Centre Scientifique et
Technique du Bâtiment
84 avenue Jean Jaurès
CHAMPS-SUR-MARNE
F-77447 Marne-la-Vallée Cedex 2
Tél. : (33) 01 64 68 82 82
Fax : (33) 01 60 05 70 37

Autorisé et notifié conformément à l'article 10 de la directive 89/106/EEC du Conseil, du 21 décembre 1988, relative au rapprochement des dispositions législatives, réglementaires et administratives des Etats membres concernant les produits de construction.

CSTB
le futur en construction

MEMBRE DE L'EOTA

European Technical Approval ETA-13/0005

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

Nom commercial : Trade name:	**SPIT FIX3**
Titulaire : Holder of approval:	Société Spit Route de Lyon F-26501 BOURG-LES-VALENCE France
Type générique et utilisation prévue du produit de construction : Generic type and use of construction product:	Cheville métallique à expansion par vissage à couple contrôlé, de fixation dans le béton non fissuré: diamètres M8, M10, M12 M16 et M20. Torque-controlled expansion anchor for use in non cracked concrete: sizes M8, M10, M12 M16 et M20
Validité du : **au :** Validity from / to:	01/05/2013 30/04/2018
Usine de fabrication : Manufacturing plant:	Société Spit Route de Lyon F-26501 BOURG-LES-VALENCE France
Le présent Agrément technique européen contient : This European Technical Approval contains:	15 pages incluant 8 annexes faisant partie intégrante du document. 15 pages including 8 annexes which form an integral part of the document.

EOTA

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 products[1], modified by the Council Directive 93/68/EEC of 22 July 1993 [2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council [3];

   – Décret n° 92-647 du 8 juillet 1992 [4] 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/EC[5];

   – 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 indicated on page 1 of this European Technical Approval.
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.
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 the Centre Scientifique et Technique du Bâtiment. 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 to the version circulated within EOTA. Translations into other languages have to be designated as such.

---

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 Official Journal of the European Union n° L 284, 31.10.2003, p. 25

4 Journal officiel de la République française du 14 juillet 1992

5 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 Spit FIX3 anchor is an anchor made of zinc electroplated 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 classes C20/25 minimum to C50/60 maximum according to EN 206-1: 2000-12. It may be anchored in non-cracked concrete only.

The FIX3 anchors 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 FIX3 anchors correspond to the drawings and provisions given in Annexes 1 to 2. The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes 1 and 2 shall correspond to the respective values laid down in the technical documentation[6] of this European Technical Approval.

The characteristic values for the design of the anchorages in accordance with the "Guideline for European technical approval of Metal Anchors for use in concrete ETAG001", Annex C, Method A are given in Annex 4 and 5.

The characteristic values for the design of the anchorages in accordance with the design method A of CEN/TS 1992-4-4 are given in Annex 6 and 7.

Each anchor is marked with the identifying mark of the producer according to Annex 2.

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

---

6 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.

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.

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,

3.2.1.1. Factory production control

The manufacturer shall have a factory production control system in the plant and shall exercise 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 plan[7]. 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.

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 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.

[7] The prescribed test plan has been deposited at the Centre Scientifique et Technique du Bâtiment and is handed over only to the approved bodies involved in the conformity attestation procedure.

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.

3.2.1.1. Other tasks of 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 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 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.

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. 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 CSTB without delay.

3.2.2.3. Continuous surveillance

The approved certification body involved by the manufacturer shall visit the factory at least once a year for routine 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:

- Commercial name;
- Name or identifying mark of the producer and manufacturing plant;
- Name of approval body and ETA number;
- Identification number of the certification body;
- Number of the EC certificate of conformity;
- Use category (ETAG 001-2 Option 7);
- The last two digits of the year in which the CE-marking was affixed;
- 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. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the Centre Scientifique et Technique du Bâtiment before the changes are introduced. The Centre Scientifique et Technique du Bâtiment will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

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 either in accordance with the

- "Guideline for European technical approval of Metal Anchors for use in concrete", Annex C, method A

or in accordance with the

- CEN/TS 1992-4-4 "Design of fastenings for use in concrete", Part 4-4: "Post-installed fasteners – Mechanical systems", design method A,

under the responsibility of an engineer experienced in anchorages and concrete work. A mixture of the design methods is not allowed.

