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NATIONAL TECHNICAL ASSESSMENT ITB-KOT-2019/0952 1st Edition

This National Technical Assessment has been issued in accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on national technical assessments (Official Journal of the Republic of Poland (Dz. U.) of 2016, item 1968) by Instytut Techniki Budowlanej (ITB -Building Research Institute) in Warsaw, upon a request of:

pgb-Polska sp. z o.o.
ul. Fryderyka Wilhelma Redena 3, 41-807 Zabrze

The National Technical Assessment ITB-KOT-2019/0952 1st Edition is a favourable assessment of the performance properties of the following construction products for their intended use:

Steel expansion fasteners SM0WA / S-WA

Date of expiry of the National Technical Assessment:

JULY 3, 2024.

DIRECTOR
of the Building Research Institute

Robert Geryło, Ph. D. (Eng)

Warsaw, July 3, 2019.

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1. TECHNICAL DESCRIPTION OF THE PRODUCT

The present National Technical Assessment refers to steel extension fasteners SM0WA / S-WA, of types: SM0WA / S-WA M8, SM0WA / S-WA M10, SM0WA / S-WA M12 and SM0WA / S-WA M16, manufactured by pgb-Polska sp. z o.o., ul. Fryderyka Wilhelma Redena 3, 41-807 Zabrze, in a manufacturing plant in China.

The fasteners SM0WA / S-WA consists of a threaded mandrel with an expansion cone, an expansion ring as well as a hexagonal nut and a washer.

The mandrels of the fasteners SM0WA / S-WA are made of carbon steel of class of mechanical properties not lower than 4.8 according to the standard PN-EN ISO 898-1:2013 and coated with zinc of thickness not less than 5 µm according to the standard PN-EN ISO 4042:2018 or PN-EN ISO 2081:2018. The nuts and washers are made of carbon steel of class of mechanical properties matched to the class of the mandrel class and coated with zinc of thickness not less than 5 µm according to the standard PN-EN ISO 4042:2018 or PN-EN ISO 2081:2018.

The shape and dimensions of the steel expansion fasteners SW0WA / S-WA are presented in Annex A.

2. THE INTENDED USE OF THE PRODUCT

The steel expansion fasteners SM0WA / S-WA are intended for fixings of statically loaded elements of building structures in substrate of plain cracked or non-cracked plain concrete of the classes: C20/25 ÷ C50/60 according to the standard PN-EN 206+A1:2016.

Due to the corrosive aggressiveness of the environment, the steel expansion fasteners SM0WA / S-WA shall be used in accordance with the requirements set forth in the standards: PN-EN ISO 12944-2:2018 and PN-EN ISO 9223:2012.

In order to determine the design resistances of fixings with the expansion fasteners SM0WA / S-WA, the characteristic resistances provided in Annex C shall be divided by partial safety factors equal to: 2,52 – when pulled out of the substrate and 1,25 in the case of shearing.

The installation and layout parameters in the substrate of expansion fasteners SM0WA / S-WA are given in Annex B.

Fixing of the expansion fastener is performed by inserting it in the hole drilled in the substrate. The hole shall be drilled perpendicularly to the substrate. The fastener should be able to be inserted into the hole with light hammer blows. Tightening the nut causes the mandrel to move out of the hole, opening of the split parts of the expansion ring and creation of a permanent anchorage of the fastener. Installation shall be carried out using a torque wrench. Care must be taken that the washer under the nut is pressed firmly against the component to be fastened when the fastener is expanded.

The steel expansion fasteners SM0WA / S-WA shall be used in accordance with the technical design, developed with taking into account the Polish construction standards and regulations, the findings of this National Technical Assessment and in compliance with the manufacturer's instructions provided to the customers concerning the conditions of performing the fixings with the above specified fasteners.

3. PERFORMANCE PROPERTIES OF THE PRODUCT AND METHODS APPLIED TO ASSESS THE PROPERTIES

3.1 Performance properties of the product

3.1.1. Characteristic resistances of fixings with the fasteners. Characteristic tension resistance and characteristic shear resistance of the fasteners are given in Annex C.

3.1.2. Working life of the fasteners. Zinc coating with a thickness of not less than 5 μm shall ensure working life of the fasteners in the scope resulting from article 2.

