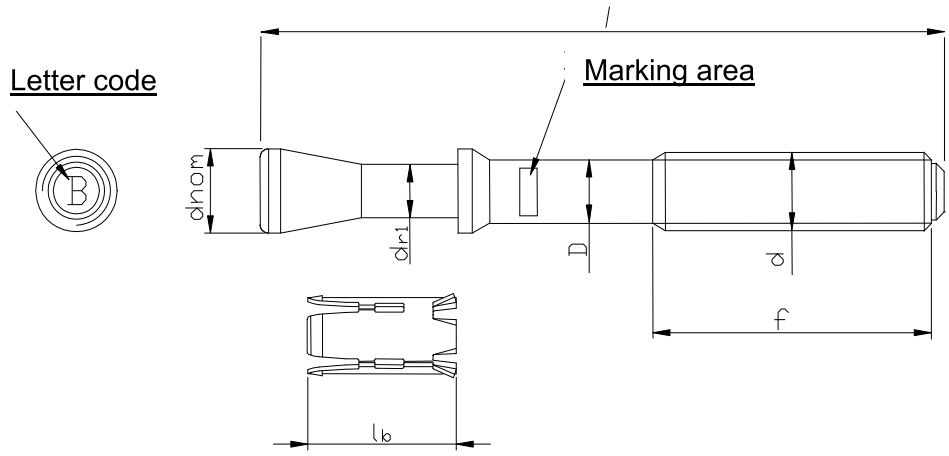
Product description Assembled and in-use anchor	**Annex A1**

Assembled anchor: bolt and expansion sleeve



Marking on the bolt:

FM L_{thr} X/Y

with L_{thr} = S (small) or L (long), length of the threaded part

X = thread diameter (d)

and Y = fixture thickness (t_{fix})

e.g. FM-L 12/10 (size M12x100; long threaded=55 mm)

A letter code corresponding to the total length of the bolt is punched on the head of the bolt.

Table 1: Materials

Part	Designation	Material	Protection
1	Bolt	**M6, M8, M10** : 19MnB4 EN 10269,cold formed **M12, M14, M16** : C30 B KD Euronorm 119-74, cold formed	ISO 4042 Galvanised (≥ 5 µm)
2	Sleeve	**M6 to M12** : EN 10132-4, cold formed **M14 and M16** : EN 10130, cold formed	ISO 2081 Galvanised (≥ 5 µm)
3	Washer	DIN 125/1	
4	Hexagonal nut	EN 24032, steel grade 8	ISO 4042 Galvanised (≥ 5 µm)

Table 2: Anchor dimensions

	Anchor size	Marking	L [mm]	t_{fix} [mm]	f [mm]	d_{r1} [mm]	d_{nom} [mm]	l_{bague} [mm]	Letter code
M6	M6x65	FM-S 6/15	65	15	18	4,2	6	10,2	B
	M6x65	FM-L 6/15	65	15	38				B
	M6x85	FM-S 6/35	85	35	18				C
	M6x85	FM-L 6/35	85	35	58				C
	M6x100	FM-L 6/50	100	50	58				D
M8	M8x65	FM-L 8/7	65	7	35	5,8	8	11,5	B
	M8x75	FM-S 8/15	75	15	35				C
	M8x75	FM-L 8/15	75	15	45				C
	M8x90	FM-S 8/30	90	30	35				D
	M8x90	FM-L 8/30	90	30	60				D
	M8x115	FM-S 8/55	115	55	40				E
	M8x115	FM-L 8/55	115	55	80				E
	M8x135	FM-S 8/75	135	75	40				F
	M8x135	FM-L 8/75	135	75	85				F
	M8x165	FM-L 8/105	165	105	85				G
M10	M10x75	FM-S 10/5	78	5	78	7,4	10	14,0	B
	M10x90	FM-S 10/20	90	20	40				C
	M10x90	FM-L 10/20	90	20	52				C
	M10x100	FM-S 10/30	100	30	62				I
	M10x120	FM-S 10/50	120	50	10				D
	M10x120	FM-L 10/50	120	50	82				D
	M10x145	FM-L 10/70	145	70	82				E
	M10x170	FM-L 10/100	173	100	82				F
M12	M12x100	FM-S 12/10	100	10	45	8,8	12	17	B
	M12x100	FM-L 12/10	100	10	55				B
	M12x110	FM-S 12/20	110	20	45				C
	M12x110	FM-L 12/20	110	20	65				C
	M12x120	FM-L 12/30	120	30	65				I
	M12x135	FM-S 12/45	135	45	50				D
	M12x135	FM-L 12/45	135	45	90				D
	M12x160	FM-S 12/70	160	70	90				E
	M12x185	FM-S 12/100	188	100	90				F
M14	M14x100	FM-L 14/3	103	3	50	10,6	14	19,5	A
	M14x110	FM-L 14/10	110	10	60				B
	M14x130	FM-L 14/30	130	30	65				C
	M14x150	FM-L 14/50	150	50	90				D
	M14x170	FM-L 14/70	170	70	90				E
	M14x200	FM-L 14/100	200	100	90				F
M16	M16x125	FM-S 16/10	125	10	65	12,6	16	23	A
	M16x145	FM-S 16/30	145	30	85				B
	M16x175	FM-S 16/60	175	60	85				C
	M16x215	FM-S 16/100	215	100	85				D

