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European Technical Assessment

ETA 16 / 0501 of 21 / 10 / 2016

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

**SOLVTEC S-DAP
SOLVTEC S-DAL**

Product family to which the construction product belongs

Deformation controlled anchor made of galvanized steel of sizes M6, M8, M10, M12, M16 and M20 for use in non-cracked concrete

Manufacturer

Solver GmbH
Furst-Abtieeinen-Str. 6
53498 Bad Breisig, Niederbreisig, Germany.

Manufacturing plant

Solver plant 3
Solver plant 4

This European Technical Assessment contains

10 pages including 4 annexes which form an integral part of this assessment. **Annex E contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.**

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

Guideline for European Technical Approval ETAG 001 "Metal anchors for used in concrete", ed. April 2013, Parts 1 and 4 used as European Assessment Document (EAD)

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to Article 25 Paragraph 3 of Regulation (EU) No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

SPECIFIC PART

1. Technical description of the product

The Solvtec S-DAP / S-DAL in the range of M6 to M20 is an anchor made of galvanised steel, which is placed into a drilled hole and anchored by deformation-controlled expansion.

The Solvtec S-DAP / S-DAL anchor in the range of M6 to M20 corresponds to the picture and provisions given in annexes A and B. The anchor consists on an anchor body and an internal plug. The characteristic material values, dimensions and tolerances of the anchor not indicated in annexes A and B shall correspond to the respective values laid down in the technical documentation ⁽¹⁾ of this European Technical Assessment.

For the installation process see figure given in annex C; a specific setting tool must be used. For the installed anchor see figure given in annex D. The fixture shall be anchored with a fastening screw or threaded rod of classes 4.6, 5.6, 5.8, 6.8 or 8.8 according to ISO 898-1.

Each sleeve is marked with the identifying mark of the producer, the trade name and the bolt metric size.

The performance of the anchor, including installation data, characteristic anchor values and displacements for the design of anchorages, is given in chapter 3.

The anchor shall only be packaged and supplied as a complete unit.

2. Specification of the intended use in accordance with the applicable EAD.

2.1 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability, and safety and accessibility in use in the sense of the basic requirements 1 and 4 of Construction Product Regulation no 305/2011 shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength class C20/25 to C50/60, according to EN 206. It may be anchored in non-cracked concrete only.

The Solvtec S-DAP / S-DAL anchor may only be used in concrete subject to dry internal conditions.

The provisions made in this European Technical Approval are based on an assumed working life of the anchor of 50 years. The assumed working life is the foreseen period of time throughout which the construction product, as installed into the construction work, will keep its performances allowing the construction work, behaving under predictable actions and with normal maintenance, to meet the basic requirements for construction works.

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

⁽¹⁾ The quality plan has been deposited at Instituto de ciencias de la constarucción Eduardo Torroja and is only made available to the notified bodies involved in the AVCP procedure.

The identification tests and the assessment for the intended use of this anchor according to the Basic Requirements (BR) were carried out in compliance with the ETAG 001. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.

3.1 Mechanical resistance and stability (BR 1)

Mechanical resistance and stability has been assessed according to ETAG 001 "Metal anchors to be used in concrete", parts 1 and 4.

Installation parameters			Performance					
			M6 ²⁾	M8 ²⁾	M10	M12	M16	M20
d _o	Nominal diameter of drill bit:	[mm]	8	10	12	15	20	25
D	Thread diameter	[mm]	M6	M8	M10	M12	M16	M20
d _f	Fixture clearance hole diameter:	[mm]	7	9	12	14	18	22
T _{inst}	Maximum installation torque:	[Nm]	4	11	17	38	60	100
l _{s,min}	Minimum screwing depth	[mm]	6	8	10	12	16	20
l _{s,max}	Maximum screwing depth	[mm]	10	13	17	21	27	34
h _{min}	Minimum thickness of concrete member:	[mm]	100	100	100	100	130	160
h ₁	Depth of drilled hole:	[mm]	27	33	43	54	70	86
h _{nom}	Overall anchor embed. depth in the concrete:	[mm]	25	30	40	50	65	80
h _{ef}	Effective anchorage depth:	[mm]	25	30	40	50	65	80
s _{min}	Minimum allowable spacing:	[mm]	60	90	80	100	130	160
c _{min}	Minimum allowable distance:	[mm]	105	105	140	175	230	280

