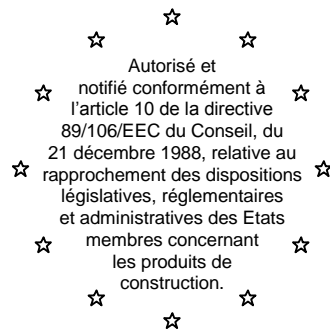


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European Technical Approval **ETA-05/0169**

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

Trade name:

Nom commercial :

FM 744

Holder of approval:

Titulaire :

**Société FRIULSIDER SpA
33048 San Giovanni al Natisone
Via Trieste, 1 (Udine)
ITALY**

Generic type and use of construction product:

Type générique et utilisation prévue du
produit de construction :

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

Cheville métallique en acier galvanisé, à expansion par vissage à
couple contrôlé, de fixation dans le béton non fissuré : diamètres M6,
M8, M10 et M12.

Validity from / to:

Validité du :
au :

**01/09/2010
31/08/2015**

Manufacturing plant:

Usine de fabrication :

**Société FRIULSIDER SpA
33048 San Giovanni al Natisone
Via Trieste, 1 (Udine)
ITALY**

This European Technical Approval contains:

Le présent Agrément Technique Européen
contient :

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

13 pages incluant 5 annexes faisant partie intégrante du document.

This European Approval cancels and replaces ETA-05/0169 with validity from 01/09/2005 to 31/08/2010

Cet Agrément Technique Européen annule et remplace l'ATE 05/0169 valide du 01/09/2005 au 31/08/2010



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 (CSTB) 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.
- 3 - This European Technical Approval is not to be transferred to manufacturers or agents of manufacturer other than those indicated on page 1; or manufacturing plants other than those announced to the Centre Scientifique et Technique du Bâtiment.
- 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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- 6 - The European Technical Approval is issued by the approval body in its official language. This version fully corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities no. L 40, 11.2.1989, p. 12

² Official Journal of the European Communities no. L 220, 30.7.1993, p. 1

³ Journal Officiel de la République française du 14 juillet 1992

⁴ Official Journal of the European Communities no. 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 744 anchor in the range of M6 to M12 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: 1990-03. 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 the product

The anchor in the range of M6 to M12 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 744, the diameter of the hole and the size of the screw.

As an example : FM 744 Ø10 M6

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

2.2 Methods of verification

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.

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 specified by the European Commission is system 1 described in the Council Directive 89/106/EEC Annex III, 2 (i), First possibility and described as follows:

- a) Tasks of the manufacturers:
 - 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 of the Notified Body:
 - 1. initial type-testing of the product,
 - 2. initial inspection of factory and of factory production control,
 - 3. continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer, factory production control

The ETA-holder has a factory production control system in its 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 components are 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 screw, 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:
 - screw (diameter, length, thread);
 - sleeve (length, thickness, catch sizes);
 - cone (diameter, angle)
 - washer (diameter, thickness).
- Material properties: screw (yielding and ultimate tensile strengths), sleeve (ultimate tensile strength), cone (yielding and ultimate tensile strengths, or hardness), 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 the Notified 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 followed by the identification number of the Notified Body involved and shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant (of the ETA-holder);
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity of Factory Production Control;
- number of the European Technical Approval;
- use category (ETAG 001-2 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).

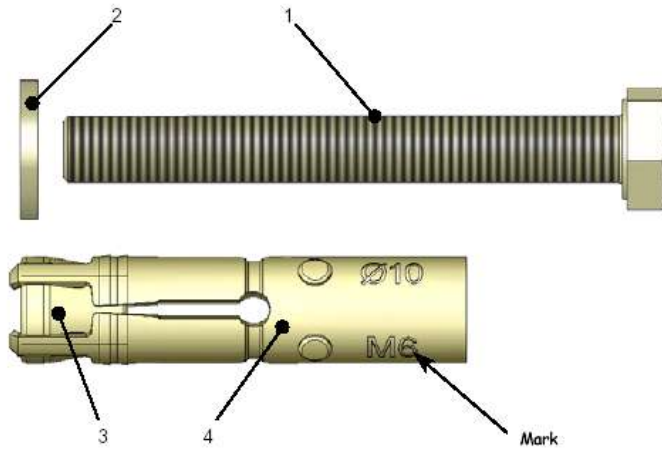
The minimum data required are:

- 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.