3.2. Methods used for performance assessment

3.2.1. Characteristic resistances of fixings with the fasteners. Characteristic resistances of fixings with the fasteners shall be tested in compliance with EAD 330232-00-0601 on fasteners anchored in the substrate described in article 2 and Annex C. The force shall be measured by means of a device with a range chosen to match the expected value of the destructive force, enabling a constant and gradual increase in force until the destruction occurs.

3.2.2. Durability of the fasteners. Test of zinc coating thickness shall be carried out in compliance with the standard PN-EN ISO 2178:2016 or PN-EN ISO 3497:2004.

4. PACKAGING, TRANSPORT AND STORAGE AND MARKING OF THE PRODUCT

The steel fasteners SM0WA / S-WA shall be delivered in sets, in the manufacturer's own packaging as well as stored and transported in a way that ensures that their technical properties remain unchanged.

The method of marking the products with a construction mark shall be in accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on the method of declaring the performance of construction products and the method of marking them with a construction mark (Journal of Laws of the Republic of Poland (Dz. U.) of 2016, item 1966, as later amended).

The marking of the product with a construction mark shall be accompanied by the following information:

- the last two digits of the year in which the construction mark was first placed on the construction product;
- the name and address of the manufacturer’s registered office or an identification mark allowing explicit identification of the name and address of the manufacturer’s registered office;
- the name and type designation of the construction product;
- the number and year of issue of the National Technical Assessment, which served as the basis for the declaration of performance; (ITB-KOT-2019/0952 1st edition);
- the number of the national declaration of performance;
- the level or class of the declared performance;
- the name of the certification body that has participated in the assessment and verification of

constancy of performance of the construction product,

- the address of the manufacturer's website, if the national declaration of performance is made available on that website.

A safety data sheet and/or information on hazardous substances contained in a construction product referred to in the Articles 31 or 33 of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and Establishing the European Chemicals Agency shall be provided or made available together with the national declaration of performance, as appropriate.

Moreover, the marking of a construction product, being a hazardous mixture according to the REACH regulation, shall comply with the requirements of Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on Classification, Labelling and Packaging of Substances and Mixtures (CLP), amending and repealing Directives: 67/548/EEC and 1999/45/EC, as well as amending Regulation (EC) No. 1907/2006.

5. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (AVCP)

5.1. National system for the assessment and verification of the constancy of performance properties

In accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on the method of declaring the performance of construction products and the method of marking them with a construction mark (Journal of Laws of the Republic of Poland (Dz. U.) of 2016, item 1966, as later amended) the System 1 of assessment and verification of the constancy of performance properties (AVCP) shall be applicable.

5.2. Type testing

The performance characteristics assessed in article 3 constitute the product-type testing, unless raw materials, components, production line or manufacturing plant have been changed.

5.3. Factory production control

In the manufacturing plant the manufacturer shall have implemented a factory production control system. All the elements, requirements and provisions adopted by the manufacturer for the system shall be documented methodically in the form of written policies and procedures, including test records. The factory production control shall be adapted to the manufacturing processes and ensure the achievement of the declared performance of the product in series production.

The factory production control includes the specification and verification of raw materials and components, inspections and in-process tests and control tests (following article 5.4) carried out by the manufacturer in accordance with the prescribed test plan and according to the principles and procedures laid down in the documentation of the factory production control.

The results of production control shall be recorded on a regular basis. The records of the register shall prove that the products have satisfied the criteria of the assessment and verification of the constancy of performance properties. Individual products or batches of the products and related manufacturing details shall be fully identifiable and traceable.

5.4. Control tests

5.4.1. Test plan. The test plan shall include:

a) ongoing tests,
b) periodic tests.

5.4.2. Ongoing tests. The ongoing tests shall include inspection of:

a) the shape and dimensions,
b) the thickness of zinc coating.

5.4.3. Periodic tests. Periodic tests shall include the verification of characteristic resistances of fixings with the fasteners.

5.5. Frequency of tests

The ongoing tests shall be conducted in compliance with the prescribed test plan, however not less frequently than for delivery of each batch of the products. The size of the batch of the products shall be specified in the documentation of factory production control.

The periodic tests shall be performed at least once every 3 years.

6. INSTRUCTIONS

6.1. The National Technical Assessment ITB-KOT-2019/0952 1st edition is a favourable assessment of the performance of those essential characteristics of the steel expansion fasteners SM0WA / S-WA, which, in accordance with the intended use, resulting from the provisions of the Assessment, have an impact on the fulfilment of basic requirements by the construction structures in which the product will be used.