Characteristic values of resistance to tension loads of design method A			Performance					
			M6 ²⁾	M8 ²⁾	M10	M12	M16	M20
Tension loads: steel failure								
N _{Rk,s}	Tension steel char. resistance, steel class 4.6:	[kN]	8,0	14,6	23,2	33,7	62,8	98,0
γ _{Ms}	Partial safety factor: ¹⁾	[-]	2,0	2,0	2,0	2,0	2,0	2,0
N _{Rk,s}	Tension steel char. resistance, steel class 4.8:	[kN]	8,0	14,6	18,2	33,7	62,8	95,1
γ _{Ms}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5
N _{Rk,s}	Tension steel char. resistance, steel class 5.6:	[kN]	10,1	18,3	18,2	42,2	78,5	122,5
γ _{Ms}	Partial safety factor: ¹⁾	[-]	2,0	2,0	1,5	2,0	2,0	2,0
N _{Rk,s}	Tension steel char. resistance, steel class 5.8:	[kN]	10,1	17,6	18,2	35,1	65,0	95,1
γ _{Ms}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5
N _{Rk,s}	Tension steel char. resistance, steel class 6.8	[kN]	12,1	17,6	18,2	35,1	65,0	95,1
γ _{Ms}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5
N _{Rk,s}	Tension steel char. resistance, steel class 8.8	[kN]	13,1	17,6	18,2	35,1	65,0	95,1
γ _{Ms}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Tension loads: pull-out failure in concrete								
N _{Rk,p, ucr}	Tension characteristic resistance in C20/25 uncracked concrete:	[kN]	-- ³⁾	-- ³⁾	-- ³⁾	-- ³⁾	-- ³⁾	-- ³⁾
ψ _c	C30/37	[-]	1,02	1,22	1,15	1,15	1,22	1,19
ψ _c	C40/45	[-]	1,04	1,41	1,29	1,28	1,41	1,35
ψ _c	C50/60	[-]	1,05	1,55	1,37	1,37	1,55	1,46
γ _{Mp}	Partial safety factor: ¹⁾	[-]	1,8	1,8	2,1	2,1	2,1	2,1
Tension loads: concrete cone and splitting failure								
h _{ef}	Effective embedment depth:	[mm]	25	30	40	50	65	80
γ _{Mc}	Partial safety factor: ¹⁾	[-]	1,8	1,8	2,1	2,1	2,1	2,1
s _{cr,N}	Critical spacing:	[mm]	75	90	120	150	195	240
c _{cr,N}	Critical edge distance:	[mm]	38	45	60	75	98	120
s _{cr,sp}	Critical spacing (splitting):	[mm]	50	60	80	100	130	160
c _{cr,sp}	Critical edge distance (splitting):	[mm]	75	90	120	150	195	240
γ _{Msp}	Partial safety factor: ¹⁾	[-]	1,8	1,8	2,1	2,1	2,1	2,1

Displacements under tension loads			Performance					
			M6 ²⁾	M8 ²⁾	M10	M12	M16	M20
N	Service tension load in uncracked concrete C20/25 to C50/60:	[kN]	2,4	3,4	6,0	7,4	17,8	18,2
$\bar{\delta}_{N0}$	Short term displacement under tension loads:	[mm]	0,1	0,1	0,1	0,1	0,1	0,1
$\bar{\delta}_{N\infty}$	Long term displacement under tension loads:	[mm]	0,3	0,3	0,3	0,3	0,3	0,3

