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Designated according to Article 29 of Regulation (EU) No 305/2011

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European Technical Assessment

ETA-04/0010 of 24/01/2017

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial *Trade name*	**SPIT FIX Z A4**
Famille de produit *Product family*	**Cheville métallique à expansion par vissage à couple contrôlé, de fixation dans le béton fissuré et non fissuré** **diamètres M8, M10, M12 et M16** ***Torque-controlled expansion anchor for use in cracked and uncracked concrete: sizes M8, M10, M12 and M16***
Titulaire *Manufacturer*	**Société SPIT** **Route de Lyon** **26501 Bourg-Les-Valence** **France**
Usine de fabrication *Manufacturing plant*	**Société SPIT** **Route de Lyon** **26501 Bourg-Les-Valence** **France**
Cette evaluation 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*	EAD 330232-00-0601
Cette evaluation remplace: *This Assessment replaces*	ATE 0 4 / 0 0 1 0 valide du 28/06/2013 au 23/01/2017 *ETA-0 4 / 0 0 1 0 with validity from 28/06/2013 to 23/01/2017*

Specific Part

1 Technical description of the product

The SPIT FIX Z A4 anchor in the range of M8 to M16 is an anchor made of stainless steel.

The anchor 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	See Annex C 1
Characteristic shear resistance	See Annex C 2
Displacements	See Annex C 5

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Characteristic tension resistance under fire exposure	See Annex C 3
Characteristic shear resistance under fire exposure	See Annex C 4

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 B 1 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.

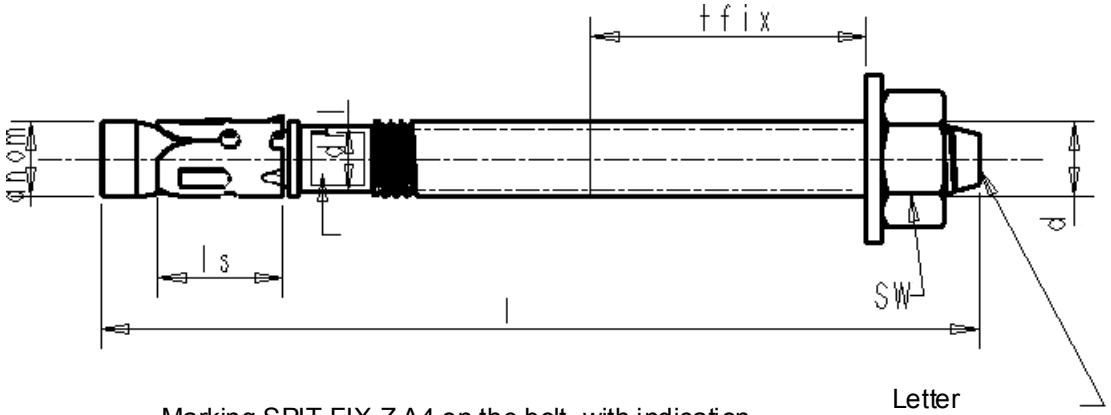
The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

The original French version is signed by

Charles Baloche
Technical Director

1 Official Journal of the European Communities L 254 of 08.10.1996

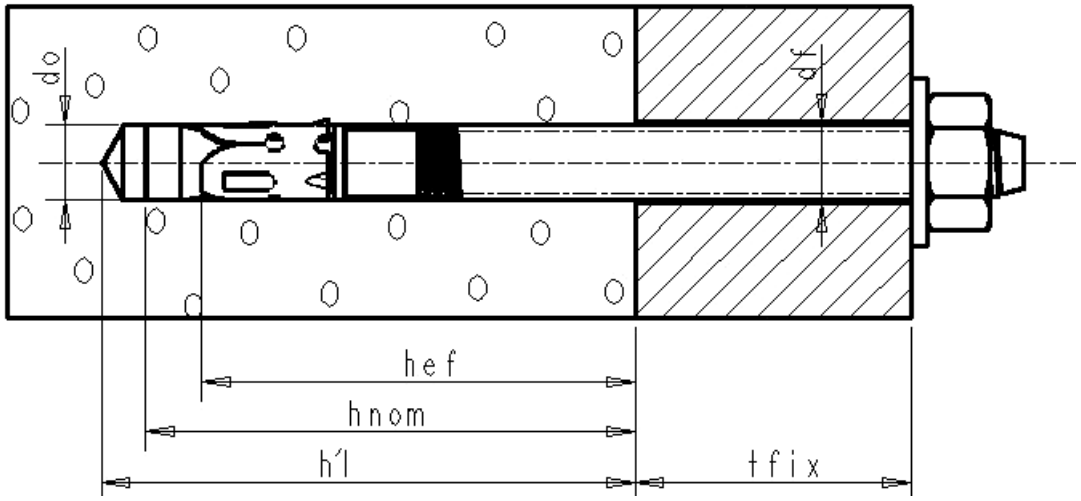
Assembled anchor and schema of the anchor in use:



Marking SPIT FIX Z A4 on the bolt, with indication of the nominal diameter and different fixture thickness.

