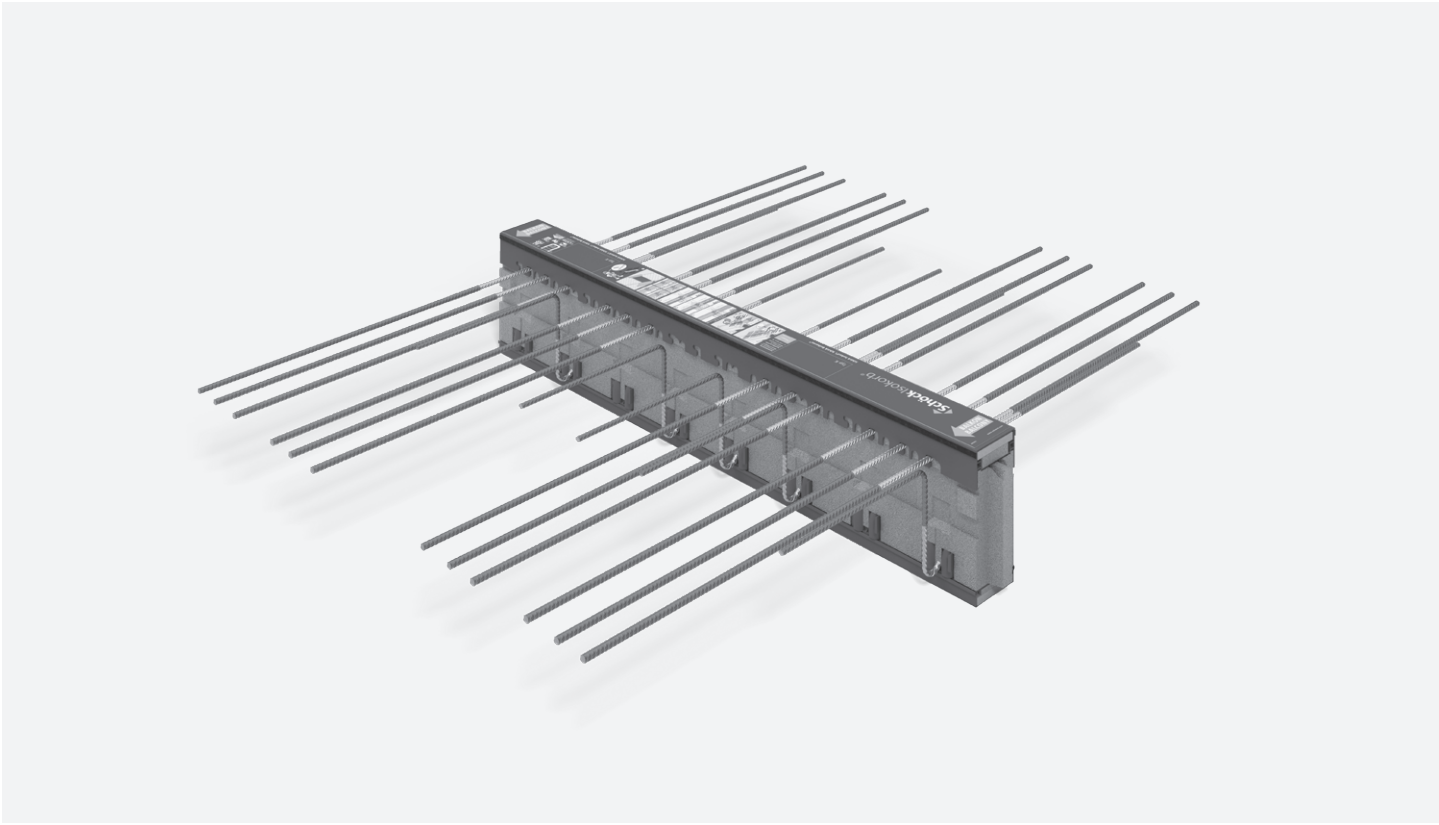
Schöck Isokorb®



BBA approval Schöck Isokorb®

Concrete-to-concrete

Steel-to-concrete

September 2018

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

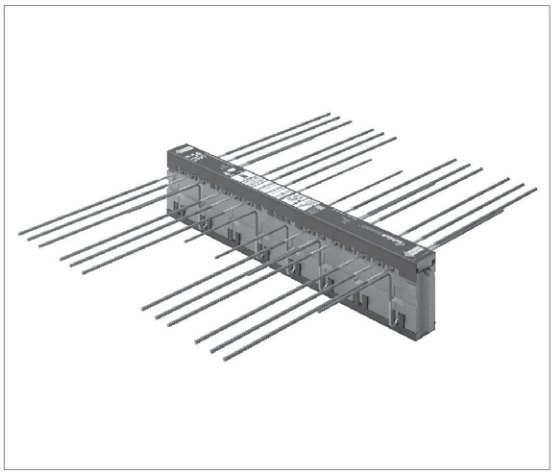
Agrément Certificate
05/4277
Product Sheet 1

SCHÖCK ISOKORB CONNECTION SYSTEMS

SCHÖCK ISOKORB THERMAL INSULATION CONNECTION SYSTEMS

This Agrément Certificate Product Sheet[1] relates to Schöck Isokorb Thermal Insulation Connection Systems, for use in reinforced concrete structures to form a thermal break between a balcony and an internal floor, whilst transferring load and maintaining full structural integrity.

(1) Hereinafter referred to as 'Certificate'.



CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Structural aspects — the systems have adequate structural strength to resist the loads associated with design loading (see section 6).

Thermal performance — the systems contribute to limiting heat loss at junctions by reducing thermal bridging between internal and external elements (see section 7).

Behaviour in relation to fire — the systems can provide up to 120 minutes fire resistance (see section 9).

Durability — under normal service conditions, the systems will have a service life of at least 60 years (see section 11).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Third issue: 1 March 2017

Originally certificated on 5 December 2005

Brian Chamberlain
Head of Technical Excellence

Claire Curtis-Thomas
Chief Executive

Certificate amended on 10 July 2017 to update section 6.
Certificate amended on 11 September 2018 to revise 6.1 and 9.4.