Characteristic values of resistance to shear loads of design method A			Performance					
			M6 ²⁾	M8 ²⁾	M10	M12	M16	M20
Shear loads: steel failure without lever arm								
$V_{Rk,s}$	Shear steel char. resistance, steel class 4.6:	[kN]	4,0	7,3	11,6	16,8	31,4	49,0
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,67	1,67	1,67	1,67	1,67	1,67
$V_{Rk,s}$	Shear steel char. resistance, steel class 4.8:	[kN]	4,0	7,3	9,1	16,8	31,4	47,5
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$V_{Rk,s}$	Shear steel char. resistance, steel class 5.6	[kN]	5,0	9,1	9,1	21,1	39,2	61,2
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,67	1,67	1,25	1,67	1,67	1,67
$V_{Rk,s}$	Shear steel char. resistance, steel class 5.8	[kN]	5,0	8,8	9,1	17,5	32,5	47,5
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$V_{Rk,s}$	Shear steel char. resistance, steel class 6.8	[kN]	6,0	8,8	9,1	17,5	32,5	47,5
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$V_{Rk,s}$	Shear steel char. resistance, steel class 8.8:	[kN]	6,5	8,8	9,1	17,5	32,5	47,5
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Shear loads: steel failure with lever arm								
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.6	[Nm]	6,1	15,0	29,9	52,4	133,3	259,8
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,67	1,67	1,67	1,67	1,67	1,67
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.8	[Nm]	6,1	15,0	29,9	52,4	133,3	259,8
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.6	[Nm]	7,6	18,8	37,4	65,5	166,6	324,8
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,67	1,67	1,67	1,67	1,67	1,67
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.8	[Nm]	7,6	18,8	37,4	65,5	166,6	324,8
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$M_{Rk,s}^0$	Characteristic bending moment, steel class 6.8	[Nm]	9,2	22,5	44,9	78,7	199,9	389,7
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
$M_{Rk,s}^0$	Characteristic bending moment, steel class 8.8	[Nm]	12,2	30,0	59,9	104,9	266,6	519,7
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Shear loads: concrete pryout failure								
K	K factor:	[-]	1,0	1,0	1,0	1,0	2,0	2,0
γ_{Mpr}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Shear loads: concrete edge failure								
l_f	Effective anchorage depth under shear loads:	[mm]	25	30	40	50	65	80
d_{nom}	Outside anchor diameter:	[mm]	8	10	12	15	20	25
γ_{Mc}	Partial safety factor: ¹⁾	[-]	1,5	1,5	1,5	1,5	1,5	1,5

Displacements under shear loads			Performance					
			M6 ²⁾	M8 ²⁾	M10	M12	M16	M20
V	Service shear load in uncracked concrete C20/25 to C50/60:	[kN]	3,8	5,0	5,2	10,1	18,6	27,2
$\bar{\delta}_{V0}$	Short term displacement under shear loads:	[mm]	2,4	2,4	2,4	1,3	1,0	1,0
$\bar{\delta}_{V\infty}$	Long term displacement under shear loads:	[mm]	3,5	3,5	3,5	2,0	1,5	1,5

¹⁾ in absence of other national regulations

²⁾ For application with statically indeterminate structural components only

³⁾ Pull out value not decisive

3.2 Safety in case of fire (BR 2)

Reaction to fire has been assessed according to Commission Decision 96/603/EC, amended by 2000/605/EC: class A1.

Resistance to fire: No performance determined

3.3 Hygiene, health and the environment (BR 3)

This requirement is not relevant for the anchor.

3.4 Safety in use (BR 4)

Requirements with respect to the safety in use are not included in this Basic Requirement but are treated under the Essential Requirement Mechanical Resistance and Stability (see section 3.1)

3.5 Protection against noise (BR 5)

This requirement is not relevant for the anchor.

3.6 Energy economy and heat retention (BR 6)

This requirement is not relevant for the anchor.

3.7 Sustainable use of natural resources (BR 7)

No performance determined

4. System of attestation of conformity

According to the decision 96/582/EC of the European Commission ⁽²⁾ the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies:

Product	Intended use	Level or class	System
Solvtec drop in anchor S-DAP/ S-DAL	To be used for fixing and/or supporting structural elements	All / any	1

The system 1, referred above is described in Construction Products Regulation (EU) No. 305/211 Annex V §. 1.3 as follows:

- a) The manufacturer shall carry out:
 - (i.) Factory production control.
 - (ii.) Further testing of samples taken at the factory by the manufacturer in accordance with the prescribed test plan;
- b) The notified production control certification body shall issue the certificate of conformity of the factory production control on the basis of:
 - (i.) Determination of the product-type on the basis of type testing (including sampling) calculation, tabulated values of descriptive documentation of the product:
 - (ii.) Initial inspection of factory and of factory production control.
 - (iii.) Continuous surveillance, assessment and evaluation of factory production

⁽²⁾ Published in the Official Journal of the European Union (OJEU) L254 of 24.06.1996 See www.new.eur-lex.europa.eu/oj/direct-access.html

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

The ETA is issued for this anchor on the basis of agreed data/information which identifies the product that has been assessed and judged. Detailed description and conditions of the manufacturing process of the anchor, and all the relevant design and installation criteria of this anchor are specified in the manufacturer's technical documentation deposited to the IETcc. The main aspects of this information are specified in the following sections. It is the manufacturer's responsibility to make sure that all those who use the anchor are appropriately informed of specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA.

