Designated according to Article29 of Regulation (EU) Nº 305/2011

Member of EOTA
www.eota.eu

INSTITUTO DE CIENCIAS DE LA CONSTRUCCIÓN EDUARDO TORROJA
C/ Serrano Galvache n. 4 28033 Madrid (Spain)
Tel.: (34) 91 302 04 40
direccion.ietcc@csic.es https://dit.ietcc.csic.es

European Technical Assessment ETA 17/0073 of 23/06/2021

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product:	**SPIT FIX Z XTREM.220**
Product family to which the construction product belongs:	Torque controlled expansion anchor made of galvanized steel of sizes M12 and M16 for use in cracked or uncracked concrete.
Manufacturer:	**Spit SAS** 150, Route de Lyon 26500 Bourg-les-Valence. France. website: www.spitpaslode.com
Manufacturing plants:	Plant 2
This European Technical Assessment contains:	13 pages including 3 annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of:	European Technical Assessment EAD 330232-00-0601 “Mechanical Fasteners for use in concrete”, ed. October 2016
This version replaces:	ETA 17/0073 version 1 issued on 25/04/2017

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to article 25 (3) of Regulation (EU) No 305/2011.

SPECIFIC PART

1. Technical description of the product

The Spit FIX Z XTREM.220 wedge anchor in the range of M12 and M16 is an anchor made of galvanised steel, with length greater than 220 mm. The anchor is installed into a predrilled cylindrical hole and anchored by torque-controlled expansion. The anchorage is characterized by friction between expansion clip and concrete.

Product and installation descriptions are given in annexes A1 and A2.

2. Specification of the intended use in accordance with the applicable European Assessment Document.

The performances given in section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 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 mean to choosing the right products in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance under static or quasi static loading	See annexes C1 and C2
Displacements under tension and shear loads	See annex C3
Characteristic resistance under seismic loading categories C1 and C2	See annex C4 and C5

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for class A1
Resistance to fire	See annex C6

4. Assessment and Verification of Constancy of Performances (hereinafter AVCP) system applied, with reference to its legal base

The applicable European legal act for the system of Assessment and Verification of Constancy of Performances (see annex V to Regulation (EU) No 305/2011) is 96/582/EC.

The system to be applied is 1.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document.

The technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de Ciencias de la Construcción Eduardo Torroja.

Instituto de Ciencias de la Construcción Eduardo Torroja
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

C/ Serrano Galvache n.º 4. 28033 Madrid.
Tel: (+34) 91 302 04 40
https://dit.ietcc.csic.es

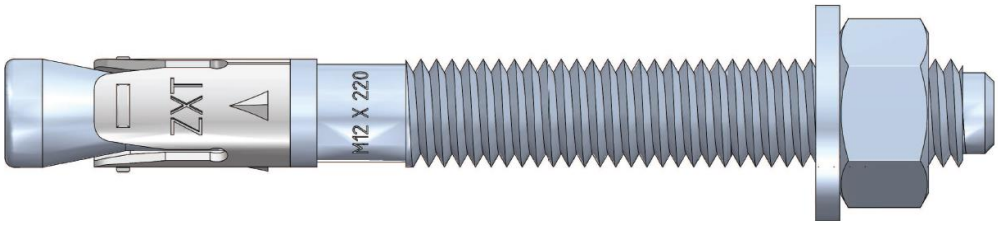
On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 23rd of June 2021

Firmado por CASTILLO TALAVERA ANGEL - DNI 52507605P
Fecha: 02/07/2021 09:05:43 CEST

Director IETcc - CSIC

Product and installed condition

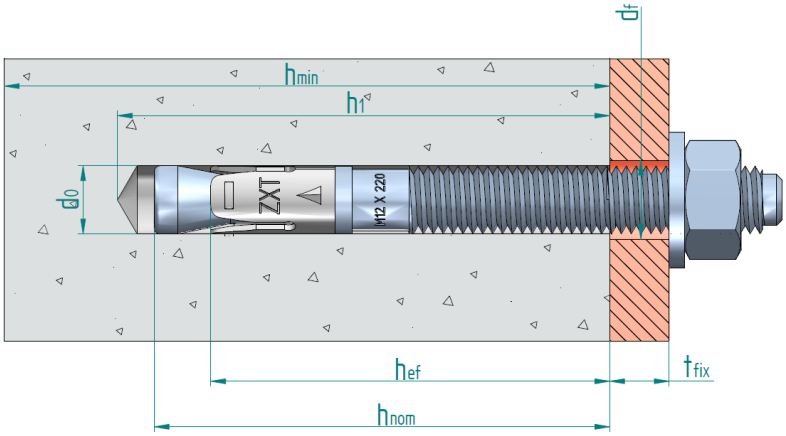
FIX Z XTREM.220 anchor



Identification on anchor:

- Expansion clip: Company logo + “FIX” + “ZXT”.
- Anchor body: Metric x Length
- Length letter code on head:

Letter on head	Length [mm]
O	220 ÷ 228
P	229 ÷ 240
Q	241 ÷ 253
R	254 ÷ 266
S	267 ÷ 300



d_0: Nominal diameter of drill bit
d_f: Fixture clearance hole diameter
h_{ef}: Effective anchorage depth
h_1: Depth of drilled hole
h_{nom}: Overall anchor embedment depth in the concrete
h_{min}: Minimum thickness of concrete member
t_{fix}: Fixture thickness

FIX Z XTREM.220 anchor	**Annex A1**
Product description Installed condition	

Table A1: materials

Item	Designation	Material for SPIT FIX Z XTREM.220 anchor
1	Anchor body	Carbon steel wire rod, galvanized ≥ 5 µm ISO 4042 Zn5/An/T0 with antifriction coating
2	Washer	DIN 125, DIN 9021, DIN 440 galvanized ≥ 5 µm ISO 4042 Zn5/An/T0
3	Nut	DIN 934 class 6, galvanized ≥ 5 µm ISO 4042 Zn5/An/T0
4	Expansion clip	Stainless steel, grade A4

Specifications of intended use

Anchorages subjected to:

- Static or quasi static loads
- Seismic actions: performance categories C1 and C2
- Resistance to fire exposure up to 120 minutes

Base materials:

- Reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013+A1:2018
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2018
- Cracked or uncracked concrete

Use conditions (environmental conditions):

- Anchorages subjected to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete.
- Verifiable calculation rules and drawings are prepared taking into 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 supports, etc.).
- Anchorages under static or quasi-static actions are designed for design method A in accordance with EN 1992-4:2018
- Anchorages under seismic actions are designed in accordance with EN 1992-4:2018. Anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure. Fastening in stand-off installation or with grout layer are not allowed.
- Anchorages under fire exposure are designed in accordance with EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

Installation:

- Hole drilling by rotary plus hammer mode.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.

FIX Z XTREM.220 anchor	**Annex B1**
Intended use Specifications	

Table C1: Installation parameters for FIX Z XTREM.220 anchor

Installation parameters			Performances	
			M12	M16
d_0	Nominal diameter of drill bit:	[mm]	12	16
d_f	Fixture clearance hole diameter:	[mm]	14	18
T_{inst}	Nominal installation torque:	[Nm]	60	100
L_{min}	Minimum total length of the bolt:	[mm]	220	220
h_{min}	Minimum thickness of concrete member:	[mm]	140	170
h_1	Depth of drilled hole:	[mm]	85	105
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	80	97
h_{ef}	Effective anchorage depth:	[mm]	70	85
t_{fix}	Thickness of fixture for washer DIN 125 ≤ [1)]	[mm]	L – 96	L - 117
t_{fix}	Thickness of fixture for washers DIN 9021, DIN 440 ≤ [1)]	[mm]	L – 97	L - 118
s_{min}	Minimum allowable spacing:	[mm]	70	85
c_{min}	Minimum allowable distance:	[mm]	70	85

[1)] L = total anchor length

Installation process

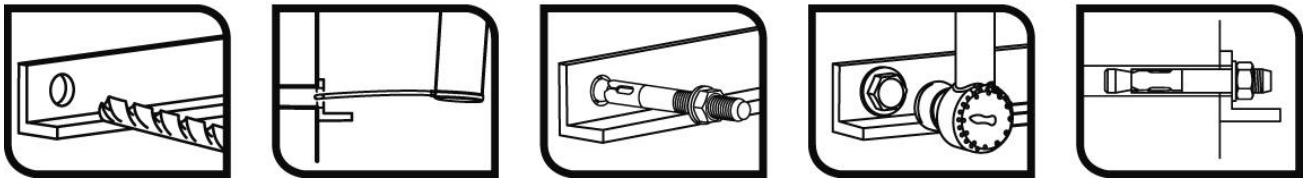


Table C2: Characteristic values to tension loads of design method A according to EN 1992-4 for FIX Z XTREM.220 anchor

