

17/04/14

## **Schöck performance values independently verified by the OISD**

As a leading specialist in the provision of advanced solutions for thermal energy structural insulation, Schöck demands extremely high product performance standards. The company always ensures that all solutions exceed the necessary building regulations and that any performance claims are verifiable. To guarantee the accuracy of its current performance values, Schöck has submitted three of its main connectivity solutions for independent evaluation by the Oxford Institute for Sustainable Development (OISD), at Oxford Brookes University. One of the UK's largest research institutes dedicated to sustainable development research in the built and natural environments.

To identify areas where there is a risk of condensation and therefore mould growth in different design situations, a 'surface temperature factor' ( $f_{Rsi}$ ) can be used. It allows surveys under any thermal conditions and compares the temperature drop across the building fabric, with the total temperature drop between the inside and outside air. The ratio is described in BRE IP1/06; a document cited in Building Regulations Approved Documents Part L1 and L2 and Section 6 in Scotland. Using the formula, the recommended ( $f_{Rsi}$ ) value for offices and retail premises is equal to or greater than 0.5; and to ensure higher standards of comfort for occupants in residential buildings, equal to or greater than 0.75.

Three connectivity types were submitted for evaluation. Namely, concrete balcony connections (type K), steel balcony connections (type KS14) and steel beam connections (type KST). All three were tested using different construction methods. The purpose of the investigation being to determine the resultant heat

loss, minimum surface temperature and therefore temperature factor ( $f_{RSi}$ ) to comply with UK Building Regulations Part L.

With the type K thermal break element, two situations were modelled. The first represents was a wall construction with balcony slab formed by projecting concrete floor slab through wall with balcony door. The second is the same wall construction, but with a Schöck type K50 isolating the balcony slab from the floor slab with balcony door.

| Results:                                   | Without Isokorb | With Isokorb K50 |
|--|-----------------|------------------|
| Temperature factor (based on wall surface) | 0.725           | 0.912            |

The results obtained show a temperature factor of 0.725 for the connection without Isokorb and 0.912 for the connection with Isokorb. As in the UK, the temperature factor ( $f_{RSi}$ ) must be greater than or equal to 0.75 for residential buildings, the type K50 exceeds these values and meets the requirements of Building Regulations Approved Documents L1 and L2. The result for the model with no connector was a failure in this application.

The type KS14 modelled four situations. (1) Direct connection of balcony support bracket to concrete floor slab; (2) a 10mm 'thermal pad' using welded endplate on balcony support bracket; (3) a 20mm 'thermal pad' using welded endplate on balcony support bracket and (4) a KS14 unit connecting balcony support bracket to concrete slab.

| Results:                      | Min. surface temp °C | Temperature factor $f_{RSi}$ |
|-------------------------------|----------------------|------------------------------|
| Description                   |                      |                              |
| No balcony connection         |                      | 0.949                        |
| Model 1 - Direct connection   | 13.62                | 0.681                        |
| Model 2 - Pad connection 10mm | 14.26                | 0.713                        |
| Model 3 - Pad connection 20mm | 14.11                | 0.706                        |
| Model 4 - KS14 H200           | 18.07                | 0.904                        |

(All of the images show display Fig numbers as they appear in the published OISD report).

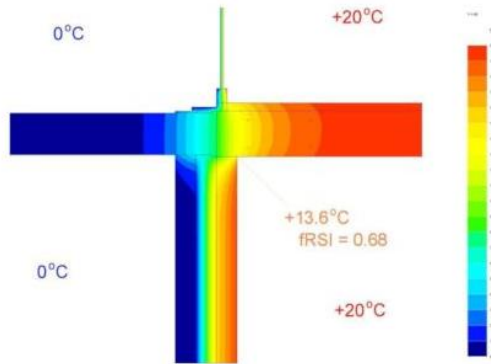


Fig 8. Direct connection (Case 1). This detail **DOES NOT** conform with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (fRSi = 0.75)

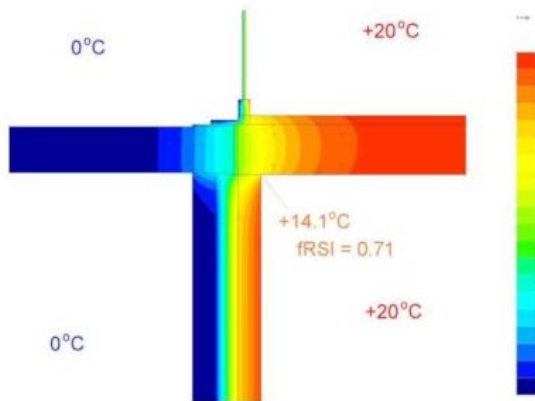


Fig 10. 20mm pad connection (Case 3). This detail **DOES NOT** conform with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (fRSi = 0.75)