6.2. The National Technical Assessment ITB-KOT-2019/0952 1st edition is not a document authorizing to mark the construction product with a construction mark.

Pursuant to the Act on Construction Products of April 16, 2004 (Journal of Laws of the Republic of Poland: Dz. U. of 2019, item 266, as later amended) the products to which this National Technical Assessment refers may be launched or made available on the domestic market, if the manufacturer has assessed and verified the constancy of performance, drawn up a national declaration of performance in accordance with the National Technical Assessment ITB-KOT-2019/0952 1st edition and marked the products with the construction mark in compliance with the applicable regulations.

6.3. The National Technical Assessment ITB-KOT-2019/0952 1st edition does not infringe the rights resulting from the provisions on industrial property protection, and in particular the Act of June 30, 2000 – the Industrial Property Law (Journal of Laws of the Republic of Poland: Dz. U. of 2017, item 776, as later amended). Ensuring these rights is the responsibility of the users of this National Technical Assessment, by ITB.

6.4. When issuing the National Technical Assessment, ITB shall not be held responsible for any possible infringement of exclusive and acquired rights.

6.5. The National Technical Assessment does not release the manufacturer of the products from responsibility for their proper quality, and the contractors of construction works from responsibility for their proper use.

6.6. The validity of the National Technical Assessment may be extended for further periods, however not exceeding 5 years.

7. LIST OF DOCUMENTS USED IN THE PROCEEDINGS

7.1. Reports, test reports, evaluations, classifications

1) Test report no. LZK00-06026/19/R45NZK. Steel expansion fasteners, Building Structures, Geotechnics and Concrete Plant of the Building Research Institute (ITB), Katowice
2) Test report no. LZK00-06026/17/R34NZK. Steel expansion fasteners, Building Structures and Geotechnics Plant of the Building Research Institute (ITB), Katowice
3) Document no. NZK-07902R: 12/DD/18, Building Structures, Geotechnics and Concrete Plant of the Building Research Institute (ITB), Katowice

7.2. Related standards and documents

PN-EN 206+A1:2016	*Beton – Wymagania, właściwości, produkcja i zgodność* *Concrete – Requirements , properties, production and compliance*
PN-EN ISO 898-1:2013	*Własności mechaniczne części złącznych wykonanych ze stali węglowej oraz stopowej. Część 1: Śruby i śruby dwustronne o określonych klasach własności. Gwint zwykły i drobnozwojny* *Mechanical properties of fasteners made of carbon steel and alloy steel. Part 1: Screws and studs with specific property classes. Coarse and fine thread*
PN-EN ISO 4042:2018	*Części złączne. Powłoki elektrolityczne* *Fasteners. Electrolytic coatings*
PN-EN ISO 2081:2018	*Powłoki metalowe i inne nieorganiczne. Elektrolityczne Powłoki cynkowe z obróbką dodatkową na żelazie lub stali* *Metallic and other inorganic coatings. Electroplated coatings of zinc with supplementary treatments on iron or steel*
PN-EN ISO 2178:2016	*Powłoki niemagnetyczne na podłożu magnetycznym. Pomiar grubości powłok. Metoda magnetyczna.* *Non-magnetic coatings on magnetic substrates. Measurement of coating thickness. Magnetic method.*
PN-EN ISO 3497:2004	*Powłoki metalowe. Pomiary grubości powłok. Metody spektrometrii rentgenowskiej.* *Metallic coatings. Measurement of coating thickness. X-ray spectrometric methods*
PN-EN ISO 9223:2012	*Korozja metali i stopów. Korozyjność atmosfer. Klasyfikacja, określenie i ocena.* *Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and assessment.*
PN-EN ISO 12944-2:2018	*Farby i lakiery. Ochrona przed korozją konstrukcji stalowych za pomocą ochronnych systemów malarskich. Część 2: Klasyfikacja środowisk* *Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Part 2: Classification of environments*
EAD 330232-00-0601	*Mechanical fasteners for use in concrete*

ANNEXES

Annex A.

