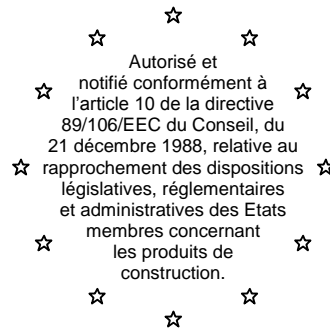


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MEMBRE DE L'EOTA

European Technical Approval

ETA-01/0014

(English language translation, the original version is in French language)

Nom commercial :

Trade name:

FM 753

Titulaire :

Holder of approval:

Société FRIULSIDER SpA

33048 San Giovanni al Natisone

Via Trieste, 1 (Udine)

ITALY

Type générique et utilisation prévue du produit de construction :

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.

Generic type and use of construction product:

Torque-controlled expansion anchor, made of galvanised steel, for use in non cracked concrete: sizes M6, M8, M10, M12, M14 and M16.

Validité du :
au :

Validity from / to:

19/02/2010

19/02/2015

Usine de fabrication :

Manufacturing plant:

Société FRIULSIDER SpA

33048 San Giovanni al Natisone

Via Trieste, 1 (Udine)

ITALY

Le présent Agrément technique européen contient :

This European Technical Approval contains:

12 pages incluant 5 annexes faisant partie intégrante du document.

12 pages including 5 annexes which form an integral part of the document.

This European Technical Approval cancels and replaces ETA-01/0014 with validity from 18/02/2005 to 18/02/2010

Cet Agrément Technique Européen annule et remplace l'Agrément ETA-01/0014 valide du 18/02/2005 au 18/02/2010



Organisation pour l'Agrément Technique Européen
European Organisation for Technical Approvals

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Centre Scientifique et Technique du Bâtiment 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 products¹, modified by the Council Directive 93/68/EEC of 22 July 1993²;
 - Décret n° 92-647 du 8 juillet 1992³ concernant l'aptitude à l'usage des produits de construction;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC⁴;
 - Guideline for European Technical Approval of « Metal Anchors for use in Concrete » ETAG 001, edition 1997, Part 1 « Anchors in general » and Part 2 « Torque-controlled expansion anchors ».
2. The Centre Scientifique et Technique du Bâtiment is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant (for example concerning the fulfilment of assumptions made in this European Technical Approval with regard to manufacturing). Nevertheless, the responsibility for the conformity of the products with the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
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4. This European Technical Approval may be withdrawn by the Centre Scientifique et Technique du Bâtiment pursuant to Article 5 (1) of the Council Directive 89/106/EEC.
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¹ Official Journal of the European Communities n° L 40, 11.2.1989, p. 12

² Official Journal of the European Communities n° L 220, 30.8.1993, p. 1

³ Journal officiel de la République française du 14 juillet 1992

⁴ Official Journal of the European Communities n° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1. Definition of 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. For the installed anchor see Figure 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 compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences. 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 classe C 20/25 at minimum and C50/60 at most according to ENV 206: 2000-12. It may be anchored in non-cracked concrete only.

The anchor may only be used in concrete subject to dry internal conditions.

The provisions made in this European Technical Approval are based on an assumed intended 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 product and methods of verification

2.1. Characteristics of product

The anchor in the range of M6 to M16 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 2 and 3 shall correspond to the respective values laid down in the technical documentation⁵ of this European Technical Approval. The characteristic anchor values for the design of anchorages are given in Annexes 4 and 5.

Each anchor is marked with the product name FM, the length of the threaded part (S=small; L=long), the bolt diameter, and the different values of the thickness of the connected part As an example :

FM S 6/15

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

The anchor shall only be packaged and supplied as a complete unit.

⁵ The technical documentation of this European Technical Approval is deposited at the Centre Scientifique et Technique du Bâtiment 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.

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 2 « Torque-controlled expansion anchors », on the basis of Option 7.

3 Evaluation of Conformity and CE marking

3.1. Attestation of conformity system

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

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.

3.2. Responsibilities

3.2.1. Tasks of the manufacturer, factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the prescribed test plan⁶. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials such as nuts, washers, wire for bolts and metal band for expansion sleeves shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. tensile strength, hardness, surface finish.

⁶ The prescribed test plan has been deposited at the Centre Scientifique et Technique du Bâtiment and is only made available to the approved bodies involved in the conformity attestation procedure.

