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**European Technical
Assessment**

**ETA-01/0009
of 29/01/2015**

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial
Trade name

FM753 A4

Famille de produit
Product family

Cheville métallique en acier inoxydable, à expansion par vissage à couple contrôlé, de fixation dans le béton non fissuré :

diamètres M8, M10, M12 et M16

Torque-controlled expansion anchor, made of stainless steel, for use in uncracked concrete:

sizes M8, M10, M12 and M16

Titulaire
Manufacturer

FRIULSIDER
Via Trieste,1
I 33048 San Giovanni al Natisone (UDINE)
ITALIE

Usine de fabrication
Manufacturing plants

Plant 1

Cette évaluation contient:
This Assessment contains

12 pages incluant 9 annexes qui font partie intégrante de cette évaluation
12 pages including 9 annexes which form an integral part of this assessment

Base de l'ETE
Basis of ETA

ETAG 001, Version April 2013, utilisée en tant que EAD
ETAG 001, Edition April 2013 used as EAD

Cette évaluation remplace:
This Assessment replaces

ATE 01/0009 valide du 18/10/2011 au 18/10/2016
ETA-01/0009 with validity from 18/10/2011 to 18/10/2016

Specific Part

1 Technical description of the product

The FM753 A4 anchor is an anchor made of stainless steel of sizes M8, M10, M12 and M16, 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	Anchorage satisfies 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 Commission¹, 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.

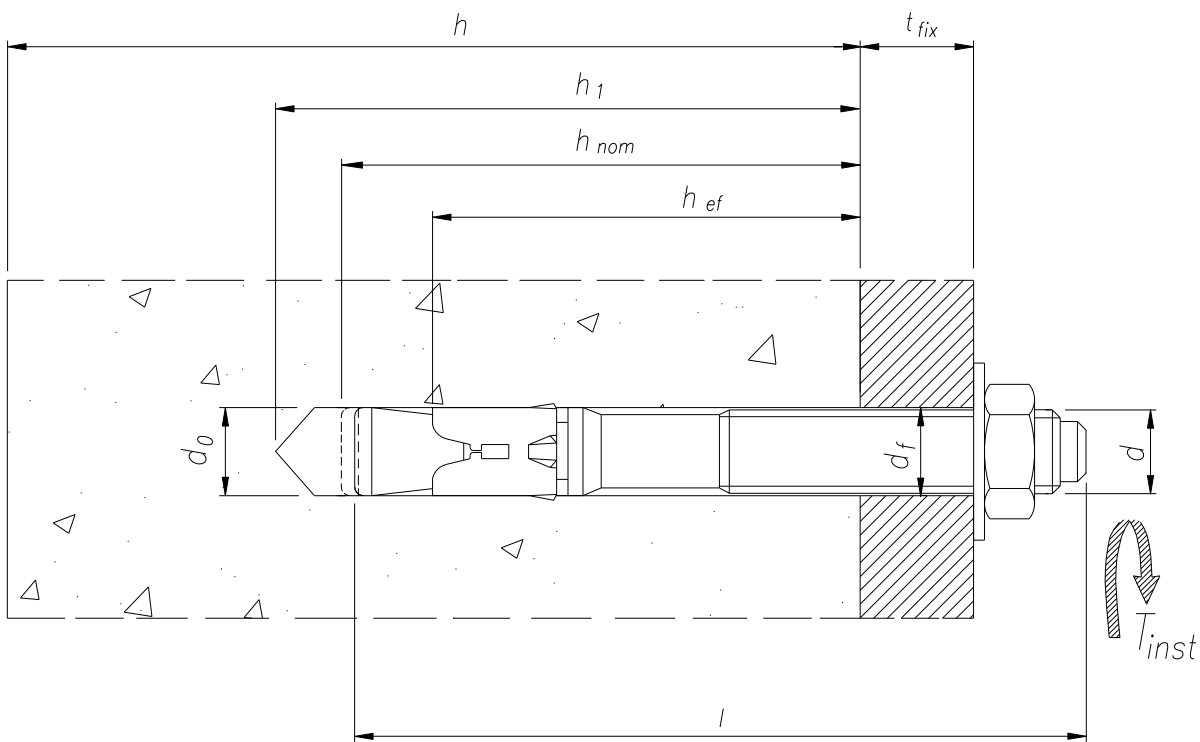
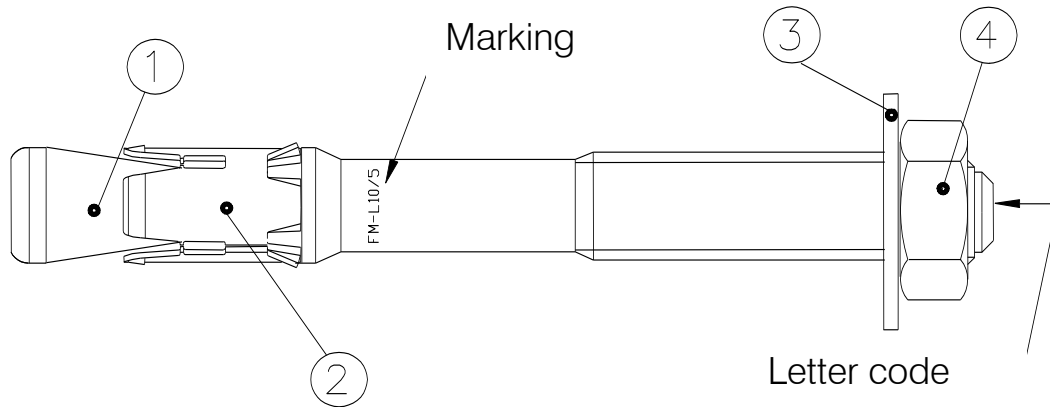
The original French version is signed by