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads.

Base materials:

- Non-cracked concrete.
- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at least to C50/60 at most according to EN 206: 2000-12.

Use conditions (Environmental conditions):

- Structures subject to dry indoor conditions, indoor with temporary condensation.

Design:

- The anchorages are designed in accordance with the ETAG001 Annex C “Design Method for Anchorages” or CEN/TS 1992-4-4 " Design of fastenings for use in concrete” 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.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer’s specifications and drawings and using the appropriate tools.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of specified torque moment using a calibrated torque wrench.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

Table 3: Installation data

	Anchor type	L (0)	Letter code	d_{cut} (1)	d_f (2)	T_{inst} (3)	h_{min} (4)	h_1 (5)	h_{nom} (6)	h_{ef} (7)	$t_{fix,max}$ (8)	s_{min} (9)	c_{min} (10)
		[mm]	marking	[mm]	[mm]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	M6x65 *	65	B	6	7	6	100	50	41	35 *	15	50	50
	M6x85 *	85	C								35		
	M6x100 *	100	D								50		
M8	M8x65	65	B	8	9	15	100	60	48	40	7	60	60
	M8x75	75	C								15		
	M8x90	90	D								30		
	M8x115	115	E								55		
	M8x135	135	F								75		
	M8x165	165	G								105		
M10	M10x75	75	B	10	12	25	100	70	59	50	5	75	75
	M10x90	90	C								20		
	M10x100	100	I								30		
	M10x120	120	D								50		
	M10x145	145	E								75		
	M10x170	170	F								100		
M12	M12x100	100	B	12	14	50	120	85	71	60	10	90	90
	M12x110	110	C								20		
	M12x120	120	I								30		
	M12x135	135	D								45		
	M12x160	160	E								70		
	M12x185	185	F								100		
M14	M14x100	100	A	14	16	70	140	95	80	70	3	105	105
	M14x110	110	B								10		
	M14x130	130	C								30		
	M14x150	150	D								50		
	M14x170	170	E								70		
	M14x200	200	F								100		
M16	M16x125	125	A	16	18	100	170	115	96	85	10	130	130
	M16x145	145	B								30		
	M16x175	175	C								60		
	M16x215	215	D								100		

* use restricted to anchoring of structural components statically indeterminated.

