

ISO 10211:2017-06 (E)

Thermal bridges in building construction - Heat flows and surface temperatures - Detailed calculations

| Contents | | Page |
|--------------------|---|-------------|
| Foreword | | v |
| Introduction | | vi |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 2 |
| 4 | Symbols and subscripts | 7 |
| 4.1 | Symbols | 7 |
| 4.2 | Subscripts | 7 |
| 5 | Description of the method | 8 |
| 5.1 | Output | 8 |
| 5.2 | General description | 8 |
| 6 | Output data and input data | 8 |
| 6.1 | Output data | 8 |
| 6.2 | Calculation time intervals | 9 |
| 6.3 | Input data | 9 |
| 7 | Modelling of the construction | 9 |
| 7.1 | Dimension systems | 9 |
| 7.2 | Rules for modelling | 9 |
| 7.2.1 | General | 9 |
| 7.2.2 | Cut-off planes for a 3-D geometrical model for calculation of total heat flow and/or surface temperatures | 9 |
| 7.2.3 | Cut-off planes for a 2-D geometrical model | 11 |
| 7.2.4 | Cut-off planes in the ground | 12 |
| 7.2.5 | Periodic heat flows via the ground | 13 |
| 7.2.6 | Adjustments to dimensions | 13 |
| 7.2.7 | Auxiliary planes | 15 |
| 7.2.8 | Quasi-homogeneous layers and materials | 15 |
| 7.3 | Conditions for simplifying the geometrical model | 15 |
| 7.3.1 | General | 15 |
| 7.3.2 | Conditions for adjusting dimensions to simplify the geometrical model | 16 |
| 7.3.3 | Conditions for using quasi-homogeneous material layers to simplify the geometrical model | 17 |
| 8 | Input data specifications | 20 |
| 8.1 | General | 20 |
| 8.2 | Thermal conductivities of materials | 21 |
| 8.3 | Surface resistances | 21 |
| 8.4 | Boundary temperatures | 21 |
| 8.5 | Thermal conductivity of quasi-homogeneous layers | 21 |
| 8.6 | Equivalent thermal conductivity of air cavities | 21 |
| 8.7 | Determining the temperature in an adjacent unheated room | 22 |
| 9 | Calculation method | 22 |

| | | |
|-----------------------|--|----|
| 9.1 | Solution technique | 22 |
| 9.2 | Calculation rules | 22 |
| 9.2.1 | Heat flows between material cells and adjacent environment | 22 |
| 9.2.2 | Heat flows at cut-off planes | 22 |
| 9.2.3 | Solution of the formulae | 22 |
| 9.2.4 | Calculation of the temperature distribution | 23 |
| 10 | Determination of thermal coupling coefficients and heat flow rate from 3-D calculations | |
| | 10.1 Two boundary temperatures, unpartitioned model | 23 |
| 10.2 | Two boundary temperatures, partitioned model | 23 |
| 10.3 | More than two boundary temperatures | 24 |
| 11 | Calculations using linear and point thermal transmittances from 3-D calculations | 25 |
| 11.1 | Calculation of thermal coupling coefficient | 25 |
| 11.2 | Calculation of linear and point thermal transmittances | 25 |
| 12 | Determination of thermal coupling coefficient, heat flow rate and linear thermal transmittance from 2-D calculations | 26 |
| 12.1 | Two boundary temperatures | 26 |
| 12.2 | More than two boundary temperatures | 26 |
| 12.3 | Determination of the linear thermal transmittance | 27 |
| 12.4 | Determination of the linear thermal transmittance for wall/floor junctions | 27 |
| 12.4.1 | All cases | 27 |
| 12.4.2 | Option A | 27 |
| 12.4.3 | Option B | 29 |
| 12.5 | Determination of the external periodic heat transfer coefficient for ground floors | 31 |
| 13 | Determination of the temperature at the internal surface | 32 |
| 13.1 | Determination of the temperature at the internal surface from 3-D calculations | 32 |
| 13.1.1 | Two boundary temperatures | 32 |
| 13.1.2 | More than two boundary temperatures | 32 |
| 13.2 | Determination of the temperature at the internal surface from 2-D calculations | 33 |
| 13.2.1 | Two boundary temperatures | 33 |
| 13.2.2 | Three boundary temperatures | 33 |
| 14 | Report | 33 |
| 14.1 | Input data | 33 |
| 14.2 | Output data | 34 |
| 14.2.1 | General | 34 |
| 14.2.2 | Calculation of the heat transmission using the thermal coupling coefficient | 34 |
| 14.2.3 | Calculation of the surface temperatures using weighting factors | 34 |
| 14.2.4 | Additional output data | 34 |
| 14.2.5 | Estimate of error | 35 |
| Annex A (normative) | Input and method selection data sheet -- Template | 36 |
| Annex B (informative) | Input and method selection data sheet -- Default choices | 38 |
| Annex C (normative) | Validation of calculation methods | 40 |
| Annex D (normative) | Examples of the determination of the linear and point thermal transmittances | 47 |
| Annex E (normative) | Determination of values of thermal coupling coefficient and temperature weighting factor for more than two boundary temperatures | 50 |
| Bibliography | | 55 |