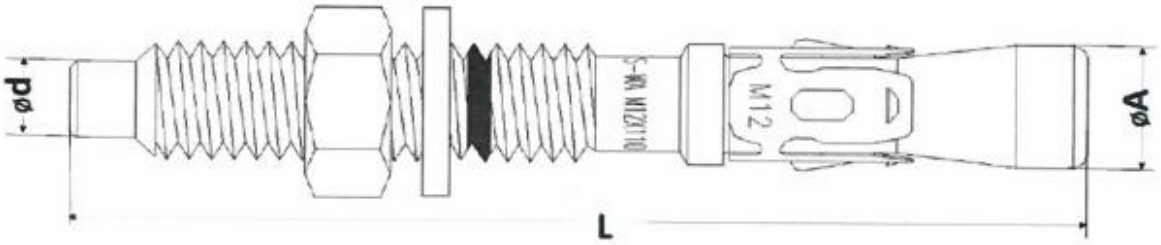

Table A1

Item	Fastener type	Dimensions, mm				
		Ø A		Ø d		L
1	*2*	*3*		*4*		*5*
1	SM0WA / S-WA M8	8,00	+0,05 -0,10	5,90	+0,10 -0,20	75
2						90
3	SM0WA / S-WA M10	10,00	+0,05 -0,10	7,40	+0,20 -0,20	90
4						100
5	SM0WA / S-WA M12	12,00	+0,05 -0,12	8,80	+0,20 -0,20	100
6						110
7						120
8	SM0WA / S-WA M16	16,00	+0,05 -0,15	12,20	+0,30 -0,20	120
9						140

Figure A. Steel expansion fasteners SM0WA / S-WA

Annex B.

