

Dipl.-Ing. G. Werner · Dr.-Ing. D. Werner  
 Beratende Ingenieure BDB DWA vfdB  
 Staatl. anerk. Sachverständige  
 - für die Prüfung des Brandschutzes  
 - für Schall- und Wärmeschutz

Isaac-Newton-Straße 1 · 59423 Unna  
 Telefon 0 23 03 / 98 358 - 0  
 Telefax 0 23 03 / 98 358-24  
 e-mail: info@ing-werner.de  
 www.ing-werner.de

Baustatik  
 Bauwerksprüfung  
 Betonsanierung  
 Brandschutz  
 Rettungs- u. Feuerwehrpläne  
 Schall- u. Wärmeschutz  
 Blower-Door-Test  
 Bebauungspläne  
 Gewässerplanung  
 Kanal- u. Straßenbau  
 SiGe - Koordination

## Calculation of the temperature factor $f_{RSI}$ , as far as of the linear thermal transmittance $\psi$ of a roller shutter box in a built-in situation; here: Brickwork with core insulation and brick frontage

### I. Details concerning the roller shutter box

- |  |   |
|--|---|
| 1. Specification:                              | <b>CBR 245x255 N</b>  |
| 2. Report number:                              | 15 624-15-EN  |
| 3. Client:                                     | BeClever Sp. zo.o.<br>u.l. Malinowa 1<br>62-300 Września  |
| 4. Assignment:                                 | Examination of the thermal process technology characteristics of the above mentioned roller shutter box in a built-in situation (brickwork with core insulation and brick frontage) |
| 5. Basis of calculation:                       | All calculations concerning the roller shutter box are based on the original drafts of the client   |
| 6. Method of analysis:                         | Software: BISCO computer program to calculate two-dimensional steady state heat transfer in free-form objects; Version 11.0w  |
| 7. Rules / Standards:                          | DIN 4108 Bbl 2: 2006-03<br>DIN EN ISO 10077-2:2012-06<br>DIN EN ISO 10211:2008-04<br><br>List of specified criteria for buildings A Part 1<br>2015/2                                |
| 8. Spec. material values (roller shutter box): | According to declaration of the client<br>PVC: $\lambda = 0,170 \text{ W/(mK)}$<br>Heat insulation: $\lambda = 0,032 \text{ W/(mK)}$<br>Aluminium: $\lambda = 160,0 \text{ W/(mK)}$ |

### II. Calculation results

The roller shutter box complies with the proof of equivalency corresponding to image 63 DIN 4108 Bbl 2: 2006-03 in accordance with the conditions and construction materials mentioned on page 2

Temperature factor:

$$f_{RSI} = 0,76 \geq 0,70$$

Psi-value:

$$\psi = 0,14 \text{ W/(mK)} \leq 0,25 \text{ W/(mK)}$$

### III. Signature

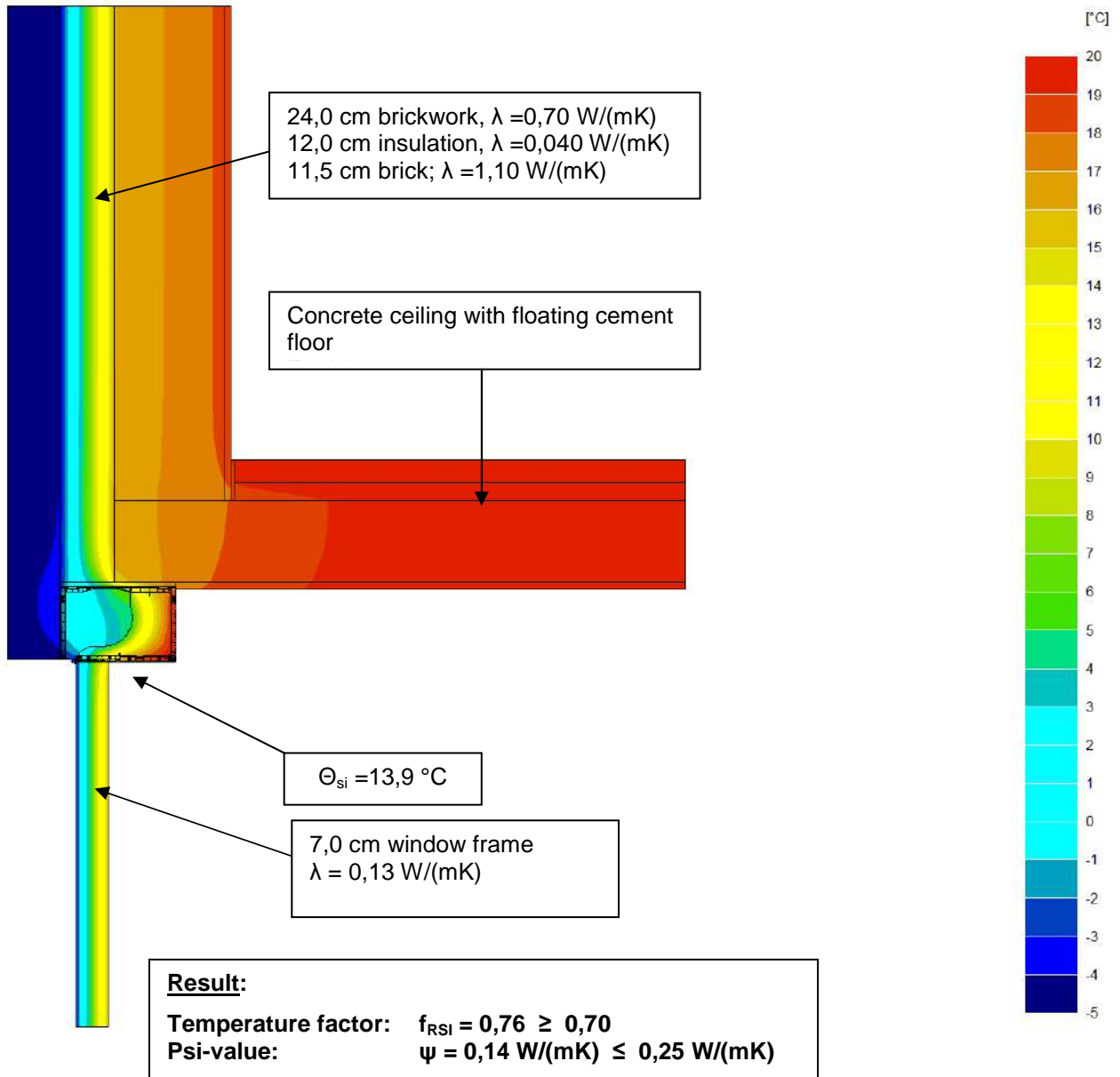
Unna, 22.09.16



(Stamp and signature of the officially recognized appraiser)

Image 1: Temperature gradation; brickwork with core insulation and brick frontage

Conditions:  $f_{RSi}$ :  $R_{se} = 0,04 (m^2K)/W$ ,  $\theta_e = -5^\circ C$ ;  $R_{si} = 0,13 (m^2K)/W$  resp.  $0,25 (m^2K)/W$ ;  
 $\theta_i = 20^\circ C$   $\psi$ -value:  $R_{se} = 0,04 (m^2K)/W$ ;  $f_e = 0$ ;  $R_{si} = 0,13 (m^2K)/W$ ;  $f_i = 1$



**Notes:**

The number of nodes in this calculation amounts to 201109.

- a) The roller shutter cavity is assumed non-ventilated. The air cells inside the box sections are non-ventilated cavities and acc. to DIN ISO 10077-2 are calculated separately. The  $\lambda$ -value of the roller shutter cavity is 0,853 (W/mK).
- b) The emission grade for the surface has been considered 0,9.