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Regulations

In the opinion of the BBA, Schöck Isokorb Thermal Insulation Connection Systems, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	A1	Loading
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design loads in accordance with section 6 of this Certificate.
Requirement:	B3(1)(3)	Internal fire spread (structure)
Comment:		The systems' fire-protection plates can provide up to 120 minutes fire resistance. See sections 9.2 to 9.4 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		Constructions incorporating the systems can satisfy this Requirement. See sections 8.1 and 8.2.
Requirement:	L1a(i)	Conservation of fuel and power
Comment:		The systems can contribute to satisfying this Requirement. See sections 7.1 and 7.3 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The systems are acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rate for new buildings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The systems can contribute to satisfying these Regulations. See sections 7.1 and 7.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The systems comply with the requirements of this Regulation. See section 11 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1(a)(b)	Structure
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design loads in accordance with section 6 of this Certificate, with reference to clauses 1.1.1[1][2] to 1.1.3[1][2].
Standard:	2.3	Structural protection
Comment:		The systems' fire-protection plates can provide up to 120 minutes resistance (long duration), with reference to clauses 2.3.1[1][2] to 2.3.3[1][2]. See sections 9.2 to 9.4 of this Certificate.
Standard:	3.15	Condensation
Comment:		Constructions incorporating the systems can satisfy this Standard, with reference to clauses 3.15.1[1][2] and 3.15.4[1][2]. See sections 8.1 and 8.2 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 6.1.1[1], 6.1.2[2] and 6.1.6[1]. See sections 7.1 and 7.3 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 6.2.3[1] and 6.2.5[2]. See sections 7.1 and 7.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The systems can contribute to satisfying the relevant Requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction satisfying a bronze level of sustainability as defined in this Standard. In addition, the systems can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[1] [Aspects 1[1] and 2[1]], 7.1.6[1][2] [Aspects 1[1][2] and 2[1]], 7.1.7[1] [Aspect 1[1]] and 7.1.9[2] [Aspect 1[2]]. See sections 7.1 and 7.3 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments in relation to the systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23	Fitness of materials and workmanship
Comment:		The systems are acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	30	Stability
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design loads in accordance with section 6 of this Certificate.

Regulation:	35(1)(3)	Internal fire spread structure
Comment:		The systems' fire-protection plates can provide up to 120 minutes fire resistance. See section 9.2 to 9.4 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The systems can contribute to satisfying these Regulations. See sections 7.1 and 7.3 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* of this Certificate.

Additional Information

NHBC Standards 2017

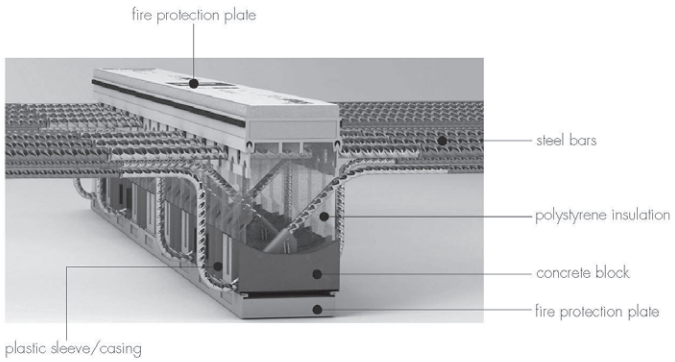
NHBC accepts the use of Schöck Isokorb Thermal Insulation Connection Systems, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

Technical Specification

1 Description

1.1 Schöck Isokorb Thermal Insulation Connection Systems (see Figure 1) are a range of systems, each incorporating components including high-density polystyrene plastic sleeves, high-density high-strength concrete bearing blocks or steel bearing blocks or steel compression bars, and EPS insulation. The number of blocks varies between 4 and 18 to every 1-metre length, depending on load requirements. An arrangement of stainless steel straight and bent bars are passed through the EPS moulding and bearing blocks to act as tension and shear reinforcement; these are factory-welded to steel reinforcing bars to provide continuity between the balcony and floor construction.

Figure 1 Detail of typical of a Schöck Isokorb Thermal Insulation Connection System



Typical cross section

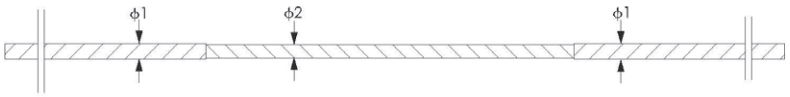
1.2 Details of components used with all systems:

- steel reinforcement bars — stainless steel ribbed reinforcement bars (steel grade B500B NR) are used to pass through the system, with high-yield ribbed reinforcement bars (to BS 4449 : 2005) used as continuity steel to lap onto floor and balcony reinforcement. For diameters and arrangement of steel reinforcement (ϕ1) and stainless steel bars (ϕ2), see Table 1 and Figure 2 of this Certificate. Both bar types are press-welded together to form a full strength butt joint. Threaded steel bars are used for connection of steel balconies to the supporting floor.

Table 1 Diameter of reinforcement steel (ϕ1) and stainless steel (ϕ2) for concrete compression bearing blocks and steel compression bearing blocks or bars

Change in diameter of tensile bars ϕ1 – ϕ2 – ϕ1	Ribbed reinforcing steel to BS EN ISO 15630-1 ϕ1 mm	Stainless steel to BS EN ISO 15630-1 ϕ2 mm
	Minimum proof strength $R_{p0,2}$ N·mm^{-2}	Minimum proof strength $R_{p0,2}$ N·mm^{-2}
(8–) 6.5 (–8)	8 500	6.5 800
(8–) 7 (–8)	8 500	7 700
(10–) 8 (–10)	10 500	8 700 (820 optional)
(12–) 9.5 (–12)	12 500	9.5 820
(12–) 10 (–12)	12 500	10 700
(12–) 11 (–12)	12 500	11 700
(14–) 12 (–14)	14 500	12 700

Figure 2 Arrangement of steel reinforcement (ϕ1) and stainless steel bars (ϕ2)



- the designation of steel plate used in the systems is S235JR, S235J0, S235J2, S355JR, S355J2 or S355J0, in accordance with BS EN 10025-2 : 2004
- the material number and tensile strength of the stainless steel (NR - non rusting) tensile bars and shear force bars for concrete compression bearing blocks and steel compression bearing blocks or bars are shown in Table 2.

Table 2 Minimum tensile strength for the stainless steel (NR) tensile bars and shear force bars for concrete compression bearing blocks and steel compression bearing blocks or bars

Material no. of steel	Standard for material number	Tensile strength to BS EN 10088-3 : 2014 MPa
1.4571	BS EN 10088-3 : 2014	500-730
1.4482	BS EN 10088-1 : 2014	650-900
1.4571		500-730
Inoxripp 4486 rings 1.4482		650-900
1.4404		490-690
1.4401	BS EN 10088-1 : 2014	500-700
1.4404		580-930
1.4362		600-830
1.4462	BS EN 10088-3 : 2014	650-880
1.4301		600-950

- insulation — expanded polystyrene in accordance with BS EN 13163 (reaction to fire class E, to BS EN 13501-1 : 2007) (Polystrol Hardfoam or with Neopor), 60 mm to 120 mm wide.

1.3 Details of components used with some systems (see Figure 5):

- concrete pressure bearing blocks (for system type K, KF, Q and XT[1] only), comprising high-strength, fibre-reinforced concrete housed in an outer, PE-HD plastic sleeve (see Figure 1)

(1) XT range will have 120 mm insulation thickness.