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 tools;

– 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 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;

– clearing the hole of drilling dust;

– Anchor installation such that the effective anchorage depth is complied with. This compliance is ensured, if the thickness of fixture is not greater than the maximum thickness of fixture marked on the anchor

– application of the torque moment given in Annex 3 using a calibrated torque wrench.

5 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 as well as in sections 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 embedment 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,

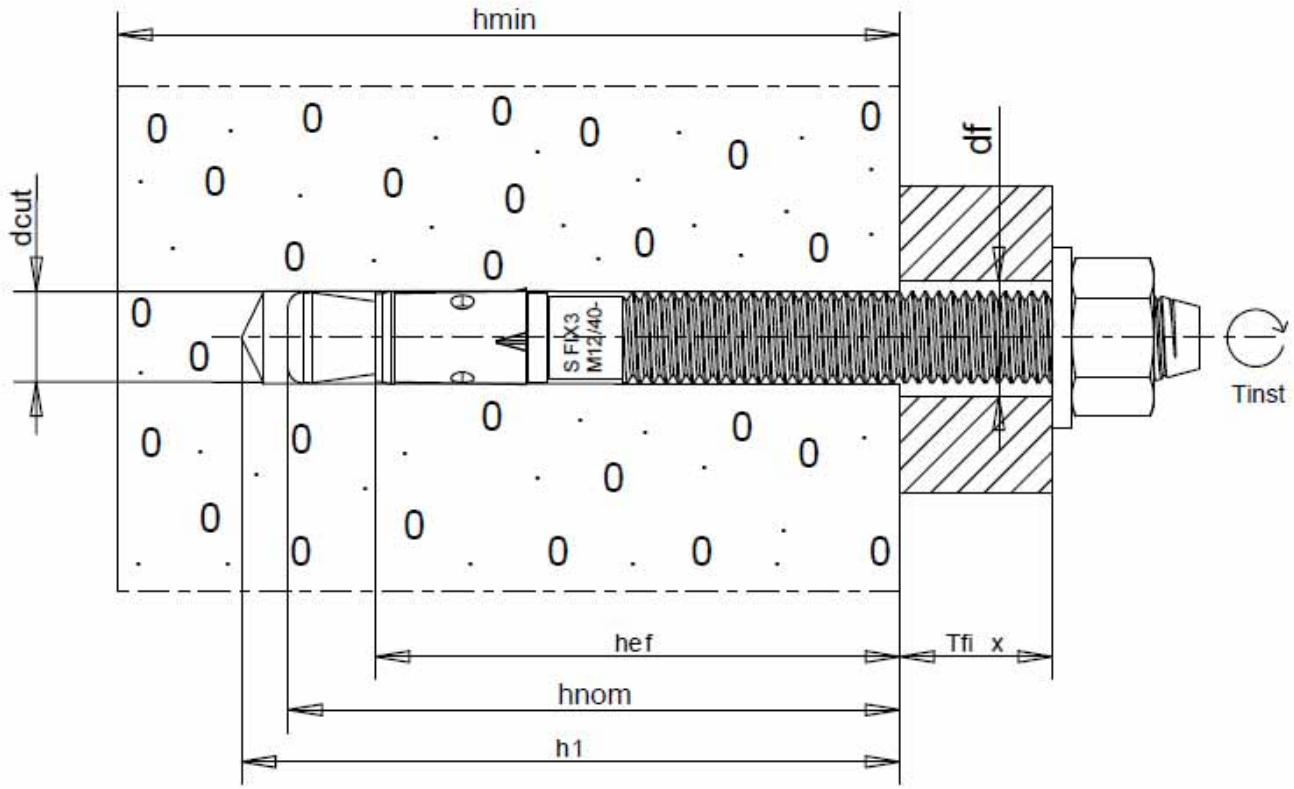
– identification of the manufacturing batch.