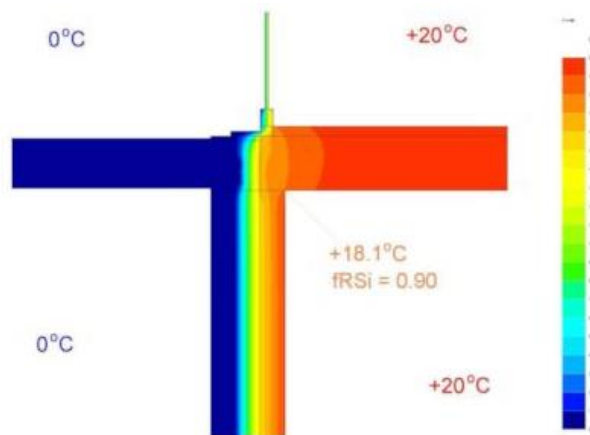
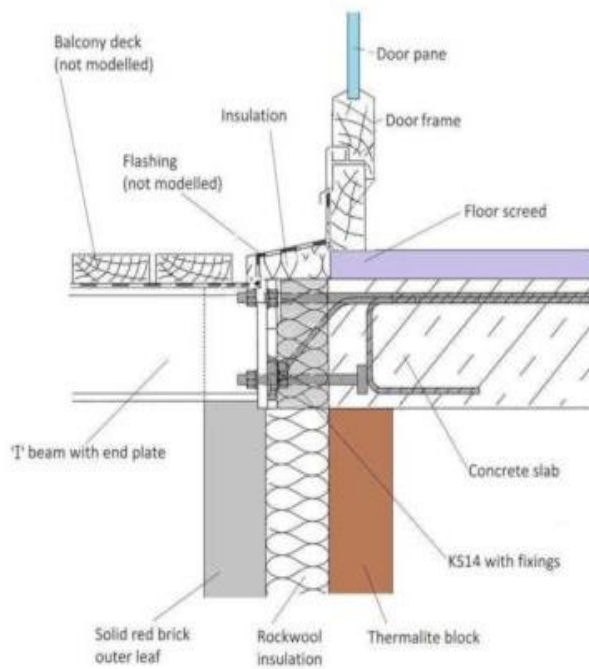
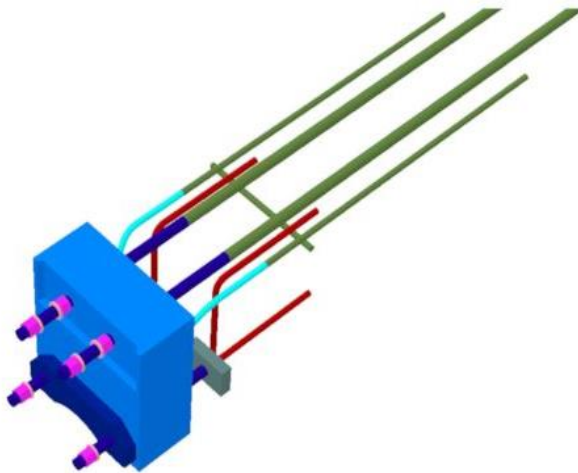


Fig 11. KS14 H200 connection (Case 4) where this detail **DOES CONFORM** with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (fRSi = 0.75)



*Fig 2. Schöck KS14 unit used with masonry wall and concrete slab*



*Fig 3. The KS14 unit SOLIDO model (surrounding construction omitted for clarity)*

It is evident that the performance of the Isokorb KS14 is the only solution, with  $f_{RSi} = 0.904$ , to exceed these values by some margin and will therefore meet the requirements of Building Regulations Approved Documents L1 and L2. Further, the results demonstrate that where no unit is used ( $f_{RSi} = 0.681$ ) and also with the 10mm and 20mm pad connections ( $f_{RSi} = 0.713$  and  $0.706$  respectively) – all three would fail against the criteria required for residential buildings.

The third product to be studied was the KST module. A steel I-beam is assumed to pass through an 80mm layer of insulation, which could represent a roof beam running through the building envelope to support an exterior canopy or overhang. Here three types of situation were studied. First an HEA200 I-beam separated by thermal isolator unit Isokorb KST16 and a HEA240 I-beam separated by thermal break unit Isokorb KST22. Second, a single HEA200 I-beam and a single HEA240 I-beam passing straight through the insulation layer. Third, an HEA240 I-beam divided by a PTFE ‘thermal pad’.

| Results:                                       |                              |
|--|------------------------------|
| Description                                    | Temperature factor $f_{RSi}$ |
| Isokorb KST16                                  | 0.82                         |
| Steel I-beam HEA200 passing through insulation | 0.51                         |
| Isokorb KST22                                  | 0.81                         |
| Steel I-beam HEA240 passing through insulation | 0.50                         |

The Isokorb KST16 and KST22 units, with  $f_{RSi} = 0.82$  and  $0.81$ , are the only solutions to exceed the required values, whereas the results for the continuous beams and beams separated by PTFE pads are marginal / failures for commercial buildings and are definitely failures for residential buildings.

The independent test results from OISD therefore all verify the product performance standards claimed by Schöck, with the various Isokorb solutions exceeding the necessary building regulations.

### **Technical Support Data**

For the **type K Isokorb**, SOLIDO software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Half a unit was modelled about its axis of symmetry. Steady state solution was by means of the iterative finite difference method.

For the **type KS14 Isokorb**, SOLIDO v3.1 software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Steady state solution was by means of the iterative finite difference method.

For the **type KST Isokorb**, TRISCO software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Steady state solution was by means of the iterative finite difference method.

Full test results are available on request:

**Type K**            **Report Reference:**    **121212SCH**

**Type KS14**       **Report Reference:**    **120927SCH**

**Type KST**        **Report Reference:**    **060814SCH**

The report findings are based on the basic standard detail with cavity wall below the slab and glazing above.

***For the above and for your free copy of the Schöck Specifiers Guide and / or the Technical Guide, contact the company on 01865 290 890 or visit [www.schoeck.co.uk](http://www.schoeck.co.uk)***

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**Notes to the editor**

**A leading European supplier**

Schöck has grown to become Europe's leading supplier of innovative structural load bearing insulation products. The main product is the Schöck Isokorb – a thermal break for various types of cantilever constructions in new buildings and for renovation. Its headquarters are at Baden-Baden in southern Germany and there are subsidiary companies in Great Britain, France, Austria, Switzerland, Italy the Netherlands, Belgium, Poland, Hungary, Russia, Japan, Canada and the USA. Sales teams and partners operate in many other European countries and also Australia and South Korea. Schöck is committed to providing the highest level of technical back up and comprehensive customer service to the construction industry.

**For images see references in text above.**