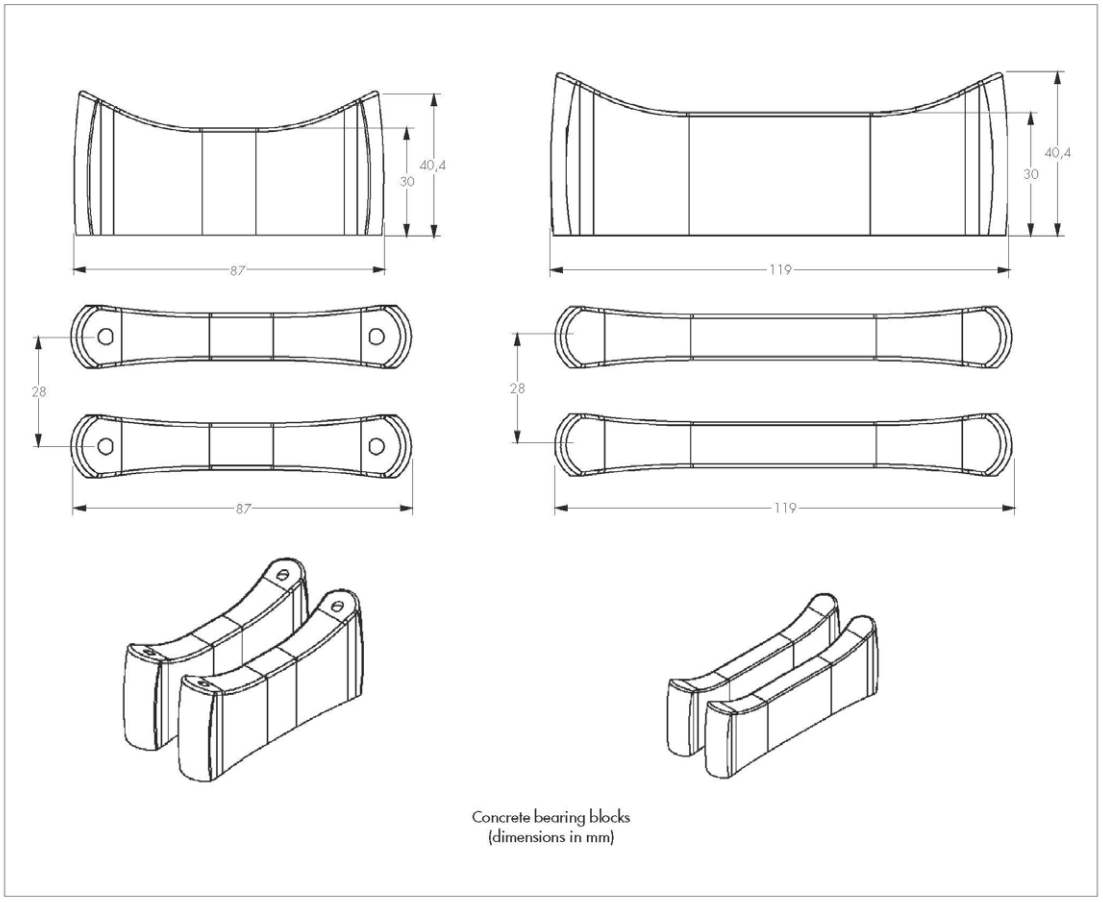
- steel compression bearing blocks or bars (system type QP, for example of steel compression bearing)
- threaded steel bars to connect the system to steel balcony (system types types KS, QS,KSXT and QSXT)
- fasteners and steel used for the systems are stainless steel in accordance with BS EN ISO 3506-1 : 2009 (eg plate, steel, bolts). The steel grade of bolts used for connections is grade A4 with tensile strength of 700 $N \cdot mm^{-2}$ and stress at 0.2% permanent strain ($R_{p0,2}$) of 450 $N \cdot mm^{-2}$
- plastic sleeve/rigid moulding (for system type K, KF, Q and XT), manufactured from extruded PVC bonded to the top and bottom of the thermal break using Dorus MS 294 adhesive or similar. The top moulding contains slotted holes in each side to receive the stainless steel reinforcement bars. A fire safety strip, manufactured from Roku-strip and bonded to the sides of the upper PVC rigid moulding, provides additional fire protection to reinforcement
- fire-protection plates — manufactured from glass fibre cement-bonded board complying with DIN 4102-2 : 1977 and ETA 11/0458. These provide a reaction-to-fire classification of Class A1 to BS EN 13501-1 : 2007 to the top and bottom of the thermal break when required
- clip to hold the shear reinforcement — manufactured from PE-HD plastic (see Figure 1).

1.4 There are three variations of concrete compression block which differ in their dimensions and/or concrete specification:

- HTE 30[1] (see Figure 3)
- HTE Modul[1] (see Figure 3)
- HTE 20 (see Figure 4).

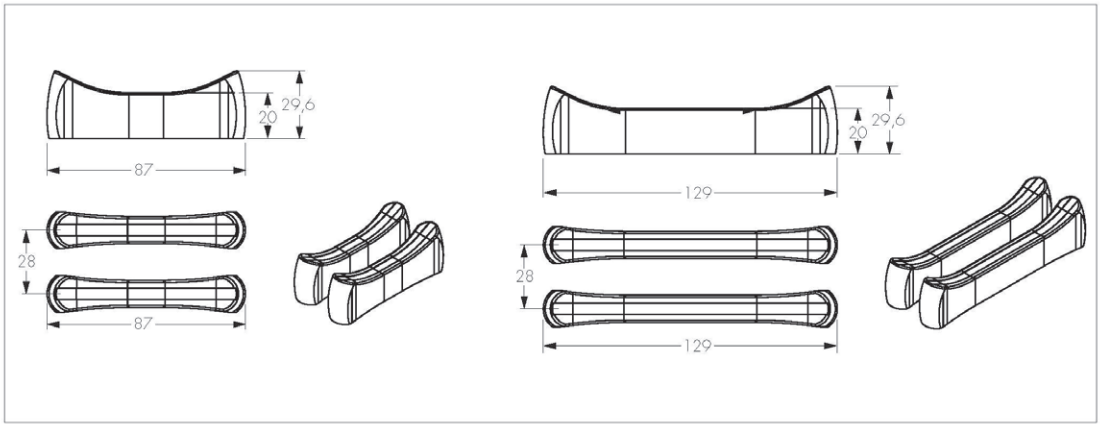
(1) HTE Modul and HTE 30 have the same geometry but different compression concrete bearing resistance.

Figure 3 Schöck concrete compression block detail HTE 30 and HTE Modul for insulation thicknesses of 80 mm or 120 mm



Concrete bearing blocks
(dimensions in mm)

Figure 4 Schöck Isokorb HTE 20 for insulation thicknesses of 80 mm or 120 mm

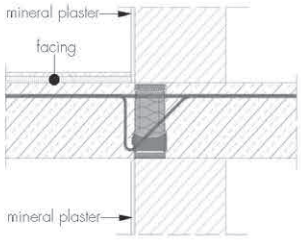


1.5 The Certificate holder's specifications for ancillary items used in conjunction with the systems include the following:

- concrete for supporting floor (see section 6 for specification of concrete)
- concrete for balconies (see section 6 for specification of concrete)
- stainless steel for steel balconies.

