



INSTYTUT TECHNIKI BUDOWLANEJ



Member of



www.eota.eu

European Technical Assessment

ETA-24/0188
of 14/05/2024



General Part

Technical Assessment Body issuing the European Technical Assessment

Instytut Techniki Budowlanej

Trade name of the construction product

Expansion Shield Anchor SMART 4SA

Product family to which the construction product belongs

Deformation-controlled expansion fastener of sizes M6, M8, M10 and M12 for use in uncracked concrete

Manufacturer

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

Manufacturing plant

Manufacturing plant no 9

This European Technical Assessment contains

11 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)
330232-01-0601 "Mechanical fasteners for use in concrete"

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 shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

Specific Part

1 Technical description of the product

Expansion Shield Anchor SMART 4SA is a deformation-controlled expansion fastener in the sizes M6, M8, M10 and M12, made of galvanized steel. The fastener is placed into a drill hole and anchored by deformation-controlled expansion. The fastener can be used with metric screw or threaded rod according to ISO 898-1, property class 4.8 or 8.8, with a nut and a washer according to Annex A1.

The H version of anchor consists of expansion element: sleeve, conical nut, ring and coil spring. The T version of anchor consists of expansion element, metric screw and washer. The K version of anchor consists of expansion element, threaded rod, washer and nut.

The product description 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 fastener is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of the fastener of 50 years, when installed in the works, provided that the fastener is subject to appropriate installation. The indications given on the working life cannot be interpreted as a guarantee given by the producer or 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 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	Annex C1
Characteristic resistance to shear load (static and quasi-static loading)	Annex C2
Displacements	Annex C1, C2

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.1.3 Aspects of durability

Essential characteristic	Performance
Durability	Annex A2, B1

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 330232-01-0601.

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

According to Decision 96/582/EC of the European Commission the system 1 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 in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in 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.

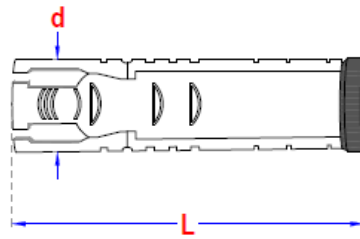
Issued in Warsaw on 14/05/2024 by Instytut Techniki Budowlanej



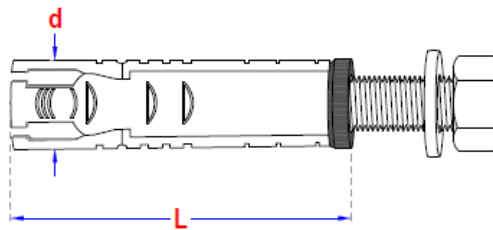
Anna Panek, MSc

Deputy Director of ITB

Expansion Shield Anchor SMART 4SA – H version:



Expansion Shield Anchor SMART 4SA – T version:



Expansion Shield Anchor SMART 4SA – K version:

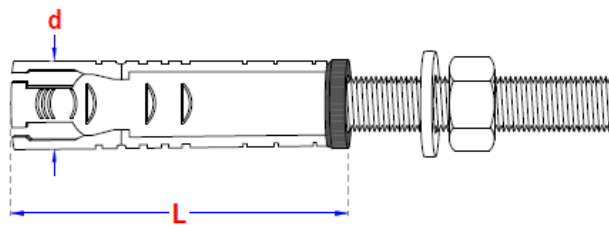


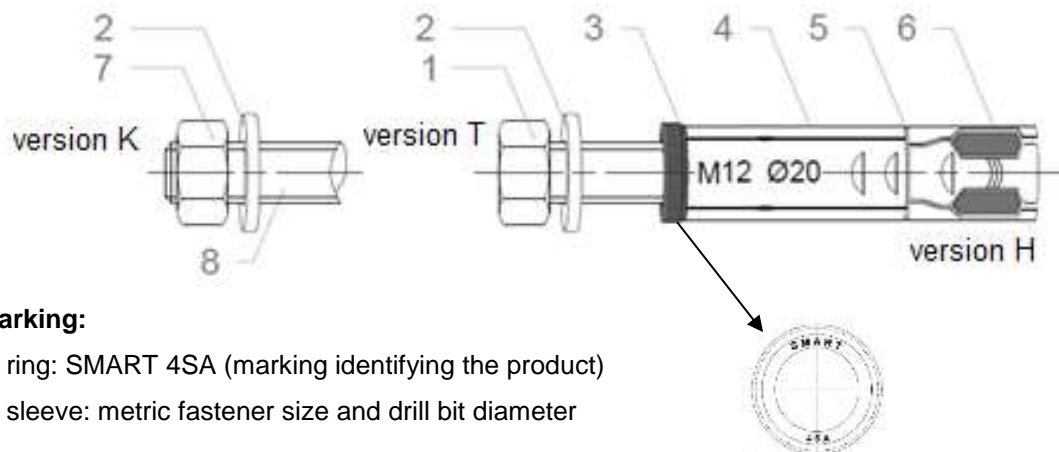
Table A1: Expansion Shield Anchor SMART 4SA dimensions

Size of fastener		M6	M8	M10	M12
Total length, L	mm	40	50	60	80
External diameter, d	mm	10	14	16	20

Expansion Shield Anchor SMART 4SA

Product description
Dimensions

Annex A1
of European
Technical Assessment
ETA-24/0188

**Marking:**

- ring: SMART 4SA (marking identifying the product)
- sleeve: metric fastener size and drill bit diameter

Table A2: Materials

No	Designation	Material	Coating
1	Metric screw (hexagonal bolt)	DIN 933 (EN ISO 4017) / DIN 931 (EN ISO 4014), EN ISO 898-1; property class 4.8 or 8.8	Zinc plated ¹⁾ ≥ 5 µm EN ISO 4042
2	Washer	DIN 125 (EN ISO 7089) / DIN 440 (EN ISO 7094) / DIN 9021 (EN ISO 7093)	
3	Ring	Cold formed steel	
4	Sleeve	Hot-rolled carbon steel	
5	Coil spring	Spring steel	-
6	Conical nut	Cold forged steel (EN 10263) 1.0214 / C10101; property class 8	Zinc plated ¹⁾ ≥ 5 µm EN ISO 4042
7	Hexagonal nut	DIN 934 (EN ISO 4032), EN ISO 898-2; property class 6 or 8	
8	Threaded rod	EN ISO 898-1; property class 4.8 or 8.8	

¹⁾ electroplated according to EN ISO 4042, passivated (bright or black)

Expansion Shield Anchor SMART 4SA

Product description
Marking and materials

Annex A2
of European
Technical Assessment
ETA-24/0188

Specification of intended use**Anchorage subject to:**

- Static and quasi-static loads.

Base material:

- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete (without fibres) of strength classes C20/25 to C50/60 according to EN 206.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.).
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.
- Anchorages under static and quasi-static loads are designed in accordance with EN 1992-4:2018.

Installation of fasteners:

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the fastener only as supplied by the manufacturer without exchanging any component of the fastener.
- Fastener installation in accordance with the manufacturer's specification and drawings and using the appropriate tools.
- Checks before placing the fastener to ensure that the strength class of the concrete in which the fastener is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- 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.

Expansion Shield Anchor SMART 4SA**Intended use
Specifications****Annex B1
of European
Technical Assessment
ETA-24/0188**

Expansion Shield Anchor SMART 4SA:

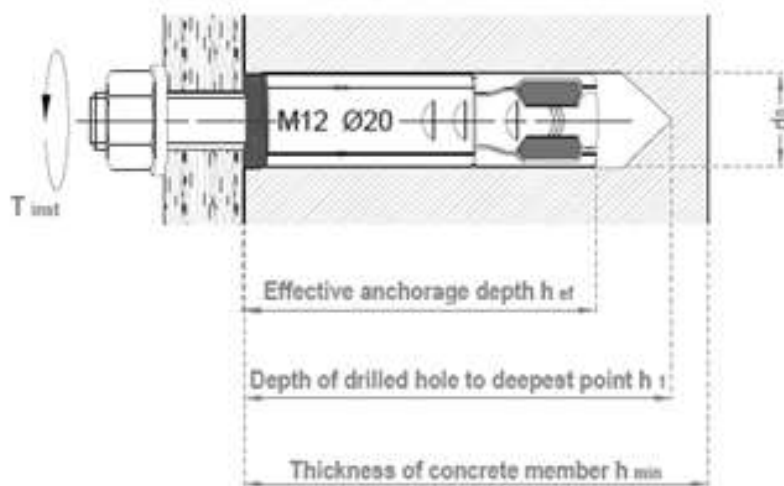


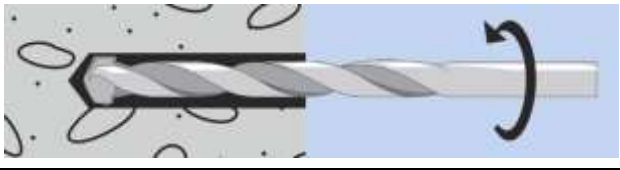
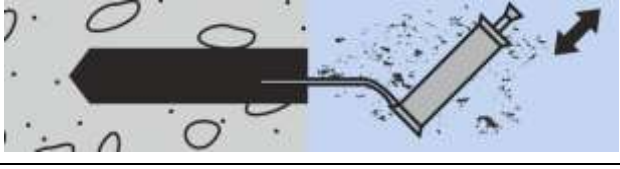
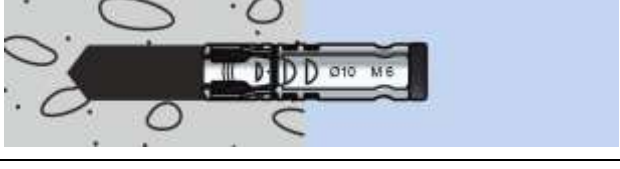
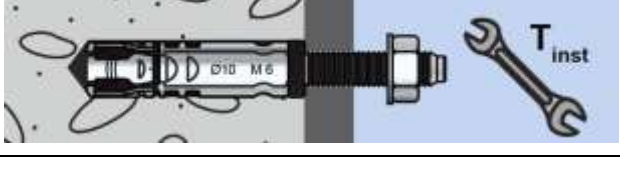
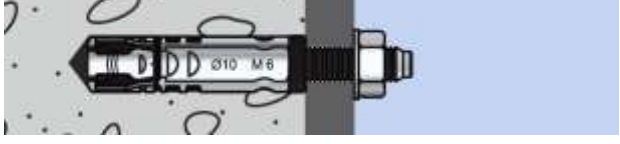
Table B2: Installation parameters

Fastener size		M6	M8	M10	M12
Effective embedment depth	h_{ef} [mm]	40	50	60	80
Nominal drill hole diameter	d_o [mm]	10	14	16	20
Depth of drill hole to deepest point	$h_1 \geq$ [mm]	45	55	65	85
Overall embedment depth in concrete	$h_{nom} \geq$ [mm]	40	50	60	80
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	9	11	13
Installation torque moment	T_{inst} [Nm]	5	15	30	45
Minimum thickness of concrete member	h_{min} [mm]	100	100	120	160
Minimum spacing	s_{min} [mm]	65	80	100	130
Minimum edge distance	c_{min} [mm]	65	80	100	130

Expansion Shield Anchor SMART 4SA

Intended use
Installation parameters

Annex B2
of European
Technical Assessment
ETA-24/0188

	1. Drill the hole perpendicular to the substrate surface.
	2. Clean the drill hole.
	3. Place an fastener sleeve in the drill hole.
	4. Assemble fastener with appropriate installation torque T_{inst} .
	5. Fastener properly installed.