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



h_{ef} : Effective anchorage depth

h_{nom} : Installation depth

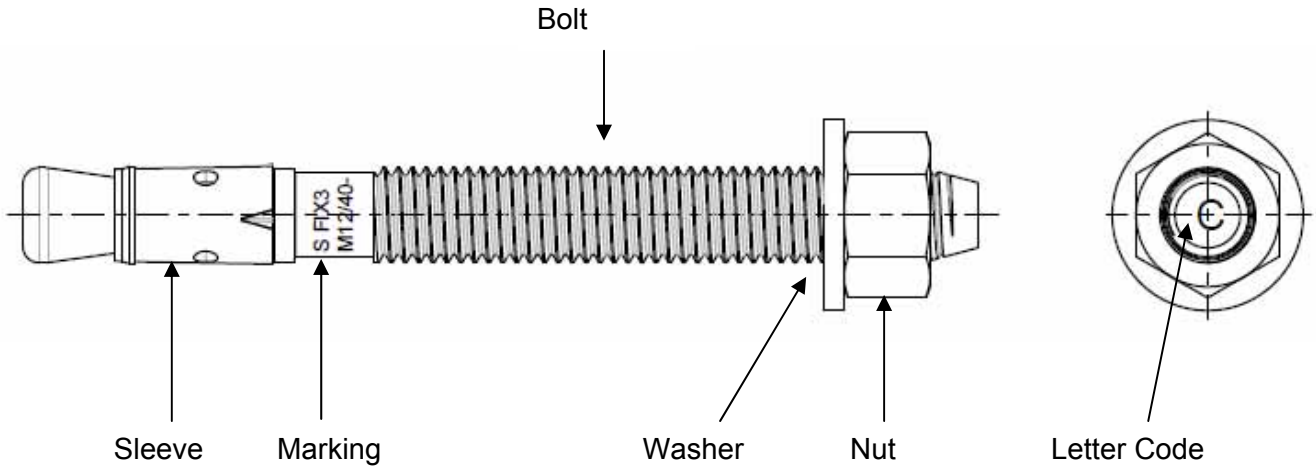
h_1 : Depth of drilled hole to deepest point

t_{fix} : Fixture thickness

Use in non cracked concrete in dry internal conditions

SPIT FIX3 torque-controlled expansion anchor	**Annex 1**
Product and intended use	**of European Technical Approval ETA-13/0005**

Different parts of the anchor:



Marking : S FIX 3 M12/40-25

S : Producer SPIT

FIX 3 : Commercial name

M12 : Size of anchor

40-25 : Maximum and minimum thickness of the fixture

Table 1 : Materials

Designation	Material	Coating
Bolt	M8, M10, M12, M16 and M20 : Cold formed NF A 35-053	NF EN 12 329 Galvanized ≥ 5 μm
Sleeve	Cold formed: NF A 35-231	M8-M16 : NF EN 10152 M20 : NF EN 12329 Galvanized ≥ 5 μm
Washer	NF E 25 513	NF EN ISO 4042 Galvanized ≥ 5 μm
Hexagonal nut	Steel grade 6 or 8 acc. ISO 898-2	

SPIT FIX3 torque-controlled expansion anchor	**Annex 2**
Matériaux des chevilles	**of European Technical Approval ETA-13/0005**