The manufactured components of the anchor shall be subjected to the following tests:

- Dimensions of component parts:
 - bolt (diameters, lengths, thread, geometry of the cone, marking);
 - sleeve (length, thickness, catch sizes);
 - hexagonal nut (proper running, wrench size across flats);
 - washer (diameters, thickness).
- Material properties: bolt (yielding and ultimate tensile strengths), sleeve (ultimate tensile strength), hexagonal nut (proof load), washer (hardness).
- Thickness of the galvanised treatment of the elements.
- Visual control of correct assembly and of completeness of the anchor.

The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the prescribed test plan taking account of the automated manufacturing process of the anchor.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- designation of the product, basic material and components;
- type of control or testing;
- date of manufacture of the product and date of testing of the product or basic material and components;
- result of control and testing and, if appropriate, comparison with requirements;
- signature of person responsible for factory production control.

The records shall be presented to the inspection body during the continuous surveillance. On request, they shall be presented to the Centre Scientifique et Technique du Bâtiment.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the prescribed test plan which is part of the technical documentation of this European Technical Approval.

3.2.2. Tasks of approved bodies

3.2.2.1. Initial type-testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type-testing has to be agreed between the Centre Scientifique et Technique du Bâtiment and the approved bodies involved.

3.2.2.2. Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the prescribed test plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1. as well as to the Annexes to the European Technical Approval.

3.2.2.3. Continuous surveillance

The approved body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the prescribed test plan.

Continuous surveillance and assessment of factory production control have to be performed according to the prescribed test plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the Centre Scientifique et Technique du Bâtiment. In cases where the provisions of the European Technical Approval and the prescribed test plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3. CE-Marking

The CE marking shall be affixed on each packaging of anchors. The symbol « CE » shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- number of the 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 during inspection of the plant by the Centre Scientifique et Technique du Bâtiment and the approved body and laid down in the technical documentation.

4.2. Installation

4.2.1. Design of anchorages

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

The anchorages are designed in accordance with the « Guideline for European Technical Approval of Metal Anchors for Use in Concrete », Annex C, Method A, for torque-controlled expansion anchors 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 support, 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 on 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 prepared for that purpose and using the appropriate special tools;
- thickness of the fixture corresponding to the range of required thickness values for the type of anchor;
- 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;
- clearing the hole of drilling dust;
- anchor installation ensuring the specified embedment depth;
- keeping of the edge distance and spacing to the specified values without minus tolerances;
- positioning of the drill holes without damaging the reinforcement;
- in case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not to the anchor in the direction of load application;
- application of the torque moment given in Annex 3 using a calibrated torque wrench.

4.2.3. Responsibility of the manufacturer

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to in 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:

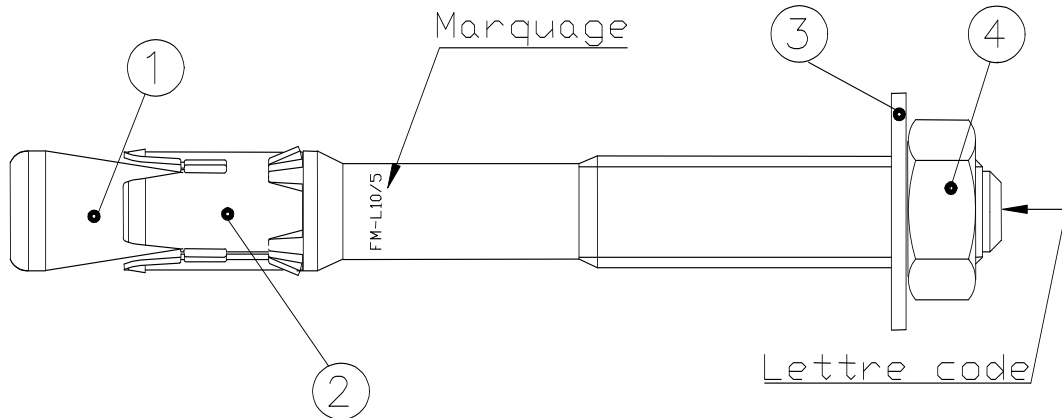
- drill bit diameter,
- thread diameter,
- maximum thickness of the fixture,
- minimum installation depth,
- minimum hole depth,
- required torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

