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European Technical Assessment

ETA-13/0005 of 05/07/2017

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial *Trade name*	**SPIT FIX3**
Famille de produit *Product family*	**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***
Titulaire *Manufacturer*	Société Spit Route de Lyon F-26501 BOURG-LES-VALENCE France
Usine de fabrication *Manufacturing plants*	Société Spit Route de Lyon F-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, "Ancrages mécaniques dans le béton" EAD 330232-00-0601, "Mechanical fasteners for use in concrete"
Cette evaluation remplace: *This Assessment replaces*	ETE-13/0005 délivrée le 15/12/2014 ETA-13/0005 issued at 15/12/2014

Specific Part

1 Technical description of the 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.

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 acc. ETAG001, Annex C	See Annex C 1
Characteristic shear resistance acc. ETAG001, Annex C	See Annex C 2
Characteristic tension resistance acc. CEN/TS 1992-4	See Annex C 3
Characteristic shear resistance acc. CEN/TS 1992-4	See Annex C 4
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

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.

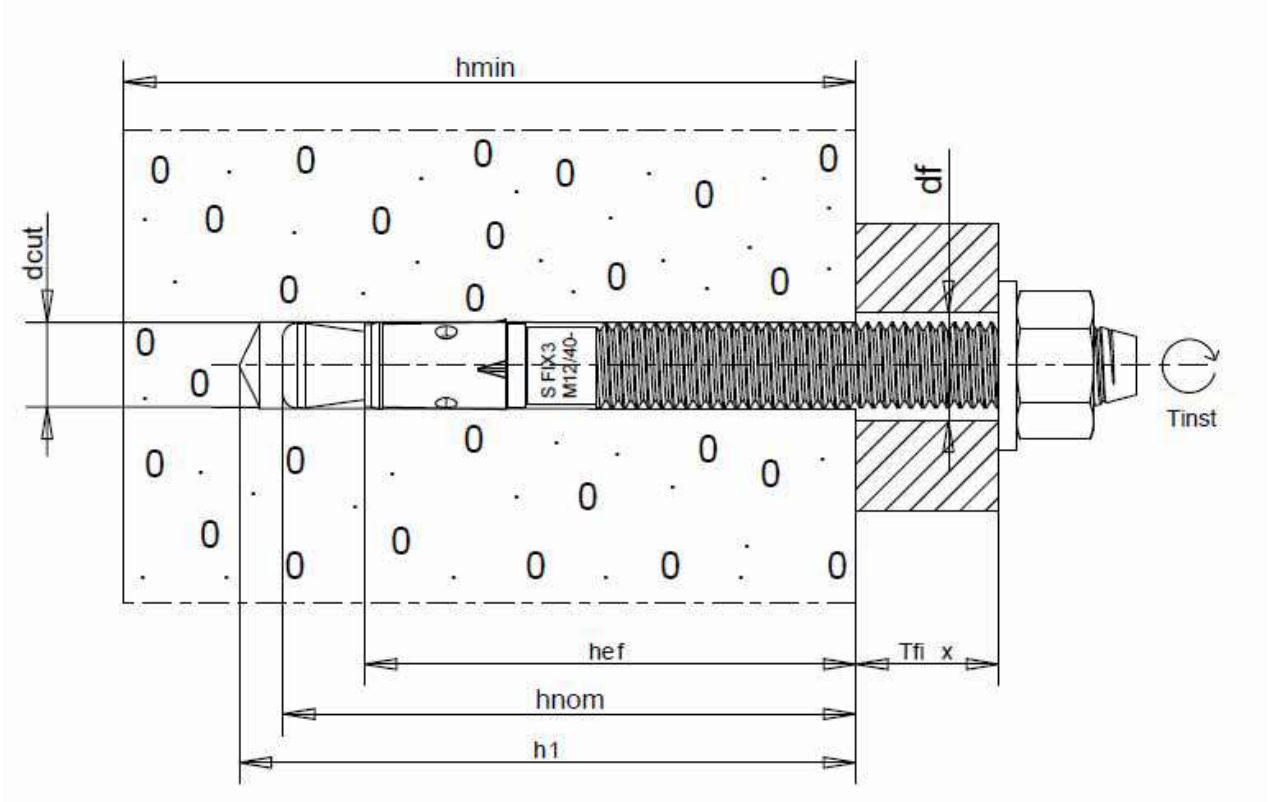
Issued in Marne La Vallée on 05-07-2017 by