Characteristic values of resistance to tension loads of design according to design method A				Performances	
				M12	M16
Tension loads: steel failure					
$N_{Rk,s}$	Characteristic resistance:		[kN]	40.4	72.7
γ_{Ms} 1)	Partial safety factor:		[-]	1.5	1.5
Tension loads: pull-out failure in concrete					
$N_{Rk,p,ucr}$	Characteristic resistance in C20/25 uncracked concrete:		[kN]	20	35
$N_{Rk,p,cr}$	Characteristic resistance in C20/25 cracked concrete:		[kN]	12	25
γ_{ins}	Installation safety factor:		[-]	1.0	1.0
ψ_c	Increasing factor for $N^0_{Rk,p}$:	C30/37	[-]	1.22	1.22
		C40/50	[-]	1.41	1.41
		C50/60	[-]	1.55	1.55
Tension loads: concrete cone and splitting failure					
h_{ef}	Effective embedment depth:		[mm]	70	85
$k_{ucr,N}$	Factor for uncracked concrete:		[-]	11.0	
$k_{cr,N}$	Factor for cracked concrete:		[-]	7,7	
γ_{ins}	Installation safety factor:		[-]	1.0	1.0
$s_{cr,N}$	Concrete cone failure:		[mm]	3 x h_{ef}	
$c_{cr,N}$			[mm]	1.5 x h_{ef}	
$s_{cr,sp}$	Splitting failure:		[mm]	350	425
$c_{cr,sp}$			[mm]	175	213

1) In absence of other national regulations

Table C3: Characteristic values to shear loads of design method A according to EN 1992-4 for FIX Z XTREM.220 anchor

Characteristic values of resistance to shear loads of design according to design method A			Performances	
			M12	M16
Shear loads: steel failure without lever arm				
$V_{Rk,s}$	Characteristic resistance:	[kN]	25.3	47.1
k_7	Ductility factor:	[-]	1.0	
γ_{Ms} 1)	Partial safety factor:	[-]	1.25	1.25
Shear loads: steel failure with lever arm				
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	78.6	199.8
γ_{Ms} 1)	Partial safety factor:	[-]	1.25	1.25
Shear loads: concrete pryout failure				
k_8	Pryout factor:	[-]	2	2
γ_{ins}	Installation safety factor:	[-]	1.0	
Shear loads: concrete edge failure				
ℓ_f	Effective length of anchor under shear loads:	[mm]	70	85
d_{nom}	Outside anchor diameter:	[mm]	12	16
γ_{ins}	Installation safety factor:	[-]	1.0	

1) In absence of other national regulations

Table C4: Displacements under tension load for FIX Z XTREM.220 anchor

Displacements under tension loads			Performances	
			M12	M16
N	Service tension load:	[kN]	6.3	10.4
δ_{N0}	Short term displacement:	[mm]	1.0	0.4
$\delta_{N\infty}$	Long term displacement:	[mm]	1.9	1.9

Table C5: Displacements under shear load for FIX Z XTREM.220 anchor

Displacements under shear loads			Performances	
			M12	M16
V	Service shear load:	[kN]	8.5	15.1
δ_{V0}	Short term displacement:	[mm]	1.8	1.9
$\delta_{V\infty}$	Long term displacement:	[mm]	2.7	2.9

Table C6: Design information for seismic performance C1 FIX Z XTREM.220 anchor

Design information for seismic performance C1			Performances	
			M12	M16
Steel failure for tension and shear failure				
$N_{Rk,s,C1}$	Characteristic tension steel failure:	[kN]	40.4	72.7
$\gamma_{Ms,N}$ [1)]	Partial safety factor:	[-]	1.5	1.5
$V_{Rk,s,C1}$	Characteristic shear steel failure:	[kN]	17.8	33.0
$\gamma_{Ms,V}$ [1)]	Partial safety factor:	[-]	1.25	1.25
Pull out failure				
$N_{Rk,p,C1}$	Characteristic pull out failure:	[kN]	8.4	17.5
γ_{ins}	Installation safety factor:	[-]	1.0	1.0
Concrete cone failure				
h_{ef}	Effective embedment depth:	[mm]	70	85
$s_{cr,N}$	Spacing:	[mm]	3 x h_{ef}	
$c_{cr,N}$	Edge distance:	[mm]	1.5 x h_{ef}	
γ_{ins}	Installation safety factor:	[-]	1.0	1.0
Concrete pryout failure				
k_8	Pryout factor:	[-]	2	2
Concrete edge failure				
ℓ_f	Effective length of anchor:	[mm]	70	85
d_{nom}	Outside anchor diameter:	[-]	12	16

