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DE LA CONSTRUCCIÓN  
EDUARDO TORROJA**

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## European Technical Assessment

**ETA 22/0099  
of 03/02/2022**

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**

**Novipro drop-in anchor SA-X**

**Product family to which the construction product belongs**

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

**Manufacturer**

**Dahl Sverige AB**  
Bryggerivägen 9  
168 67 Bromma. Sweden.  
website: [www.dahl.se](http://www.dahl.se)

**Manufacturing plants**

Dahl Sverige AB plant 1

**This European Technical Assessment contains**

10 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

*English translation prepared by IETcc*

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to article 25 (3) of Regulation (EU) No 305/2011.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 Novipro drop-in anchor SA-X 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 anchorage is characterised by friction between the sleeve and concrete.

Product and product description is given in annex A.

### 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 to C3
Displacements under tension and shear loads	See annexes C2 and C3

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for class A1

### 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.

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**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  
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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja  
Madrid, 3<sup>rd</sup> of February 2022

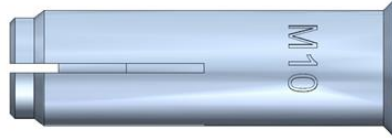


Director IETcc - CSIC

English translation prepared by IETcc

## Product

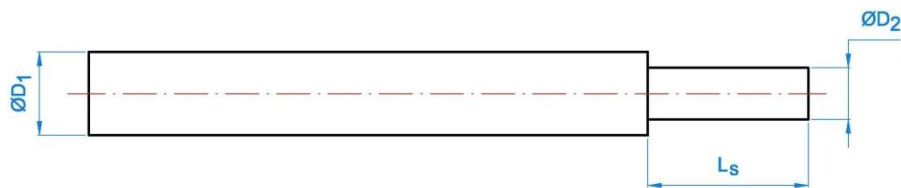
### SA-X anchor



Identification on sleeve: Novipro logo + "SA\_X" + Metric; e.g: SA-X M6

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

### Setting tool



Setting tool dimensions		M6	M8	M10	M12	M16
Ø D <sub>1</sub>	[mm]	8.0	10.0	12.0	15.0	20.0
Ø D <sub>2</sub>	[mm]	4.9	6.4	8.2	10.0	13.5
L <sub>s</sub>	[mm]	15.0	18.0	21.0	30.0	36.0

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

SA-X anchor

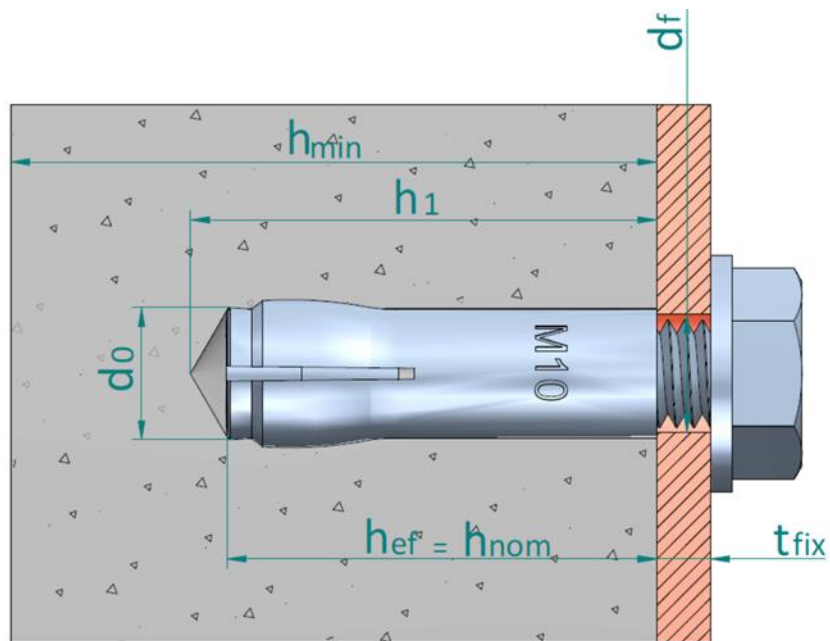
Product description

Product

Annex A1

English translation prepared by IETcc

**Installed condition**



- $h_{ef}$ : 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

**Table A1: materials**

Item	Designation	Material for SA-X
1	Sleeve	Carbon steel wire rod, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2
2	Cone	Carbon steel wire rod, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2
3	Plastic retainer	PVC