Table 2: Setting data

						Minimal embedment depth $h_{ef\,min}$					Maximal embedment depth $h_{ef\,max}$				
	L (mm)	Code letter	d_0 (mm)	d_f (mm)	T_{inst} (Nm)	h_{min} (mm)	h_1 (mm)	h_{nom} (mm)	$h_{ef\,min}$ (mm)	$t_{fix,max}$ (mm)	h_{min} (mm)	h_1 (mm)	h_{nom} (mm)	$h_{ef\,max}$ (mm)	$t_{fix,max}$ (mm)
	0		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(4)	(5)	(6)	(7)	(8)
M8x55/5	51,9	-	8	9	15	80	50	38	30	5	80	60	48	40	-
M8x70/20-10	66,9	C								20					10
M8x90/40-30	86,9	E								40					30
M8x100/50-40	96,9	F								50					40
M8x115/65-55	111,9	G								65					55
M8x130/80-70	126,9	H								80					70
M8x160/110-100	157,4	J								110					100
M10x65/5	65,9	-	10	12	30	100	60	50	40	5	100	70	60	50	-
M10x75/15-5	75,9	C								15					5
M10x85/25-15	85,9	D								25					15
M10x95/36-26	96,9	E								36					26
M10x110/50-40	110,9	F								50					40
M10x125/65-55	125,9	G								65					55
M10x140/80-70	140,9	I								80					70
M10x160/100-90	161,4	J								100					90
M12x80/5	81,2	-	12	14	50	100	75	62	50	5	130	90	77	65	-
M12x100/25-10	101,2	F								25					10
M12x115/40-25	116,2	G								40					25
M12x125/50-35	126,2	H								50					35
M12x140/65-50	141,2	I								65					50
M12x160/85-70	161,2	J								85					70
M12x180/105-90	181,2	L								105					90
M12x220/145-130	221,7	O								145					130
M16x100/5	103,9	-	16	18	100	130	95	80	65	5	160	110	95	80	-
M16x125/30-15	128,9	G								30					15
M16x150/55-40	153,9	I								55					40
M16x170/75-60	173,9	K								75					60
M16x185/90-75	189,4	L								90					75
M20x125/10	125,4	-	20	22	160	150	110	93	75	10	200	135	118	100	-
M20x165/50-25	165,4	J								50					25
M20x220/105-80	220,4	N								105					80

* 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, $t_{fix,max}$ (mm)

Table 3 : Minimum spacing and edge distance

Non- cracked concrete only				**M8**		**M10**	**M12**	**M16**	**M20**
Effective anchorage depth $h_{ef,min}$	Slab thickness	h_{min}	(mm)	80	100	100	100	130	150
	Minimum spacing	S_{min}	(mm)	40	40	50	100	100	100
	Minimum edge distance	C_{min}	(mm)	50	45	65	100	100	115
Effective anchorage depth $h_{ef,max}$	Slab thickness	h_{min}	(mm)	80		100	130	160	200
	Minimum spacing	S_{min}	(mm)	45		60	70	90	100
	Minimum edge distance	C_{min}	(mm)	55		65	70	105	120

SPIT FIX3 torque-controlled expansion anchor

Annex 3

Installation data

of European Technical Approval ETA-13/0005

Table 4 : Characteristic resistance in tension loads
Design method A acc. ETAG001, Annex C

Anchor size			M8		M10		M12		M16		M20	
Steel failure												
Characteristic resistance	$N_{Rk,s}$	(kN)	17,8		26,0		42,1		72,7		103,2	
Partial safety factor	γ_{Ms} 2)	-	1,50						1,47		1,40	
Pull-out failure												
Effective anchorage depth	h_{ef}	[mm]	30 1)	40	40	50	50	65	65	80	75	100
Characteristic resistance	$N_{Rk,p}$	(kN)	7,5	3)	3)	3)	3)	3)	3)	3)	3)	3)
Partial safety factor	γ_{Mp} 2)	-	1,5 4)									
Increasing factor for $N_{Rk,p}$	ψ_c 5)	-	$\psi_c = \left(\frac{f_{ck,cube}}{25}\right)^{0,5}$									
Concrete cone failure and splitting failure 6)												
Effective anchorage depth	h_{ef}	[mm]	30	40	40	50	50	65	65	80	75	100
Slab thickness	h_{min}	(mm)	80 / 100	80 / 100	100	100	100	130	130	160	150	200
Spacing	$s_{cr,N}$	(mm)	90	120	120	150	150	195	195	240	225	300
	$s_{cr,sp}$	(mm)	250 / 170	300 / 230	210	250	200	340	320	330	370	370
Edge distance	$c_{cr,N}$	(mm)	45	60	60	75	75	97,5	97,5	120	112,5	150
	$c_{cr,sp}$	(mm)	125 / 85	150 / 115	105	125	100	170	160	165	185	185
Partial safety factor	γ_{Mc} 2) γ_{Msp} 2)		1,5 4)									