Charles Baloche *The original French version is signed*

Directeur technique

[1] Official Journal of the European Communities L 254 of 08.10.1996

Assembled anchor and schema of the anchor in use

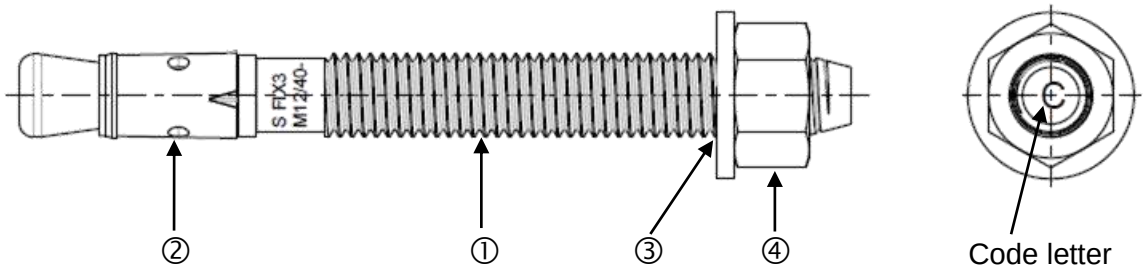


h_{ef} : Effective anchorage depth
h_{nom} : Installation depth
h_1 : Depth of drilled hole to deepest point
t_{fix} : Fixture thickness

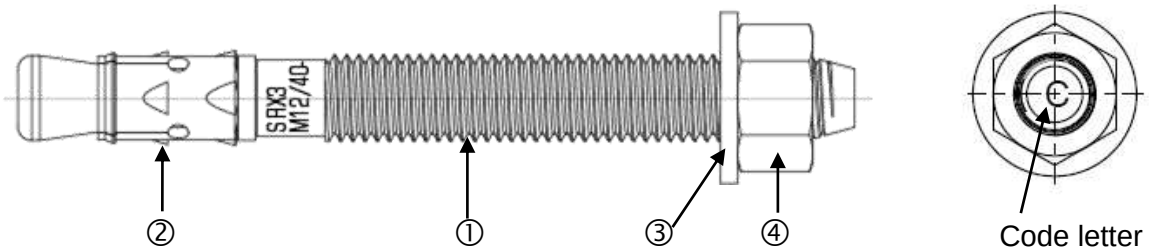
SPIT FIX3 torque-controlled expansion anchor	**Annex A1**
Product description Installation condition	

Different parts of the anchor:

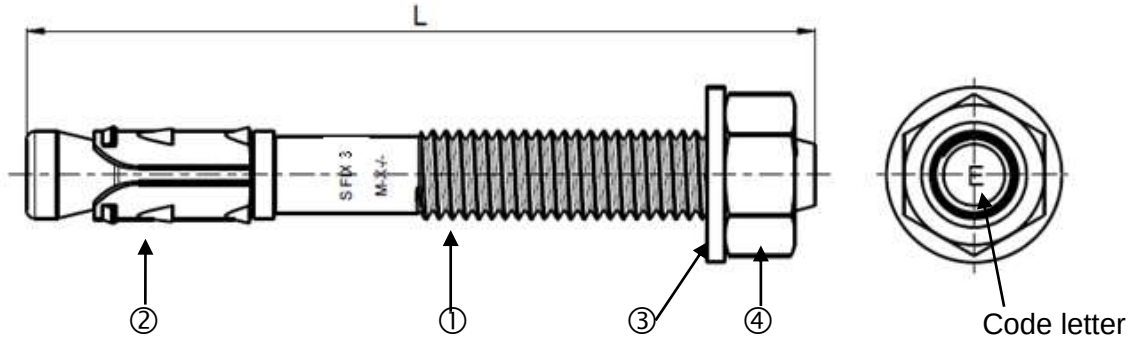
- Type with no slit clip (available for size M8, M10, M16)



- Type with slit clip (available for size M12)



- Specific clip design for size M20



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

SPIT FIX3 torque-controlled expansion anchor	
Product description Materials	**Annex A2**

Table 1: Materials

Part	Designation	Material	Protection
①	Bolt	M8, M10, M12, M16 and M20 : Cold formed NF A 35-053	NF EN 12 329 Galvanized ≥ 5 μm
②	Clip	Cold formed: NF A 35-231	M8-M16 : NF EN 10152 M20 : NF EN 12329 Galvanized ≥ 5 μm
③	Washer	NF E 25 513	NF EN ISO 4042 Galvanized ≥ 5 μm
④	Nut	Steel grade 6 or 8 acc. ISO 898-2	

Table 2 : Washers dimensions

Anchor size			M8	M10	M12	M16	M20
Washer sizes		d1 (mm) inner Ø	8,4	10,5	13	17	21
Washer type	Narrow (standard version)	d2 (mm) outer Ø	16	20	24	30	36
	Broad	d2 (mm) outer Ø	18	22	32	40	50
	X-broad	d2 (mm) outer Ø	22	27	40	50	60

Specifications of intended use

Anchorages subject to:

- Static or quasi-static loads

Base materials:

- Reinforced or unreinforced normal weight concrete of strength classes C 20/25 at least to C50/60 at most according to EN 206: 2000-12.
- Non-cracked concrete

Use conditions (Environmental conditions):

- Structures subject to dry indoor conditions, indoor with temporary condensation.