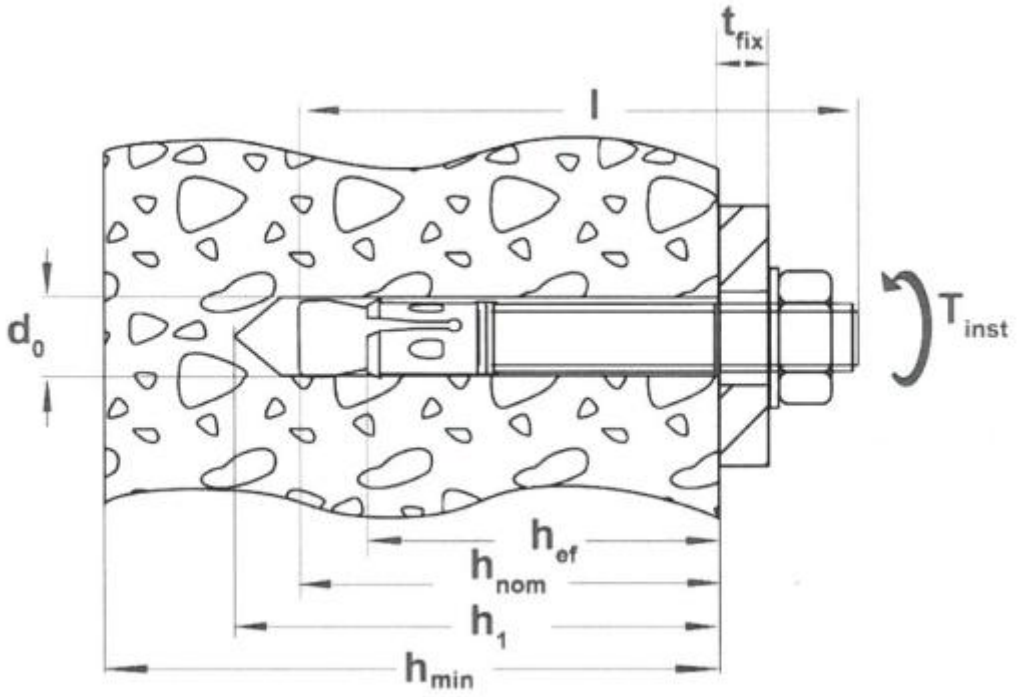

Figure B1. Installation parameters of steel expansion fasteners SM0WA / S-WA

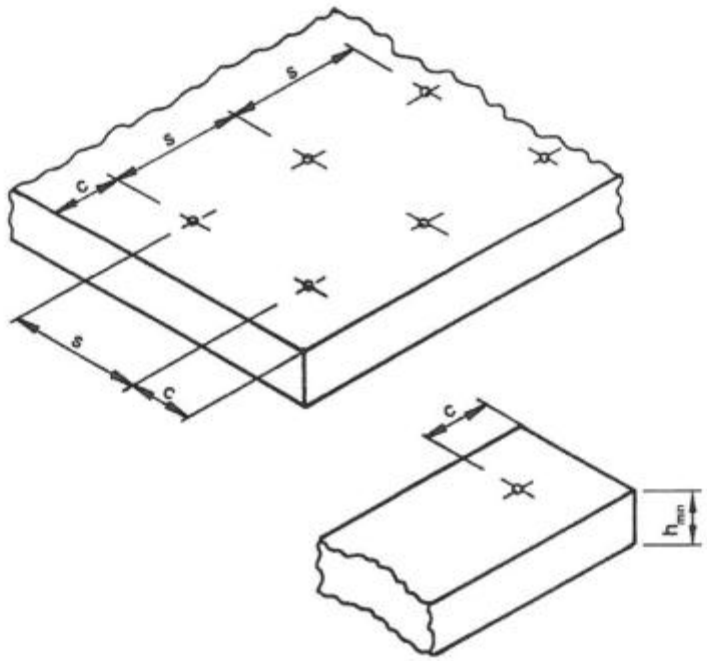

Figure B2. Layout parameters of steel expansion fasteners SM0WA / S-WA

Table B. Installation and layout parameters of steel expansion fasteners SM0WA / S-WA

Item	Parameter	Designation of the fastener			
		SM0WA / S-WA			
		M8	M10	M12	M16
1	*2*	*3*	*4*	*5*	*6*
1	Nominal diameter of a drill d_0, equal to nominal diameter of the drill d_{nom}, mm	8	10	12	16
2	Minimum depth of a hole h_1, mm	45	55	68	87
3	Installation depth $h_{nom\ 1}$, mm	40	50	63	82
4	Effective depth of anchorage h_{ef}, mm	30	40	50	64
5	Tightening torque T_{inst}, Nm	15	30	50	100
6	Minimum thickness of substrate h_{min} mm	100	100	130	160
7	Minimum spacing of the fasteners s, mm	120	150	195	240
8	Minimum distance of the anchor from the substrate edge c, mm	60	75	98	120

Annex C.

Table C. Characteristic tension resistance $N_{R,k}$ and characteristic shear resistance $V_{R,k}$ of fixings with steel expansion fasteners SM0WA / S-WA

<table>
<tr><th rowspan="3">Pos.</th><th rowspan="3">Designation of the fastener</th><th rowspan="3">Type of substrate</th><th rowspan="3">Effective depth of anchorage h_{ef}, mm</th><th colspan="4">Characteristic tension resistance $N_{R,k}$ and characteristic shear resistance $V_{R,k}$, kN</th></tr>
<tr><th colspan="2">cracked concrete[1)]</th><th colspan="2">non-cracked concrete[1)]</th></tr>
<tr><th>$N_{R,k}$, kN</th><th>$V_{R,k}$, kN</th><th>$N_{R,k}$, kN</th><th>$V_{R,k}$, kN</th></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>1</td><td>SM0WA / S-WA M8</td><td rowspan="4">Cracked or non-cracked plain concrete of the class C20/25[1)]
For concrete of higher classes than C20/25, the characteristic resistance values N_{Rk}, given in columns 5 and 7 shall be multiplied by the following increasing factors ψ_c:
<table><tr><th>for concrete of class</th><th>ψ_c</th></tr><tr><td>C30/37</td><td>1,22</td></tr><tr><td>C40/50</td><td>1,41</td></tr><tr><td>C50/60</td><td>1,55</td></tr></table></td><td>30</td><td>1,10</td><td>1,10</td><td>7,5</td><td>7,5</td></tr>
<tr><td>2</td><td>SM0WA / S-WA M10</td><td>40</td><td>1,50</td><td>1,50</td><td>12</td><td>12</td></tr>
<tr><td>3</td><td>SM0WA / S-WA M12</td><td>50</td><td>2,00</td><td>2,00</td><td>13</td><td>17</td></tr>
<tr><td>4</td><td>SM0WA / S-WA M16</td><td>64</td><td>3,00</td><td>3,00</td><td>30</td><td>32</td></tr>
<tr><td colspan="8">[1)] plain concrete according to the standard PN- EN 206+A1:2016</td></tr>
</table>