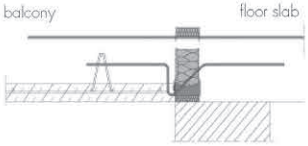
1.6 Each of the systems (see Figure 5) incorporates compression bearing concrete blocks, steel compression bearing blocks or bars and steel threaded bars, and is designed based on functional requirements regarding the transfer of positive or negative bending moment and shear forces.

Figure 5 Range of Schöck Isokorb Thermal Insulation Connection Systems



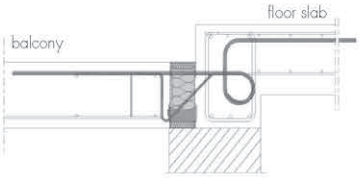
type K

For in-situ reinforced cantilever balcony for transferring negative bending moment and shear force into concrete floor.



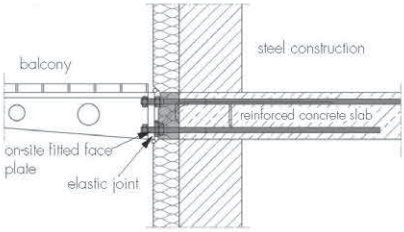
type KF

For precast concrete cantilever balcony for transferring negative bending moment and shear force into concrete floor.



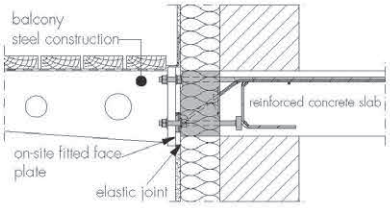
type K-HV

For cantilever balcony step down for transferring negative bending moment and positive shear force.



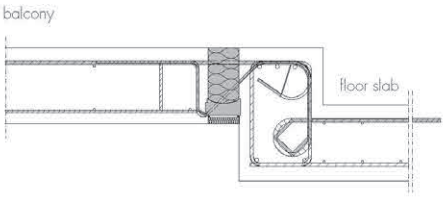
type KS

For cantilever steel balcony for transferring bending moment and shear force into concrete floor.



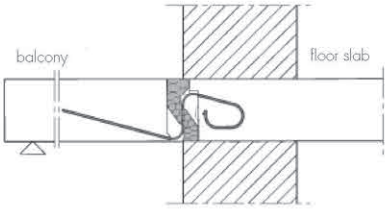
type KSXT

For cantilever steel balcony for transferring bending moment and shear force into concrete floor (120 mm thick insulation).



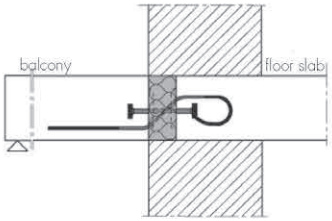
type K-BH

For cantilever balcony step up for transferring negative moment and positive shear force.



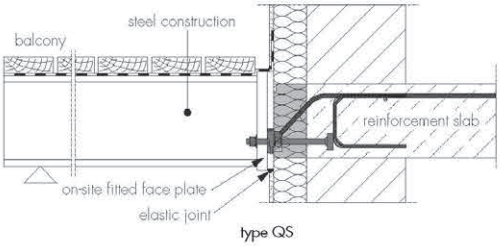
type V

For in-situ concrete balcony with flexible joint, plus additional end support using podium or columns for transferring lateral and shear forces into floor slab.



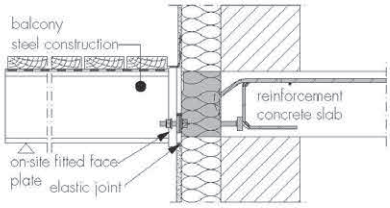
type QP

For in-situ concrete balcony with flexible joint, plus additional end support using podium or columns for transferring shear forces into floor slab where stress and height are critical.



type QS

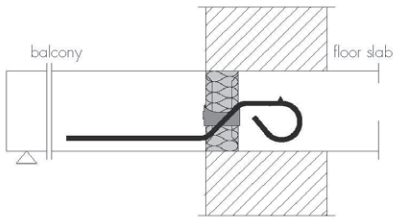
For supported steel constructions to concrete slabs transferring positive shear force.



type QSXT

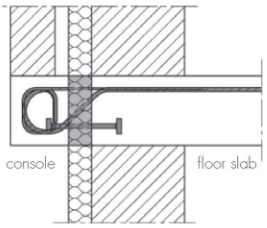
For supported steel constructions to concrete slabs transferring positive shear force (120 mm thick insulation).

Figure 5 Range of Schöck Isokorb Thermal Insulation Connection Systems (continued)



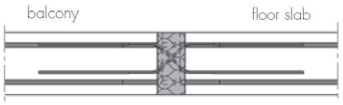
type Q

For in-situ concrete balcony with flexible joint, plus additional end support using podium or columns for transferring shear forces into floor slab where stress and height are critical.



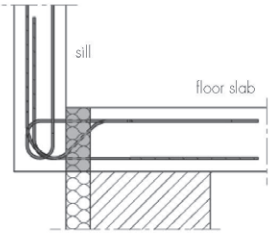
type O

For reinforced concrete corbel for transferring bending moment and shear forces.



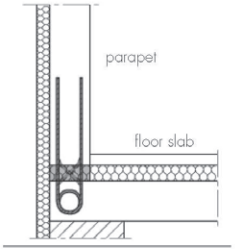
type D

For in-situ concrete balcony within same area as main floor requiring transfer of positive and negative bending moment and shear forces.



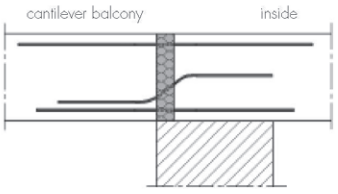
type F

For providing insulation between protruding balustrades and transferring bending moment and shear forces.



type A

For parapet for transferring bending moment, shear and compression forces.

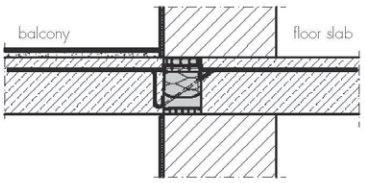


type S

For in-situ concrete balcony to carry bending moment and shear force into floor without use of thrust blocks.

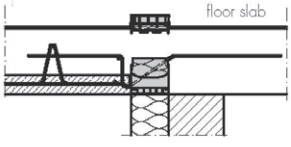
type W

For cantilever shear wall, transfer negative moments and positive shear forces and horizontal shear forces.



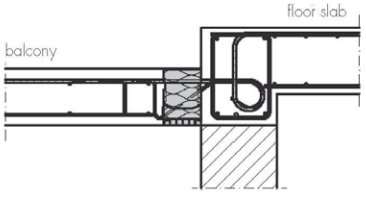
type KXT

For in-situ reinforced cantilever balcony for transferring bending moment and shear forces into concrete floor.



type KFXT

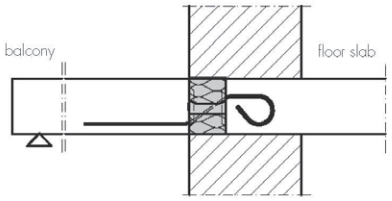
For precast concrete cantilever balcony for transferring bending moment and shear forces into concrete floor.



