

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

UK Technical Assessment	UKTA-0836-23/6892 of 06/06/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Schöck Stacon ⁽¹⁾ type LD
	⁽¹⁾ Registered trademark
Product family to which the construction productbelongs:	Dowel for structural joints
Manufacturer:	Schöck Bauteile GmbH Schöckstraße 1 D-76534 Baden-Baden Germany
Manufacturing plant(s):	Schöck Bauteile GmbH Schöckstraße 1 D-76534 Baden-Baden Germany
This UK Technical Assessment contains:	23 pages including 3 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 050019-00-0301: March 2019: Dowels for structural joints under static and quasi-static loading:

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1. Technical description of the product

The Schöck Stacon type LD dowel connectors (dowels for structural joints) consist of a dowel and a sleeve. The dowel is a round bar made of stainless or hot-dip galvanized steel, the corresponding sleeve is made of stainless steel or polypropylene (Annexes A1 to A3).

The two components of a dowel connector are manufactured separately in the factory and assembled on the construction site into an expansion joint between concrete elements.

The dowel is inserted into a sleeve on the one side of the joint and embedded in concrete on the opposite side. Such setting allows free expansion of the joint and shear stress transmission.

The possible combination of dowels and sleeves and the corresponding combination type according to UKAD 050019-00-0301 are listed in Table A4 (Annex A4).

The used materials are listed in Annexes A1 to A5.

If the construction of the expansion joint must fulfill further fire resistance requirements, the fire protection collars LD BSM or LD-Q BSM can be used (Annex A5). The collar is plugged on the dowel between the concrete elements. In the case of fire, the collar will expand and protect the dowel against heating. The thickness of the fire protection collar is selected according to Table A7 in Annex A6. Arrangement of fire protection collars are given in Annex A6.

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

The performance given in clause 3 are only valid if the dowel connectors are used in compliance with the specifications and conditions given in Annex B.

The provisions made in this UK Technical Assessment are based on an assumed working life of the connectors of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Technical Approval Body 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 characteristic	Performance
Ultimate limit state	Annex C1
Serviceability limit state	Annex C1

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Type of element, connector	Performance
	Stainless steel dowel bar	A1
	Galvanized steel dowel bar	A1
Reaction to fire	Stainless steel sleeve	A1
	Polypropylene sleeve	No performance assessed
Resistance to fire	Dowel connector with collar LD BSM or LD-Q BSM plugged on the dowel between the concrete elements	Annex C2

3.3. Health, hygiene and the environment (BWR 3)

The Schöck Stacon type LD dowel connectors do not contain and/or release dangerous substances.

In order to meet the provisions of Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, other requirements applicable to the products falling within its scope (e.g., transposed European legislation and national laws, Regulations and administrative provisions), need also to be complied with, when and where they apply.

3.4. Safety and accessibility in use (BWR 4)

When connecting floor slabs, the surface unevenness between the two sides of the joint has to be less than 5 mm.

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.

3.8. General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

3.9. Methods used for the assessment

The assessment of the product for the declared intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 has been made in accordance with UKAD 050019-00-0301: March 2019: Dowels for structural joints under static and quasi-static loading.

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. 050019-00-0301 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 the following AVCP applies.

Product	Intended use	Level or class	System
Dowels for structural	For uses subject to structural performance regulations	_	2+
joints	For uses subject to regulations on reaction to fire	(A1 to E) ⁽¹⁾ , F	4

⁽¹⁾ Products/materials that do not require to be tested for reaction to fire

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.

For the type testing the results of the tests performed as part of the assessment for the UK Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between British Board of Agrément and the Approved Body.

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 (where applicable)
- UKTA number.

On behalf of the British Board of Agrément

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Date of Issue: 6 June 2023

Hardy Giesler Chief Executive



British Board of Agrément,

1st Floor Building 3, Hatters Lane, Croxley Park Watford WD18 8YG

ANNEX



This annex applies to the product described in the main body of the UK Technical Assessment.

