

European Technical Assessment

ETA-14/0481 of 02/03/2015

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial
Trade name

DI-PLUS

Famille de produit
Product family

**Cheville métallique à expansion par déformation contrôlée,
pour usage multiple et pour applications non structurales
dans le béton**

***Deformation-controlled expansion anchor made of
galvanized steel for multiple use and for non-structural
applications in concrete***

Titulaire
Manufacturer

Sympafix BV
Fluorietweg 25E
1812RR Alkmaar
The Netherlands

Usine de fabrication
Manufacturing plants

1 MT-2

Cette évaluation contient:
This Assessment contains

10 pages incluant 5 annexes qui font partie intégrante de
cette évaluation
*10 pages including 5 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 évaluation remplace:
This Assessment replaces

Specific Part

1 Technical description of the product

The SYMPAFIX DI-PLUS anchor is an anchor made of zinc electroplated steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

The anchor consists of an expansion sleeve and an internal plug.

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)

Not relevant.

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance under fire acc. ETAG001, Annex C	See Annex C 2

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)

Essential characteristic	Performance
Design resistance acc. ETAG001, Annex C	See Annex C 1
Displacements	See Annex C 1

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 Commission¹, 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 class	or	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	—		2+

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

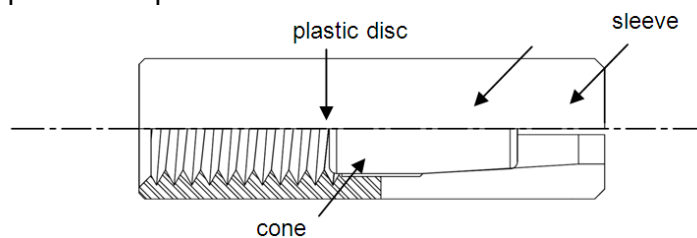
Charles Baloche
Technical Director

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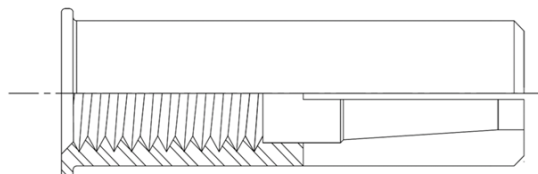
Official Journal of the European Communities L 254 of 08.10.1996

Sympafix Drop-in anchor DI-PLUS:

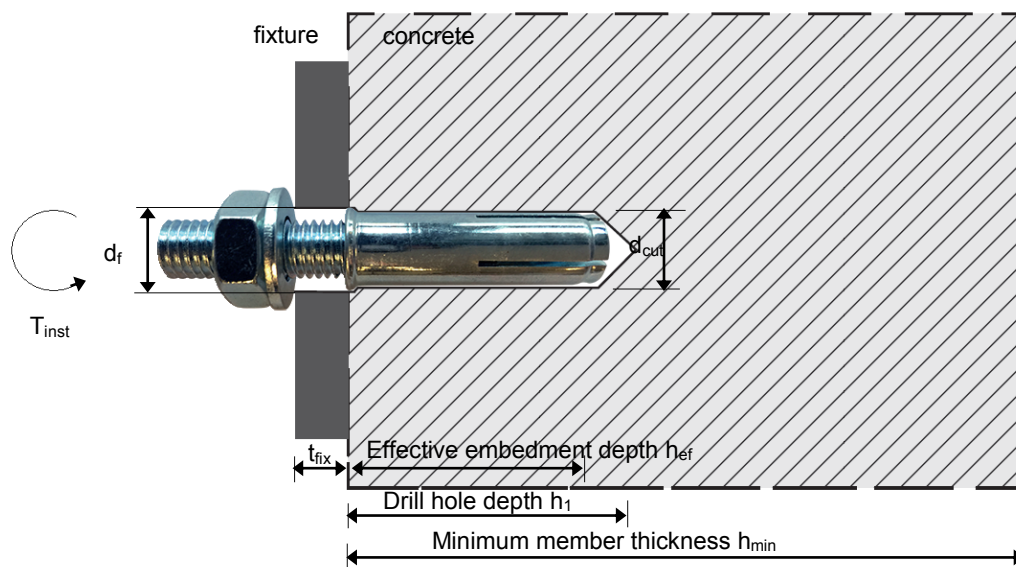
General working principle of a drop in anchor



Marking of the sleeve: e.g. "DI-PLUS M8"



Anchor in use:



Inteded use:

- Only for multiple use for non-structural applications
- Anchorages with requirements related to resistance to fire
- Use for dry internal conditions

SYMPAFIX DROP-IN ANCHOR DI-PLUS

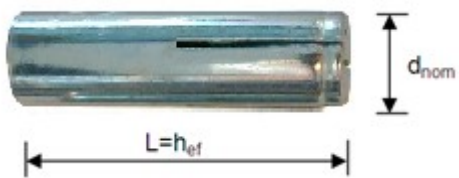
Product description
 Installation condition

Annex A1

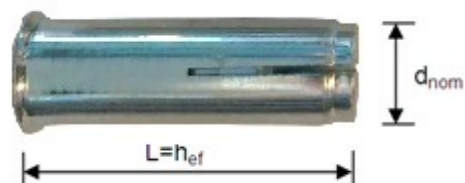
Different anchor versions and different parts of the anchor:

Anchor sleeve

Drop-in anchor



Lipped drop-in anchor



Expansion cone

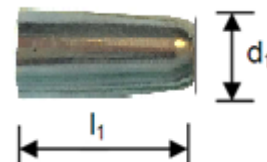


Table 1: Materials

Part	Designation	Product	Material	Protection
1	Anchor sleeves	DI-PLUS	Cold formed steel, grade SWRCH8A	Zinc plated > 5 μ m
		DI-LIP-PLUS		
2	Expansion cones	DI-PLUS	Cold formed steel, grade SWRCH8A	Zinc plated > 5 μ m
		DI-LIP-PLUS		
3	Screw of threaded rod for fastening	DI-PLUS	Steel strength class 4.6, 5.6, 5.8 or 8.8 according to ISO898-1	Zinc plated > 5 μ m
		DI-LIP-PLUS		

Table 2: Anchor dimensions

				M8	M10	M12
Length sleeve	DI-PLUS	$L = h_{ef}$	[mm]	30	40	50
	DI-LIP-PLUS		[mm]	30	40	50
Nom. diameter	DI-PLUS	d_{nom}	[mm]	9,9	11,9	15,9
	DI-LIP-PLUS		[mm]	9,9	11,8	15,9
Cone diameter		d_1	[mm]	5,6	7,4	9,6
Cone length		l_1	[mm]	11,8	15,3	20,8

The length of the fastening screw shall be determined depending on thickness of fixture t_{fix} , admissible tolerance and available tread length l_{smax} as well as minimum screwing length l_{smin} .

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Product description
 Installation condition

Annex A1

Drop-in anchor setting tool:

Basic version without marking function DI-ST



Version with marking function and safety grip DI-ST-SG



The setting tool with marking function produces with correct installation a mark on the collar of the drop in anchor. This mark enables to check after installation the correct expansion of the product.

Table 3: Dimensions setting tool

			M8	M10	M12
Diameter setting tool	d _{ST}	[mm]	5,7	7,1	9,8
Length setting pin	l _{ST}	[mm]	19,7	23,8	24,9

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Product description
 Setting tool, marking

Annex A1

Specifications of intended use

Anchorage subject to:

- Static, quasi-static and fire.

Base materials:

- Cracked concrete and non-cracked concrete (multiple use)
- Reinforced or unreinforced normal weight concrete of strength classes C 20/25 at least to C50/60 at most according to ENV 206: 2000-12.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages are designed in accordance with the method C of ETAG001 Annex C “Design Method for Anchorages” 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.
- The anchor may only be used if in the design and installation specifications for the fixture the excessive slip or failure of one anchor will not result in a significantly violation of the requirements on the fixture in the serviceability and ultimate state
- The anchor is to be used only for multiple use for non-structural applications, the definition of multiple use according to the Member States is given in the informative [Annex 1 of ETAG 001, Part 6](#).

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.
- 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.