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:



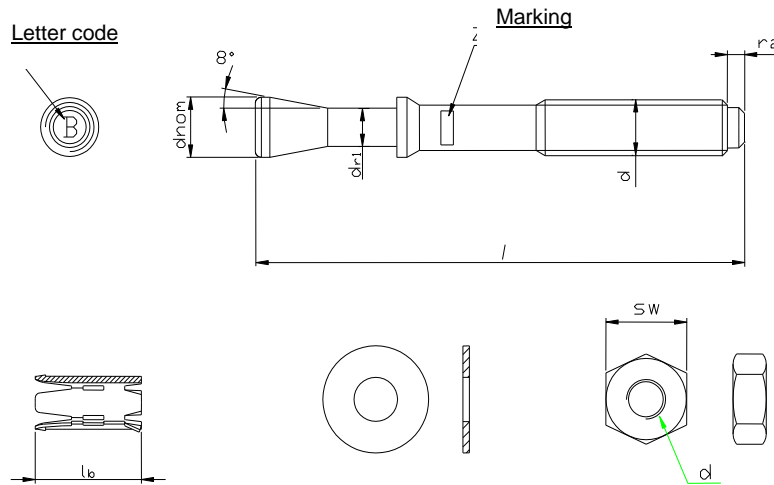
h_{ef} : effective embedment depth
 h_{nom} : embedment depth
 h_1 : drilling hole depth
 t_{fix} : fixture thickness

FM753 A4 torque-controlled expansion anchor

Product description
 Assembled and in-use anchor

Annex A1

Assembled anchor: bolt and expansion sleeve



Marking on the bolt:

FM X/Y A4
 with X = thread diameter (d)
 Y = fixture thickness (t_{fix})
 e.g. FM 10/5 A4 (size M10x75)

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
1	Bolt	Stainless steel AISI 316-L-Cu X3CrNiCuMo 17-11-3-2 (UNI EN 10088/3) Stainless steel AISI 316-L X2CrNiMo 17-12-2 (UNI EN 10088/3)
2	Expansion sleeve	Stainless steel AISI 316-L X2CrNiMo 17-12-2 (UNI EN 10088/2)
3	Washer	A4 – 140 Hv (DIN 125)
4	Hexagonal nut	A4-70 (DIN 934)

FM753 A4 torque-controlled expansion anchor

Product description
 Parts, materials and marking

Annex A2

Specifications of intended use

Anchorage 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):

- The FM753 A4 anchor may be used in concrete subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist.

Note: 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).

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.

FM753 A4 torque-controlled expansion anchor

Intended Use
Specifications

Annex B1

Table 2: Anchor dimensions

	Anchor size	Marking	L [mm]	t _{fix} [mm]	d _r [mm]	d _{nom} [mm]	l _{bague} [mm]	Letter code
M8	M8x65	FM 8/7 A4	65	7	5,8	8,0	11,5	B
	M8x75	FM 8/15 A4	75	15				C
	M8x90	FM 8/30 A4	90	30				D
	M8x115	FM 8/55 A4	115	55				E
	M8x135	FM 8/75 A4	135	75				F
	M8x165	FM 8/105 A4	165	105				G
M10	M10x75	FM 10/5 A4	78	5	7,4	10,0	14,0	B
	M10x90	FM 10/20 A4	90	20				C
	M10x120	FM 10/50 A4	120	50				D
	M10x145	FM 10/75 A4	145	75				E
	M10x170	FM 10/100 A4	173	100				F
M12	M12x100	FM 12/10 A4	100	10	8,8	12,0	17	B
	M12x110	FM 12/20 A4	110	20				C
	M12x135	FM 12/45 A4	135	45				D
	M12x160	FM 12/70 A4	160	70				E
	M12x185	FM 12/100 A4	188	100				F
M16	M16x125	FM 16/10 A4	125	10	12,6	16,0	23	A
	M16x145	FM 16/30 A4	145	30				B
	M16x175	FM 16/60 A4	175	60				C
	M16x215	FM 16/100 A4	215	100				D

Table 3: Installation data

	Anchor type	d _{cut} [mm]	d _f [mm]	T _{inst} [Nm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	s _{min} [mm]	c _{min} [mm]
M8	FM 8/7 A4 FM 8/15 A4 FM 8/30 A4 FM 8/55 A4 FM 8/75 A4 FM 8/105 A4	8	9	15	100	60	48	40	60	60
M10	FM 10/5 A4 FM 10/20 A4 FM 10/50 A4 FM 10/75 A4 FM 10/100 A4	10	12	25	100	70	59	50	75	75
M12	FM 12/10 A4 FM 12/20 A4 FM 12/45 A4 FM 12/70 A4 FM 12/100 A4	12	14	50	120	85	71	60	90	90
M16	FM 16/10 A4 FM 16/30 A4 FM 16/60 A4 FM 16/100 A4	16	18	100	170	115	96	85	130	130