Product description

Dimensions and materials of sleeve LD Part S/P



Table A2: Dimensions and materials of sleeve LD-Q Part S

Type of sleeve	Material	L _{s,q} [mm]	D _{s,q,i} [mm]	W _{s,q,i} [mm]	H _{s,q} [mm]
LD-Q 16 Part S	1.4362 / 1.4404 / 1.4571	185	17	47	70
LD-Q 20 Part S	1.4362 / 1.4404 / 1.4571	210	21	46	75
LD-Q 22 Part S	1.4362 / 1.4404 / 1.4571	225	23	46	77
LD-Q 25 Part S	1.4362 / 1.4404 / 1.4571	245	26	56	80
LD-Q 27 Part S	1.4362 / 1.4404 / 1.4571	255	28	56	82
LD-Q 30 Part S	1.4362 / 1.4404 / 1.4571	275	31	56	85
LD-Q 35 Part S	1.4362 / 1.4404 / 1.4571	310	36	76	90
LD-Q 40 Part S	1.4362 / 1.4404 / 1.4571	340	41	76	95

Schöck Stacon type LD

Product description

Dimensions and materials of sleeve LD-Q Part S

Annex A2



 Insertion length
Dowel length L_d

- Dowel diameter

Table A3: Dimensions and materials of dowel LD Part A4 / Zn

Type of dowel	Material	L₀ [mm]	D₀ [mm]
LD 16 Part A4	Stainless steel 1.4362 / 1.4462	270	16
LD 20 Part A4	Stainless steel 1.4362 / 1.4462	320	20
LD 22 Part A4	Stainless steel 1.4362 / 1.4462	350	22
LD 25 Part A4	Stainless steel 1.4362 / 1.4462	390	25
LD 27 Part A4	Stainless steel 1.4362 / 1.4462	420	27
LD 30 Part A4	Stainless steel 1.4362 / 1.4462	450	30
LD 35 Part A4	Stainless steel 1.4362 / 1.4462	520	35
LD 40 Part A4	Stainless steel 1.4362 / 1.4462	580	40
LD 16 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	270	16
LD 20 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	320	20
LD 22 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	350	22
LD 25 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	390	25
LD 27 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	420	27
LD 30 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	450	30
LD 35 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	520	35
LD 40 Part Zn	Hot-dip galvanized steel 1.7225 / 1.7227	580	40

Schöck Stacon type LD

Annex A3

Product description

Dimensions and materials of dowel LD Part A4 / Zn

Table A4: Possible combinations of Schöck Stacon type LD dowel connector elements and the corresponding combination type

Type of connector	Type of sleeve	Type of dowel	Combination type
LD ø P-Zn	LD ø Part P	LD ø Part Zn	A1
LD ø P-A4	LD ø Part P	LD ø Part A4	A1
LD ø S-A4	LD ø Part S	LD ø Part A4	A1
LD-Q ø S-A4	LD-Q ø Part S	LD ø Part A4	A2

Table A5: Materials of the elements of the Schöck Stacon type LD dowel connector elements

Type of element	Element	Material
LD ø Part P	Sleeve	Polypropylene (PP)
LD ø Part S	Sleeve	Stainless steel 1.4362 / 1.4404 / 1.4571
LD-Q ø Part S	Sleeve	Stainless steel 1.4362 / 1.4404 / 1.4571
LD ø Part Zn	Dowel	Hot-dip galvanized steel 1.7225 / 1.7227
LD ø Part A4	Dowel	Stainless steel 1.4362 / 1.4462

Schöck	Stacon	type	LD
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Product description

Possible combinations, type and materials of the Schöck Stacon type LD dowel connector elements

