



INSTYTUT TECHNIKI BUDOWLANEJ
PL 00-611 WARSZAWA
ul. Filtrowa 1
tel.: (+48 22) 825-04-71
(+48 22) 579-62-94
eta@itb.pl
www.itb.pl



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European Technical Assessment

**ETA-15/0122
of 30/06/2022**

General Part

**Technical Assessment Body issuing the
European Technical Assessment**

Instytut Techniki Budowlanej

Trade name of the construction product

SMART S-IA, S-IAD, S-IAL and S-IAI

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

Fasteners for use in concrete for redundant
non-structural systems

Manufacturer

pgb-Polska Sp. z o.o.
ul. Fryderyka Wilhelma Redena 3
PL 41-807 Zabrze
Poland

Manufacturing plant(s)

Manufacturing Plants no. 5a and 5b

**This European Technical Assessment
contains**

14 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"

This version replaces

ETA-15/0122 issued on 11/08/2020

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Specific Part

1 Technical description of the product

The SMART S-IA, S-IAD, S-IAL and S-IAI are deformation-controlled expansion anchors in sizes of M6, M8, M10, M12, M16 and M20. The anchors S-IA, S-IAD and S-IAL are made of zinc plated steel and S-IAI are made of stainless steel.

The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

The description of the product is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B.

The performances given 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 or the Technical Assessment Body, 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 and references to the methods used for its assessment

3.1 Performance of the product

3.1.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	Annex C2

3.1.2 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance for all load directions	Annex C1
Edge distance and spacing	Annex C1
Durability	Annex B1

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 330747-00-0601.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base


According to Decision 97/161/EC of the European Commission the system 2+ of assessment and verification of constancy of performance applies (see Annex V to regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

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 Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 30/06/2022 by Instytut Techniki Budowlanej



Anna Panek, MSc
Deputy Director of ITB

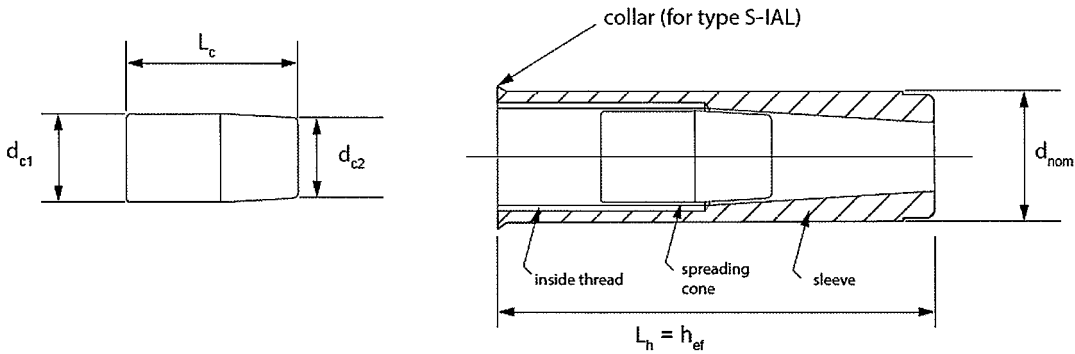
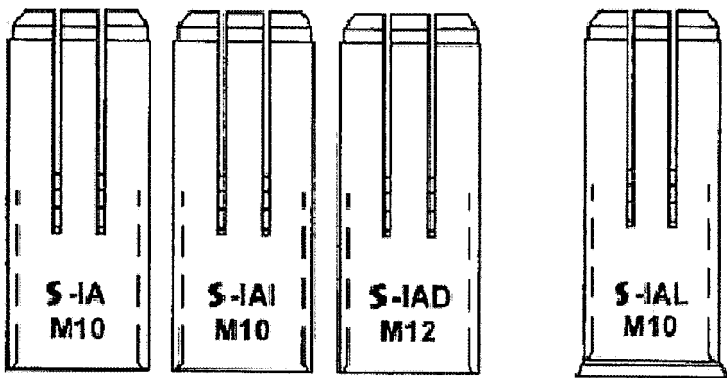
<div></div>	
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<p>SMART S-IA, S-IAI and S-IAD (only M12) – zinc plated</p> <p>SMART S-IAI – stainless steel</p>	
SMART S-IA, S-IAL, S-IAD and S-IAI	Annex A1 of European Technical Assessment ETA-15/0122
Product description Characteristic of the product	