**SA-X anchor**

**Product description**

Installed condition and Materials

**Annex A2**

## **Specifications of intended use**

### **Anchorage subjected to:**

- Static or quasi static loads

### **Base materials:**

- Reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013+A1:2016
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016
- 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

### **Installation:**

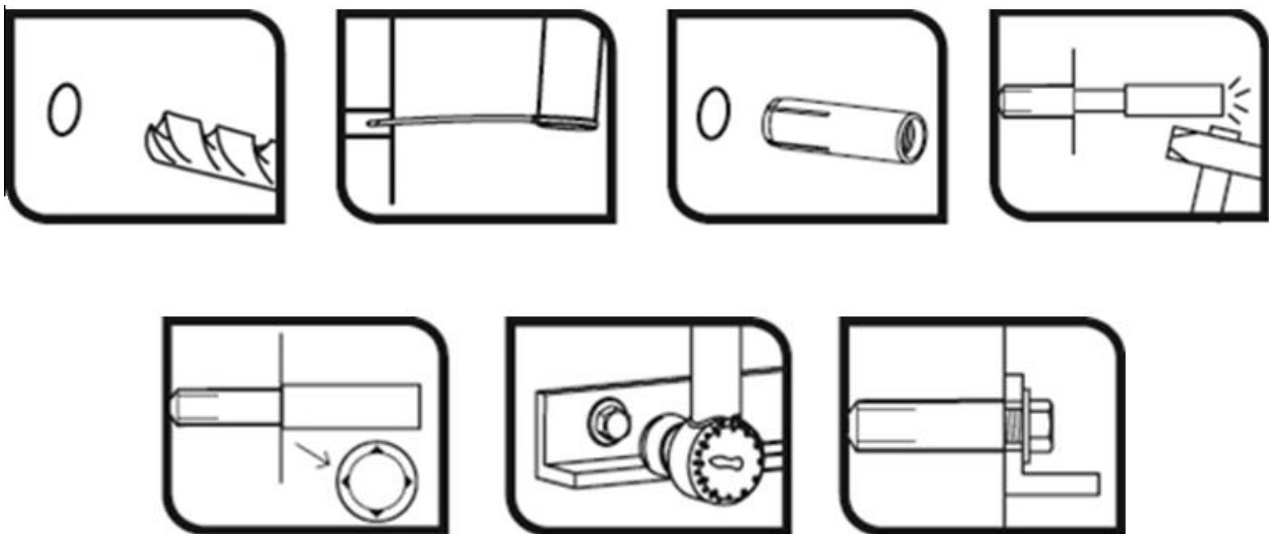
- Hole drilling by rotary plus hammer mode.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole 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.
- The bolt or threaded rod to be used shall be property class 4.6 / 5.6 / 5.8 / 6.8 or 8.8 according to ISO 898-1.
- The length of the bolt shall be determined as:
  - Minimum bolt length =  $t_{fix} + l_{s,min}$
  - Maximum bolt length =  $t_{fix} + l_{s,max}$

<b>SA-X anchor</b>	<b>Annex B1</b>
<b>Intended use</b>	
Specifications	

**Table C1: Installation parameters for SA-X anchor**

Installation parameters			Performances				
			M6	M8	M10	M12	M16
$d_o$	Nominal diameter of drill bit:	[mm]	8	10	12	15	20
D	Thread diameter:	[mm]	M6	M8	M10	M12	M16
$d_f$	Fixture clearance hole diameter $\leq$	[mm]	7	9	12	14	18
$T_{inst}$	Maximum installation torque:	[Nm]	4	11	17	38	60
$l_{s,min}$	Minimum screwing depth:	[mm]	6	8	10	12	16
$l_{s,max}$	Maximum screwing depth:	[mm]	10	13	17	21	27
$h_{min}$	Minimum thickness of concrete member:	[mm]	100	100	100	100	130
$h_1$	Depth of drilled hole:	[mm]	27	33	43	54	70
$h_{nom}$	Overall anchor embedm. depth in the concrete:	[mm]	25	30	40	50	65
$h_{ef}$	Effective anchorage depth:	[mm]	25	30	40	50	65
$s_{min}$	Minimum allowable spacing:	[mm]	60	60	80	100	130
$c_{min}$	Minimum allowable distance:	[mm]	105	105	140	175	230