5.1 Tasks of the manufacturer

5.1.1 Factory production control

The manufacturer has a factory production control system and shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this ETA.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the quality plan ⁽³⁾. The incoming raw materials shall be subjected to controls by the manufacturer before acceptance. Check of materials shall include control of the inspection documents presented by suppliers by verifying dimension and material properties, e.g. chemical composition, mechanical properties etc. The manufactured components are checked visually, for dimensions and properties, where appropriate.

The quality plan which is part of the Technical Documentation of this ETA, includes details of the extent, nature and frequency of testing and controls to be performed within the factory production control and has been agreed between the assessment holder and IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the quality plan. The records include at least the following information:

- Designation of the product, the basic materials and components;
- Type of control or testing and minimum frequencies of them;
- Date of manufacture of the product and date testing of the product or basic material and components;
- Results of controls and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to the notified body involved in the continuous surveillance. On request, they shall be presented to the IETcc.

5.2 Tasks of notified bodies

5.2.1 Determination of the product-type on the basis of type testing

For type-testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between ETA holder and the notified body.

5.2.2 Initial inspection of factory and of factory production control

⁽³⁾ the quality plan has been deposited at IETcc and is only made available to the notified bodies involved in the ACVP procedure.

The notified body shall ascertain that, in accordance with the quality plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in annex A of this the European Technical Assessment.

5.2.3 Continuous surveillance

The notified body shall visit the factory at least once a year for regular inspection.

This continuous surveillance and assessment of factory production control have to be performed according to the quality plan. The system of factory production control and the specified manufacturing process has to be verified that they are maintained as the quality plan defined. The results of product certification and continuous surveillance shall be made available on demand by the product certification body or factory production control body, respectively, to IETcc. In cases where the provisions of the European Technical Assessment and the quality plan are no longer fulfilled the conformity certificate shall be withdrawn.



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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja

Madrid, 21st October 2016

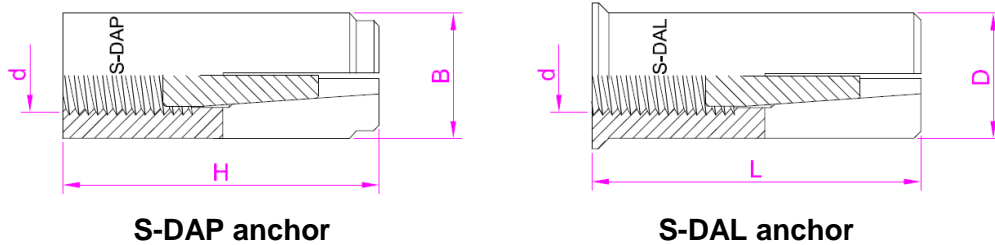
A handwritten signature in blue ink, appearing to read 'Marta Mª Castellote Armero', written over a faint, illegible stamp.

Marta Mª Castellote Armero
Director

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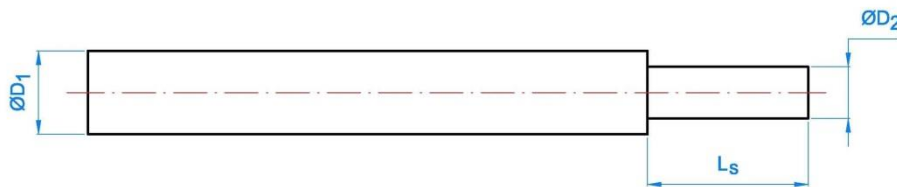
Annex A: Assembled anchor



Identification on sleeve: Solvtec logo + “S-DAP (S-DAL)” + Metric; e.g: S-DAP M6

Anchor dimensions	M6	M8	M10	M12	M16	M20
ØD: External diameter [mm]	8	10	12	15	20	25
Ød: internal diameter [mm]	M6	M8	M10	M12	M16	M20
L: total length [mm]	25	30	40	50	65	80

Setting tool



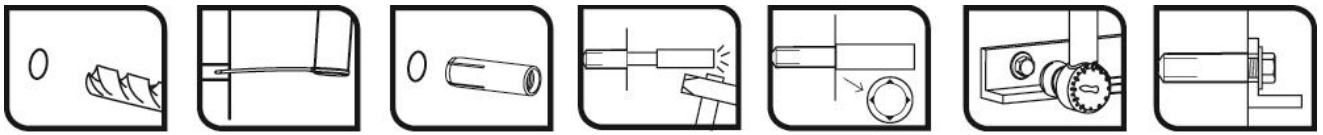
Setting tool dimensions	M6	M8	M10	M12	M16	M20
Ø D ₁ [mm]	7,5	9,5	11,5	14,5	18,0	22,0
Ø D ₂ [mm]	5,0	6,5	8,0	10,2	13,5	16,5
L _s [mm]	15	18	24	30	36	50

