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European Technical Assessment

**ETA 21/0463 – version 02
of 27/03/2024**

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: **Technický a skúšobný ústav stavebný, n. o.**

Trade name of the construction product

PSB[®] Headed Anchor:
PSB[®] Single Headed Anchor
PSB[®] Double Headed Anchor
PSB[®]-J Headed Anchor
PSB[®]-S Headed Anchor

Product family to which the construction product belongs

Product area code: 16
Reinforcing and Prestressing Steel for Concrete (and Ancillaries). Post Tensioning Kits.

Manufacturer

Peikko Group Oy
Voimakatu 3
15101 Lahti
Finland
<http://www.peikko.com>

Manufacturing plant

Peikko production units

This European Technical Assessment contains

8 pages including 2 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

EAD 160012-01-0301

This version replaces

ETA 21/0463 – version 01, issued on 14/06/2021

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Specific part

1 Technical description of the product

The ETA covers PSB[®] Single Headed Anchor, PSB[®] Double Headed Anchor, PSB[®]-J Headed Anchor, PSB[®]-S Headed Anchor as headed (PSB[®] heads) reinforcing bars for reinforcement for concrete. The products are round mechanical anchors with diameter $\geq 3\varnothing$, where \varnothing is diameter of reinforcing bar, forged at one or both ends of the reinforcing bar and used for anchoring reinforcing bars in concrete. The head allows anchoring the full tensile strength of the reinforcing bar once it is cast in concrete. The nominal reinforcing bar diameter is in the range of \varnothing 10 mm to \varnothing 32 mm. The material of reinforcing bar complies with EN 10080 and EN 1992-1-1 with 500 MPa characteristic yield strength and ductility class B or C.

The types of PSB[®] Headed Anchor products are depicted in Annex 1. The dimensions of products and geometry of anchoring heads are summarized in Annex 1.

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

PSB[®] Single Headed Anchor, PSB[®] Double Headed Anchor, PSB[®]-J Headed Anchor, PSB[®]-S Headed Anchor products are used to anchor reinforcing bar in reinforced concrete structures. The head provides mechanical end anchorage or an alternative to developing reinforcement through the combination of bond and bends/hooks.

The products are to be used in concrete structures with:

- Static and quasi-static loading;
- High-cycle fatigue loading.

The assumed working life of PSB[®] Single Headed Anchor, PSB[®] Double Headed Anchor, PSB[®]-J Headed Anchor, PSB[®]-S Headed Anchor products for the intended use is 100 years when installed in the works (provided that the headed reinforcing steel bars are subject to appropriate installation).

These provisions are based upon the current state of the art and the available knowledge and experience. When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works¹.

3 Performance of the product and references to the methods used for its assessment

The performance of the product is summarized in Table 1.

¹ The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

Table 1 – Performance of the assembled system

Product – type: PSB [®] Headed Anchor: PSB [®] Single Headed Anchor PSB [®] Double Headed Anchor PSB [®] -J Headed Anchor PSB [®] -S Headed Anchor		Intended use: PSB [®] Single Headed Anchor, PSB [®] Double Headed Anchor, PSB [®] -J Headed Anchor, PSB [®] -S Headed Anchor products are used to anchor the reinforcing bar in reinforced concrete structures. The head provides mechanical end anchorage or an alternative to developing reinforcement through the combination of bond and bends/hooks. The products are to be used in concrete structures with: - Static and quasi-static loading; - High-cycle fatigue loading.
BWR	Essential characteristic	Performance
1	Robustness of head-to-bar connection	Category B3: a) The capability of heads for anchoring for each type of product with reinforcing bar diameter \varnothing 32 mm corresponds to category B3 according to clause 7.3.2 of ISO 15698-1:2012 b) The capability of heads for anchoring for each type of product with reinforcing bar diameter up to and including \varnothing 28 mm corresponds to category B3 according to clause 7.3.2 of ISO 15698-1:2012. No cracks visible in the heads, the bar or the head-to-bar connection to a person with normal or corrected vision.
	Characteristic resistance under static and quasi-static loading	Category B3: The capability of head for anchoring corresponds to category B3 according clause 7.2.2 of ISO 15698-1:2012 for each type of product and each reinforcing bar diameter.
	Characteristic resistance under seismic loading	NPA
	Characteristic resistance under high-cycle fatigue loading	Category F2 for: PSB [®] Headed Anchor products with diameters of reinforcing bars \varnothing 12 mm, \varnothing 14 mm, \varnothing 16 mm, \varnothing 20 mm and \varnothing 25 mm - All specimens failed in the rebar outside the affected zone. The fatigue performance of headed bar is at least equal to that of the rebar. - The upper stress level/s, the stress range/s of rebar/s and corresponding number/s of cycle/s at stress range/s for headed bar/s, Annex 2. - The minimum number/s of cycles at the stress range/s of headed bar/s tested in one series, Annex 2. NPA for: PSB [®] Headed Anchor products with diameters of reinforcing bars \varnothing 10 mm, \varnothing 28 mm and \varnothing 32 mm
2	Reaction to fire	Class A1
NOTE 1 BWRs 3, 4, 5, 6 and 7 are not relevant, see EAD 160012-00-0301.		