**Installation process**



**SA-X anchor**

**Performances**

Installation parameters and installation procedure

**Annex C1**



**Table C2: Characteristic values to tension loads of design method A according to EN 1992-4 for SA-X anchor**

Characteristic values of resistance to tension loads of design according to design method A			Performances					
			M6	M8	M10	M12	M16	
<b>Tension loads: steel failure</b>								
$N_{Rk,s}$	Tension steel char. resistance, steel class 4.6:	[kN]	8,0	14,6	23,2	33,7	62,8	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	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	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	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	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	2,0	2,0	1,5	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	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	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	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	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	
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1,5	1,5	1,5	1,5	1,5	
<b>Tension loads: pull-out failure in concrete</b>								
$N_{Rk,p,ucr}$	Tension characteristic resistance in C20/25 uncracked concrete	[kN]	-- <sup>2)</sup>	-- <sup>2)</sup>	-- <sup>2)</sup>	-- <sup>2)</sup>	-- <sup>2)</sup>	
$\psi_c$	Increasing factor for $N_{Rk,p}^0$ :	C30/37	[-]	1,02	1,22	1,15	1,15	1,22
		C40/50	[-]	1,04	1,41	1,29	1,28	1,41
		C50/60	[-]	1,05	1,55	1,37	1,37	1,55
$\gamma_{ins}$	Installation safety factor:	[-]	1,2	1,2	1,4	1,4	1,4	
<b>Tension loads: concrete cone and splitting failure</b>								
$h_{ef}$	Effective embedment depth:	[mm]	25	30	40	50	65	
$k_{ucr,N}$	Factor for uncracked concrete:	[-]	11.0					
$\gamma_{ins}$	Installation safety factor:	[-]	1,2	1,2	1,4	1,4	1,4	
$S_{cr,N}$	Concrete cone failure:	[mm]	3 x $h_{ef}$					
$C_{cr,N}$		[mm]	1.5 x $h_{ef}$					
$S_{cr,sp}$	Splitting failure:	[mm]	150	180	240	300	390	
$C_{cr,sp}$		[mm]	75	90	120	150	195	
<b>Displacements under tension loads</b>								
$N$	Service tension load in uncracked concrete C20/25 to C50/60:	[kN]	2,4	3,4	6,0	7,4	17,8	
$\delta_{N0}$	Short term displacement under tension loads:	[mm]	0,1	0,1	0,1	0,1	0,1	
$\delta_{N\infty}$	Long term displacement under tension loads:	[mm]	0,3	0,3	0,3	0,3	0,3	

<sup>1)</sup> In absence of other national regulations

<sup>2)</sup> Pull out failure does not govern

SA-X anchor

Performances

Characteristic values for tension loads

Annex C2

**Table C3: Characteristic values to shear loads of design method A according to EN1992-4 for SA-X anchor**

Characteristic values of resistance to shear loads of design according to design method A			Performances				
			M6	M8	M10	M12	M16
<b>Shear loads: steel failure without lever arm</b>							
$V_{Rk,s}$	Shear steel char. resistance, steel class 4.6:	[kN]	4,0	7,3	11,6	16,8	31,4
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	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
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	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
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,67	1,67	1,25	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
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	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
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	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
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,25	1,25	1,25	1,25	1,25
<b>Shear loads: steel failure with lever arm</b>							
$M^0_{Rk,s}$	Characteristic bending moment, steel class 4.6	[Nm]	6,1	15,0	29,9	52,4	133,3
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,67	1,67	1,67	1,67	1,67
$M^0_{Rk,s}$	Characteristic bending moment, steel class 4.8	[Nm]	6,1	15,0	29,9	52,4	133,3
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,25	1,25	1,25	1,25	1,25
$M^0_{Rk,s}$	Characteristic bending moment, steel class 5.6	[Nm]	7,6	18,8	37,4	65,5	166,6
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,67	1,67	1,67	1,67	1,67
$M^0_{Rk,s}$	Characteristic bending moment, steel class 5.8	[Nm]	7,6	18,8	37,4	65,5	166,6
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,25	1,25	1,25	1,25	1,25
$M^0_{Rk,s}$	Characteristic bending moment, steel class 6.8	[Nm]	9,2	22,5	44,9	78,7	199,9
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,25	1,25	1,25	1,25	1,25
$M^0_{Rk,s}$	Characteristic bending moment, steel class 8.8	[Nm]	12,2	30,0	59,9	104,9	266,6
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1,25	1,25	1,25	1,25	1,25
<b>Shear loads: concrete pryout failure</b>							
$k_8$	Pryout factor:	[-]	1,0	1,0	1,0	1,0	2,0
$\gamma_{ins}$	Installation safety factor:	[-]	1,0				
<b>Shear loads: concrete edge failure</b>							
$l_f$	Effective anchorage depth under shear loads:	[mm]	25	30	40	50	65
$d_{nom}$	Outside anchor diameter:	[mm]	8	10	12	15	20
$\gamma_{ins}$	Installation safety factor:	[-]	1,0				
<b>Displacements under shear loads</b>							
$V$	Service shear load in uncracked concrete C20/25 to C50/60:	[kN]	3,8	5,0	5,2	10,1	18,6
$\bar{\delta}_{V0}$	Short term displacement under shear loads:	[mm]	2,4	2,4	2,4	1,3	1,0
$\bar{\delta}_{V\infty}$	Long term displacement under shear loads:	[mm]	3,5	3,5	3,5	2,0	1,5