Example : SPIT FIX Z A4 M12/30-10

Letter code marking



SPIT FIX Z A4 torque-controlled expansion anchor	
Product description Installation condition	**Annex A1**

Different parts of the anchor:

Table 1: Materials

Part	Designation	Material	Protection
1	Bolt	M8, M10, M12 and M16 NF EN 10088.3	-
2	Sleeve	NF EN 10088.3	-
3	Washer	Stainless steel A4, NF EN 20898	-
4	Hexagonal nut	Stainless steel A4-80, NF EN 20898-2	-

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads,
- Fire.

Base materials:

- Cracked concrete and 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.

Use conditions (Environmental conditions):

- The 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. Such 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 1992-4-4:2009 " Design of fastenings for use in concrete” under the responsibility of an engineer experienced in anchorages and concrete work.
- For application with resistance under fire exposure the anchorages are designed in accordance with method given in TR020 “Evaluation of Anchorage in Concrete concerning Resistance to Fire”.
- 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 2: Anchor dimensions				**M8**	**M10**	**M12**	**M16**
Length of the anchor	**Min.**	**L**	**[mm]**	55	65	79	125
	Max.		**[mm]**	130	121	140	170
Fixture thickness	**Min.**	t_{fix}	**[mm]**	5	5	5	8
	Max.		**[mm]**	80	60	65	75
Length expansion sleeve		l_{clip}	**[mm]**	14,7	18,0	20,0	24,0
Width torque wrench		**SW**	**[mm]**	13	17	19	24

Table 3: Installation data			**M8**	**M10**	**M12**	**M16**
Drill hole diameter	d_{cut}	**[mm]**	≤ 8,45	≤ 10,45	≤ 12,50	≤ 16,50
Nominal drilling diameter	d_0	**[mm]**	8	10	12	16
Drill hole depth for $h_{ef,min}$	$h_{1,min}$	**[mm]**	52	62	75	95
Drill hole depth for $h_{ef,max}$	$h_{1,max}$	**[mm]**	65	78	95	117
Embedment depth	$h_{ef,min}$	**[mm]**	35	42	50	64
	$h_{ef,max}$	**[mm]**	48	58	70	86
Installation torque	T_{inst}	**[Nm]**	20	35	50	100
Diameter through hole fixture	d_f	**[mm]**	9	12	14	18
Min. member thickness $h_{ef,min}$	$h_{min,1}$	**[mm]**	100	100	100	128
Min. member thickness $h_{ef,max}$	$h_{min,2}$		100	116	140	172
Minimum edge and spacing distances for $h_{ef,min}$	c_{min}	**[mm]**	60	65	100	100
	s_{min}	**[mm]**	60	75	170	150
Minimum edge and spacing distances for $h_{ef,max}$	c_{min}	**[mm]**	60	65	90	105
	s_{min}	**[mm]**	50	55	75	90

SPIT FIX Z 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 design method A

				M8	M10	M12	M16
Steel failure							
Char. resistance		$N_{Rk,s}$	[kN]	16,7	26,8	40.7	62,4
Partial safety factor		γ_{Ms} [1)]	[-]	1,81	1,71	1,87	2,11
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$							
Minimum embedment depth $h_{ef,min}$							
Char. resistance in concrete C20/25	cracked	$N^0_{Rk,p,cr}$	[kN]	3	6	7,5	12
	non-cracked	$N^0_{Rk,p,ucr}$	[kN]	9	9	12	20
Maximum embedment depth $h_{ef,max}$							
Char. resistance in concrete C20/25	cracked	$N^0_{Rk,p,cr}$	[kN]	4	7,5	9	16
	non-cracked	$N^0_{Rk,p,ucr}$	[kN]	12	16	16	30
Partial safety factor for cracked or non-cracked concrete		$\gamma_2 = \gamma_{inst}$ [1)]	[-]	1,0			
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22			
	concrete C40/50		[-]	1,41			
	concrete C50/60		[-]	1,55			
Concrete cone failure and splitting failure							
Factor for determination of the resistance to concrete cone failure		$k_1=k_{cr}$	[-]	Values are given in TR055 depending of the design guide			
		$k_1=k_{ucr}$	[-]				
Minimum effective embedment depth		$h_{ef,min}$	[mm]	35 [2)]	42	50	64
Char. spacing	concrete cone failure	$s_{cr,N}$	[mm]	105	126	150	192
	splitting failure	$s_{cr,sp}$	[mm]	210	210	250	320
Char. edge distance	concrete cone failure	$c_{cr,N}$	[mm]	53	63	75	96
	splitting failure	$c_{cr,sp}$	[mm]	105	105	125	160
Maximum effective embedment depth		$h_{ef,max}$	[mm]	48	58	70	86
Char. spacing	concrete cone failure	$s_{cr,N}$	[mm]	144	174	210	258
	splitting failure	$s_{cr,sp}$	[mm]	290	290	350	430
Char. edge distance	concrete cone failure	$c_{cr,N}$	[mm]	72	87	105	129
	splitting failure	$c_{cr,sp}$	[mm]	145	145	175	215
Partial safety factor for craked or non-cracked concrete		$\gamma_2 = \gamma_{inst}$ [1)]		1,0			