Table A1. Anchors SMART S-IA, S-IAL, S-IAD – materials and dimensions

Anchor type		SMART S-IA, S-IAL					
Anchor size		M6x25	M8x25	M8x30	M10x25	M10x30	M10x40*
Anchor length L _H	[mm]	25	25	30	25	30	40
Thread inside	[mm]	6	8	8	10	10	10
External diameter d _{nom}	[mm]	8	10	10	12	12	12
Anchor type		SMART S-IA, S-IAL					S-IAD
Anchor size		M12x25	M12x50	M16x65	M20x80	M12x50	
Anchor length L _H	[mm]	25	50	65	80	50	
Thread inside	[mm]	12	12	16	20	12	
External diameter d _{nom}	[mm]	15	15	20	25	16	
Anchor material	cold forming steel C1008 or according to EN 10277; galvanized ≥ 5 μm according to EN ISO 4042; f _{uk} ≥ 450 N/mm ² and f _{yk} ≥ 360 N/mm ² *cold forming steel C1015 or according to EN 10277; galvanized ≥ 5 μm according to EN ISO 4042; f _{uk} ≥ 450 N/mm ² and f _{yk} ≥ 360 N/mm ²						

Table A2. Anchor SMART S-IAI – materials and dimensions

Anchor type		SMART S-IAI					
Anchor size		M6x25	M8x30	M10x40	M12x50	M16x65	M20x80
Anchor length L_H	[mm]	25	30	40	50	65	80
Thread inside	[mm]	6	8	10	12	16	20
External diameter d_{nom}	[mm]	8	10	12	15	20	25
Anchor material	stainless steel 1.4401 according to EN 10088 (AISI 316) $f_{uk} \geq 500 \text{ N/mm}^2$ and $f_{yk} \geq 210 \text{ N/mm}^2$						

Table A3. Expansion plug – materials and dimensions

Spreading cone		M6	M8	M10	M12	M16	M20
Rear diameter d_{c1}	[mm]	5,0	6,4	8,0	10,0	13,5	16,8
Front diameter d_{c2}	[mm]	4,3	5,1	6,8	8,8	13,0	15,2
Length l_c	[mm]	9,8	11,4	16,0	20,8	29,2	30,0
Expansion plug material	cold forming steel C1008; galvanized $> 5 \mu\text{m}$ or stainless steel 1.4401, 1.4404 according to EN 10088						

SMART S-IA, S-IAL, S-IAD and S-IAI

Product description
Characteristic of the product

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Specification of intended use

Anchorage subject to:

- Multiple use for non-structural applications: sizes from M6 to M20.
- Static and quasi-static loads: sizes from M6 to M20.
- Anchorages with requirements related to resistance to fire – only for normal weight concrete: sizes from M8 to M20.

Base material:

- Reinforced or unreinforced, cracked or non-cracked normal weight concrete (without fibres) of strength classes C20/25 to C50/60 at maximum according to EN 206.
- Precast prestressed hollow concrete slabs (with $w/e \leq 4,2$) and strength class C40/50 at minimum to C50/60 at maximum according to EN 206: SMART S-IAL size M8x25, M10x25 and M12x25 only.

Use conditions (environmental conditions):

- All sizes (zinc coated steel) and size M6 (stainless steel): structures subject to dry internal conditions.
- Sizes from M8 to M20 (stainless steel): structures subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions, if no particular aggressive conditions exist.

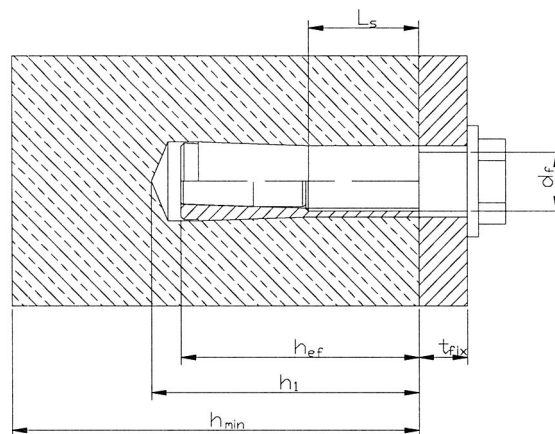
Design:

- Anchorages are designed 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 transmitted. 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 and quasi-static loads and under fire exposure are designed in accordance with EN 1992-4:2018.