Annex A4



Type of product	Material	D _f [mm]	W _f [mm]	T _f [mm]
LD 16-22 BSM 20	Mineral wool / Promaseal PL	22	-	20
LD 25-30 BSM 20	Mineral wool / Promaseal PL	30	-	20
LD 35-40 BSM 20	Mineral wool / Promaseal PL	40	-	20
LD 16-22 BSM 30	Mineral wool / Promaseal PL	22	-	30
LD 25-30 BSM 30	Mineral wool / Promaseal PL	30	-	30
LD 35-40 BSM 30	Mineral wool / Promaseal PL	40	-	30
LD-Q 16-22 BSM 20	Mineral wool / Promaseal PL	22	48	20
LD-Q 25-30 BSM 20	Mineral wool / Promaseal PL	30	56	20
LD-Q 35-40 BSM 20	Mineral wool / Promaseal PL	40	76	20
LD-Q 16-22 BSM 30	Mineral wool / Promaseal PL	22	48	30
LD-Q 25-30 BSM 30	Mineral wool / Promaseal PL	30	56	30
LD-Q 35-40 BSM 30	Mineral wool / Promaseal PL	40	76	30

The LD BSM or LD-Q BSM collar is made of:

 2,5 mm Promaseal PL intumescent fire protection plate produced by PROMAT GmbH, with B-s1, d0 reaction to fire class according to EN 13501-1.

- 17,5 mm or 27,5 mm mineral fibre board of A1 reaction to fire class according to EN 13501-1.

Schöck Stacon type LD

Product description Dimensions and materials of LD BSM / LD-Q BSM fire protection collars



Initial joint width f during construction	Fire protection collar	Permitted additional joint width
20 mm	LD (-Q) Ø BSM 20	10 mm
30 mm	LD (-Q) Ø BSM 30	10 mm
40 mm	2 x LD (-Q) Ø BSM 20	20 mm
50 mm	LD (-Q) Ø BSM 20 + LD (-Q) Ø BSM 30	10 mm
60 mm	2 x LD (-Q) Ø BSM 30	0 mm

Table A7: Arrangement of the LD BSM / LD-Q BSM fire protection collars in dependence on the planned joint width

Schöck Stacon type LD

Product description

Annex A6

Arrangement of the LD BSM / LD-Q BSM fire protection collars

Specification of intended use

Dowel connectors subjected to:

- Static and quasi-static loads.
- Reinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at maximum according to EN 206.
- Nominal joint width from 10 to 60 mm.
- The minimal slab thickness and the upper and lower corresponding maximal concrete cover in-dependence of the dowel diameter are given in Table B1 (Annex B2)

Use conditions (environmental conditions):

- Dowel connectors made of stainless steel grade 1.4462 and 1.4362 may be used in environmental category C3 according to EN ISO 12944-2.
- Dowel connectors made of stainless steel grade 1.4571 may be used in environmental category C2 according to EN ISO 12944-2.
- Dowel connectors with the elements made of galvanized steel may be used in environmental category C1 (dry internal conditions) according to EN ISO 12944-2.

Design:

- The design is based on the design method in EN 1992-1-1 under the responsibility of an engineer experienced in concrete building.
- Verifiable calculation notes and drawings are prepared taking into account the loads to be transferred. The transfer of the loads to the concrete member is verified.
- Single dowels or groups of dowels are used.
- The position of the product is indicated on the design drawings (e.g. position of the dowels with respect to the reinforcement).

Installation:

- Installation carried out by suitably experienced personnel and under the supervision of the person responsible for technical matters on site.
- Use of the product only as supplied by the manufacturer without exchanging the components.
- Installation in accordance with the manufacturer's specifications and the design drawings with exact position and dimensions as described in this UKTA.
- The dowel fixed to the formwork or auxiliary constructions in a way that no movement of the product will occur during placing of reinforcement or during placing and compacting of the concrete.
- The concrete surrounding the reinforcement and under the dowel properly compacted (no cavities).
- Observation of the prescribed values of installations.
- Welding-on of the intended and designed steel components to the product performed by companies meeting the corresponding quality requirements for welding according to EN 1090.

