

Expert Services

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ETA 24/0037

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European Technical Assessment

I General Part

Technical Assessment Body issuing the ETA	Eurofins Expert Services Oy
Trade name of the construction product	BREKAR Column Shoes
Product family to which the construction product belongs	Three-dimensional nailing plates
Manufacturer	BREKAR SAS 1 Impasse Dorothée Le Maitre 77700 SERRIS FRANCE
Manufacturing plant	BREKAR plant 02
This European Technical Assessment contains	40 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 130186-00-0603 for Three-dimensional nailing plates

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II Specific Part

1 Technical description of the product

There are nine different types of BREKAR Column Shoes: Adjustable Column Shoe, Multi Adjustable column shoe, Column Anchor Strap, Column Shoe type E, Column Shoe type L, Column Shoe type D, Heavy Supporting Shoe, Adjustable Column Leg and Adjustable Supporting Tube (see Figure 1). Construction and dimensions of all types of BREKAR Column Shoes are given in Annex 1. Tolerance for the main dimensions of the connectors and the position of the holes is within \pm 1,00 mm.



Figure 1. Different types of BREKAR Column Shoes: a) Adjustable Column Shoe, b) Multi Adjustable Column Shoe, c) Column Anchor Strap, d) Column Shoe type E, e) Column Shoe type L, f) Column Shoe type D and g) Heavy Supporting Shoe, h) Adjustable Column Leg and i) Adjustable Supporting Tube.

Column Anchor Straps and Column Shoes of type D are one-piece non-welded three-dimensional nailing plates manufactured by pressing of steel plate. All other BREKAR Column Shoes are welded steel connectors. Heavy Supporting Shoes are welded from steel plates. Adjustable and Multi Adjustable Column Shoes, Adjustable Column Legs and Adjustable Supporting Tubes are assembly from pressed steel plates, thread rods, nuts and steel pipes. Column Shoes of types E and L are welded from pressed steel plates and ribbed reinforcement bars. The Adjustable Column Legs are yellow electroplated zinc coated and one of the Column Shoe type E product is stainless steel connector. All other BREKAR Column Shoes are hot dipped galvanized after pressing and welding.

The steel plate material used in mild steel BREKAR Column Shoes is hot rolled steel strip of grade S235JR according to the standard EN 10025-2 or Chinese grade Q235B in accordance with the specification GB/T 3274. The yield strength R_{eH} is at least 235 N/mm², the tensile strength R_m at least 360 N/mm² and elongation at failure A_{80} at least 19 %. The thickness of steel plate is 4,0 \pm 0,5 mm, 5,0 \pm 0,6 mm or 6,0 \pm 0,6 mm.

The ribbed bars are hot rolled reinforcement bar of Chinese grade HRB335 according to specification GB 1499. The characteristic yield strength of ribbed bars is 335 N/mm². The grade of threaded rods is 4.8 according to ISO 4018 and the grade of nuts is 5 according to ISO 4034.

The stainless steel Column Shoes are manufactured from cold rolled austenitic stainless steel plate of the grade of 1.4301 according to the standard EN 10088-2 or from grade AISI 304 (SS304) according to the standard ASTM A240/A240M.

The mild steel column shoes are hot dipped galvanized according to EN ISO 1461:1999 with a zinc thickness at least 55 μ m or yellow electroplated zinc coated according to ISO 2081 with a zinc thickness of at least 5 μ m.

2 Specification of the intended uses in accordance with the applicable EAD

2.1 Intended uses

The intended use of BREKAR Column Shoes is to support end of timber columns to concrete structures as structural connectors (see Figure 2). The timber columns are strength graded timber according to EN 14081-1, glulam according to EN 14080 or laminated veneer lumber according to EN 14374. The characteristic density ρ_k of the timber shall not be greater than 500 kg/m³. This ETA does not cover column shoes fixed as load bearing fasteners to the end grain of a timber member or to the edge face of a LVL member. Strength class of concrete shall be at least C20/25.

The upper part of the column shoe e.g. a U- or L-shaped plate or a steel plate is fastened to the timber member with nails, screws, bolts or dowels. The lower part of the column shoe is fastened to the concrete basement by a threaded rod, a tube or a plate for embedment into the support of concrete or a steel plate to be fasteners by anchor bolts to the support of concrete. The penetration length in concrete shall be at least 150 mm. The used anchor bolts shall have a separate European Technical Assessment, where the lateral load-carrying capacity and withdrawal resistance for bolted steel-to-concrete connection is given.