(0) Total length of the bolt (mm)
(1) Nominal diameter of drill bit, d_{cut} (mm)
(2) Diameter of clearance hole in the fixture, d_f (mm)
(3) Required torque moment, T_{inst} (Nm)
(4) Minimum thickness of concrete member, h_{min} (mm)
(5) Depth of drilled hole to deepest point, h_1 (mm)
(6) Minimum installation depth, h_{nom} (mm)
(7) Effective anchorage depth, h_{ef} (mm)
(8) Maximum thickness of the fixture, $t_{fix,maxi}$ (mm)
(9) Minimum spacing (mm)
(10) Minimum edge distance (mm)

FM753 torque-controlled expansion anchor

Intended Use
Installation parameters

Annex B2

Table 4: Characteristic values for tension loads in case of static and quasi static loading for design method A acc. ETAG001, Annex C

				M6 *	M8	M10	M12	M14	M16
Steel failure									
Characteristic resistance		$N_{Rk,s}$	[kN]	10,9*	17,2	28,0	31,6	51,2	72,3
Partial safety factor		γ_{Ms} 1)	[-]	1,48*	1,40	1,40	1,40	1,48	1,48
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$									
Characteristic resistance in non-cracked concrete C20/25		$N^0_{Rk,p}$	[kN]	**6***	**9**	**12**	**20**	**25**	**35**
Partial safety factor for non-cracked concrete		γ_{Mp} 1)	[-]	1,8 2)			1,5 3)		
Increasing factor for N_{RK} in concrete	C30/37	Ψ_c	[-]	1,17			1,22		
	C40/50		[-]	1,32			1,41		
	C50/60		[-]	1,42			1,55		
Concrete cone failure and splitting failure									
Effective embedment depth		h_{ef}	[mm]	35*	40	50	60	70	85
Partial safety factor for non-cracked concrete		$\gamma_{Mc} = \gamma_{Msp}$ 1)	[-]	1,8 2)			1,5 3)		
Increasing factor for N_{RK} in concrete	C30/37	Ψ_c	[-]	1,17			1,22		
	C40/50		[-]	1,32			1,41		
	C50/60		[-]	1,42			1,55		
Char. spacing	concrete cone	$s_{cr,N}$	[mm]	105*	120	150	180	210	255
	splitting	$s_{cr,sp}$	[mm]	210*	240	300	360	420	510
Char. edge distance	concrete cone	$c_{cr,N}$	[mm]	53*	60	75	90	105	130
	splitting	$c_{cr,sp}$	[mm]	105*	120	150	180	210	255

* Use restricted to anchoring of structural components statically indeterminated.

1) In absence of other national regulations

2) The value contains an installation safety factor $\gamma_2 = 1.2$

3) The value contains an installation safety factor $\gamma_2 = 1.0$

FM753 torque-controlled expansion anchor

Annex C1

Design according to ETAG001, Annex C

Characteristic resistance under tension loads

Table 5: Characteristic values for shear loads in case of static and quasi static loading for design method A acc. ETAG001, Annex C

			M6	M8	M10	M12	M14	M16
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	6,0	9,1	14,8	18,4	32,1	42,3
Partial safety factor	γ_{Ms} 1)	[-]	1,5					
Steel failure with lever arm								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	24	49	68	121	193
Partial safety factor	γ_{Ms} 1)	[-]	1,5					
Concrete pry-out failure								
Factor in equation (5.6) of ETAG001, Annex C, § 5.2.3.3	k	[-]	1,0			2,0		
Partial safety factor	γ_{Mc} 1)	[-]	1,5 2)					
Concrete edge failure								
Effective length of anchor under shear loading	l_f	[mm]	25	28	36	43	50	62
Outside diameter of anchor	d_{nom}	[mm]	6	8	10	12	14	16
Partial safety factor	γ_{Mc} 1)	[-]	1,5 2)					

1) In absence of other national regulations

2) The value contains an installation safety factor $\gamma_2 = 1.0$

FM753 torque-controlled expansion anchor

Annex C2

Design according to ETAG001, Annex C

Characteristic resistance under shear loads

Table 6: Characteristic values for tension loads in case of static and quasi static loading for design method A acc. CEN/TS 1992-4