Schöck Stacon type LD

Annex B1

Intended use Specifications

Table B1: Minimal slab thickness and maximum concrete cover for each dowel diameter

Dowel diameter [mm]	Minimal slab thickness [mm]	Maximum concrete cover at the minimal slab thickness [mm]
LD 16	160	20
LD 20	160	20
LD 22	160	20
LD 25	180	20
LD 27	190	30
LD 30	210	30
LD 35	250	30
LD 40	280	30

Schöck	Stacon	type	LD
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Annex B2

Intended use Minimal slab thickness and maximum concrete cover

Ultimate limit state

The ultimate limit state of the Schöck LD dowel connector shall be calculated in accordance with the qualification class 2 of ETAG 030-1. Therefore the following requirements have to be met:

$$V_{Ed} \leq \begin{cases} V_{Rd,ce} \\ V_{Rd,ct} \\ V_{Rd,s} \end{cases}$$

[Equation C1]

[Equation C2]

V_{Rd,ct} through-the-thickness failure

The design value of resistance against through-the-thickness failure results from the following equation:

$$V_{Rd.ct} = 0.14 \cdot \kappa \cdot (100 \cdot \rho_l \cdot f_{ck})^{\frac{1}{3}} \cdot u \cdot d_m / \beta$$

scaling factor with: Κ $\kappa = 1 + (200/d_m)^{0.5}$ mean of the effective height of the slab dm mean reinforcement ratio in x- and y-direction ρ $\rho_l = \sqrt{\rho_{lx} \cdot \rho_{ly}} \leq \begin{cases} 0.5 \cdot f_{cd} / f_{yd} \\ 0.02 \end{cases}$ design concrete compression strength f_{cd} design reinforcement yield strength **f**_{yd} **f**ck characteristic concrete compression strength load increasing factor β β = 1.4 for dowels installed at the edge of the slab β = 1,5 for dowels installed at the corner of the slab basic control perimeter according to Figure C1 u $\mathbf{u} = 2 \cdot c + l_c + \pi \cdot d_m \cdot 1,5$ concrete cover at the edge of the slab С I_c distance between the first stirrups at the left and right side of the dowel (see Figure C1) Schöck Stacon type LD Annex C1 Performances Mechanical resistance and stability of Schöck Stacon type LD dowel connectors



V_{Rd,s} steel resistance of the dowel

The steel load bearing capacity of the Schöck dowel connectors LD shown in Table C1 and Table C2 is assessed according to EN 1993-1-1:2005 + AC 2009, EN 1993-1-4:2007 and ETAG 030-1.

Table C1: Steel load bearing capacities of Schöck dowel connectors LD

Load bearing capacity of dowel LD V _{Rd,s} [kN]	Joint width [mm]					
	10	20	30	40	50	60
LD 16	24,9	18,8	15,1	12,6	10,9	9,5
LD 20	43,0	33,5	27,4	23,2	20,1	17,7
LD 22	54,2	42,6	35,2	29,9	26,0	23,0
LD 25	73,5	58,8	49,0	42,0	36,8	32,7
LD 27	88,2	71,2	59,7	51,4	45,2	40,3
LD 30	112,9	92,4	78,2	67,7	59,8	53,5
LD 35	161,4	134,5	115,3	100,9	89,6	80,7
LD 40	219,0	185,3	160,6	141,7	126,8	114,7

Table C2: Steel load bearing capacities of Schöck dowel connectors LD-Q

Load bearing capacity of dowel	Joint width [mm]					
LD-Q V _{Rd,s} [kN]	10	20	30	40	50	60
LD-Q 16	13,8	10,4	8,4	7,0	6,0	5,3
LD-Q 20	23,9	18,6	15,2	12,9	11,2	9,8
LD-Q 22	30,1	23,7	19,5	16,6	14,5	12,8
LD-Q 25	40,8	32,7	27,2	23,3	20,4	18,2
LD-Q 27	49,0	39,6	33,2	28,6	25,1	22,4
LD-Q 30	62,7	51,3	43,4	37,6	33,2	29,7
LD-Q 35	89,6	74,7	64,0	56,0	49,8	44,8
LD-Q 40	121,7	102,9	89,2	78,7	70,4	63,7