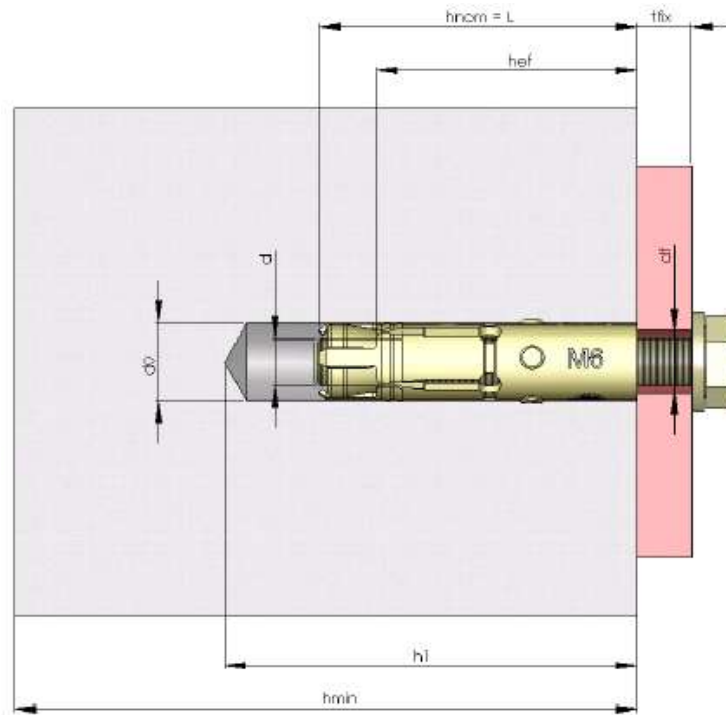
All data shall be presented in a clear and explicit form.

**The original version is signed by
C. BALOCHE**

Assembled anchor and schema of the anchor in use :



- 1. Screw
- 2. Washer
- 3. Cone
- 4. Expansion sleeve



FRIULSIDER FM 744 expansion anchor

Product and intended use

Annex 1

**of European
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Different parts of the anchor

Table 1 : Dimensions

Anchor type	h_{nom}	d [mm]	D [mm]	H [mm]	t_w	L_{screw}
FM744 M6	40	6	10	9,5	1,6	50
FM744 M8	50	8	14	13,5	1,6	60
FM744 M10	60	10	16	14,5	2	80
FM744 M12	80	12	20	18,5	2,5	90

$h_{nom} = L$ = overall anchor embedment depth in the concret

d = diameter of the threaded part of the screw

D = external diameter of the expansion sleeve

H = length of the cone

$t_w = L$ = thickness of the washer

L_{screw} = length of the screw

FRIULSIDER FM 744 expansion anchor

Dimensions of anchors

Annex 2

of European
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Table 2 : Installation data

Marking of the anchor	embedment depth h_{ef} [mm]	drill hole diameter [mm]	depth of drill hole h_1 [mm]	thickness of fixture t_{fix} (*) [mm]	Setting torque T_{inst} [Nm]	thickness of concrete member h_{min} [mm]	diameter of clearance hole d_f [mm]
FM744 M6	33.5	10	55	12	6	100	8
FM744 M8	41.0	14	65	15	15	100	10
FM744 M10	50.0	16	75	20	30	100	12
FM744 M12	66.5	20	95	15	50	135	14

* : t_{fix} value refers to standard screw 8.8 delivered with the expansion sleeve. The thickness of the fixture can vary by using different lengths of screws from same grade and same coating.