In holes of 5 mm anchor nails or anchor screws according EN 14592 are used (see Figure 3). The diameter of these anchor nails shall be d = 4,0 mm and the profiled length at least 24 mm. The diameter of the smooth part of the anchor screws shall be d = 4,5...5,0 mm and the inner diameter of the threaded part $d_1 \ge 3,0$ mm. The length of the threaded part of the screw shall be at least 6*d*. In Column Anchor Straps, anchor nails of diameter d = 6 mm or lag screws according to EN 14592 are used. Timber parts are not pre-bored for the nails and screws of diameter $d \le 6$ mm.



Figure 2. Typical use of BREKAR Column Shoes.



Figure 3. Anchor nail and screw types to be used in holes of 5 mm of the column shoes.

In the holes from 7,0 to 13,5 mm of the upper part of Column Shoes bolts or lag screws according to EN 14592 are used as follows: in holes of 7 mm diameter of the fastener is 6,0 mm, in 9 mm holes 8 mm, in 10,5 and 11 mm holes 10 mm and in holes of 13 and 13,5 mm the nominal diameter of bolt or lag screws should be 12 mm. Lag screw is a shank screw where the outer thread diameter is equal to the shank diameter. Bolts are used with nuts as double or single shear steel to timber fasteners and lag screws as single shear fasteners. For bolts and lag screws pre-drilling of timber is used according to requirements of EN 1995-1-1.

For BREKAR Column Shoes, the intended service classes according to EN 1995-1-1 are classes 1, 2 and 3. However, the yellow zinc plated PPAAL1650 and PPAAL2080 connectors are suitable only for service class 1 applications and the yellow zinc plated PPAAL24100 connectors are not suitable for service class 3 applications.

In service class 2, the anchor nails and anchor screws shall have an electroplated zinc coating according to EN ISO 2081 at least of type and thickness Fe/Zn 12c, or they shall be hot dip zinc coated according to EN ISO 1461, thickness at least 39 μ m. In service class 3, the nails, screws and bolts shall have an electroplated zinc coating according to EN ISO 2081 at least of type and thickness Fe/Zn 25c, or they shall be hot dip zinc coated according to EN ISO 1461, thickness at least 49 μ m. In stainless steel connectors, only fasteners manufactured of applicable stainless steel shall be used.

2.2 Working life

The provisions made in this European Technical Assessment are based on an assumed intended working life of BREKAR Column Shoes of 50 years¹.

2.3 Identification

BREKAR Column Shoes are identified having "BKR" stamped on each connector.

¹ This means that it is expected that when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements of the works. The indications given as to the working life of a building kit cannot be interpreted as a guarantee given by the producer or the technical assessment body. They should only be regarded as a means for the specifiers to choose the appropriate criteria for building kits 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

Basic requirement and essential characteristics	Performance
BWR 1. Mechanical resistance and stability	
Joint strength	Clause 3.1
Joint stiffness	No performance assessed
Joint ductility	No performance assessed
Resistance to corrosion and deterioration	Clause 3.1
Dimensional stability	No performance assessed
BWR 2. Safety in case of fire	
Reaction to fire	Clause 3.2
Resistance to fire	No performance assessed

Table 1. Basic requirements for construction works and essential characteristics

3.1 Mechanical resistance and stability, BWR 1

3.1.1 Joint strength

Characteristic resistance values of BREKAR Column Shoes are given in Annex 2.

3.1.2 <u>Resistance to corrosion and deterioration</u>

The hot dip galvanised and stainless steel BREKAR Column Shoes have been assessed as having satisfactory durability and serviceability when used in timber structures when the timber species (including timbers preserved with organic solvent, boron diffusion and related preservatives) described in Eurocode 5 (EN 1995-1-1: 2004) are used and the structures are subject to the conditions defined by service classes 1, 2 and 3. The yellow zinc plated PPAAL1650 and PPAAL2080 connectors are suitable only for service class 1 applications and the yellow zinc plated PPAAL24100 connectors for service classes 1 and 2.

3.2 Safety in case of fire, BWR 2

3.2.1 Reaction to fire

BREKAR Column Shoes are made of materials classified to have reaction to fire class A1 according to EN 13501-1.

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

According to the Decision 97/638/EC of the European Commission², the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 2+.

² Official Journal of the European Communities L 268 of 1/10/1997

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 at Eurofins Expert Services Oy.

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