Design:

- The anchorages are designed in accordance with the ETAG001 Annex C “Design Method for Anchorages” or CEN/TS 1992-4-4 "Design of fastenings for use in concrete” 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.

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.
- 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 3: 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
M20x150/10	150	-	20	22	160	-	-	-	-	-	200	130	113	100	10
M20x170/30	170	K								-					30
M20x220/80	220	O								-					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 4 : 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	-
	Minimum spacing	S_{min}	[mm]	40	40	50	100	100	-
	Minimum edge distance	C_{min}	[mm]	50	45	65	100	100	-
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	130
	Minimum edge distance	C_{min}	[mm]	55		65	70	105	120

SPIT FIX3 torque-controlled expansion anchor

Intended Use
Installation data

Annex B2

Table 5 : Characteristic resistances 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		99,1
Partial safety factor	γ_{Ms} 2)	-	1,50								1,47		1,50
Pull-out failure													
Effective anchorage depth	h_{ef}	[mm]	30 1)		40		40	50	50	65	65	80	100
Characteristic resistance	$N_{Rk,p}$	[kN]	7,5		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	100
Slab thickness	h_{min}	[mm]	80	100	80	100	100	100	100	130	200	160	200
Spacing	$s_{cr,N}$	[mm]	90		120		120	150	150	195	195	240	300
	$s_{cr,sp}$	[mm]	250	170	300	230	210	250	200	340	320	330	370
Edge distance	$c_{cr,N}$	[mm]	45		60		60	75	75	97,5	97,5	120	150
	$c_{cr,sp}$	[mm]	125	85	150	115	105	125	100	170	160	165	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

SPIT FIX3 torque-controlled expansion anchor

Design according to ETAG001, Annex C
Characteristic resistances under tension loads

Annex C1

Table 6: Characteristic resistances 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	100
Steel failure without lever arm											
Characteristic resistance	$V_{Rk,s}$	[kN]	10,0		13,7		27,4		36,5		61,0
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		315,7
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	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	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 7 : Characteristic resistances 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		99,1
Partial safety factor	γ_{Ms} 2)	-	1,50								1,47		1,50
Pull-out failure													
Effective anchorage depth	h_{ef}	[mm]	30 1)		40		40	50	50	65	65	80	100
Characteristic resistance	$N_{Rk,p}$	[kN]	7,5		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	100
Slab thickness	h_{min}	[mm]	80	100	80	100	100	100	100	130	200	160	200
Factor for non-cracked concrete	k_{ucr}	-	10,1										
Spacing	$s_{cr,N}$	[mm]	90		120		120	150	150	195	195	240	300
	$s_{cr,sp}$	[mm]	250	170	300	230	210	250	200	340	320	330	370
Edge distance	$c_{cr,N}$	[mm]	45		60		60	75	75	97,5	97,5	120	150
	$c_{cr,sp}$	[mm]	125	85	150	115	105	125	100	170	160	165	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

Design method A according to CEN/TS 1992-4
Characteristic resistances under tension loads

Annex C3

Table 8: Characteristic resistances 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	100
Steel failure without lever arm											
Characteristic resistance	$V_{Rk,s}$	[kN]	10,0		13,7		27,4		36,5		61,0
Partial safety factor	γ_{Ms} [2]	-	1,25								1,50
Factor considering ductility	k_2	-	1,0								
Steel failure with lever arm											
Characteristic resistance	$M^0_{Rk,s}$	[N.m]	24,0		49,0		85,0		200,0		315,7
Partial safety factor	γ_{Ms} [2]	-	1,25								1,50
Concrete pry-out failure											
k_3 factor	k_3	-	1,0		1,0		1,0	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	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 9: 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	100
Tension load for C20/25	N	[kN]	3,6	6,1	6,1	8,5	8,5	12,6	12,6	17,2	23,8
Displacements	δ_{N0}	[mm]	0,1	0,1	0,1	0,2	0,3	0,9	0,1	0,2	0,4
	$\delta_{N\infty}$	[mm]	1,1								1,7
Tension load for C50/60	N	[kN]	5,5	9,4	9,4	13,2	13,2	19,5	19,5	26,7	36,9
Displacements	δ_{N0}	[mm]	0,1	0,3	0,2	0,4	0,8	2,4	0,2	0,8	0,8
	$\delta_{N\infty}$	[mm]	1,9				2,4		1,9		2,1

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

Table 10: 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	100
Shear load for C20/25 to C50/60	V	[kN]	5,0		8,2		12,1		21,7		34,5
Displacements	δ_{V0}	[mm]	2,1		1,2		1,6		1,7		1,5
	$\delta_{V\infty}$	[mm]	3,2		1,8		2,4		2,5		2,3

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