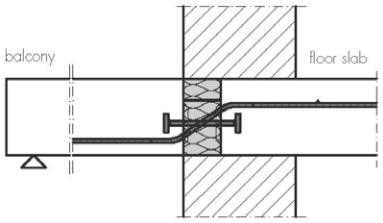
type KXT-HV

For cantilever balcony with step-up for transferring bending moment and shear forces into concrete floor.

Figure 5 Range of Schöck Isokorb Thermal Insulation Connection Systems (continued)

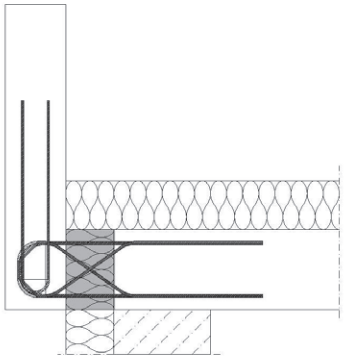


type QXT



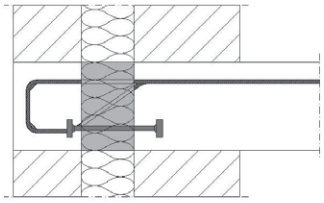
type QPXT

For in-situ concrete with flexible joint, plus additional end support using podium or columns for transferring shear forces into floor slab where stress and height are critical.



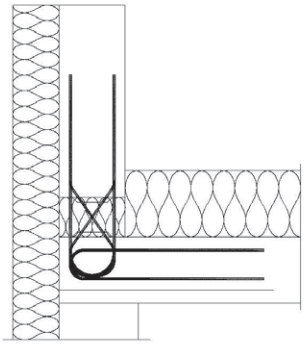
type FXT

For providing insulation between protruding balustrades and transferring bending moment and shear force.



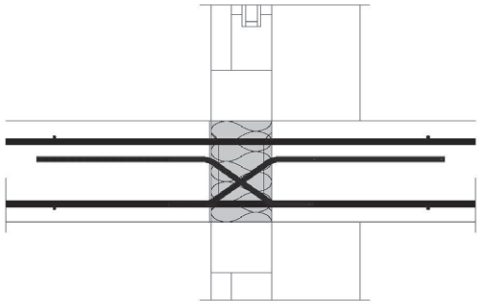
type OXT

For reinforced concrete corbel for transferring bending moment and shear force.



type AXT

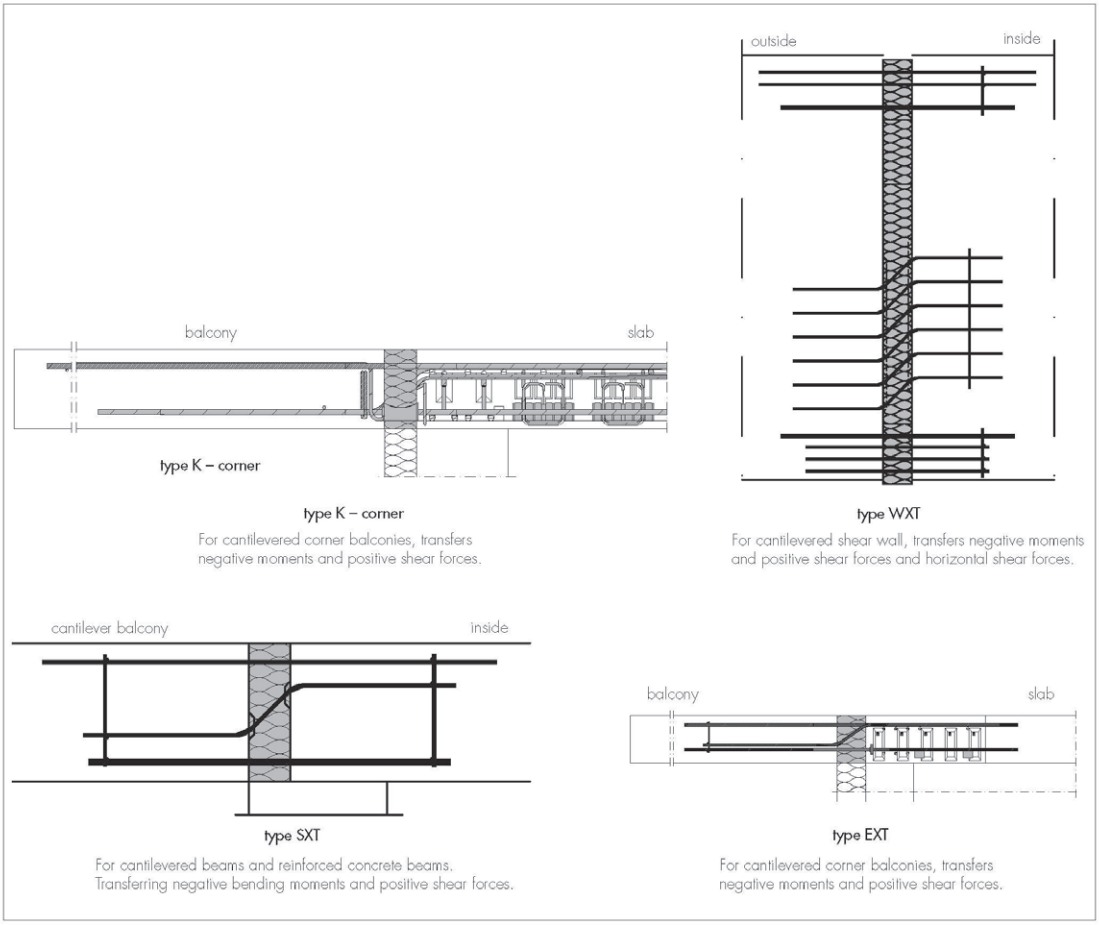
For parapet for transferring bending moment, shear and compression forces.



type DXT

For in-situ concrete balcony within the same area as main floor requiring transfer of positive and negative bending moment and shear force.

Figure 5 Range of Schöck Isokorb Thermal Insulation Connection Systems (continued)



2 Manufacture

2.1 The incoming components are bought-in to an agreed specification and completed for final assembly. The process involves welding and cutting bars and templates used to form the units and assembling using hot melt adhesive, to join the insulation EPS layers to each other.

2.2 The welding between stainless steel and continuity high-yield reinforcement is carried out under strict factory control in accordance with BS EN ISO 17660-1 : 2006. In-house testing is regularly carried out to ensure strength parameters are achieved.

2.3 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

2.4 The management system of Schöck Bauteile GmbH has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by DEKRA Certification GmbH (Certificate 31112676/1).

3 Delivery and site handling

3.1 The units are normally supplied to order on wooden pallets and shrink-wrapped in foil. A label is affixed to each product bearing the BBA Certificate number, a batch number, production date, information on product type, diameter of reinforcement and full installation instructions.

3.2 During off-loading, care must be taken to avoid bending reinforcement or damaging the expanded polystyrene moulding. Packages must be stored under cover and away from direct sunlight (wrapped with white colour where required to prevent direct sunlight), or contact with solvents or other harmful chemicals.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Schöck Isokorb Thermal Insulation Connection Systems.

