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European Technical Assessment

ETA-10/0146 of 14/08/2015

General Part

Nom commercial *Trade name*	**DFX**
Famille de produit *Product family*	**Cheville métallique en acier galvanisé, à expansion par déformation contrôlée, pour fixation dans le béton non fissuré: diamètres M6, M8, M10, M12 et M16.** ***Deformation-controlled expansion anchor, made of galvanised steel, for use in non-cracked concrete: sizes M6, M8, M10, M12 and M16.***
Titulaire *Manufacturer*	OUTIFIX 82, rue Saint Lazare 75009 Paris France
Usine de fabrication *Manufacturing plants*	Usine 1
Cette evaluation contient: *This Assessment contains*	10 pages incluant 7 annexes qui font partie intégrante de cette évaluation 10 *pages including 7 annexes which form an integral part of this assessment*
Base de l'ETE *Basis of ETA*	ETAG 001, Version April 2013, utilisée en tant que EAD *ETAG 001, Edition April 2013 used as EAD*
Cette evaluation remplace: *This Assessment replaces*	ATE-10/0146 valide du 14/04/2010 au 18/03/2015 ETA-10/0146 with validity from 14/04/2010 to 18/03/2015

Specific Part

1 Technical description of the product

The OUTIFIX DFX anchor in the range of M6 to M16 is an anchor made of galvanised steel, which is placed into a drilled hole and anchored by deformation-controlled expansion. The OUTIFIX DFX anchor is produced in two versions (OUTIFIX DFX and OUTIFIX DFX L) differing only by a shoulder at the top of the OUTIFIX DFX L body.

The fixture shall be fixed with a fastening screw or threaded rod.

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 or CEN/TS 1992-4	See Annex C1
Characteristic shear resistance acc. ETAG001, Annex C or CEN/TS 1992-4	See Annex C2
Displacements	See Annex C3

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 B1 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.

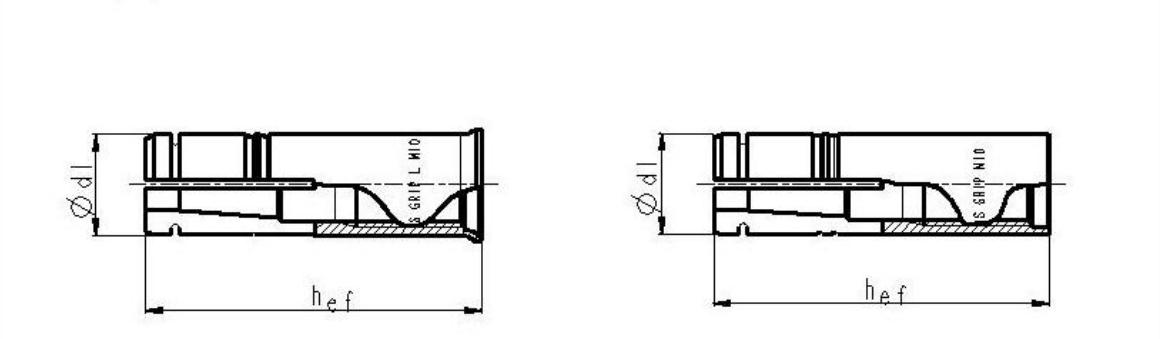
Issued in Marne La Vallée on 14-08-2015 by

Charles Baloche *The original French version is signed*

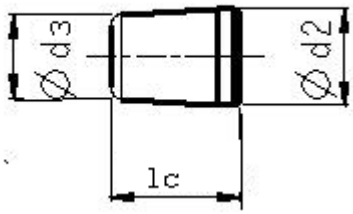
Directeur technique

1 Official Journal of the European Communities L 254 of 08.10.1996

Parts and dimensions



Expansion sleeve - 1



Tapered expansion plug - 2

Table 1 : Dimensions

DFX L and DFX	L M6x30 M6x30	L M8x30 M8x30	L M10x30	L M10x40 M10x40	L M12x50 M12x50	L M16x65 M16x65
h_{ef} [mm]	30	30	30	40	50	65
d_1 [mm]	7.95	9.95	11.95	11.95	14.9	19.8
d_2 [mm]	5	6.5	8.2	8.2	10.3	13.8
d_3 [mm]	4.1	5.8	7.1	7.1	9.3	12.9
l_c [mm]	10	9.5	11	11	14	21

Table 2 : Material

Part	Designation	Material	Protection
1	Expansion sleeve M6 to M16	Steel 11SMnPb30	Galvanized ≥ 5 μm
2	Tapered expansion plug M6 to M16	FB10 NFA 35-053	Galvanized ≥ 5 μm

Requirements for the fastening screw or threaded rod :
Minimum strength class 4.6 acc. to EN ISO 898-1

OUTIFIX DFX	**Annex A1**
Product description Product, dimensions and materials	

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.