[1)] In absence of other national regulations

[2)] Use restricted to anchoring of structural components statically indeterminate

SPIT FIX Z A4 torque-controlled expansion anchor

Design according to Technical Report TR055
Characteristic resistance under tension loads

Annex C1

Table 5: Characteristic values for shear loads in case of static and quasi static loading for design design method A

				M8	M10	M12	M16
Steel failure without lever arm							
Char. resistance		$V_{Rk,s}$	[kN]	12,4	18,6	29,5	45,5
Partial safety factor		γ_{Ms} [1)]	[-]	1,51	1,42	1,56	1,76
Factor taking account of the ductility		$k_2 = k_7$	[-]	0,8	0,8	0,8	0,8
Steel failure with lever arm							
Char. bending resistance		$M^0_{Rk,s}$	[Nm]	25	48	92	193
Partial safety factor		γ_{Ms} [1)]	[-]	1,51	1,42	1,56	1,76
Concrete pry-out failure							
Factor for determination of resistance to pryout failure	$h_{ef,min}$	$k_3 = k_8$	[-]	1,0	1,0	1,0	2,0
	$h_{ef,max}$	$k_3 = k_8$	[-]	1,0	1,0	2,0	2,0
Partial safety factor		$\gamma_2 = \gamma_{inst}$ [1)]	[-]	1,0			
Concrete edge failure							
Effective length of anchor under shear loading	$h_{ef,min}$	l_f	[mm]	35	42	50	64
	$h_{ef,max}$	l_f	[mm]	48	58	70	86
Outside diameter of anchor		d_{nom}	[mm]	8	10	12	16
Partial safety factor		$\gamma_2 = \gamma_{inst}$ [1)]	[-]	1,0			

[1)] In absence of other national regulations

Table 10: Characteristic tension resistance in cracked and non-cracked concrete under fire exposure acc. TR020

				M8	M10	M12	M16
Steel failure							
Characteristic resistance		R30 $N_{Rk,s,fi}$	[kN]	4.9	7.7	11.3	21.0
		R60 $N_{Rk,s,fi}$	[kN]	3.2	5.1	8.2	15.2
		R90 $N_{Rk,s,fi}$	[kN]	1.5	2.4	5.1	9.5
		R120 $N_{Rk,s,fi}$	[kN]	0.7	1.1	3.5	6.6
Pullout failure (cracked and non-cracked concrete)							
Char. resistance in concrete ≥ C20/25	$h_{ef,min}$	R30 $N_{Rk,p,fi}$	[kN]	0.8	1.5	1.9	3.0
		R60 $N_{Rk,p,fi}$	[kN]	0.8	1.5	1.9	3.0
		R90 $N_{Rk,p,fi}$	[kN]	0.8	1.5	1.9	3.0
		R120 $N_{Rk,p,fi}$	[kN]	0.6	1.2	1.5	2.4
	$h_{ef,max}$	R30 $N_{Rk,p,fi}$	[kN]	1.0	1.9	2.3	4.0
		R60 $N_{Rk,p,fi}$	[kN]	1.0	1.9	2.3	4.0
		R90 $N_{Rk,p,fi}$	[kN]	1.0	1.9	2.3	4.0
		R120 $N_{Rk,p,fi}$	[kN]	0.8	1.5	1.8	3.2
Concrete cone and splitting failure[2] (cracked and non-cracked concrete)							
Char. resistance in concrete ≥ C20/25	$h_{ef,min}$	R30 $N^0_{Rk,c,fi}$	[kN]	1.3	2.1	3.2	5.9
		R60 $N^0_{Rk,c,fi}$	[kN]	1.3	2.1	3.2	5.9
		R90 $N^0_{Rk,c,fi}$	[kN]	1.3	2.1	3.2	5.9
		R120 $N^0_{Rk,c,fi}$	[kN]	1.0	1.6	2.5	4.7
	$h_{ef,max}$	R30 $N^0_{Rk,c,fi}$	[kN]	2.9	4.6	7.4	12.3
		R60 $N^0_{Rk,c,fi}$	[kN]	2.9	4.6	7.4	12.3
		R90 $N^0_{Rk,c,fi}$	[kN]	2.9	4.6	7.4	12.3
		R120 $N^0_{Rk,c,fi}$	[kN]	2.3	3.7	5.9	9.9
Characteristic spacing		$s_{cr,N,fi}$	[mm]	4 x h_{ef}			
Characteristic edge distance		$c_{cr,N,fi}$	[mm]	2 x h_{ef}			

1) Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.1.

