



INSTYTUT TECHNIKI BUDOWLANEJ

PL 00-611 WARSZAWA, ul. Filtrowa 1, www.itb.pl

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NATIONAL TECHNICAL ASSESSMENT ITB-KOT-2019/0793 2nd 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 (the Building Research Institute (ITB)) in Warsaw, upon a request of

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

National Technical Assessment ITB-KOT-2019/0793 2nd Edition is a favourable assessment of the performance properties of the following construction products for their intended use:

**Self-drilling/tapping screws ZBG14
for fixing steel metal sheets
to steel and timbered substrate**

Date of validity of the National Technical Assessment:

March 12, 2025.

DIRECTOR
of Building Research Institute

Robert Geryło, PH.D (Eng)



Warsaw, March 12, 2020.

The Document of National Technical Assessment ITB-KOT-2019/0793 – edition 2, contains 9 pages, including 1 Annex. The National Technical Assessment ITB-KOT-2019/0793 – edition 2 replaces the National Technical Assessment ITB-KOT-2019/0793 – edition 1. The text of this document may only be copied in its entirety. Any publication or dissemination in any other form of excerpts from the text of the National Technical Assessment shall require written agreement with Instytut Techniki Budowlanej.

1. TECHNICAL DESCRIPTION OF THE PRODUCT

The subject of this National Technical Assessment are the self-drilling/tapping screws ZBG14 type for fixing steel metal sheets to steel or timbered substrate produced by pgb-Polska Sp. z o.o., ul. F. W. Redena 3, 41-807 Zabrze, in a manufacturing plant in Vietnam.

The screws ZBG14 have the form of a screw ended with a drill. The screws can be applied with steel or aluminium washers with 14 mm diameter, with vulcanised gasket of EPDM. The screws ZBG14 and their dimensions of the screws are provided in a drawing in a table A1 in Annex A. Tolerances of the dimensions correspond to *m* tolerance class according to the standard PN-EN 22768-1:1999.

The screws ZBG14 are made of carbon steel, grade SAE 1022 according to the American standard AMS 5070:1994/RG and coated with a zinc layer of thickness not less than 5 µm according to the standard PN-EN ISO 4042:2018. The washers are made of low carbon steel, grade SGCC Z12 according to the standard JIS G3302 or of aluminium alloy.

2. SPECIFICATION OF THE INTENDED USE OF THE PRODUCT

The screws ZBG14 are intended to fix steel metal sheets to steel or timbered substrate and connect steel metal sheets as indicated in Annex A.

Characteristic resistances of fixings with the screws covered by this National Technical Assessment are given in Annex A.

In order to determine the design characteristic resistance, the characteristic resistance value shall be divided by the safety factor $\gamma_m = 1,33$. For timbered substrates, in order to determine the design characteristic resistance, the characteristic resistance value shall be additionally multiplied by the factor k_{mod} according to the table 3.1 of the standard PN-EN 1995-1-1:2010. If the nature of the failure for timber substrates is such that the steel plate has failed or the screw has been pulled through the metal sheet, then the factor $k_{mod} = 1,0$ shall be taken.

Due to the corrosion aggressiveness of the environment, the screws ZBG14 shall be used in accordance with the requirements provided for in the standards: PN-EN ISO 12944-2:2018, PN-EN ISO 9223:2012 and PN-EN ISO 2081:2018.

The steel screws ZBG14 are classified as not-flammable and which meet the requirements of Class A1 reaction to fire in accordance with the standard PN-EN 13501-1:2019 and the Decision of the European Commission 96/603/EC (as later amended).

Installation parameters of the screws covered by this National Technical Assessment are given in Annex A. Minimum spacing of the screws shall be 30 mm, and minimum distance between the screw and substrate edge shall amount to 10 mm.

Screwdrivers with adjustable tightening torque to drive the screws shall be necessarily used.

The screws covered by this National Technical Assessment shall be used in accordance with the technical design, drawn up taking into account Polish construction standards and regulations, the findings of this National Technical Assessment and in accordance with the manufacturer's instructions concerning the conditions for providing the fixings using the above mentioned screws.

