

Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6454 of 08/11/2022		
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément		
Trade name of the construction product:	Punching reinforcement Schöck Bole ®		
Product family to which the construction product belongs:	Product area code 16 Double headed studs as punching reinforcement for flat slabs and footings		
Manufacturer:	Schöck Bauteile GmbH Schockstrasse 176534 Baden-Baden Germany		
Manufacturing plant(s):	Schöck manufacturing plants		
This UK Technical Assessment contains:	15 pages including 2 annexes which form an integral part of this assessment		
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 160003-00-0301: Double headed studs for the increase of punching shear resistance of flat slabs or footings and ground slabs		

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1 Technical description of the product

The Schöck Bole® double headed studs with ribbed shafts are manufactured from weldable ribbed reinforcement bars with nominal characteristic yield strength of 500 MPa. The mechanical properties of the steel fulfils the requirement according to EN 1992-1-1, Annex C.

They have a head at both ends with a diameter of three times the shaft diameter.

The diameters of the shafts are 10, 12, 14, 16, 20 and 25 mm.

The studs are assembled to form reinforcement elements comprising at least two studs (see Annex A1). The studs are tack welded or clamped at one end to a non-structural steel rail or steel bars (reinforcing bars or round bars) for securing the position of the double headed studs when pouring the concrete. They also may be tack welded or clamped to steel bars at the shaft. In this case the bars shall have a diameter of ds = 6 mm (for studs with diameter d_{am} < 20 mm) and ds = 8 mm (for studs with d_A ≥ 20 mm). For use in semi-prefabricated slabs only, plastic bars and special plastic clips are used to secure the placement during casting. All studs of one of those reinforcement elements shall have the same diameter.

The bars used to secure the stud's position during casting (assembling bars or -rails) are made of weldable reinforcing steel ds = 6 mm to ds = 10 mm or structural steel (smooth steel bars) ds = 6 mm to ds = 8 mm and the rails are made of structural steel. The Material for the structural steel (bars or rails) shall be acc. to EN 10025-2 or non-corrosive steel acc. to EN 10088-5 or acc. EN 10088-3 or according to technical documentation.

The detailed product description is given in Annex A.

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

The performances given in Section 3 are only valid if the Product is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this UK Technical Assessment is based lead to the assumption of a working life of the Product of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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 Mechanical resistance and stability (BWR 1)

Essential characteristics	Performance
Increasing factor for punching shear resistance	k _{pu,sl} = 1.96
	k _{pu,fo} = 1.50
characteristic fatigue strength for N = $2 \cdot 10^6$ load cycles	$\Delta \sigma_{\text{Rsk,n=2.10}^6}$ = 70 MPa

3.2 Safety in case of fire (BWR 2)

Essential characteristics	Performance
Reaction to fire	Class A1

3.3 Health, hygiene and the environment (BWR 3)

Not relevant

3.4 Safety and accessibility in use (BWR 4)

Not relevant

3.5 Protection against noise (BWR 5)

Not relevant

3.6 Energy economy and heat retention (BWR 6)

Not relevant

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1 System of assessment and verification of constancy of performance

According to UKAD No. 160003-00-0301 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1+ applies.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance
- UKTA number.

On behalf of the British Board of Agrément

2.1

Date of Issue: 8 November 2022

Hardy Giesler Chief Executive Officer



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ANNEX A1 Product description / Dimensions and load capacity of double headed studs

Material of stud:

- reinforcing steel with $f_{\rm jk} \ge 500~N/mm^2$ acc. to EN 1992-1-1, Annex C and provided data sheet.

Dimensions:



Marking:

- S : symbol of manufacturing plant 20 : example for stud-Ø 20



stud	head	head	cross section	load	studheight
diameter	diameter	thickness	area	capacity	
d _A	dĸ	min. h _K	A _A	$F_{Rk} = A_A * f_{yk}$	h _A
[mm]	[mm]	[mm]	[mm²]	[kN]	[mm]
10	30	5	79	39,27	
12	36	6	113	56,55	$h_A = h - c_o - c_u$
14	42	7	154	76,97	
16	48	7	201	100,53	h : slabthickness
20	60	9	314	157,08	co: upper concrete cover
25	75	12	491	245,44	c _u : lower concrete cover

ANNEX A2 Product description / Materials and arrangement of mounting bars

Mounting bar made of reinforcing or round steel



Materials for mounting bar

-B500 A/B according to EN 1992-1-1, Annex C and data sheet -B500 NR or stainless round steel according to EN 1993-1-4, EN 10088-3 and EN 10088-5 -Construction steel according to EN 10025-2 and data sheet

Unit [mm]

ANNEX A3 Product description / Materials and design of mounting rails made of flat steel or plastic

Mounting rail made of flat steel



Material of assembling rail:

- Stainless steel according to EN 1993-1-4, EN 10088-3 and EN 10088-5 - Structural steel according to EN 10025-2 and data sheet

Assembling bar made of plastic for prefabricated ceiling



ANNEX A4 Product description / Design of the reinforcement element

Design of Schöck Bole®

Due to the symmetric design of the Schöck Bole element, the radial distances between the studs can be assured, if several elements are placed in one row. The first element starts at the face of the column.