2) As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \cdot h_{ef}$.

In absence of national regulation, the partial safety factor $\gamma_{Ms} = 1,0$ is recommended in fire situation

SPIT FIX Z A4 torque-controlled expansion anchor

Design according to Technical Report TR020
Characteristic tension resistance under fire exposure

Annex C3

Table 11: Characteristic shear resistance in cracked and non-cracked concrete under fire exposure for design method A acc. TR020

				M8	M10	M12	M16
Steel failure without lever arm							
Characteristic resistance		R30 $V_{Rk,s,fi}$	[kN]	4.9	7.7	11.3	21.0
		R60 $V_{Rk,s,fi}$	[kN]	3.2	5.1	8.2	15.2
		R90 $V_{Rk,s,fi}$	[kN]	1.5	2.4	5.1	9.5
		R120 $V_{Rk,s,fi}$	[kN]	0.7	1.1	3.5	6.6
Steel failure with lever arm							
Characteristic bending moment		R30 $M^0_{Rk,s,fi}$	[Nm]	5.0	9.9	17.5	44.5
		R60 $M^0_{Rk,s,fi}$	[Nm]	3.3	6.5	12.7	32.3
		R90 $M^0_{Rk,s,fi}$	[Nm]	1.6	3.1	7.9	20.1
		R120 $M^0_{Rk,s,fi}$	[Nm]	0.7	1.5	5.5	14.0
Concrete pry-out failure							
Factor for determination of resistance to pryout failure	$h_{ef,min}$	$k_3 = k_8$	[-]	1,0	1,0	1,0	2,0
	$h_{ef,max}$	$k_3 = k_8$	[-]	1,0	1,0	2,0	2,0

[1)] Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.2.

TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \cdot h_{ef}$.

Table 13: Displacements under tension loading

				M8	M10	M12	M16
Non-cracked concrete C20/25	Tension load for $h_{ef,min}$	N	[kN]	3,6	3,6	4,8	7,9
	Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,1
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,4	0,4
	Tension load for $h_{ef,max}$	N	[kN]	3,6	6,4	6,4	11,9
	Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,1
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,4	0,4
Non-cracked concrete C50/60	Tension load for $h_{ef,min}$	N	[kN]	5,5	5,5	7,4	12,3
	Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,9
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,4	0,9
	Tension load for $h_{ef,max}$	N	[kN]	5,5	9,8	9,8	18,5
	Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	4,1
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,4	4,1
Cracked concrete C20/25	Tension load for $h_{ef,min}$	N	[kN]	1,2	2,4	3,0	4,8
	Displacement	δ_{N0}	[mm]	0,4	0,4	0,5	0,6
		$\delta_{N\infty}$	[mm]	0,5	0,8	0,8	1,0
	Tension load for $h_{ef,max}$	N	[kN]	1,6	3,0	3,6	6,4
	Displacement	δ_{N0}	[mm]	0,6	0,6	0,6	0,3
		$\delta_{N\infty}$	[mm]	1,0	1,0	1,0	1,0
Cracked concrete C50/60	Tension load for $h_{ef,min}$	N	[kN]	1,9	3,7	4,6	7,4
	Displacement	δ_{N0}	[mm]	0,8	1,1	0,5	0,5
		$\delta_{N\infty}$	[mm]	0,8	1,1	0,8	1,0
	Tension load for $h_{ef,max}$	N	[kN]	2,5	4,6	5,5	9,8
	Displacement	δ_{N0}	[mm]	0,8	1,1	0,6	0,6
		$\delta_{N\infty}$	[mm]	1,0	1,1	1,0	1,0

Table 14: Displacements under shear loads

			M8	M10	M12	M16
Shear load in non-cracked concrete C20/25 to C50/60		**[kN]**	5,4	8,6	12,4	18,1
Displacement	δ_{V0}	[mm]	3,4	3,5	3,6	3,8
	$\delta_{V\infty}$	[mm]	5,1	5,2	5,4	5,7
Shear load in cracked concrete C20/25 to C50/60		**[kN]**	5,4	8,6	12,4	18,1
Displacement	δ_{V0}	[mm]	4,2	4,4	4,6	5,0
	$\delta_{V\infty}$	[mm]	4,2	4,4	4,6	5,0

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

SPIT FIX Z A4 torque-controlled expansion anchor

Annex C5

Design
Displacements