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

4.1 System of assessment and verification of constancy of performance

According to the Decision 97/597/EC the European Commission, the system of assessment and verification of constancy of performance system 1+ applies, see Table 2.

Table 2 – System of assessment and verification of constancy of performance applicable to PSB[®] Single Headed Anchor, PSB[®] Double Headed Anchor, PSB[®]-J Headed Anchor, PSB[®]-S Headed Anchor

Product(s)	Intended use(s)	Level(s) or class(es)	System(s) of assessment and verification of constancy of performance
Reinforcing steel products: - bars - rods, coils - welded fabrics - lattice girder - indented strips	used for the reinforcement of concrete	Any	1+

The manufacturer shall draw up the declaration of performance on the basis of the assessments and verifications of constancy of performance carried out under the system 1+ as laid down in the Commission Delegated Regulation (EU) No 568/2014 of 18 February 2014, Annex V, 1.3. This system provides for:

- (a) the manufacturer shall carry out:
 - (i) factory production control;
 - (ii) further testing of samples taken at the manufacturing plant taken by the manufacturer in accordance with the prescribed test plan;
- (b) the notified product certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product on the basis of the outcome of the following assessments and verifications carried out by that body:
 - (i) an assessment of the performance of the construction product on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of that product;
 - (ii) initial inspection of the manufacturing plant and of factory production control;
 - (iii) continuing surveillance, assessment and evaluation of factory production control.
 - (iv) audit-testing of samples taken by the notified product certification body at the manufacturing plant or at the manufacturer's storage facilities;

4.2 Construction products for which a European Technical Assessment has been issued

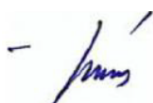
Manufacturers undertaking tasks under system 1+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Notified Body shall therefore not undertake the task referred to in point 4.1 (b)(i).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

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On behalf of the Technický a skúšobný ústav stavebný, n. o.
Bratislava, 27 March 2024

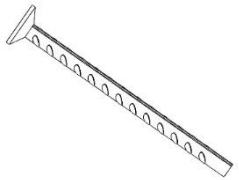
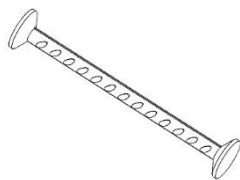
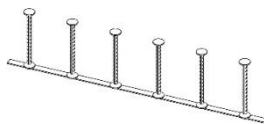
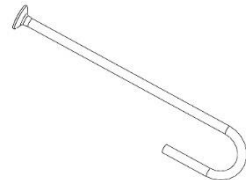


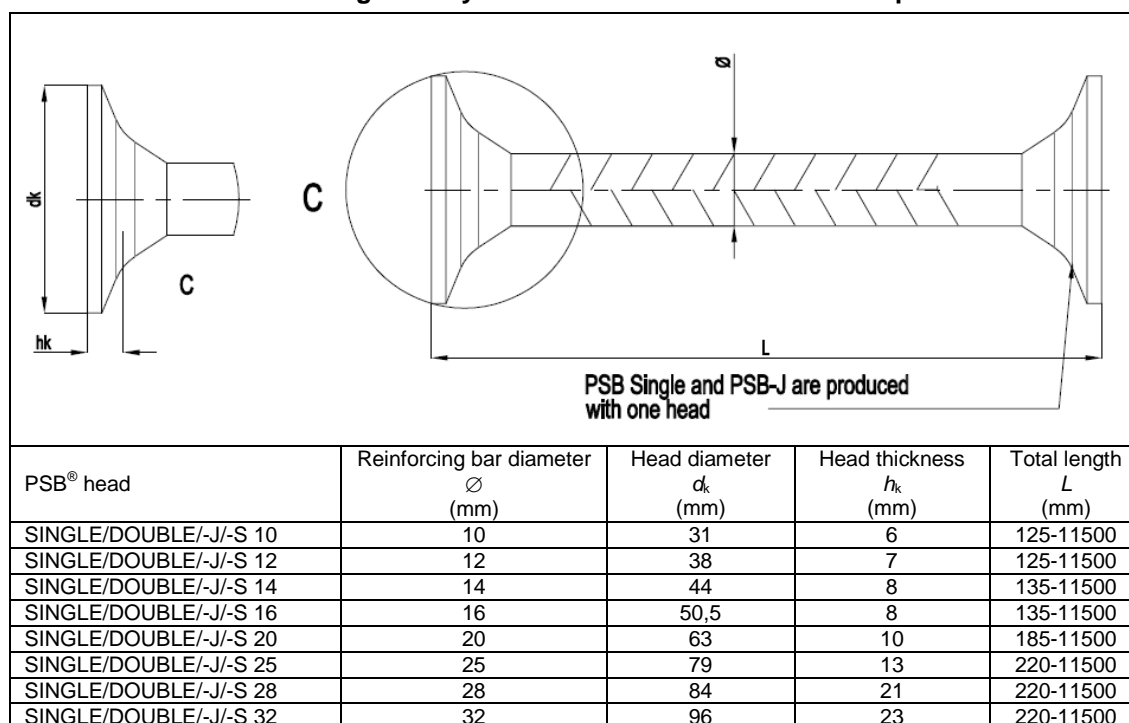
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Head of Technical Assessment Body