<sup>1)</sup> In absence of other national regulations

SA-X anchor

Performances

Characteristic values for shear load.

Annex C3



**INSTITUTO DE CIENCIAS  
DE LA CONSTRUCCIÓN  
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## European Technical Assessment

## ETA 22/0098 of 03/02/2022

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:**

**Novipro drop-in anchor SA-X**

**Product family to which the construction product belongs:**

Deformation controlled anchor made of galvanized steel or stainless steel or stainless steel of sizes M6, M8, M10, M12 and M16 for use in concrete for redundant non-structural systems

**Manufacturer:**

**Dahl Sverige AB**  
Bryggerivägen 9  
168 67 Bromma. Sweden.  
website: [www.dahl.se](http://www.dahl.se)

**Manufacturing plant:**

Dahl Sverige AB plant 1

**This European Technical Assessment contains:**

10 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 Assessment Document EAD 330747-00-0601, "Fasteners for use in concrete for redundant non-structural systems", ed. May 2018.

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English translation prepared by IETcc

## SPECIFIC PART

### 1. Technical description of the product

The Novipro drop-in anchor SA-X, in the range of M6 to M16, is an anchor made of galvanised steel. It is placed into a drilled hole and anchored by deformation-controlled expansion. The anchorage is characterised by friction between the sleeve 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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfies requirements for class A1 according to EN 13501-1
Resistance to fire	See annex C3

#### 3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Essential characteristics under static or quasi static loading	See annex C3

### 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 97/161/EC.

The system to be applied is 2+.

English translation prepared by IETcc

**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  
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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja  
Madrid, 3<sup>rd</sup> of February 2022

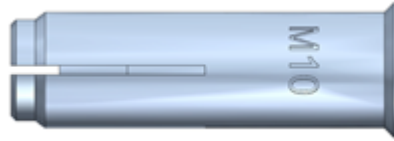


Director IETcc - CSIC

English translation prepared by IETcc

**Product**

**SA-X anchor**



Identification on sleeve: Novipro logo + “SA-X” + Metric; e.g: SA-X M6

**Table A1: Dimensions**

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

**Table A2: Materials**

Item	Designation	Material for SA-X
1	Sleeve	Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0
2	Cone	Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0
3	Retention disc	Plastic