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 any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check of concrete being well compacted, e.g. without significant voids.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- Anchor installation such that the effective anchorage depth is complied with.
- Anchor expansion by impact on the cone (expansion plug) of the anchor with appropriate tool.

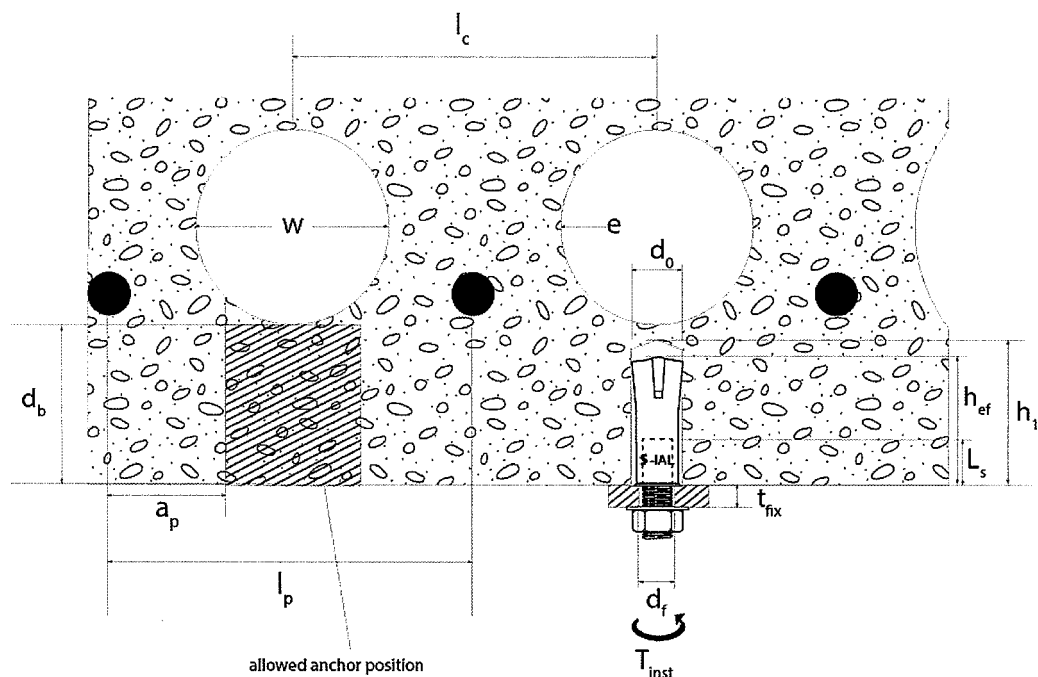
<p align="center">SMART S-IA, S-IAL, S-IAD and S-IAI</p>	<p align="center">Annex B1 of European Technical Assessment ETA-15/0122</p>
<p align="center">Intended use Specification</p>	

**Table B1:** Installation parameters of SMART S-IA, S-IAL, S-IAD and S-IAI in concrete

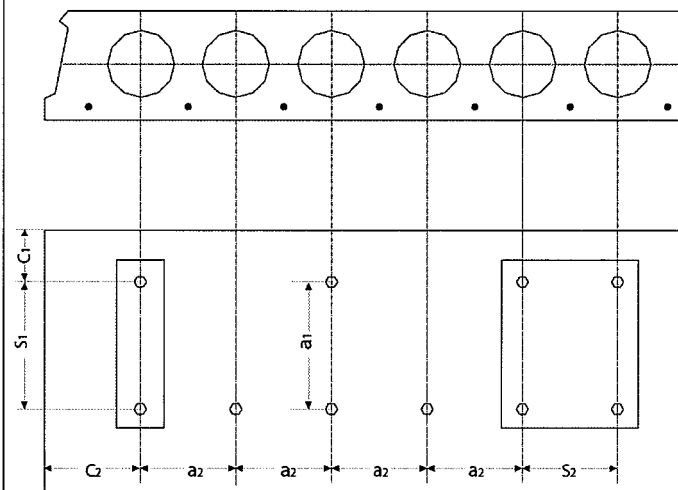
Anchor size	Effective anchorage depth	Drill hole depth	Drill hole diameter	Installation torque moment (max)	Thickness of concrete member (min)	Screwing depth (min)	Screwing depth (max)	Diameter of clearance hole in the fixture
	[mm]	[mm]	[mm]	[Nm]	[mm]	[mm]	[mm]	[mm]
	h_{ef}	h_1	d_0	$\max T_{inst}$	h_{min}	$L_{s, min}$	$L_{s, max}$	d_f
M6	25	27	8	4,5	80	6	11	7
M8	30	33	10	11	80	8	13	9
M10	30	33	12	22	80	10	13	12
M10	40	43	12	22	80	10	15	12
M12	50	54	15	38	100	12	20	14
M12 *	50	54	16	38	100	12	20	14
M16	65	70	20	98	130	16	25	18
M20	80	86	25	130	160	20	35	22