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

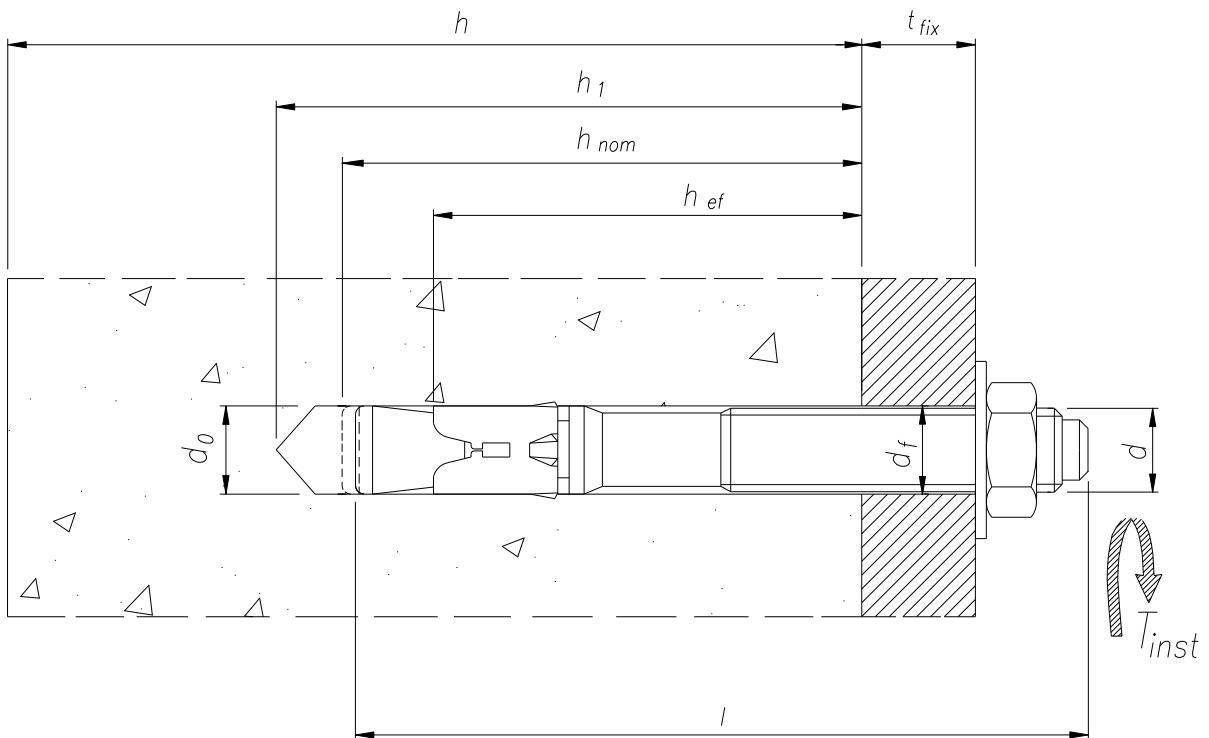
The original French version is signed by

**Le Directeur Technique
C. BALOCHE**

**Assembled anchor and schema
 of the anchor in use :**



- 1. bolt
- 2. expansion sleeve
- 3. washer
- 4. hexagonal nut



<p>FRIULSIDER FM 753 expansion anchor</p>	<p>Annex 1</p>
<p>Product and intended use</p>	<p>of European Technical Approval ETA-01/0014</p>

Different parts of the anchor :