1) Use restricted to anchoring of structural components statically indeterminated.
2) In absence of other national regulation.
3) The pull-out failure mode is not decisive for design.
4) The installation safety factor γ_2=1.0 is included.
5) Use concrete strength class according to EN 206-1, the maximum concrete strength is limited to $f_{ck,cube}$=60N/mm².
6) To give proof of splitting failure due to loading use the smaller value of $N_{Rk,p}$ and $N^0_{Rk,c}$ in equation 5.3 according to ETAG001 Annex C

Table 5: Characterisitc resistance in shear loads
Design method A acc. ETAG001, Annex C

Anchor size			**M8**[1]		**M10**		**M12**		**M16**		**M20**	
Effective anchorage depth	h_{ef}	[mm]	30	40	40	50	50	65	65	80	75	100
Steel failure without lever arm												
Characteristic resistance	$V_{Rk,s}$	(kN)	10,0		13,7		27,4		36,5		71,1	
Partial safety factor	γ_{Ms}[2]	-	1,25		1,25		1,25		1,25		1,50	
Steel failure with lever arm												
Characteristic resistance	$M^0_{Rk,s}$	(N.m)	24,0		49,0		85,0		200,0		376,0	
Partial safety factor	γ_{Ms}[2]	-	1,25		1,25		1,25		1,25		1,50	
Concrete pry-out failure												
k Factor	k	-	1,0	1,0	1,0	1,0	1,0	2,0	2,0	2,0	2,0	2,0
Partial safety factor	γ_{Mc}[2]	-	1,50[3]									
Concrete edge failure												
Effective length of anchor under shear loading	l_f	(mm)	30	40	40	50	50	65	65	80	75	100
Outside diameter of anchor	d_{nom}	(mm)	8		10		12		16		20	
Partial safety factor	γ_{Mc}[2]	-	1,50[3]									

1) Use restricted to anchoring of structural components statically indeterminated.
2) In absence of other national regulation.
3) The installation safety factor γ_2=1.0 is included.
4) k Factor in equation (5.6) of ETAG001 Annex C, § 5.2.3.3.

Table 6 : Characterisitc resistance in tension loads
Design method A acc. CEN/TS 1992-4

Anchor size			M8		M10		M12		M16		M20	
Steel failure												
Characteristic resistance	$N_{Rk,s}$	(kN)	17,8		26,0		42,1		72,7		103,2	
Partial safety factor	γ_{Ms} 2)	-	1,5						1,47		1,40	
Pull-out failure												
Effective anchorage depth	h_{ef}	[mm]	30 1)	40	40	50	50	65	65	80	75	100
Characteristic resistance	$N_{Rk,p}$	(kN)	7,5	3)	3)	3)	3)	3)	3)	3)	3)	3)
Partial safety factor	γ_{Mp} 2)	-	1,5 4)									
Increasing factor for $N_{Rk,p}$	ψ_c 5)	-	$\psi_c = \left(\frac{f_{ck,cube}}{25}\right)^{0.5}$									
Concrete cone failure and splitting failure 6)												
Effective anchorage depth	h_{ef}	[mm]	30 1)	40	40	50	50	65	65	80	75	100
Slab thickness	h_{min}	(mm)	80 / 100	80 / 100	100	100	100	130	130	160	150	200
Factor for non-cracked concrete	k_{ucr}	-	10,1									
Spacing	$s_{cr,N}$	(mm)	90	120	120	150	150	195	195	240	225	300
	$s_{cr,sp}$	(mm)	250 / 170	300 / 230	210	250	200	340	320	330	370	370
Edge distance	$c_{cr,N}$	(mm)	45	60	60	75	75	97,5	97,5	120	112,5	150
	$c_{cr,sp}$	(mm)	125 / 85	150 / 115	105	125	100	170	160	165	185	185
Partial safety factor	γ_{Mc} 2) γ_{Msp} 2)		1,5 4)									

1) Use restricted to anchoring of structural components statically indeterminated.
2) In absence of other national regulation.
3) The pull-out failure mode is not decisive for design.
4) The installation safety factor γ_2=1.0 is included.
5) Use concrete strength class according to EN 206-1, the maximum concrete strength is limited to $f_{ck,cube}$=60N/mm².