Design Considerations

4 Use

4.1 The systems allow full transfer of load from an external concrete or steel balcony into the main structure whilst providing a thermal break to reduce heat loss to the outside. The systems are used primarily in reinforced concrete supporting structures, and are designed to perform integrally with the floor construction.

4.2 The units have the capability to transfer tensile, shear and compressive forces via the steel reinforcement and the thrust-force bearing blocks through to the supporting structure.

5 Practicability of installation

The systems must be installed by competent trained builders in accordance with the Certificate holder's Installation Manual.

6 Structural stability

6.1 An appropriately-qualified engineer must establish the applied tensile, compression stress and shear forces applied on the system in accordance with the relevant standards, including:

- the deflection of the concrete slab and steel should not exceed the permissible values specified in BS EN 1992-1-1 : 2004 and the UK National Annex to BS EN 1993-1-1 : 2005. The deflection calculations should take into account the requirements for drainage of the balcony
- the pre-camber of the balcony formwork should be specified by an appropriately-qualified engineer. It is used to compensate for some or all of the deflection, but any upward deflection incorporated in the formwork should not generally exceed span/250 — refer to clause 7.4.1(4) of BS EN 1992-1-1 : 2004
- if appropriate fire protection has not been provided for the steel profiles used for steel balconies, the section resistance of steel profiles must be reduced in accordance with BS EN 1993-1-2 : 2005 and its UK National Annex
- the steel reinforcement must be detailed in accordance with requirements of BS EN 1992-1-2 : 2004 and its UK National Annex, (see also section 9.1 of this Certificate).

6.2 The Certificate holder must establish the layout of the reinforcement steel for concrete and structural steel necessary for each type of system (in accordance with BS EN 1992-1-1 : 2004 and BS EN 1993-1-1 : 2005 and their respective UK National Annex) to resist the applied stresses and loads (see section 6.1). The following must be taken into consideration:

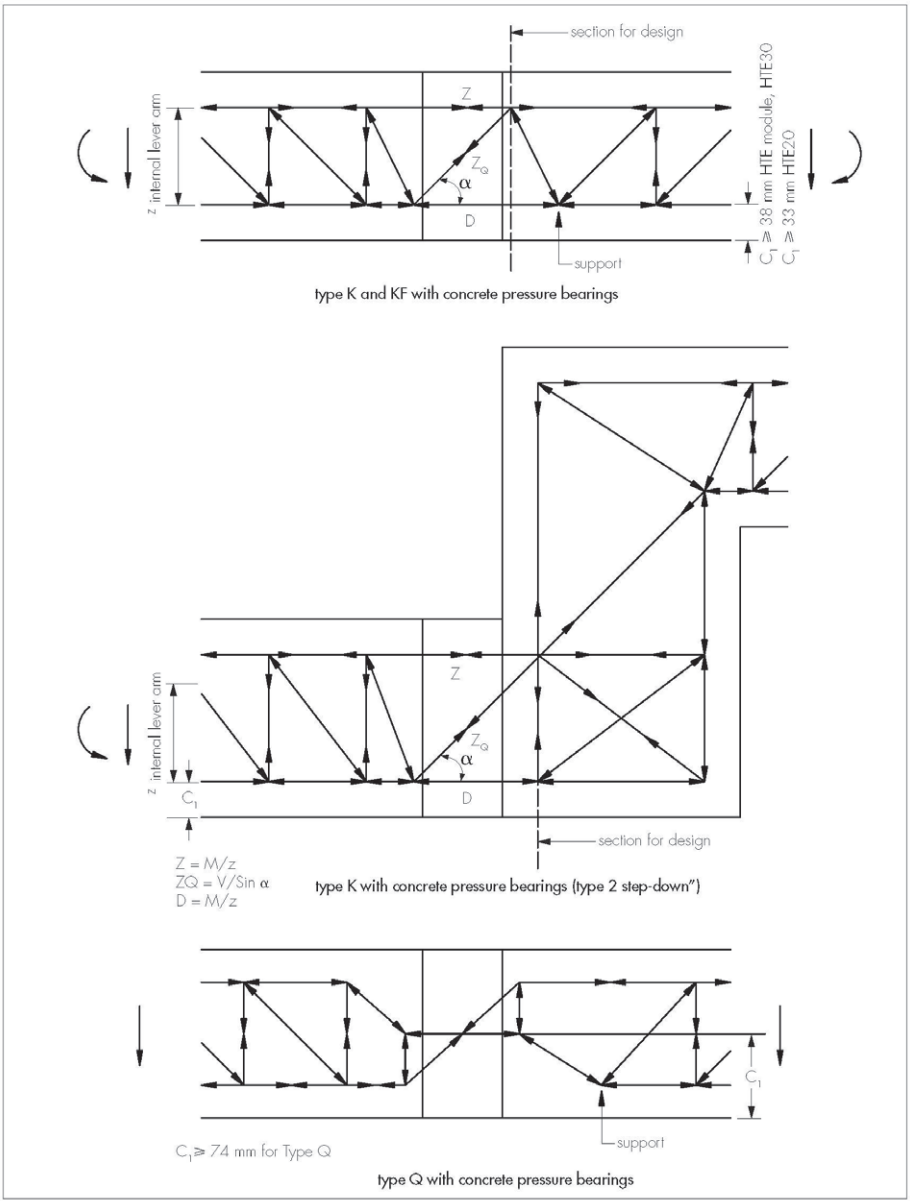
- the strut-and-tie models (refer to clause 5.6.4 of BS EN1992-1-1 : 2004) are used as a basis to determine the internal forces and required diameter and position of reinforcement steel to resist the applied loads on the system (see section 6.1)
- the tensile, shear force, compression bars and their anchorage lengths are in accordance with BS EN 1992-1-1 : 2004, and the maximum spacing for the tensile reinforcement in accordance with BS EN 1992-1-1 section 9.3.1.1(3)
- at least four compression, tensile and/or shear force bars must be located per metre of the connected slab
- the maximum and minimum permissible tensile bar diameter for concrete compression bearing blocks are 20 mm and 6 mm. The maximum shear reinforcement for type Q is 14 mm diameter
- structural adequacy of the fasteners e.g. bolts, plates, etc. for threaded steel bar in terms of, bearing, tensile and shear resistance in accordance with BS EN 1993-1-4 : 2006 and its UK National Annex
- the fatigue stresses for normal forces and bending moment resulting from deformation due to different temperatures to be controlled by limiting the joint spacing in the external structural components. The Certificate holder should be consulted, especially in respect of expansion joints/fatigue resistance (available from the Certificate holder's website)
- the natural frequency of the external concrete slab and steel balconies as part of serviceability under full dead load plus 0.3 x imposed load (UDL) must exceed 4.0Hz and 7.5Hz respectively. The vibration due to rhythmic activity (such as dancing) and any external sources (eg building construction or rail traffic) are excluded from the system
- for each case, the appropriate type of system eg concrete compression bearing blocks (HTE30, HTE Module and HTE20), steel compression bearing blocks or threaded steel bar are used
- the minimum strength class of concrete used in the balcony must be C30/37, with a minimum strength grade of the supporting floor slab of C25/30. The minimum and maximum depth of concrete slab should be 160 mm and 250 mm respectively. The exact required strength class, concrete depth and reinforcement of the supporting floor slab depends on site specific requirements and should be designed to BS EN 1992-1-1:2004 by the Certificate holder
- structural calculations must ensure that the ultimate compressive force induced by imposed, dead loads on individual pairs of concrete pressure-bearing blocks does not exceed 34.4 kN, 38.0 and 45.0 kN for HTE Modul, HTE 20 and HTE 30 respectively. In addition, the concrete adjacent to shear reinforcement bends should not be overstressed; the Certificate holder's advice should be sought in this respect.