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

3.1 Performance of the product

3.1.1. Destructive tightening torques. Destructive tightening torques are given in Annex A.

3.1.2. Characteristic resistance of fixings. Characteristic resistance of fixings with the screws are provided in Annex A.

3.1.3. Working life of the screws. Zinc coating with a thickness not less than 5 µm ensures the working life of the screws to the extent resulting from article 2.

3.2. Methods used to assess performance properties

3.2.1. Destructive tightening torques. Testing of destructive tightening torques shall be carried out according to the standard: PN-EN ISO 10666:2002.

3.2.2. Characteristic resistances of fixings. Characteristic resistances of fixings with the screws shall be tested on the screws seated in the substrates according to Annex A. 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.

3.2.3. Working life of the screws. Thickness of the zinc coating shall be tested according to the standard: PN-EN ISO 2178:2016 or PN-EN ISO 3497:2004.

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

The screws ZBG14 shall be delivered in original manufacturer's packaging and stored and transported in such a way as to ensure that their technical properties remain unchanged.

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

Product marking 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 the 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 according to which the performance properties were declared (ITB-KOT-2019/0793 2nd edition);
- the number of the national declaration of performance properties;
- the level or class of the declared performance properties;

- the name of the certification body which participated in the assessment and verification of the constancy of performance properties of the construction product;
- the address of the manufacturer's website, if the national declaration of performance properties 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 Article 31 or 33 of the 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 properties, as appropriate.

Moreover, the marking of a construction product, being a hazardous mixture according to the REACH regulation, shall comply with the requirements of the 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 the Directives 67/548/EEC and 1999/45/EC, and amending the Regulation (EC) No. 1907/2006.

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

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

In accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on the manner of declaring the performance properties of construction products and the manner of marking them with construction mark (Official Journal of the Republic of Poland (Dz. U.) of 2016, item 1966, as later amended), the system for the assessment and verification of the constancy of performance: 2+ shall be applicable.

5.2. Type testing

The performance properties assessed in article 3 shall constitute the product type testing unless the changes in raw materials, components, production line or manufacturing plant have been introduced.

5.3. Factory production control

At 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 in a systematic manner 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 properties of the product in serial production.

The factory production control includes the specification and verification of raw materials and components, inspections and tests to be carried out during manufacture process and control tests (according to article 5.4), conducted by the manufacturer in accordance with the established test plan and according to the principles and procedures specified 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 confirm whether the products have satisfied the criteria of the assessment and verification of the constancy of performance properties. Individual products or batches of 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 verification of:

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

5.4.3. Periodic tests. The periodic tests shall include verification of :

- a) destructive tightening torque,
- b) characteristic resistance of fixings with the screws.

5.5. Frequency of tests

The ongoing tests shall be conducted in accordance with the prescribed test plan, but not less frequently than for each batch of the products. The size of a batch of 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-2019/0793 2nd edition replaces the National Technical Assessment ITB-KOT-2019/0793 1st edition.

6.2. The National Technical Assessment ITB-KOT-2019/0793 2nd edition is a favourable assessment of the performance properties of those essential characteristics of the self-drilling/tapping screws ZBG14 which, in accordance with the intended use, resulting from the provisions of the Assessment, influence the fulfilment of basic requirements by the construction objects in which the product will be applied.

6.3. The National Technical Assessment ITB-KOT-2019/0793 2nd edition is not a document authorizing to mark a 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 2020, item 215), the products to which this National Technical Assessment applies may be marketed or made available on the domestic market, if the manufacturer has assessed and verified the constancy of performance properties, drawn up a national declaration of performance properties in accordance with the National Technical Assessment ITB-KOT-2019/0793 2nd edition and marked the products with the construction mark in compliance with the applicable regulations.