Schöck Stacon type LD

Annex C1

Performances Mechanical resistance and stability of Schöck Stacon type LD dowel connectors

V_{Rd,ce} concrete edge failure The design value of resistance against concrete edge failure results from the following equation: [Equation C3] $V_{Rd,ce} = V_{Rd,1} + V_{Rd,2} \le A_s \cdot f_{yd}$ with: $V_{Rd,1} = X_1 \cdot X_2 \cdot \sum \psi_i \cdot A_s \cdot f_{yk} \cdot (f_{ck}/30)^{0,5} / \gamma_c$ [Equation C4] product specific factor from Table C3 **X**1 statistical factor from Table C3 **X**2 Ψ factor taking into account the distance I_{c,i} of the considered stirrup to the dowel $\psi = 1 - 0.2 \cdot \left(\frac{l_{c,i}}{c}\right)$ $c_1 = h/2$ cross section area of the stirrups As **f**_{vd} design value of yield strength of the stirrups characteristic yield strength of the stirrups **f**_{vk} f_{ck} characteristic compressive strength of the concrete (set to 30 for all concrete classes) partial safety factor for concrete Yc $V_{Rd,2} = \pi \cdot d_s \cdot \sum l'_i \cdot f_{bd}$ [Equation C5] d۹ diameter of the stirrup design value of the bond strength according to EN 1992-1-1:2004 **f**_{bd} ľ effective anchorage length of the considered stirrup $l'_i = H_{spec} - (0.5 \cdot d_b + d_s + c_{nom}) - l_{c,i} \cdot \tan \alpha$ H_{spec} height of the concrete cone from Table C3 mandrel diameter of the stirrup db bar diameter of the stirrup ds distance between the centre of the dowel and considered stirrup I_{c,i} nominal concrete cover of the considered stirrup Cnom tan α angle of the concrete cone from Table C3 Table C3: Product specific parameters of Schöck Stacon type LD dowel connectors Parameter Type of product Product specific parameters For all types Χ1 0,61 **X**2 For all types 0,92 (1) The concrete cone starts from the centre of the dowel to the edge of Hspec For all types the slab h/2 For all types 33° ⁽¹⁾ X₂ value was obtained to reach V_{Rd, ce} \geq 1,5 V_{U, test} as a 5%-fractile with a confidence level of 75% The product specific parameters are determined by tests. These tests showed a very small influence of the concrete strength. Therefore the concrete strength fck in Equation C4 is set to 30 N/mm² for all concrete classes. Schöck Stacon type LD Annex C1 Performances

Mechanical resistance and stability of Schöck Stacon type LD dowel connectors

Requirements for the reinforcement layout

In order to ensure the load bearing capacity of the concrete the following requirements for the reinforcement layout have to be considered:

The diameter of the longitudinal reinforcement bar parallel to the edge of the slab must be at least the bar diameter of the stirrups close to the dowel.

$$\emptyset A_{sy} \ge \emptyset A_{sx}$$

The maximum concrete cover c of the stirrups at the edge of the slab must be less or equal 30 mm.

The distance of the longitudinal reinforcement bar to the edge of the slab must be smaller than:

$$a_r \leq H_{spec} - c_{nom} - 2 \cdot \emptyset A_{sx}$$



Figure C2: Dimensions of the reinforcement close to the dowel



Classification of fire resistance in accordance with clause 7 of EN 13501-2

The element, loadbearing reinforced concrete floor or wall without separating function with Schöck Stacon type LD dowels, sleeves and fire protection collars (Annex A6) is classified:

Fire resistance classification: R120

Schöck Stacon type LD	Anney C2	
Performances Classification of fire resistance	Annex C2	



British Board of Agrément, 1st Floor Building 3,

1st Floor Building 3, Hatters Lane, Croxley Park Watford WD18 8YG