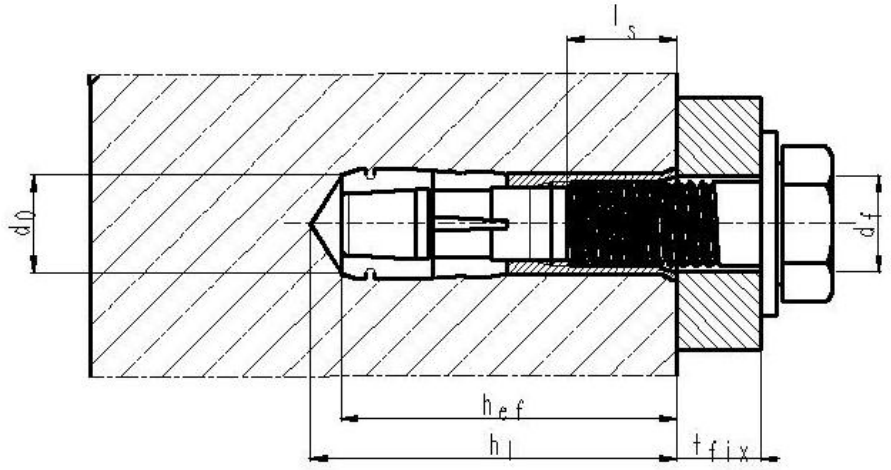
Design:

- 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 (Annexes A and B).
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- The effective setting depth is complied with if the expansion sleeve does not exceed the concrete surface;
- 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.

Schema of the anchor in use



h_{ef} : effective anchorage depth

d_0 : drill hole diameter

h_l : depth of drill hole

d_f : diameter of clearance hole

t_{fix} : fixture thicknessr

Table 3 : Installation data

Size	Drill hole diameter d_0 [mm]	Diameter of the thread d [mm]	Depth of drill hole h_1 [mm]	Effective anchorage depth h_{ef} [mm]	Minimum thickness of concrete h_{min} [mm]	Available internal thread L_{th} [mm]	Minimal screwing depth L_{sdmin} [mm]	Setting torque T_{inst} [Nm]	diameter of clearance hole d_f [mm]
M6x30	8	6	32	30	100	13	10	5	7
M8x30	10	8	33	30	100	13	10	10	9
M10x30	12	10	33	30	100	12	11	22	12
M10x40	12	10	43	40	100	15	12	22	12
M12x50	15	12	54	50	100	21	14	36	14
M16x65	20	16	70	65	130	28	18	80	18

Table 4: Minimum spacing and edge distance

			M6x30	M8x30	M10x30	M10x40	M12x50	M16x65
Minimum spacing	S_{min}	[mm]	60	70	80	95	125	130
Minimum edge distance	C_{min}	[mm]	105	105	140	140	195	227