6.3 Tension reinforcement forming each of the units must not be bent on site, but remain straight.

6.4 Site welding must not to be undertaken under any circumstances.

6.5 The mechanism of structural resistance of the type K and KF; type K ('step-down'); and type Q in a framework model form is shown in Figure 6.

Figure 6 Typical framework model for shear and bending moment



7 Thermal performance

7.1 The psi (ψ) value of junctions incorporating the product should be determined in accordance with BS EN ISO 10211 : 2007 and BRE Report 497 : 2016, using dimensions of the components and values for the thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$) of:

- EPS (Neopor declared) 0.031
- steel reinforcing bar 50
- Bent stainless steel 15
- Stainless steel rebar 13
- Concrete compression block 0.95
- Concrete compression body 0.50

- Plastic rail 0.17
- Fire protection plate 0.21.

7.2 The effect of thermal bridging at the junction between the balcony and the wall must be minimised. The performance of this junction will be dependent upon other elements not covered by this Certificate and a suitable assessment of all junction details should be carried out (see section 7.1).

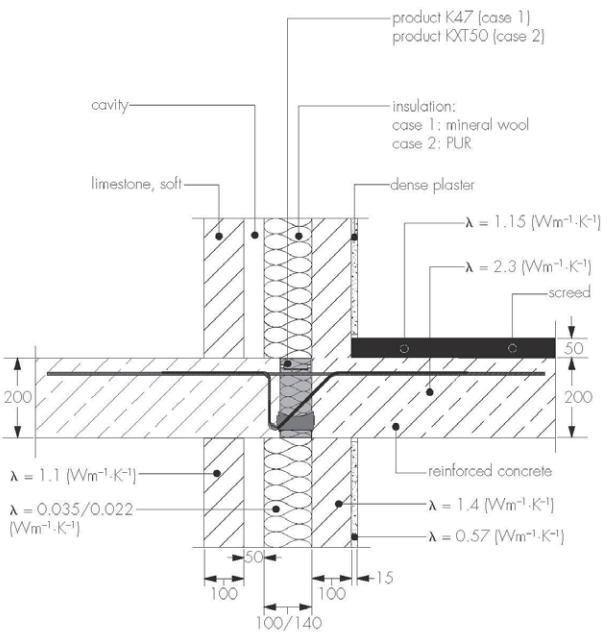
7.3 Example ψ values are given in Table 3.

Table 3 Example ψ-values for E23[1] junction

Connector type	Construction	ψ value (W·m⁻¹·K⁻¹)	
		Balcony within a dwelling	
		U wall = 0.3 (W·m⁻²·K⁻¹)	U wall = 0.15 (W·m⁻²·K⁻¹)
K47	Figure 7	0.132[2]	N/A
KXT50		N/A	0.105[3]
Default (SAP Appendix K)	–	1.0	1.0

(1) Standard Assessment Procedure (SAP) 2012 version 9.92.
(2) Case 1 in Figure 7.
(3) Case 2 in Figure 7.

Figure 7 Example junction construction



Note:
In order to consider a good junction as well as an unfavourable junction, two different constructions are used for the psi-value calculations. The insulation material differs so that different U values occur:
Case 1: insulation of 100 mm with λ = 0.035 (Wm⁻¹·K⁻¹)
Case 2: insulation of 140 mm with λ = 0.022 (Wm⁻¹·K⁻¹)

8 Condensation

Surface condensation

8.1 Junction temperature factors (f_{Rsi}) and hence risk of surface condensation should be assessed in accordance with section 7.1 of this Certificate, section 3.2 of BR 497 : 2016 and section 4 of BRE Information Paper IP 01/06.

8.2 As an example, using the Isokorb K47 and KXT50 units (see Figure 3), calculations provided by the Certificate holder indicate f_{Rsi} values of 0.94 and 0.96, respectively.

8.3 For cases where the balcony coincides with a sill/threshold (above) and/or a head (below) junction(s), these should be modelled together, in accordance with section 2.2.3 of BR 497 : 2016 to obtain the combined f_{Rsi}. There may be an elevated risk of surface condensation and mould growth at this point.

9 Behaviour in relation to fire

9.1 The use of the system, when incorporating top and bottom fire-protection plates and PVC rigid moulding, will not introduce any additional hazard in respect of behaviour in a fire situation if installed in accordance with the Certificate holder's instructions.

9.2 The nominal cover to reinforcement should be appropriate to the exposure conditions, in accordance with BS EN 1992-1-1 : 2004 (Section 4) or BS EN 1992-1-2 : 2004 and their UK National Annexes), whichever is the greater.

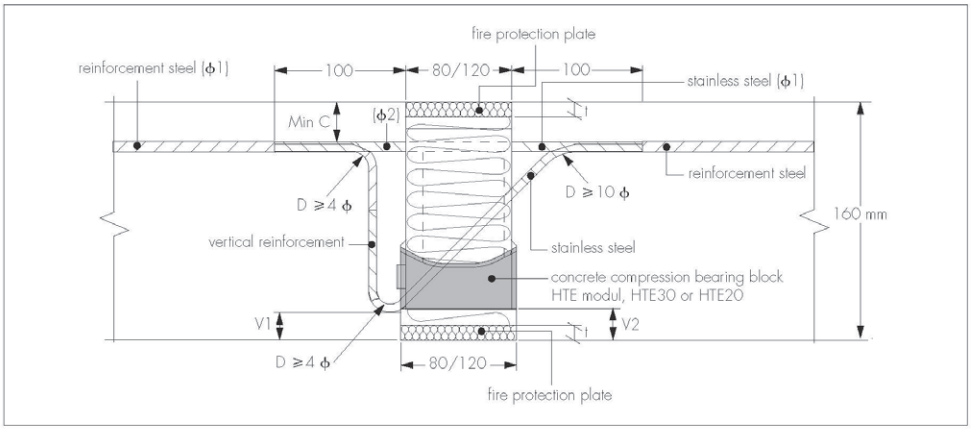
9.3 Top and bottom fire-protection plates will provide up to 120 minutes fire resistance (see Figures 8 and 9 for detail).