[1)] In absence of other national regulations

Table C7: Design information for seismic performance C2 FIX Z XTREM.220 anchor

Design information for seismic performance C2			Performances	
			M12	M16
Steel failure for tension and shear failure				
$N_{Rk,s,C2}$	Characteristic tension steel failure:	[kN]	40.4	72.7
$\gamma_{Ms,N}$ [1)]	Partial safety factor:	[-]	1.5	1.5
$V_{Rk,s,C2}$	Characteristic shear steel failure:	[kN]	17.8	33.0
$\gamma_{Ms,V}$ [1)]	Partial safety factor:	[-]	1.25	1.25
Pull out failure				
$N_{Rk,p,C2}$	Characteristic pull out failure:	[kN]	5.2	8.9
γ_{ins}	Installation safety factor:	[-]	1.0	1.0
Concrete cone failure				
h_{ef}	Effective embedment depth:	[mm]	70	85
$s_{cr,N}$	Spacing:	[mm]	3 x h_{ef}	
$c_{cr,N}$	Edge distance:	[mm]	1.5 x h_{ef}	
γ_{ins}	Installation safety factor:	[-]	1.0	1.0
Concrete pryout failure				
k_8	Pryout factor:	[-]	2	2
Concrete edge failure				
ℓ_f	Effective length of anchor:	[mm]	70	85
d_{nom}	Outside anchor diameter:	[-]	12	16
Displacements				
$\delta_{N,C2\ (DLS)}$	Displacement Damage Limitation State: [2) 3)]	[mm]	2.34	3.99
$\delta_{V\ C2\ (DLS)}$		[mm]	5.53	5.96
$\delta_{N,C2\ (ULS)}$	Displacement Ultimate Limit State: [2)]	[mm]	9.54	10.17
$\delta_{V,C2\ (ULS)}$		[mm]	9.08	10.66

[1)] In absence of other national regulations
[2)] The listed displacements represent mean values
[3)] A small displacement may be required in the design in the case of displacements sensitive fastening of “rigid” supports. The characteristics resistance associated with such small displacements may be determined by linear interpolation or proportional reduction.

Table C8: Characteristic values for resistance to fire FIX Z XTREM.220 anchor

Characteristic values for resistance to fire				Performances	
				M12	M16
Steel failure					
$N_{Rk,s,fi}$	Characteristic tension resistance:	R30	[kN]	1,7	3,1
		R60	[kN]	1,3	2,4
		R90	[kN]	1,1	2,0
		R120	[kN]	0,8	1,6
$V_{Rk,s,fi}$	Characteristic shear resistance:	R30	[kN]	1,7	3,1
		R60	[kN]	1,3	2,4
		R90	[kN]	1,1	2,0
		R120	[kN]	0,8	1,6
$M^0_{Rk,s,fi}$	Characteristic bending resistance:	R30	[Nm]	2,6	6,7
		R60	[Nm]	2,0	5,0
		R90	[Nm]	1,7	4,3
		R120	[Nm]	1,3	3,3
Pull out failure					
$N_{Rk,p,fi}$	Characteristic resistance:	R30 R60 R90	[kN]	3,0	6,3
		R120	[kN]	2,4	5,0
Concrete cone failure [2)]					
$N_{Rk,c,fi}$	Characteristic resistance:	R30 R60 R90	[kN]	7,4	12,0
		R120	[kN]	5,9	9,6
$s_{cr,N,fi}$	Critical spacing:	R30 to R120	[mm]	4 x h_{ef}	
$s_{min,fi}$	Minimum spacing:	R30 to R120	[mm]	70	85
$c_{cr,N,fi}$	Critical edge distance:	R30 to R120	[mm]	2 x h_{ef}	
$c_{min,fi}$	Minimum edge distance:	R30 to R120	[mm]	c_{min} = 2 x h_{ef}; if fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm and ≥ 2 x h_{ef}	
Concrete pry out failure					
k_8	Pryout factor:	R30 to R120	[-]	2	2

[1)] As a rule, splitting failure can be neglected since cracked concrete and reinforcement is assumed.
In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{m,fi}$ = 1,0 is recommended