SPIT FIX3 torque-controlled expansion anchor	**Annex 6**
Characterisitc resistance in tension loads **Design method A acc. CEN/TS 1992-4**	**of European Technical Approval** **ETA-13/0005**

Table 7: Characterisitc resistance in shear loads
Design method A acc. CEN/TS 1992-4

Anchor size			**M8**[1]		**M10**		**M12**		**M16**		**M20**	
Effective anchorage depth	h_{ef}	[mm]	30	40	40	50	50	65	65	80	75	100
Steel failure without lever arm												
Characteristic resistance	$V_{Rk,s}$	(kN)	10,0		13,7		27,4		36,5		71,1	
Partial safety factor	γ_{Ms}[2]	-	1,25		1,25		1,25		1,25		1,50	
Factor considering ductility	k_2	-	1,0		1,0		1,0		1,0		1,0	
Steel failure with lever arm												
Characteristic resistance	$M^0_{Rk,s}$	(N.m)	24,0		49,0		85,0		200,0		376,0	
Partial safety factor	γ_{Ms}[2]	-	1,25		1,25		1,25		1,25		1,50	
Concrete pry-out failure												
k_3 Factor	k_3	-	1,0	1,0	1,0	1,0	1,0	2,0	2,0	2,0	2,0	2,0
Partial safety factor	γ_{Mc}[2]	-	1,50[3]									
Concrete edge failure												
Effective length of anchor under shear loading	l_f	(mm)	30	40	40	50	50	65	65	80	75	100
Outside diameter of anchor	d_{nom}	(mm)	8		10		12		16		20	
Partial safety factor	γ_{Mc}[2]	-	1,50[3]									

1) Use restricted to anchoring of structural components statically indeterminated.
2) In absence of other national regulation.
3) The installation safety factor γ_2=1.0 is included.

Table 8: Displacement under tension loads

Anchor size			**M8**[1)]		**M10**		**M12**		**M16**		**M20**	
Effective anchorage depth	h_{ef}	[mm]	30	40	40	50	50	65	65	80	75	100
Tension load for C20/25	N	(kN)	3,6	6,1	6,1	8,5	8,5	12,6	12,6	17,2	15,6	24,1
Displacements	δ_{N0}	(mm)	0,1	0,1	0,1	0,2	0,3	0,9	0,1	0,2	0,1	0,2
	$\delta_{N\infty}$	(mm)	1,1									
Tension load for C50/60	N	(kN)	5,5	9,4	9,4	13,2	13,2	19,5	19,5	26,7	24,2	37,3
Displacements	δ_{N0}	(mm)	0,1	0,3	0,2	0,4	0,8	2,4	0,2	0,8	0,2	1,1
	$\delta_{N\infty}$	(mm)	1,9				2,4		1,9			

1) Use restricted to anchoring of structural components statically indeterminated.

Table 9: Displacement under shear loads

Anchor size			**M8**[1)]		**M10**		**M12**		**M16**		**M20**	
Effective anchorage depth	h_{ef}	[mm]	30	40	40	50	50	65	65	80	75	100
Shear load for C20/25 to C50/60	V	(kN)	5,0		8,2		12,1		21,7		28,2	
Displacements	δ_{V0}	(mm)	2,1		1,2		1,6		1,7		3,8	
	$\delta_{V\infty}$	(mm)	3,2		1,8		2,4		2,5		5,7	

1) Use restricted to anchoring of structural components statically indeterminated.

SPIT FIX3 torque-controlled expansion anchor	**Annex 8**
Displacements	**of European Technical Approval ETA-13/0005**