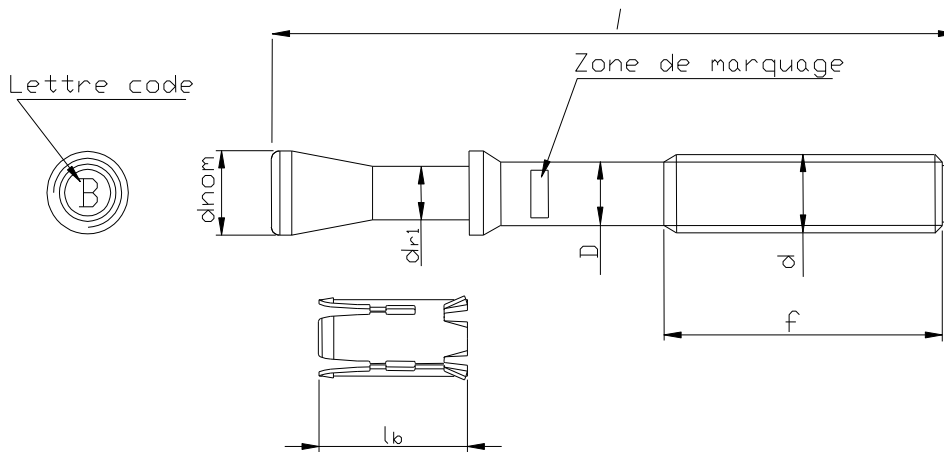


Table 1 : Dimensions

Type	Marking	tfix	Code letter	l [mm]	f [mm]	lb [mm]	dnom [mm]	dr1 [mm]
M6x65	FM-S 6/15	15	B	65	18	10,2	6	4,2
M6x65	FM-L 6/15	15	B	65	38			
M6x85	FM-S 6/35	35	C	85	18			
M6x85	FM-L 6/35	35	C	85	58	11,5	8	5,8
M8x65	FM-L 8/7	7	B	65	35			
M8x75	FM-S 8/15	15	C	75	35			
M8x75	FM-L 8/15	15	C	75	45			
M8x90	FM-S 8/30	30	D	90	35			
M8x90	FM-L 8/30	30	D	90	60			
M8x115	FM-S 8/55	55	E	115	40			
M8x115	FM-L 8/55	55	E	115	80			
M8x135	FM-S 8/75	75	F	135	40			
M8x135	FM-L 8/75	75	F	135	85	14,0	10	7,4
M8x165	FM-L 8/105	105	G	165	85			
M10x75	FM-S 10/5	5	B	78	78			
M10x90	FM-S 10/20	20	C	90	40			
M10x90	FM-L 10/20	20	C	90	52			
M10x120	FM-S 10/50	50	D	120	10			
M10x120	FM-L 10/50	50	D	120	82	17	12	8,8
M10x145	FM-L 10/70	70	E	145	82			
M10x170	FM-L 10/100	100	F	173	82			
M12x100	FM-S 12/10	10	B	100	45			
M12x100	FM-L 12/10	10	B	100	55			
M12x110	FM-S 12/20	20	C	110	45			
M12x110	FM-L 12/20	20	C	110	65			
M12x135	FM-S 12/45	45	D	135	50			
M12x135	FM-L 12/45	45	D	135	90			
M12x160	FM-S 12/70	70	E	160	90	19,5	14	10,6
M12x185	FM-S 12/100	100	F	188	90			
M14x100	FM-L 14/3	3	A	103	50			
M14x110	FM-L 14/10	10	B	110	60			
M14x130	FM-L 14/30	30	C	130	65			
M14x150	FM-L 14/50	50	D	150	90			
M14x170	FM-L 14/70	70	E	170	90			
M14x200	FM-L 14/100	100	F	200	90	23	16	12,6
M16x125	FM-S 16/10	10	A	125	65			
M16x145	FM-S 16/30	30	B	145	85			
M16x175	FM-S 16/60	60	C	175	85			
M16x215	FM-S 16/100	100	D	215	85			

FRIULSIDER FM 753 expansion anchor

Dimensions of anchors

Annex 2

of European
 Technical Approval
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Table 2: Installation data

Anchor type	L (mm) (0)	Letter code marking	d _{cut} (mm) (1)	d _r (mm) (2)	T _{inst} (Nm) (3)	h _{min} (mm) (4)	h ₁ (mm) (5)	h _{nom} (mm) (6)	h _{ef} (mm) (7)	t _{fix,max} (mm) (8)
M6 x 65 (*)	65	B	6	7	6	100	50	41	35(*)	15
M6 x 85 (*)	85	C								35
M8 x 65	65	B	8	9	15	100	60	48	40	7
M8 x 75	75	C								15
M8 x 90	90	D								30
M8 x 115	115	E								55
M8 x 135	135	F								75
M8 x 165	165	G								105
M10 x 75	75	B								10
M10 x 90	90	C	20							
M10 x 120	120	D	50							
M10 x 145	145	E	75							
M10 x 170	170	F	100							
M12 x 100	100	B	12	14	50	120	85	71	60	
M12 x 110	110	C								20
M12 x 135	135	D								45
M12 x 160	160	E								70
M12 x 185	185	F								100
M14 x 100	100	A	14	16	70	140	95	80	70	3
M14 x 110	110	B								10
M14 x 130	130	C								30
M14 x 150	150	D								50
M14 x 170	170	E								70
M14 x 200	200	F								100
M16 x 125	125	A	16	18	100	170	115	96	85	10
M16 x 145	145	B								30
M16 x 175	175	C								60
M16 x 215	215	D								100

* use restricted to anchoring of structural components statically indetermined.