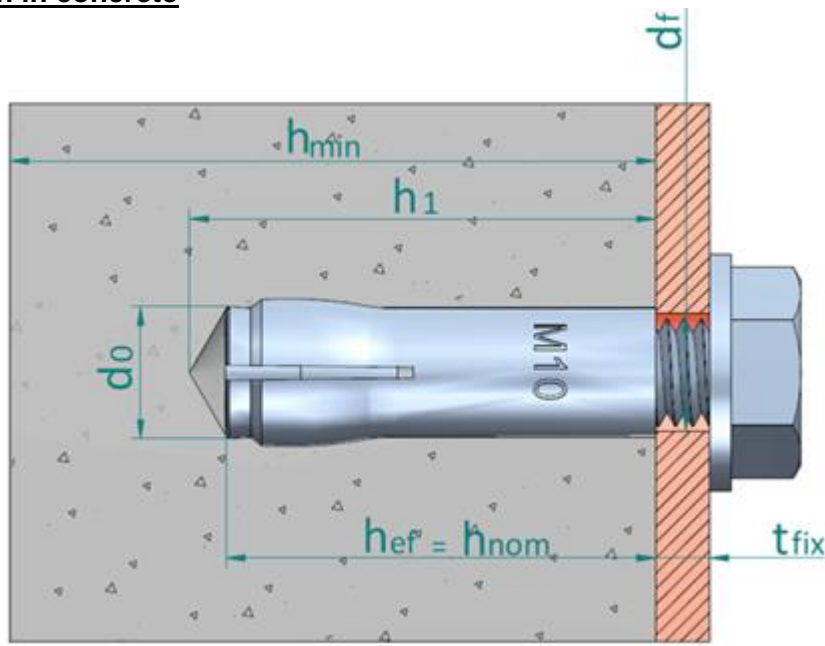
**SA-X anchor**

**Product description**

Product and materials

**Annex A1**

**Installed condition in concrete**



- $h_{ef}$ : 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

**Setting tool**



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

**Table A3: Setting tool dimensions**

Setting tool dimensions	M6	M8	M10	M12	M16
$\varnothing D_1$ [mm]	8.0	10.0	12.0	15.0	20.0
$\varnothing D_2$ [mm]	4.9	6.4	8.2	10.0	13.5
$L_s$ [mm]	15.0	18.0	21.0	30.0	36.0

**SA-X anchor**

**Product description**

Installed condition in concrete and setting tool

**Annex A2**



## **Specifications of intended use**

### **Anchorage subjected to:**

- Static or quasi static loads for redundant non-structural systems.
- Use for anchorages with requirements related to resistance of fire (not for using in prestressed hollow core slabs).
- 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 significant violation of the requirements on the fixture in the serviceability and ultimate state.

### **Base materials:**

- Reinforced or unreinforced normal weight concrete without fibres according to EN 206-1:2013+A1:2016.
- Strength classes C12/15 to C50/60 according to EN 206-1:2013+A1:2016.
- 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 B in accordance with EN 1992-4:2018
- Anchorages under fire exposure are designed in accordance to 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.
- The bolt or threaded rod to be used shall be property class 4.6, 5.6, 5.8, 6.8 or 8.8 according to ISO 898-1.
- The length of the bolt shall be determined as:
  - Minimum bolt length =  $t_{fix} + l_{s,min}$
  - Maximum bolt length =  $t_{fix} + l_{s,max}$

<b>SA-X anchor</b>	<b>Annex B1</b>
<b>Intended use</b>	
<b>Specifications</b>	

English translation prepared by IETcc

**Table C1: Installation parameters in concrete for SA-X anchor**

Installation parameters			Performances				
			M6	M8	M10	M12	M16
$d_0$	Nominal diameter of drill bit:	[mm]	8	10	12	15	20
D	Thread diameter:	[mm]	M6	M8	M10	M12	M16
$d_f$	Fixture clearance hole diameter $\leq$	[mm]	7	9	12	14	18
$T_{inst}$	Maximum installation torque:	[Nm]	4	11	17	38	60
$l_{s,min}$	Minimum screwing depth:	[mm]	6	8	10	12	16
$l_{s,max}$	Maximum screwing depth:	[mm]	10	13	17	21	27
$h_1$	Depth of drilled hole:	[mm]	27	33	43	54	70
$h_{nom}$	Overall anchor embedment depth:	[mm]	25	30	40	50	65
$h_{ef}$	Effective anchorage depth:	[mm]	25	30	40	50	65
$h_{min}$	Minimum thickness of concrete member:	[mm]	100	100	100	100	130
$s_{min}$	Minimum allowable spacing:	[mm]	60	60	80	100	130
$c_{min}$	Minimum allowable distance:	[mm]	105	105	140	175	230