9.4 When the concrete compression bearing blocks (HTE 20, HTE 30, HTE Modul) and steel compression bearing blocks were tested in accordance with BS EN 1366-4 : 2006, BS EN 1365-2 : 2000 and BS EN 1363-1 : 2012, the system achieved the loadbearing capacity of 120 minutes integrity and 120 minutes insulation REI 120 in accordance BS EN 13501-2 : 2007 at one side fire exposure. The following conditions must be met:

For concrete compression bearing blocks (see Figure 8):

- the entire top and bottom surfaces of the Schöck Isokorb should be covered with fire-protective boards, as defined in section 1 of this Certificate
- the minimum cover to steel reinforcement (*c*) should be 30 mm(1)
- the minimum thickness of the fire protection plate (*t*) should be 10 mm
- the minimum values of v1(1) and v2 should be 20 mm and 21 mm respectively.

Figure 8 Example connection of concrete compression bearing blocks to the balcony and supporting floor slab (reinforcement steel, stainless steel and additional overlap length for system type K)

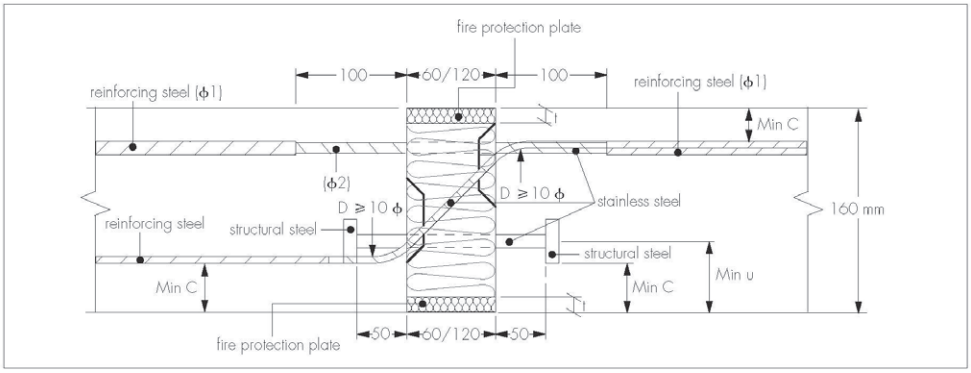


For steel compression bearing blocks or bars (see Figure 9):

- the entire top and bottom surfaces of the system should be covered with fire-protective boards as defined in section 1 of this Certificate
- the minimum cover to steel reinforcement (*c*) should be 30 mm(1)
- the minimum axis spacing of the shear reinforcement steel (*u*) should be 35 mm
- the minimum thickness of the fire-protection plate (*t*) should be 10 mm.

(1) The nominal cover to the top and bottom reinforcement must be designed by an appropriately-qualified engineer to the requirements of BS EN 1992-1-2 : 2004 and its UK National Annex to ensure that the proposed detail will remain stable against loads for a minimum duration of 2 hours.

Figure 9 Example connection of steel compression bearing blocks to the balcony and supporting floor slab (reinforcement steel, stainless steel and additional overlap length for system type K)



10 Maintenance

As the systems are protected by other construction materials once in service, maintenance is not envisaged.

11 Durability

11.1 Balconies constructed with the systems using the nominal cover to reinforcement appropriate to the exposure conditions and requirement of fire resistance in accordance with BS EN 1992-1-1 : 2004, BS EN 1992-1-2 : 2004 and BS 8500-1 : 2015 and their respective UK National Annex will have 60 years durability provided they are used in accordance with this Certificate.

11.2 The steel passing through the thermal insulation material and the adjacent concrete members without sufficient concrete cover to reinforcement should be stainless steel to avoid corrosion. The stainless steel materials should be Class III, in accordance with Table A.3 of BS EN 1993-1-4 : 2006.

11.3 The fasteners (eg bolts, plates) should be stainless steel in accordance with BS EN ISO 3506-1 : 2009.

11.4 The exposure class for the concrete of the external slab should be appropriate to the climatic conditions at the place of use in terms of freeze thaw resistance.

12 Reuse and recyclability

The systems contain polypropylene, concrete and reinforcement steel which can be recycled.

Installation

13 General

It is important for designers, planners, contractors and/or installers to ensure that the installation of the systems is in accordance with the Certificate holder's instructions and the information given in this Certificate.

14 Procedure

14.1 The following procedure applies to the K and KXT range of systems. Top and bottom reinforcement is laid and fixed to standard detailing requirements, leaving sufficient space to insert the system.

14.2 The system is seated within the reinforcement and its position checked for correct alignment, then wired to the top and bottom reinforcement. The nearest distribution bar must butt against the pressure pad, or alternatively an additional 8 mm diameter reinforcing bar should be used.

14.3 A final position check is made prior to pouring concrete.

14.4 During pouring, the concrete should be evenly distributed around the system. Care should be taken when using vibrators so as not to dislodge the system.

Technical Investigations

15 Investigations

15.1 An examination was made of data relating to advisory opinion for floor vibration calculation and existing approval documents for the DIBt Zulassung Z-15.7-239 and Z-15.7-240, including:

- test report for endurance and static load test, by TUM and MPA Karlsruhe
- advisory opinion for fire behaviour, by MFPA Leipzig Gmbh
- test report for fire resistance, by MFPA Leipzig Gmbh

- fatigue tests and advisory opinion for fatigue test.

15.2 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

15.3 An examination was made of existing data to assess:

- thermal conductivity ($\lambda_{90/90}$ *values*)
- example of Psi value for junction was examined
- dimensional accuracy
- durability.

15.4 The risk of condensation was examined.

Bibliography

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BS EN 1363-1 : 2012 *Fire resistance tests. General requirements*

BS EN 1365-2 : 2000 *Fire resistance tests for loadbearing elements — Part 2: Floors and roofs*

BS EN 1366-4 : 2006 *Fire resistance tests for service installations — Part 4: Linear joint seals*

BS EN 1992-1-1 : 2004 *Design of concrete structures — General rules and rules for buildings*
BS EN 1992-1-2 : 2004 *Eurocode 2. Design of concrete structures — General rules —Structural fire design*
NA to BS EN 1992-1-2: 2004 UK National Annex to *Eurocode 2 : Design of concrete structures — General rules and rules for buildings*

BS EN 1993-1-1 : 2005 *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*
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BS EN 10025-2:2004 *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

BS EN 10088-1 : 2014 *Stainless steels Part 1: List of stainless steels*

BS EN 10088-3 : 2014 *Stainless steels Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

BS EN 13163: 2012 *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

BS EN 13501-2 : 2007 *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

BS EN ISO 3506-1:2009 *Mechanical properties of corrosion-resistant stainless steel fasteners. Bolts, screws and studs*

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BRE Information paper IP 01/06 *Assessing the effects of thermal bridging at junctions and around openings*

BRE Report (BR 497 : 2007) *Conventions for calculating linear thermal transmittance and temperature factors*

DIN 4102-2 : 1977 *Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests*

DIBt Zulassung Nos Z-15.7-239 and Z-15.7-240

ETA 11/0458 *AESTUVER Fire Protective Board*

Conditions of Certification

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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