* SMART S-IAD only

Fastening screws or anchor threaded rods:Steel, property class ≥ 4.8 according to EN-ISO 898-1; galvanized $\geq 5 \mu\text{m}$ (SMART S-IA, S-IAD, S-IAL)Stainless steel 1.4401 according to EN 10088, property class ≥ 70 according to EN ISO 3506 (SMART S-IAI)**SMART S-IA, S-IAL, S-IAD and S-IAI****Intended use**
Installation parameters – concrete**Annex B2**
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d_b	Bottom flange thickness	$\geq 35 \text{ mm}$
l_c	Core distance	$\geq 100 \text{ mm}$
l_p	Prestressing steel distance	$\geq 100 \text{ mm}$
a_p	Distance between anchor position and prestressing steel	$\geq 50 \text{ mm}$
w	Core width	$w/e \leq 4,2$
e	Web thickness	



C_1, C_2 Edge distance
 S_1, S_2 Anchor spacing
 a_1, a_2 Distance between anchor groups

$C_{min} \geq 150 \text{ mm}$
 $S_{min} \geq 200 \text{ mm}$
 $a_{min} \geq 200 \text{ mm}$

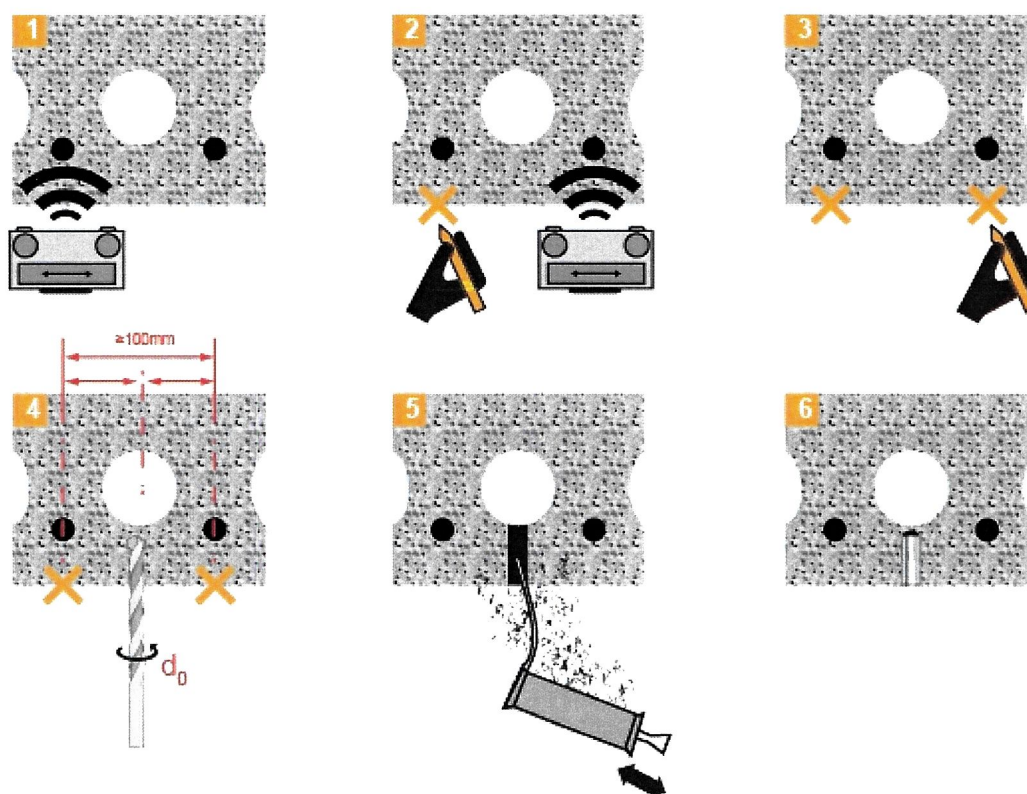
SMART S-IA, S-IAL, S-IAD and S-IAI

Intended use
Installation parameters – precast prestressed hollow concrete slab

Annex B3
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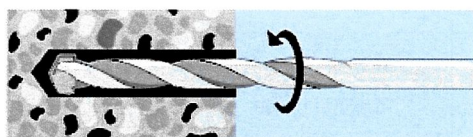
Table B2: Installation parameters of SMART S-IAL in precast prestressed hollow concrete slab