**SA-X anchor**

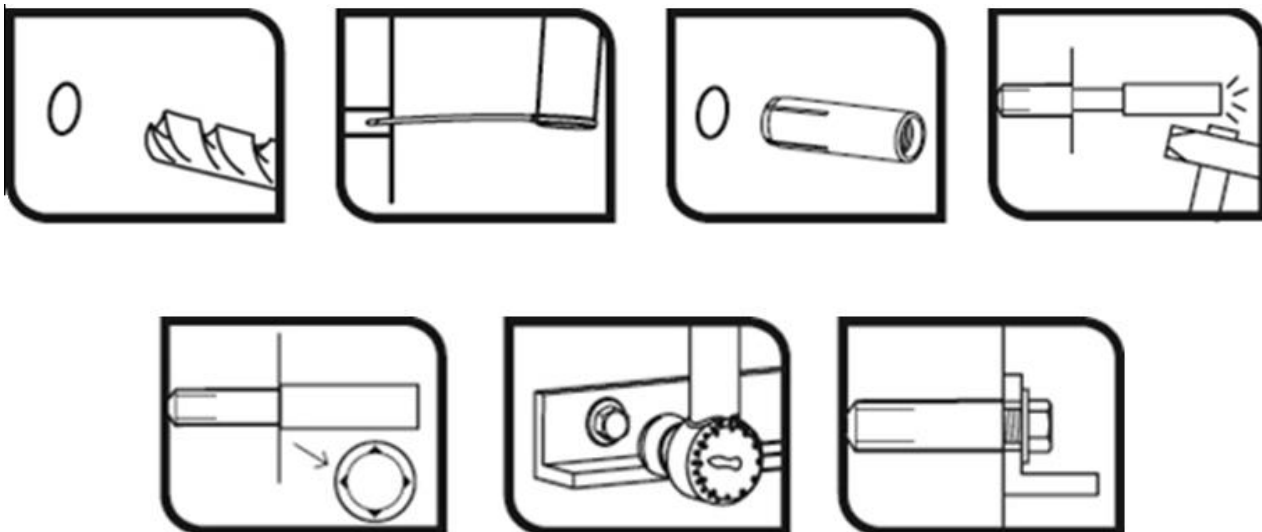
**Performances**

Installation parameters in concrete

**Annex C1**

English translation prepared by IETcc

### Installation process



**SA-X anchor**

**Performances**

Installation procedure

**Annex C2**

English translation prepared by IETcc

**Table C2: Essential characteristics in concrete to loads of design method B according to EN 1992-4 for SA-X anchor**

Essential characteristics of resistance to loads of design method B			Performances				
			M6	M8	M10	M12	M16
<b>Any load direction</b>							
$F_{Rk}^0$	Characteristic resistance in C12/15 concrete:	[kN]	1.5	3.0	4.0	6.0	9.0
$F_{Rk}^0$	Characteristic resistance in C20/25 to C50/60 concrete:	[kN]	2.0	3.0	5.0	7.5	12.0
$\gamma_{ins}$	Installation safety factor:	[-]	1.2	1.2	1.4	1.4	1.4
$s_{cr}$	Critical spacing:	[mm]	75	90	120	150	195
$c_{cr}$	Critical edge distance:	[mm]	40	45	60	75	100
<b>Shear loads: steel failure with lever arm</b>							
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.6	[Nm]	6.1	15.0	29.9	52.4	133.3
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.67				
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.8	[Nm]	6.1	15.0	29.9	52.4	133.3
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25				
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.6	[Nm]	7.6	18.8	37.4	65.5	166.6
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.67				
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.8	[Nm]	7.6	18.8	37.4	65.5	166.6
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25				
$M_{Rk,s}^0$	Characteristic bending moment, steel class 6.8	[Nm]	9.2	22.5	44.9	78.7	199.9
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25				
$M_{Rk,s}^0$	Characteristic bending moment, steel class 8.8	[Nm]	12.2	30.0	59.9	104.9	266.6
$\gamma_{Ms}^{(1)}$	Partial safety factor:	[-]	1.25				

<sup>1)</sup> In absence of other national regulations

**Table C3: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for SA-X anchor**

Essential characteristics under fire exposure in concrete C20/25 to C50/60 in any load direction			Performances				
			M6	M8	M10	M12	M16
R30	Characteristic resistance: $F_{Rk,fi30}^0$	[kN]	0.2	0.4	0.9	1.7	3.1
R60	Characteristic resistance: $F_{Rk,fi60}^0$	[kN]	0.2	0.3	0.8	1.3	2.4
R90	Characteristic resistance: $F_{Rk,fi90}^0$	[kN]	0.1	0.3	0.6	1.1	2.0
R120	Characteristic resistance: $F_{Rk,fi120}^0$	[kN]	0.1	0.2	0.5	0.8	1.6
R30 to R120	Spacing	$s_{cr,fi}$ [mm]	4 x $h_{ef}$				
	Edge distance	$c_{cr,fi}$ [mm]	2 x $h_{ef}$				

<sup>1)</sup> in absence of other national regulations the partial safety factor for resistance under fire exposure  $\gamma_{M,fi} = 1.0$  is recommended  
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is  $c \geq 300$  mm

<b>SA-X anchor</b>	<b>Annex C3</b>
<b>Performances</b>	
Essential characteristics in concrete and under fire exposure	