- | | |
|--|--|
| (0) Total length of the bolt (mm) | (5) Depth of drilled hole to deepest point, h ₁ (mm) |
| (1) Nominal diameter of drill bit, d _{cut} (mm) | (6) Minimum installation depth, h _{nom} (mm) |
| (2) Diameter of clearance hole in the fixture, d _r (mm) | (7) Effective anchorage depth, h _{ef} (mm) |
| (3) Required torque moment, T _{inst} (Nm) | (8) Maximum thickness of the fixture, t _{fix,maxi} (mm) |
| (4) Minimum thickness of concrete member, h _{min} (mm) | |

Non- cracked concrete only			M6	M8	M10	M12	M14	M16
Minimum spacing	S _{min}	(mm)	50	60	75	90	105	130
Minimum edge distance	C _{min}	(mm)	50	60	75	90	105	130

Table 3 : Matériaux

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	(≥ 5 µm)
4	Hexagonal nut	EN 24032, steel grade 8	ISO 4042 Galvanised (≥ 5 µm)

FRIULSIDER FM 753 expansion anchor

Installation data and materials

Annex 3

of European
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Table 4: Characteristic values of resistance to tension loads of design method A

			M6	M8	M10	M12	M14	M16	
Steel failure									
Characteristic resistance (reduced part)	$N_{Rk,s}$	(kN)	10,9*	17,2	28,0	31,6	51,2	72,3	
Partial safety factor	γ_{Ms}	-	1,48*	1,40	1,40	1,40	1,48	1,48	
Pull-out failure									
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	(kN)	6*	9	12	20	25	35	
Partial safety factor	γ_2	-	1,2*	1,2	1,2	1	1	1	
	γ_{Mp}	-	1,8*	1,8	1,8	1,5	1,5	1,5	
Increasing factor for N_{Rk} for non-cracked 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									
Partial safety factor	γ_2	-	1,2*	1,2	1,2	1	1	1	
	$\gamma_{Mc} = \gamma_{Sp}$	-	1,8*	1,8	1,8	1,5	1,5	1,5	
Effective anchorage depth	h_{ef}	(mm)	35*	40	50	60	70	85	
Spacing	$s_{cr,N}$	(mm)	105*	120	150	180	210	255	
	$s_{cr,sp}$	(mm)	210*	240	300	360	420	510	
Edge distance	$c_{cr,N}$	(mm)	53*	60	75	90	105	130	
	$c_{cr,sp}$	(mm)	105*	120	150	180	210	255	

* Use restricted to anchoring of structural components statically indetermined.

Table 5 : Displacements under tension loads

		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_{N0} (mm)	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{N\infty}$ (mm)	1,6	1,6	1,6	1,6	1,6	1,6

FRIULSIDER FM 753 expansion anchor

Design method A : characteristic values of resistance to tension loads and displacements

Annex 4

of European
 Technical Approval
ETA- 01/0014

Table 6: Characteristics values of resistance to shear loads of design method A.

			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}	-	1,5	1,5	1,5	1,5	1,5	1,5
Steel failure with lever arm								
Characteristic resistance	$M_{Rk,s}$	(Nm)	12	24	49	68	121	193
Partial safety factor	γ_{Ms}	-	1,5	1,5	1,5	1,5	1,5	1,5
Concrete pryout failure								
Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3	k	-	1	1	1	2	2	2
Partial safety factor	γ_2	-	1,00					
	γ_{Mpr}	-	1,50					
Concrete edge failure								
Effective length of anchor	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_2	-	1,00					
	γ_{Mc}	-	1,50					

Table 7: Displacements under shear loads

		M6	M8	M10	M12	M14	M16
Shear load in non-cracked concrete C20/25 à 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.

FRIULSIDER FM 753 expansion anchor

Design method A : characteristic values of resistance to shear loads and displacements

Annex 6

of European
 Technical Approval
ETA- 01/0014