OUTIFIX DFX

Intended Use
Installation data

Annex B2

Setting tool and marking at complete expansion

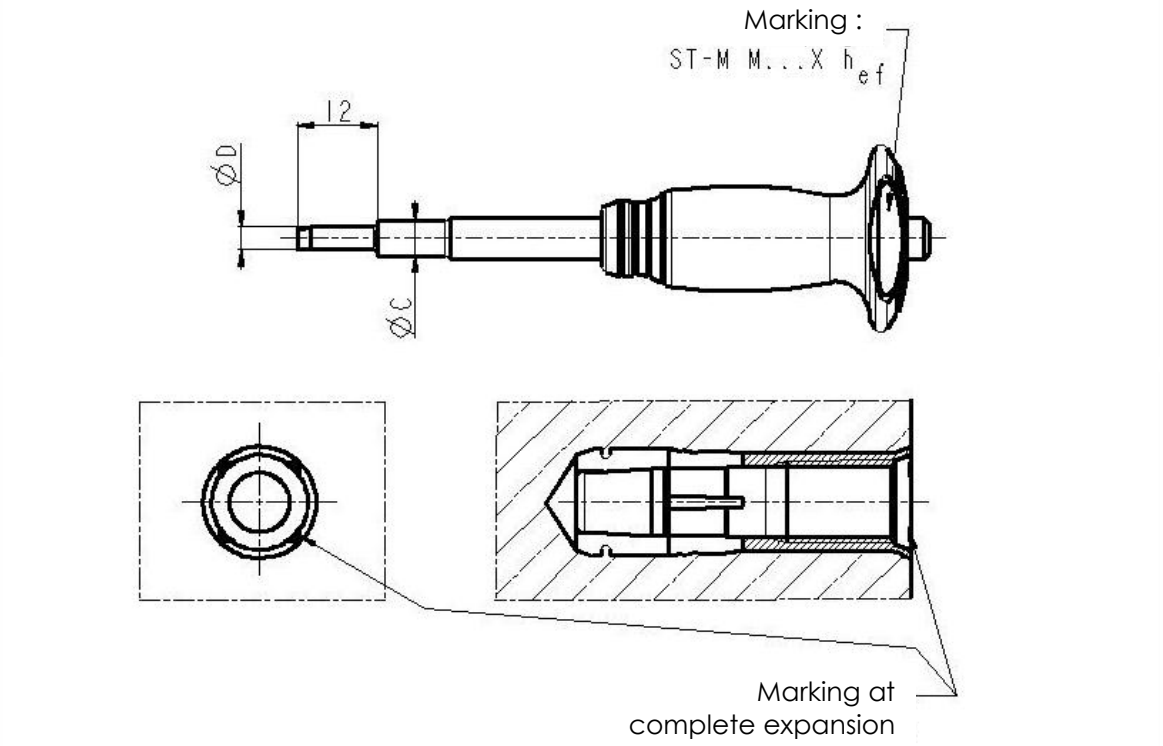


Table 5: Dimensions of the setting tools

Setting tool	Anchor size	∅ D [mm]	∅ C [mm]	l_2 [mm]
ST-M M6x30	M6x30	4.9	8.3	20.0
ST-M M8x30	M8x30	6.4	10.3	20.5
ST-M M10x30	M10x30	8.2	12.5	19.0
ST-M M10x40	M10x40	8.2	12.5	29.0
ST-M M12x50	M12x50	10.0	15.0	36.0
ST-M M16x65	M16x65	13.5	20.0	44.0

Table 6 : Characteristic resistances in tension loads
Design method A, acc. to ETAG001, Annexe C or CEN/TS 1992-4

Anchor size			**M6x30***	**M8x30***	**M10x30***	**M10x40**	**M12x50**	**M16x65**
Steel failure								
Characteristic resistance **steel 4.6**	$N_{Rk,s}$	[kN]	8,0	14,6	23,2		33,7	62,8
Partial safety factor	γ_{Ms} [1)]	-	2,0					
Characteristic resistance **steel 5.6**	$N_{Rk,s}$	[kN]	10,1	18,3	29		42,2	78,5
Partial safety factor	γ_{Ms} [1)]	-	2,0					
Characteristic resistance **steel 5.8**	$N_{Rk,s}$	[kN]	10,1	20,6	26,9		45,6	76,3
Partial safety factor	γ_{Ms} [1)]	-	1,5	1,82	1,82		1,98	1,91
Characteristic resistance **steel 8.8**	$N_{Rk,s}$	[kN]	15	20,6	26,9		45,6	76,3
Partial safety factor	γ_{Ms} [1)]	-	1,63	1,82	1,82		1,98	1,91
Pull-out failure = non decisive failure mode								
Concrete cone failure and splitting failure [2)]								
Effective anchorage depth	h_{ef}	[mm]	30	30	30	40	50	65
Factor for non-cracked concrete	k_{ucr} [3)]	-	10,1					
Increasing factor C30/37	ψ_c	-	1,22					
Increasing factor C40/50	ψ_c	-	1,41					
Increasing factor C50/60	ψ_c	-	1,55					
Partial safety factor	γ_{Mc} [1)]	-	1,8 [4)]					
Spacing	$s_{cr,N}$	[mm]						
Spacing	$s_{cr,sp}$	[mm]	210	210	210	280	350	454
Edge distance	$c_{cr,N}$	[mm]						
Edge distance	$c_{cr,sp}$	[mm]	105	105	105	140	175	227