Non- cracked concrete only			M6	M8	M10	M12
Minimum spacing	S_{min}	(mm)	35	40	50	70
Minimum edge distance	C_{min}	(mm)	35	40	50	70

Table 3 : Materials

Part	Designation	Material	Protection
1	Screw	Grade 8.8 ISO 898/1	Galvanised ($\geq 5 \mu\text{m}$)
2	Washer	DIN 125/1	Galvanised
3	Cone	Cold formed Medium carbon steel	($\geq 5 \mu\text{m}$)
4	Expansion sleeve	Cold formed Low carbon steel	Galvanised ($\geq 5 \mu\text{m}$)

FRIULSIDER FM 744 expansion anchor

Installation data and materials

Annex 3

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

			M6 ⁽¹⁾	M8	M10	M12
Steel failure						
Characteristic resistance	$N_{Rk,s}$	(kN)	16,1	29,3	46,4	67,4
Partial safety factor	γ_{Ms}	-	1,50	1,50	1,50	1,50
Pull-out failure						
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	(kN)	6	12	-*	-*
Partial safety factor	γ_2	-	1	1		
	γ_{Mp}	-	1,5	1,5		
Increasing factor for N_{Rk} for non-cracked concrete	C30/37	ψ_c	1,22	1,22		
	C40/50		1,41	1,41		
	C50/60		-	1,55	1,55	
Concrete cone failure and splitting failure						
Partial safety factor	γ_2	-	1	1	1	1
	$\gamma_{Mc} = \gamma_{Sp}$	-	1,5	1,5	1,5	1,5
Effective anchorage depth	h_{ef}	(mm)	33,5	41	50	66,5
Spacing	$s_{cr,N}$	(mm)	101	123	150	200
	$s_{cr,sp}$	(mm)	200	250	300	400
Edge distance	$c_{cr,N}$	(mm)	50	62	75	100
	$c_{cr,sp}$	(mm)	100	125	150	200

(1) : for application with statically indeterminate structural components only

* : pull-out failure not decisive

Table 5 : Displacements under tension loads

			M6	M8	M10	M12
Tension load in non-cracked concrete C20/25 (kN)			2,9	5,7	8,5	13,0
Displacement	δ_{N0}	(mm)	0,5	0,6	0,8	1,2
	$\delta_{N\infty}$	(mm)	0,6	0,6	0,8	1,2

			M6	M8	M10	M12
Tension load in non-cracked concrete C50/60 (kN)			4,4	8,9	13,1	20,2
Displacement	δ_{N0}	(mm)	0,7	1,0	1,4	2,1
	$\delta_{N\infty}$	(mm)	0,7	1,0	1,4	2,1

FRIULSIDER FM 744 expansion anchor**Annex 4****Design method A : characteristic values of resistance to tension loads and displacements**of European
Technical Approval
ETA-05/0169

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

			M6	M8	M10	M12
i) Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	(kN)	7,4	14,6	21,5	32,0
Partial safety factor	γ_{Ms}	-	1,25	1,25	1,25	1,25
ii) Steel failure with lever arm						
Characteristic resistance	$M_{Rk,s}$	(Nm)	12	30	60	105
Partial safety factor	γ_{Ms}	-	1,25	1,25	1,25	1,25
iii) Concrete pryout failure						
Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3	k	-	1	1	1	2
Partial safety factor	γ_2	-	1,00	1,00	1,00	1,00
	γ_{Mpr}	-	1,50	1,50	1,50	1,50
iv) Concrete edge failure						
Effective length of anchor	l_f	(mm)	34	41	50	67
Outside diameter of anchor	d_{nom}	(mm)	10	14	16	20
Partial safety factor	γ_2	-	1,00	1,00	1,00	1,00
	γ_{Mc}	-	1,50	1,50	1,50	1,50

Table 7 : Displacements under shear loads

		M6	M8	M10	M12
Shear load in non-cracked concrete C20/25 to C50/60 (kN)		4,2	8,3	12,3	18,3
Displacement	δ_{V0} (mm)	2,5	3,3	2,9	3,50
	$\delta_{V\infty}$ (mm)	3,75 (+0,7)	4,95 (+1,2)	4,35 (+1,2)	5,25 (+1,2)

Displacement : the table shows the deformation to be expected from the anchor itself. 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 744 expansion anchor

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

Annex 5

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