List of annexes

- Annex 1 Types, dimensions and geometry of head of PSB[®] Headed Anchor products
- Annex 2 Description of categories for characteristic resistance under high-cycle fatigue loading

Types of PSB® Headed Anchor products

PSB® Single Headed Anchor	PSB® Double Headed Anchor	PSB®-S Headed Anchor	PSB®-J Headed Anchor
			
Reinforcing bar with PSB® head forged at one end	Reinforcing bar with PSB® head forged at both ends	Prefabricated assemblies of double-headed anchors	Reinforcing bar with PSB® head forged at one end and bent hook at the other end

Dimensions and geometry of head of PSB® Headed Anchor products

PSB® Headed Anchor products with PSB® head shall be installed in accordance with detailed technical documentation, such as: drawings, models, specifications etc., established for the individual works. The PSB® head and the head-to-bar connection shall not be machined or otherwise modified. Bending of steel reinforcing bar with PSB® heads shall be carried out such that the start of the bend is at least in a distance of 2- times of the nominal bar diameter from the head-to-bar connection. Steel reinforcing bars with PSB® heads are part of the reinforcing bar for concrete structure, based on the structural design for the works according to applicable design standards. Necessary bursting and spalling reinforcing bar, due to partially loaded areas, local crushing and transverse tension forces shall be considered. To ensure the resistance to fire, the structure has to be designed and constructed according to the provisions of an appropriate standard for structural fire design. The products shall be used in structures with minimum concrete class C30/37.

Types, dimensions and geometry of head of PSB® Headed Anchor products

**Annex 1
of European Technical Assessment
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The characteristic resistance under high-cycle fatigue loading is of category F2 for PSB[®] Headed Anchor products with diameters of reinforcing bars Ø 12 mm, Ø 14 mm, Ø 16 mm, Ø 20 mm and Ø 25 mm:

- All specimens failed in the reinforcing bar outside the affected zone. The high-cycle fatigue performance of headed anchors is at least equal to that of the reinforcing bar.
- The upper stress level, the stress ranges and corresponding numbers of cycles for headed anchors are shown in Table below.

Stress ranges and corresponding numbers of cycles

$R_{eH} = 500 \text{ MPa}$	
Upper stress level	$0,6 \cdot R_{eH} = 300 \text{ MPa}$
Low stress range of reinforcing bar	$2\sigma_{a,low} = 0,324 \cdot R_{eH} = 0,324 \times 500 = 162 \text{ MPa}$
Number of cycles of reinforcing bar at low stress range	$N = 1\,000\,000$
High stress range of reinforcing bar	$2\sigma_{a,high} = 0,5 \cdot R_{eH} = 0,5 \times 500 = 250 \text{ MPa}$
Number of cycles of reinforcing bar at high stress range	$N = 116\,000$

- The minimum number of cycles of PSB[®] Headed Anchor products in series at low stress range:
 $N = 181\,559 > 116\,000$
- The minimum number of cycles PSB[®] Headed Anchor products in series at high stress range:
 $N = 1\,025\,946 > 1\,000\,000$

For PSB[®] Headed Anchor products of diameters of reinforcing bar Ø 10 mm, Ø 28 mm and Ø 32 mm no performance assessed for characteristic resistance under high-cycle fatigue loading.

Description of categories for characteristic resistance under high-cycle fatigue loading

**Annex 2
of European Technical Assessment
ETA 21/0463**

REFERENCES

- [1] PSB Head, Headed Reinforcement, drawing RD000275, Peikko Group Oy
- [2] Test Report 01/2021, Testing Laboratory of Faculty of Civil Engineering of University of Žilina, March 2021
- [3] PSB Headed Reinforcement, Test Report – Tensile and robustness tests, Peikko Group Oy, 07/12/2020
- [4] Control Plan for PSB Headed Bars, Peikko Group Oy, 04/11/2020
- [5] Fatigue tests of headed reinforcement bars d14 mm, dx mm and d32 mm, Report No. EUFI29-20001199-T1, Eurofins Expert Services, Espoo, Finland
- [6] Fatigue tests of headed reinforcement bars d12 mm, d16 mm and d25 mm, Report No. EUFI29-20002281-T1, Eurofins Expert Services, Espoo, Finland