Expansion Shield Anchor SMART 4SA

Intended use
Installation instruction

Annex B3
of European
Technical Assessment
ETA-24/0188

Table C1.1: Characteristic resistance to tension load (static and quasi-static loading) in uncracked concrete, method A

Fastener size			M6	M8	M10	M12
Steel failure						
Steel failure - steel property class 4.8						
Characteristic resistance		$N_{Rk,s}$ [kN]	8,0	14,0	23,0	33,0
Partial safety factor		γ_{Ms} ¹⁾	1,5			
Steel failure - steel property class 8.8						
Characteristic resistance		$N_{Rk,s}$ [kN]	16,0	29,0	46,0	67,0
Partial safety factor		γ_{Ms} ¹⁾	1,5			
Pull-out failure						
Characteristic resistance in uncracked concrete C20/25		$N_{Rk,p}$ [kN]	8,0	13,0	20,0	²⁾
Installation safety factor		γ_{inst}	1,0			
Increasing factor for concrete	C30/37	ψ_c	1,22			
	C40/50		1,41			
	C50/60		1,55			
Concrete cone failure and splitting failure						
Effective embedment depth		h_{ef} [mm]	40	50	60	80
Factor for uncracked concrete		$k_{ucr,N}$	11,0			
Installation safety factor		γ_{inst}	1,0			
Characteristic resistance to concrete cone failure		$N^0_{Rk,c}$ [kN]	8,0	13,0	20,0	²⁾
Characteristic resistance for splitting failure		$N^0_{Rk,sp}$ [kN]	8,0	13,0	20,0	²⁾
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	120	150	180	240
	splitting failure	$s_{cr,sp}$ [mm]	240	300	360	480
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	60	75	90	120
	splitting failure	$c_{cr,sp}$ [mm]	120	150	180	240
¹⁾ in the absence of other national regulations						
²⁾ pull-out failure mode is not decisive						

Table C1.2: Displacements under tension loading

Fastener size		M6	M8	M10	M12
Tension load	N [kN]	5,58	9,27	13,37	32,32
Displacement	δ_{NO} [mm]	1,44	1,97	2,00	2,19
	$\delta_{N\infty}$ [mm]	2,10	2,63	2,65	2,85

Expansion Shield Anchor SMART 4SA
Performances

Characteristic resistance to tension load, displacements

Annex C1
 of European
 Technical Assessment
 ETA-24/0188

Table C2.1: Characteristic resistance to shear load (static and quasi-static loading) in uncracked concrete, method A

Fastener size		M6	M8	M10	M12
Steel failure without lever arm					
Steel failure - steel property class 4.8					
Characteristic resistance	$V_{Rk,s}$ [kN]	4,0	7,0	11,0	16,0
Ductility factor	k_7	0,8			
Partial safety factor	γ_{Ms} ¹⁾	1,25			
Steel failure - steel property class 8.8					
Characteristic resistance	$V_{Rk,s}$ [kN]	8,0	14,0	23,0	33,0
Ductility factor	k_7	0,8			
Partial safety factor	γ_{Ms} ¹⁾	1,25			
Steel failure with lever arm					
Steel failure - steel property class 4.8					
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	6,11	15,00	29,93	52,44
Partial safety factor	γ_{Ms} ¹⁾	1,25			
Steel failure - steel property class 8.8					
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	12,21	30,00	59,86	104,88
Partial safety factor	γ_{Ms} ¹⁾	1,25			
Concrete pry-out failure					
Factor	k_8	1,0		2,0	
Installation safety factor	γ_{inst}	1,0			
Concrete edge failure					
Effective length of fastener under shear loading	l_f [mm]	40	50	60	80
Outside diameter of fastener	d_{nom} [mm]	10	14	16	20
Minimum member thickness	h_{min} [mm]	100	100	120	160
Installation safety factor	γ_{inst}	1,0			
¹⁾ in the absence of other national regulations					

Table C2.2: Displacements under shear loading

Fastener size		M6	M8	M10	M12
Shear load	V [kN]	6,32	9,75	15,04	31,37
Displacement	δ_{vo} [mm]	1,49	1,99	2,00	2,00
	$\delta_{v\infty}$ [mm]	2,23	2,99	3,00	3,00

Expansion Shield Anchor SMART 4SA
Performances

Characteristic resistance to shear load, displacements

Annex C2
of European
Technical Assessment
ETA-24/0188