FM753 A4 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

			M8	M10	M12	M16	
Steel failure							
Characteristic resistance	$N_{RK,s}$	[kN]	17,2	28,0	39,5	81,0	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,59				
Pullout failure $N_{RK,p} = \Psi_c \times N_{RK,p}^0$							
Characteristic resistance in non-cracked concrete C20/25	$N_{RK,p}^0$	[kN]	7,5	12	-*	35	
Partial safety factor for non-cracked concrete	$\gamma_{Mp}^{1)}$	[-]	1,5 ²⁾				
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]	40	50	60	85	
Partial safety factor for non-cracked concrete	$\gamma_{Mc} = \gamma_{Msp}^{1)}$	[-]	1,5 ²⁾				
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]	120	150	180	255
	splitting	$S_{cr,sp}$	[mm]	240	300	360	510
Char. edge distance	concrete cone	$C_{cr,N}$	[mm]	60	75	90	130
	splitting	$C_{cr,sp}$	[mm]	120	150	180	255

* pull-out failure is not a decisive failure mode for size M12.

¹⁾ In absence of other national regulations

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

FM753 A4 torque-controlled expansion anchor

Design according to **ETAG001, Annex C**

Characteristic resistance under tension loads

Annex C1

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

			M8	M10	M12	M16
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	11,9	18,9	27,4	51,0
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33			
Steel failure with lever arm						
Characteristic bending resistance	$M_{Rk,s}^0$	[Nm]	24	49	85	216
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33			
Concrete pry-out failure						
Factor in equation (5.6) of ETAG001, Annex C, § 5.2.3.3	k	[-]	1,0	1,0	2,0	2,0
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 ²⁾			
Concrete edge failure						
Effective length of anchor under shear loading	l_f	[mm]	40	36	43	62
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 ²⁾			

¹⁾ In absence of other national regulations

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

FM753 A4 torque-controlled expansion anchor

Design according to **ETAG001, Annex C**
 Characteristic resistance under shear loads

Annex C2

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

				M8	M10	M12	M16
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]		17,2	28,0	39,5	81,0
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]		1,59			
Pullout failure $N_{Rk,p} = \Psi_c \times N_{Rk,p}^0$							
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}^0$	[kN]		7,5	12	-*	35
Partial safety factor for non-cracked concrete	$\gamma_{Mp}^{1)}$	[-]		1,5 ²⁾			
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]		40	50	60	85
Factor for non cracked concrete	k_{ucr}	[-]		10,1			
Partial safety factor for non-cracked concrete	$\gamma_{Mc} = \gamma_{Msp}^{1)}$	[-]		1,5 ²⁾			
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]	120	150	180	255
	splitting	$S_{cr,sp}$	[mm]	240	300	360	510
Char. edge distance	concrete cone	$C_{cr,N}$	[mm]	60	75	90	130
	splitting	$C_{cr,sp}$	[mm]	120	150	180	255

* pull-out failure is not a decisive failure mode for size M12.

¹⁾ In absence of other national regulations

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

FM753 A4 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

			M8	M10	M12	M16
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	11,9	18,9	27,4	51,0
Factor considering ductility	k_2	[-]	0,8			
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33			
Steel failure with lever arm						
Characteristic bending resistance	$M_{Rk,s}^0$	[Nm]	24	49	85	216
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33			
Concrete pry-out failure						
Factor in equation (16) of CEN TS 1992-4-4, § 6.2.2.3	k_3	[-]	1,0	1,0	2,0	2,0
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 ²⁾			
Concrete edge failure						
Effective length of anchor under shear loading	l_f	[mm]	40	36	43	62
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 ²⁾			

¹⁾ In absence of other national regulations

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

FM753 A4 torque-controlled expansion anchor

Annex C4

Design according to **CEN/TS 1992-4**

Characteristic resistance under shear loads

Table 8: Displacements under tension loading

			M8	M10	M12	M16
Tension load in non-cracked concrete C20/25 to C50/60			3,6	5,7	11,1	16,7
Displacement	δ_{N0}	[mm]	0,1	0,2	0,3	1,2
	$\delta_{N\infty}$	[mm]	1,6	1,6	1,6	1,6

Table 9: Displacements under shear loading

			M8	M10	M12	M16
Shear load in non-cracked concrete C20/25 to C50/60			6,4	10,1	14,8	27,5
Displacement	δ_{V0}	[mm]	0,8 (+0,7)	0,9 (+1,2)	1,0 (+1,2)	1,2 (+1,2)
	$\delta_{V\infty}$	[mm]	1,3 (+0,7)	1,4 (+1,2)	1,5 (+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.

FM753 A4 torque-controlled expansion anchor

Design
 Displacements

Annex C5