6.4. The National Technical Assessment ITB-KOT-2019/0794 1st edition does not infringe the rights resulting from the provisions on industrial property protection, and in particular the Act of June 30, 2000 – Industrial Property Law (Journal of Laws of the Republic of Poland (Dz. U.) of 2017, item 776, as later amended). Ensuring these rights shall be the responsibility of the users of this ITB National Technical Assessment.

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

6.6. The National Technical Assessment shall not release the manufacturer of products from responsibility for their proper quality, while the contractors of construction works from responsibility for their proper use.

6.7. The validity of this National Technical Assessment may be extended for further periods not exceeding 5 years.

7. LIST OF DOCUMENTS USED IN THE PROCEEDINGS

7.1. Reports, test reports, evaluations, classifications

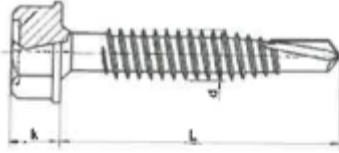
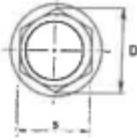
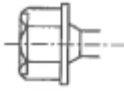
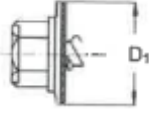
- 1) LOK-761/A/07. Test report and technical assessment concerning farmer screws 4,8 x L. Department of Building Construction Elements of the Silesian Branch of the Building Research Institute (ITB), Katowice, 2007.
- 2) LOK04-6026/11/R01OSK. Test report concerning the self-drilling/tapping screws MCF (so called farmer screws). Department of Building Construction Elements of the Silesian Branch of the Building Research Institute (ITB), Katowice, 2011.
- 3) LOK00-6026/13/R12OSK. Test report concerning the self-drilling/tapping screws MCF (so called farmer screws). Department of Elements for Building Constructions and Structures Sited in Mining Areas, Katowice, 2013.
- 4) LZK00-06026/17/R40NZK. Test report and specification of test results concerning the self-drilling/tapping screws MCF, FHD, FHDS, WHD, PHD and WHW. Department of Building Constructions, Geotechnical Engineering and Concrete of the Building Research Institute (ITB), Katowice, 2017.
- 5) LZK00-06026/17/R35NZK. Test report concerning the screws. Department of Building Constructions, Geotechnical Engineering and Concrete of the Building Research Institute (ITB), Katowice, 2017.

7.2. Related standards and documents

PN-EN 22768-1:1999	<i>Tolerancje ogólne. Tolerancje wymiarów liniowych i kątowych bez indywidualnych oznaczeń tolerancji (General tolerances. Tolerances for linear and angular dimensions without individual tolerance indications)</i>
PN-EN ISO 4042:2018	<i>Części złączne. Powłoki elektrolityczne (Fasteners. Electroplated coatings)</i>
PN-EN 1995-1-1:2010	<i>Eurokod 5. Projektowanie konstrukcji drewnianych. Część 1-1: Postanowienia ogólne. Reguły ogólne i reguły dotyczące budynków. (Eurocode 5. Designing of timber structures. Part 1-1: General provisions. General rules and the rules relating to buildings.)</i>

PN-EN ISO 12944-2:2001	<i>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)</i>
PN-EN ISO 9223:2012	<i>Korozja metali i stopów. Korozyjność atmosfer. Klasyfikacja, określenie i ocena (Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and estimation)</i>
PN-EN ISO 2081:2018	<i>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)</i>
PN-EN 13501-1:2019	<i>Klasyfikacja ogniowa wyrobów budowlanych i elementów budynków. Część 1: Klasyfikacja na podstawie wyników badań reakcji na ogień (Fire classification of construction products and building elements. Part 1: Classification using data from reaction to fire tests)</i>
PN-EN ISO 10666:2002	<i>Wkręty wierzące samogwintujące. Własności mechaniczne i funkcjonalne (Drilling screws with tapping thread. Mechanical and functional properties)</i>
PN-EN ISO 2178:2016	<i>Powłoki niemagnetyczne na podłożu magnetycznym. Pomiar grubości powłok. Metoda magnetyczna (Non-magnetic coatings on magnetic substrates. Measurement of coating thickness. Magnetic method)</i>
PN-EN ISO 3497:2004	<i>Powłoki metalowe. Pomiar grubości powłok. Metody spektrometrii rentgenowskiej (Metallic coatings. Measurement of coating thickness. X-ray spectrometric methods)</i>
ITB-KOT-2019/0793 1 st edition	<i>Łączniki wierzące, samogwintujące ZBG14 do mocowania blach stalowych do podłoża stalowego i drewnianego (Self-drilling/tapping screws ZBG14 for fixing steel metal sheets to steel and timber substrate)</i>