ANNEX B1 Intended use / Specification

The double headed studs are used to increase the punching shear resistance of flat slabs, ground slabs and footings under static, quasi-static and fatigue loading.

The calculation of the punching shear resistance and the arrangement of the double headed studs is done in accordance with EOTA TR060.

The intended use covers the following applications:

- Flat slabs, footings and ground slabs made of reinforced normal weight concrete of strength class C20/25 to C50/60 according to EN 206-1
- Flat slabs, footings and ground slabs with a minimum height of h=180mm
- Reinforcement elements with double headed studs of the same diameter in the punching area around a column or high concentrated load
- Reinforcement elements with double headed studs installed in an upright (rail at the bottom of the slab) or hanging position
- Reinforcing steel for the studs according to EN1992-1-1 may be used with f_{yk}≥500 N.mm⁻², in design only f_{yk}=500 N.mm⁻² is allowed
- Reinforcement elements with double headed studs positioned such that the double headed studs are perpendicular to the surface of the flat slab, footing or ground slab
- Reinforcement elements with double headed studs directed radially towards the column or high concentrated load and distributed evenly in the critical punching area
- Reinforcement elements with double headed studs positioned such that the upper heads of the studs reach at least to the outside of the uppermost layer and the lower heads of the studs reach at least to the uppermost layer of the flexural reinforcement
- Reinforcement elements with double headed studs positioned such that the concrete cover complies with the provisions given in EN1992-1-1
- Reinforcement elements with double headed studs positioned such that the minimum and maximum distances between the double headed studs on an element and between the elements are arranged around a column or area of high concentrated load complies with the provisions of EOTA TR060, section 3
- The provisions of EOTA TR060, section e, are kept on site with an accuracy of 0.1h (h=height of the slab);
- Reinforcement elements with double headed studs can be also used for semi-fabricated slabs in combination with lattice girders, if the respective UKTA or national guidelines ae observed. Double headed studs are also effective as bond reinforcement between precast and in-situ concrete.

ANNEX B2 Intended use / Specification

Installation of double headed studs

- When installed correctly, the double headed studs have sufficient robustness to resist the usual actions before and during concreting
- When the double headed studs are used in semi-fabricated slabs, there are not additional requirements in terms of robustness (as mentioned before) as long as safe transportation and positioning is ensured
- If semi-fabricated slabs need to be joined in the punching area, the recess between the prefabricated elements shall be at least 40mm wide and has to be carefully filled with concrete on site
- In the punching area, the sei-fabricated slabs can be put on column up to 10mm or placed with a joint on the edge of the column up to 40mm. Therefore, the following requirements shall be considered on site:
 - The joints in the compression zone between the semi-prefabricated plate and the column have to be filled up carefully with appropriate concrete of the same strength as the in-situ concrete
 - The provisions of the distances between the double headed studs and the edge of the column have to be observed
 - If the semi-prefabricated plate is put on the column, the joint between the plate and the column has to be filled with mortar, so the loads from the upper floors are transferred reliably
 - The concrete of the semi-prefabricated plates must not be damaged due to chiselling work
 - The concrete has to be compacted carefully in the bearing area
 - The upper edge of the concreted column shall be below the bottom edge of the semi-prefabricated slab.

Transport and storage

Special considerations shall be given to the transport of prefabricated elements to avoid any damage to the anchorage of the headed studs in the pre-cast concrete slab (see Annex B6).

ANNEX B3 Intended use / Installation of reinforcement elements in prefabricated slabs

Schöck Bole[®] for assembling in prefabricated slabs Type: Schöck Bole[®] elements with mounting bars are placed on lattice girders



Material of assembling bars:

-B500 A/B according to EN 1992-1-1, Annex C and data sheet -B500 NR or stainless round steel according to EN 1993-1-4, EN 10088-3 and EN 10088-5 -structural steel according to EN 10025-2 and data sheet



ANNEX B4 Intended use / Installation of reinforcement elements in prefabricated slabs

Installation of Schöck Bole® with welded mounting bars in prefabricated slabs

Schöck Bole® elements are placed with the mounting bars at the lattice girder



ANNEX B5 Intended use / Installation of reinforcement elements in prefabricated slabs

Placing of Schöck Bole[®] with mounting rail made of plastic in prefabricated flat

Separate installation of mounting rail below the reinforcement bars and double headed studs after placing of reinforcement bars



ANNEX B6 Intended use / Storage and transport

Example of bearing and transport of prefabricated ceiles with Schöck Bole®





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