* use restricted to anchoring of structural elements statically indeterminate

1) In absence of other national regulations

2) 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

3) Parameter relevant only for design according to CEN/TS 1992-4:2009

4) Partial safety factor $\gamma_2 = 1,2$ is included

Table 7: Characteristic resistances in shear loads
Design method A, acc. to ETAG001, Annexe C or CEN/TS 1992-4

Anchor size			**M6x30***	**M8x30***	**M10x30***	**M10x40**	**M12x50**	**M16x65**
Steel failure without lever arm								
Factor considering ductility [1]	k_2	-	1,0					
Characteristic resistance **steel 4.6**	$V_{Rk,s}$	[kN]	4,0	7,3	11,6		16,9	31,4
Partial safety factor	γ_{Ms} [2]	-	1,67					
Characteristic resistance **steel 5.6**	$V_{Rk,s}$	[kN]	5,0	9,2	14,5		21,1	39,2
Partial safety factor	γ_{Ms} [2]	-	1,67					
Factor considering ductility [1]	k_2	-	0,8					
Characteristic resistance **steel 5.8**	$V_{Rk,s}$	[kN]	4,2	10,3	13,4		22,8	38,2
Partial safety factor	γ_{Ms} [2]	-	1,36	1,52	1,52		1,65	1,59
Characteristic resistance **steel 8.8**	$V_{Rk,s}$	[kN]	4,2	10,3	13,4		22,8	38,2
Partial safety factor	γ_{Ms} [2]	-	1,36	1,52	1,52		1,65	1,59
Steel failure with lever arm								
Characteristic resistance **steel 4.6**	$M^0_{Rk,s}$	[N.m]	5,1	15	30		52	133
Partial safety factor	γ_{Ms} [2]	-	1,67					
Characteristic resistance **steel 5.6**	$M^0_{Rk,s}$	[N.m]	6,4	19	37		65	166
Partial safety factor	γ_{Ms} [2]	-	1,67					
Characteristic resistance **steel 5.8**	$M^0_{Rk,s}$	[N.m]	6,4	19	37		65	166
Partial safety factor	γ_{Ms} [2]	-	1,25					
Characteristic resistance **steel 8.8**	$M^0_{Rk,s}$	[N.m]	10,2	30	60		105	266
Partial safety factor	γ_{Ms} [2]	-	1,25					
Concrete pry-out failure								
k factor	k [3] k_3 [4]	-	1					2
Partial safety factor	γ_{Mc} [2]	-	1,5 [5]					
Concrete edge failure								
Effective length of anchor under shear loading	l_f	[mm]	30	30	30	40	50	65
Outside diameter of anchor	d_{nom}	[mm]	7,95	9,95	11,95		14,9	19,8
Partial safety factor	γ_{Mc} [2]	-	1,5 [5]					

* use restricted to anchoring of structural elements statically indeterminate
[1] Parameter relevant only for design according to CEN/TS 1992-4:2009, 6.3.3.1
[2] In absence of other national regulations
[3] Parameter relevant only for design according to ETAG 001 Annex C, factor in equation (5.6) of 5.2.3.3
[4] Parameter relevant only for design according to CEN/TS 1992-4:2009
[5] Partial safety factor γ_2 = 1,0 is included

Table 8: Displacements under tension loads

Anchor size			**M6x30***	**M8x30***	**M10x30***	**M10x40**	**M12x50**	**M16x65**
Tension load in non-cracked concrete C20/25 to C50/60		[kN]	5,1	5,1	5,1	7,8	11,0	16,2
Displacement	δ_{N0}	[mm]	0,10					
	$\delta_{N\infty}$	[mm]	0,15					

***** use restricted to anchoring of structural elements statically indeterminate

Table 9: Displacements under shear loads

Anchor size			**M6x30***	**M8x30***	**M10x30***	**M10x40**	**M12x50**	**M16x65**
Shear load in non-cracked concrete C20/25 to C50/60		[kN]	5,1	5,1	5,1	7,8	11,0	16,2
Displacement	δ_{V0}	[mm]	0,10					
	$\delta_{V\infty}$	[mm]	0,15					