Anchor size	Effective anchorage depth	Drill hole depth	Drill hole diameter	Installation torque moment (max)	Thickness of concrete member (min)	Screwing depth (min)	Screwing depth (max)	Diameter of clearance hole in the fixture
	[mm]	[mm]	[mm]	[Nm]	[mm]	[mm]	[mm]	[mm]
	h_{ef}	h_1	d_0	$\max T_{inst}$	h_{min}	$L_{s, min}$	$L_{s, max}$	d_f
M8	25	27	10	11	80	8	13	9
M10	25	27	12	22	80	10	13	12
M12	25	27	15	38	80	12	13	14

Fastening screws or anchor threaded rods:Steel, property class ≥ 4.8 according to EN-ISO 898-1; galvanized $\geq 5 \mu m$ **Installation instructions for anchorages in prestressed hollow core slabs****SMART S-IA, S-IAL, S-IAD and S-IAI****Intended use**

Installation parameters – precast prestressed hollow concrete slab

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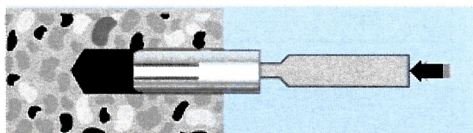
1. Drilling:

Choose the correct drill diameter (d_0) and drilling depth (h_1). In case of installation in hollow concrete verify the bottom flange thickness and prestressed steel positioning (see annex B3).



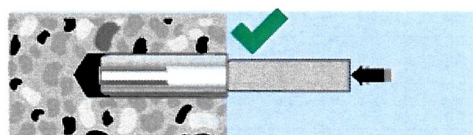
2. Cleaning of the drill hole:

Remove drill dust by blowing.



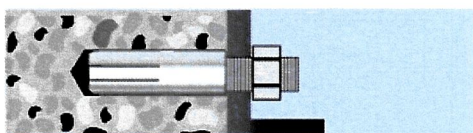
3. Installation

Install the anchor by using the correct setting tool.



4. Verifying:

Verify that the installation tool is on the rim of the anchor.



5. Fixing:

Apply the torque using a calibrated torque wrench to complete the installation.

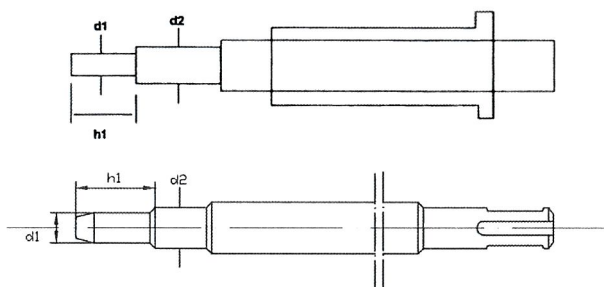


Table B3: Installation tools

Size	d1	d2	h1
M6 x 25	5,0	7,5	15,0
M8 x 25	6,5	9,5	16,0
M8 x 30	6,5	9,5	18,0
M10 x 25	8,0	11,5	16,0
M10 x 30	8,0	11,5	18,0
M10 x 40	8,0	11,5	24,0
M12 x 25	10,2	14,5	16,0
M12 x 50	10,2	14,5	30,0
M16 x 65	13,5	18,0	36,0
M20 x 80	16,5	22,0	50,0

SMART S-IA, S-IAL, S-IAD and S-IAI

Intended use

Installation instruction and tools – concrete and precast prestressed hollow concrete slab

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Table C1: Characteristic resistance in concrete – SMART S-IA, S-IAL, S-IAD

Anchor type			Property class	SMART S-IA and S-IAL							S-IAD
				6x25	8x30	10x30	10x40	12x50	16x65	20x80	12x50
All load directions (fastening screw or threaded rod property class ≥ 4.8)											
Characteristic resistance in concrete C20/25 to C50/60	F ⁰ _{Rk}	[kN]	≥ 4.8	1,56	2,87	4,79	5,75	5,87	12,59	15,43	6,33
Partial safety factor	γ ₂	[-]	-	1,4							
Characteristic spacing	s _{cr}	[mm]		200					260	320	200
Characteristic edge distance	c _{cr}	[mm]		150					195	240	150
Shear load: steel failure with lever arm											
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	4.8	6	15	30	30	52	133	260	52
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	5.8	8	19	37	37	66	167	325	66
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	6.8	9	23	45	45	79	200	390	79
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	8.8	12	30	60	60	105	267	520	105