				M6 *	M8	M10	M12	M14	M16
Steel failure									
Characteristic resistance		$N_{Rk,s}$	[kN]	10,9*	17,2	28,0	31,6	51,2	72,3
Partial safety factor		γ_{Ms} [1)]	[-]	1,48*	1,40	1,40	1,40	1,48	1,48
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$									
Characteristic resistance in non-cracked concrete C20/25		$N^0_{Rk,p}$	[kN]	**6***	**9**	**12**	**20**	**25**	**35**
Partial safety factor for non-cracked concrete		γ_{Mp} [1)]	[-]	1,8 [2)]			1,5 [3)]		
Increasing factor for N_{RK} in concrete	C30/37	Ψ_c	[-]	1,17			1,22		
	C40/50		[-]	1,32			1,41		
	C50/60		[-]	1,42			1,55		
Concrete cone failure and splitting failure									
Effective embedment depth		h_{ef}	[mm]	35*	40	50	60	70	85
Factor for non cracked concrete		k_{ucr}	[-]	10,1					
Partial safety factor for non-cracked concrete		$\gamma_{Mc} = \gamma_{Msp}$ [1)]	[-]	1,8 [2)]			1,5 [3)]		
Increasing factor for N_{RK} in concrete	C30/37	Ψ_c	[-]	1,17			1,22		
	C40/50		[-]	1,32			1,41		
	C50/60		[-]	1,42			1,55		
Char. spacing	concrete cone	$s_{cr,N}$	[mm]	105*	120	150	180	210	255
	splitting	$s_{cr,sp}$	[mm]	210*	240	300	360	420	510
Char. edge distance	concrete cone	$c_{cr,N}$	[mm]	53*	60	75	90	105	130
	splitting	$c_{cr,sp}$	[mm]	105*	120	150	180	210	255

* Use restricted to anchoring of structural components statically indeterminated.

[1)] In absence of other national regulations

[2)] The value contains an installation safety factor $\gamma_2 = 1.2$

[3)] The value contains an installation safety factor $\gamma_2 = 1.0$

FM753 torque-controlled expansion anchor

Annex C3

Design according to CEN/TS 1992-4

Characteristic resistance under tension loads

Table 7: Characteristic values for shear loads in case of static and quasi static loading for design method A acc. CEN/TS 1992-4

			M6	M8	M10	M12	M14	M16
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	6,0	9,1	14,8	18,4	32,1	42,3
Factor considering ductility	k_2	[-]	0,8					
Partial safety factor	γ_{Ms} 1)	[-]	1,5					
Steel failure with lever arm								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	24	49	68	121	193
Partial safety factor	γ_{Ms} 1)	[-]	1,5					
Concrete pry-out failure								
Factor in equation (16) of CEN TS 1992-4-4, § 6.2.2.3	k_3	[-]	1,0			2,0		
Partial safety factor	γ_{Mc} 1)	[-]	1,5 2)					
Concrete edge failure								
Effective length of anchor under shear loading	l_f	[mm]	25	28	36	43	50	62
Outside diameter of anchor	d_{nom}	[mm]	6	8	10	12	14	16
Partial safety factor	γ_{Mc} 1)	[-]	1,5 2)					

1) In absence of other national regulations

2) The value contains an installation safety factor $\gamma_2 = 1.0$

Table 8: Displacements under tension loading

			M6	M8	M10	M12	M14	M16
Tension load in non-cracked concrete C20/25 to C50/60		**[kN]**	**2,4**	**3,6**	**4,8**	**9,5**	**11,9**	**16,7**
Displacement	δ_{V0}	[mm]	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{V\infty}$	[mm]	1,6	1,6	1,6	1,6	1,6	1,6

Table 9: Displacements under shear loading

			M6	M8	M10	M12	M14	M16
Shear load in non-cracked concrete C20/25 to C50/60		**[kN]**	**2,9**	**4,3**	**7,0**	**8,8**	**15,3**	**20,1**
Displacement	δ_{V0}	[mm]	0,8 (+0,7)	0,8 (+0,7)	0,9 (+1,2)	1,0 (+1,2)	1,2 (+1,2)	1,2 (+1,2)
	$\delta_{V\infty}$	[mm]	1,2 (+0,7)	1,3 (+0,7)	1,4 (+1,2)	1,5 (+1,2)	1,8 (+1,2)	1,8 (+1,2)

* Displacement : the table shows the deformation to be expected from the anchor itself, whilst the bracket value indicates the movement between the anchor body and the hole drilled in the concrete member or the hole in the fixture.

Additional displacement due to annular gap between anchor and fixture is to be taken into account.