Setting tool could be assembled with a plastic handle for hand protection purposes

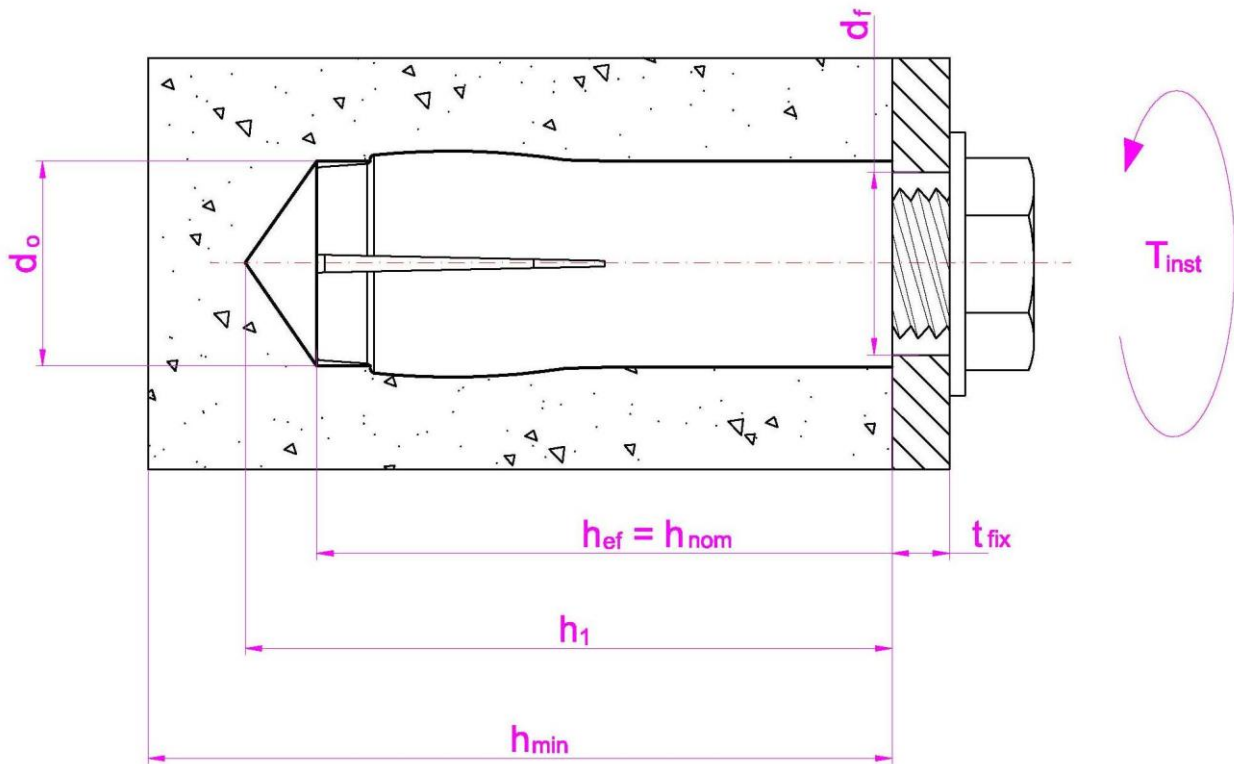
Annex B. Materials

Item	Designation	Material
1	Sleeve	Carbon steel wire rod, zinc plated ≥ 5 µm ISO 4042 A2
2	Expansion plug	Carbon steel wire rod, zinc plated ≥ 5 µm ISO 4042 A2

Annex C. Installation process



Annex D. Schema of the anchor in use



- 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} : Thickness of fixture
- d_0 : Nominal diameter of drill bit
- d_f : Fixture clearance hole diameter

The screw or threaded rod to use shall be property class 4.6 / 5.6 / 5.8 / 6.8 / 8.8 according to ISO 898-1.

The length of the screw shall be determined depending on thickness of fixture t_{fix} , admissible tolerances and available thread length $l_{s,max}$ as well as minimum screw depth $l_{s,min}$.