Table C2: Characteristic resistance in concrete – SMART S-IAI

Anchor type			Property class	SMART S-IAI					
				6x25	8x30	10x40	12x50	16x65	20x80
All load directions (fastening screw or threaded rod property class A4-70)									
Characteristic resistance in concrete C20/25 to C50/60	F ⁰ _{Rk}	[kN]	A4-70	0,84	1,59	2,58	4,02	9,05	12,26
Partial safety factor	γ ₂	[-]	-	1,4					
Characteristic spacing	S _{cr}	[mm]		200				260	320
Characteristic edge distance	C _{cr}	[mm]		150				195	240
Shear load: steel failure with lever arm									
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	A4-70	11	26	52	92	233	454

SMART S-IA, S-IAL, S-IAD and S-IAI

Performances
Characteristic resistance – concrete

Annex C1
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Table C3: Characteristic resistance in precast prestressed hollow concrete slab – SMART S-IAL

Anchor type			Property class	SMART S-IAL		
				8x25	10x25	12x25
All load directions (fastening screw or threaded rod property class ≥ 4.8)						
Characteristic resistance in concrete C40/50 to C50/60	F ⁰ _{Rk}	[kN]	≥ 4.8	5,5	9,5	9,5
Partial safety factor	γ ₂	[-]	-	1,4	1,2	1,0
Characteristic spacing	s _{cr}	[mm]		200		
Characteristic edge distance	c _{cr}	[mm]		150		
Shear load: steel failure with lever arm						
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	4.8	15	30	52
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	5.8	19	37	66
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	6.8	23	45	79
Characteristic bending moment	M ⁰ _{Rk,S}	[Nm]	8.8	30	60	105

SMART S-IA, S-IAL, S-IAD and S-IAI

Performances

Characteristic resistance – precast prestressed hollow concrete slab

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Table C4: Characteristic resistance under fire exposure in concrete C20/25 to C50/60 – SMART S-IA, S-IAL and S-IAD

Fire resistance class	SMART S-IA, S-IAL and S-IAD	M8	M10	M12	M16	M20	
All load directions (fastening screw or threaded rod property class ≥ 4.8)							
R30	Characteristic resistance F _{Rk,fi} ¹	[kN]	0,4	0,9	1,5	3,1	3,9
R60		[kN]	0,3	0,8	1,3	2,4	3,7
R90		[kN]	0,3	0,6	1,1	2,0	3,2
R120		[kN]	0,2	0,5	0,8	1,6	2,5
Spacing	S _{cr,fi}	[mm]	4 x h _{ef}				
Edge distance	C _{cr,fi}	[mm]	2 x h _{ef}				
In case of fire attack from more than one side, the edge distance shall be ≥ 300 mm.							

⁽¹⁾ in the absence of other national regulations a partial safety factor $\gamma_{m,fi} = 1,0$ is recommended

Table C5: Characteristic resistance under fire exposure in concrete C20/25 to C50/60 – SMART S-IAI

Fire resistance class	SMART S-IAI	M8	M10	M12	M16	M20	
All load directions (fastening screw or threaded rod property class ≥ A4-70)							
R30	Characteristic resistance $F_{Rk,fi}^1$	[kN]	0,4	0,6	1,0	2,3	3,1
R60		[kN]	0,4	0,6	1,0	2,3	3,1
R90		[kN]	0,4	0,6	1,0	2,3	3,1
R120		[kN]	0,3	0,5	0,8	1,8	2,5
Spacing	$S_{cr,fi}$	[mm]	4 x h_{ef}				
Edge distance	$C_{cr,fi}$	[mm]	2 x h_{ef}				
In case of fire attack from more than one side, the edge distance shall be ≥ 300 mm.							

⁽¹⁾ in the absence of other national regulations a partial safety factor $\gamma_{m,fi} = 1,0$ is recommended

SMART S-IA, S-IAL, S-IAD and S-IAI

Performances
Characteristic resistance under fire exposure – concrete

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