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Intended Use
Specifications

Annex B2

Table 4: Installation data				M8	M10	M12
Drill hole diameter		d_{cut}	[mm]	≤10,45	≤12,5	≤16,5
Drill hole depth	DI-PLUS	h_1	[mm]	32	42	53
	DI-LIP-PLUS			32	42	53
Embedment depth	DI-PLUS	h_{ef}	[mm]	30	40	50
	DI-LIP-PLUS			30	40	50
Installation torque		T_{inst}	[Nm]	8	15	35
Passage hole diameter		d_f	[mm]	9	12	14
Minimum screwing length		l_{smin}	[mm]	8	10	12
Thread length	DI-PLUS	l_{smax}	[mm]	13	17	21
	DI-LIP-PLUS			13	17	21
Design method C						
Min. member thickness		h_{min}	[mm]	80	80	80
Minimum edge distance		c_{cr}	[mm]	150	150	150
Minimum spacing		s_{cr}	[mm]	200	200	200

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Intended Use
 Installation parameters and Design method C

Annex B3

Table 5: Characteristic values for all loading directions, C20/25 to C50/60

Sympafix DI-PLUS					
Design method C			M8	M10	M12
Char. resistance (C20/25 to C50/60)	F_{Rk}^0	[kN]	4,0	4,0	6,0
Partial safety factor	γ_M	[-]	1,5 ²⁾	2,1 ³⁾	1,8 ⁴⁾
Design value of resistance	F_{Rd}	[kN]	2,7	1,9	3,3
Char. spacing (design method C)	s_{cr}	[mm]	200	200	200
Char. edge distance (design method C)	c_{cr}	[mm]	150	150	150
Shear load with lever arm					
Characteristic bending moment, steel grade 4.6	$M_{Rk,s}^0$ ⁵⁾	[Nm]	14,9	29,8	52,3
Partial safety factor	γ_M ¹⁾	[-]	1,67	1,67	1,67
Design value	$M_{Rd,s}^0$	[Nm]	8,9	17,8	31,3
Characteristic bending moment, steel grade 5.6/5.8	$M_{Rk,s}^0$ ⁵⁾	[Nm]	18,6	37,3	65,5
Partial safety factor	γ_M ¹⁾	[-]	1,67	1,67	1,67
Design value	$M_{Rd,s}^0$	[Nm]	11,1	22,3	39,2
Characteristic bending moment, steel grade 8.8	$M_{Rk,s}^0$ ⁵⁾	[Nm]	29,8	51,2	104,6
Partial safety factor	γ_M ¹⁾	[-]	1,25	1,25	1,25
Design value	$M_{Rd,s}^0$	[Nm]	23,8	41,0	83,7
Displacements					
Applied load	F	[kN]	1,9	1,4	2,4
Displacements at short term	δ_{F0}	[mm]	0,54	0,60	0,79
Displacements at long term	$\delta_{F\infty}$	[mm]	0,07	0,07	0,07

¹⁾ In absence of other national regulations

²⁾ The value contains an installation safety factor $\gamma_2= 1,0$

³⁾ The value contains an installation safety factor $\gamma_2= 1,4$

⁴⁾ The value contains an installation safety factor $\gamma_2= 1,2$

⁵⁾ The characteristic bending moment $M_{Rk,s}^0$ for equation 5.5 in ETAG001 Annex C

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Design according to **ETAG001, Annex C**

Caractéristique resistance for all loading directions

Design values - Displacements

Annex C1

Table 6: Characteristic values under fire exposure in concrete C20/25 to C50/60 in any load direction without lever arm, Design method C

Fire resistance class	Sympafix DI-PLUS			M8	M10	M12
Tension and shear ¹⁾						
R 30	Characteristic resistance	$F_{Rk,fi}^{2)}$	[kN]	0,37	0,87	1,69
R 60	Characteristic resistance	$F_{Rk,fi}^{2)}$	[kN]	0,33	0,75	1,26
R 90	Characteristic resistance	$F_{Rk,fi}^{2)}$	[kN]	0,26	0,58	1,10
R 120	Characteristic resistance	$F_{Rk,fi}^{2)}$	[kN]	0,18	0,46	0,84
Shear load with lever arm ¹⁾						
R 30	Char. bending resistance	$M_{Rk,fi}^{2)}$	[Nm]	0,37	1,12	2,62
R 60	Char. bending resistance	$M_{Rk,fi}^{2)}$	[Nm]	0,34	0,97	1,97
R 90	Char. bending resistance	$M_{Rk,fi}^{2)}$	[Nm]	0,26	0,75	1,70
R 120	Char. bending resistance	$M_{Rk,fi}^{2)}$	[Nm]	0,19	0,60	1,31

1) In case of fire attack from more than one side, the edge distance shall be $\geq 300\text{mm}$

2) In absence of other national regulations the partial safety factor for resistance under fire exposure.

$\gamma_{M,fi} = 1,0$ is recommended

SYMPAFIX DROP-IN ANCHOR DI-PLUS

Design according to **ETAG001, Annex C**
 Characteristic resistance under fire exposure

Annex C2