Annex A.
Table A1. Characteristic resistances of fixings, materials, dimensions and parameters of installation of the screws ZBG14

<p>Material</p> <p>Screw: carbon steel, grade SAE 1022 according to American standard: AMS 5070:1994/RG, thickness of zinc coating $\geq 5 \mu\text{m}$ in accordance with the standard: PN-EN ISO 4042:2001/Ap1:2004</p> <p>Washer: low carbon steel, grade SGEE Z12 according to the standard: JIS G3302 or aluminium alloy, with a washer of EPDM</p> <p>Element I: sheet metal of carbon steel, grade S280GD, S320GD or S350GD in accordance with the standard: PN-EN 10346:2015</p> <p>Element II: sheet metal of carbon steel, grade S280GD, S320GD or S350GD in accordance with the standard: PN-EN 10346:2015 or construction timber grade C24 in accordance with the standard PN-EN 338:2016</p> <p>Drilling capacity: $\Sigma t_i \leq 2 \times 1,6 \text{ mm}$ Destructive tightening torque: $M_{t,nom} \geq 10,3 \text{ Nm}$</p>	  <p>$d = 4,8 \text{ mm}$ $L = 20, 35 \text{ and } 55 \text{ mm}$ $k = 4,8 \div 5,3 \text{ mm}$ $S = 8,0 \text{ mm}$ $D = 9,8 \div 10,5 \text{ mm}$</p>   <p>Connector without a washer</p> <p>Connector with a washer $D_1 = 14 \text{ mm}$</p>
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Thickness of steel substrate $t_{N,II}$ [mm]			1,00	1,13	1,25	1,50	2,00	2,50	Substrate of timber class C24		
									$h_{ef} = 19,20$ [mm]	$h_{ef} = 38,40$ [mm]	
Thickness of fastened sheet metal $t_{N,I}$ [mm]	$V_{R,k}$ [kN]	0,50	1,54	1,54	1,54	1,54	1,54	1,54	1,57*	1,78*	*resistance connected with failure in element I
		0,55	1,54	1,54	1,54	1,54	1,54	—	1,57*	1,78*	
		0,63	1,54	1,54	1,54	1,54	1,54	—	1,57*	1,78*	
		0,75	1,54	1,54	1,54	1,54	1,54	—	1,57*	1,78*	
		0,88	1,54	1,54	1,54	1,54	1,54	—	1,57*	1,78*	
	$N_{R,k}$ [kN]	0,50	1,08	1,08	1,08	1,08	1,08	1,08	1,04*	1,90*	*resistance connected with failure in element II
		0,55	1,08	1,08	1,08	1,08	1,08	—	1,04*	1,90*	
		0,63	1,08	1,08	1,08	1,08	1,08	—	1,04*	1,90*	
		0,75	1,08	1,08	1,08	1,08	1,08	—	1,04*	2,17*	
		0,88	1,08	1,08	1,08	1,08	1,08	—	1,04*	2,17*	

Where:

- Element I - fastened steel sheet metal
- Element II - steel or timber substrate
- $t_{N,I}$ - thickness of fastened steel sheet metal
- $t_{N,II}$ - thickness of steel substrate
- h_{ef} - anchorage depth in timber substrate
- $M_{t,nom}$ - destructive tightening torque
- $V_{R,k}$ - characteristic shear resistance
- $N_{R,k}$ - characteristic tension resistance