

# DIN 4108-4:2020-11 (E)

## Thermal insulation and energy economy in buildings - Part 4: Hygrothermal design values

---

Contents	Page
Foreword .....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions.....	11
4 Hygrothermal characteristic values.....	11
4.1 Building materials, building types and building components and elements.....	11
4.2 Moisture content in equilibrium .....	27
4.3 Conversion factors for the moisture content .....	28
4.4 Thermal resistance of air layers.....	29
4.5 Surface resistance .....	29
4.6 Specific heat capacity .....	29
4.7 Floors and ceilings .....	29
5 Glazing, windows, doors and curtain walling.....	31
5.1 Windows, window doors, external doors and roof windows.....	31
5.1.1 Design values for windows, window doors,external doors and roof windows as in DIN EN 14351-1.....	31
5.1.2 Air permeability as a function of design features of windows, window doors and external doors.....	32
5.2 Insulating glass units as in DIN EN 1279-5.....	33
5.2.1 Design values for the thermal transmittance.....	33
5.2.2 Design values for the total solar energy transmittance (solar factor) and light transmittance .....	33
5.3 Design values for curtain walling.....	35
5.3.1 Design values for thermal transmittance.....	35
5.3.2 Design value for total solar energy transmittance (solar factor) and light transmittance .....	36
6 Rooflights.....	36
6.1 Individual rooflights and continuous rooflights of plastic materials.....	36
6.2 Glass constructions in roof areas (e.g. glass roofs) .....	38
7 Design values for industrial, commercial and garage doors and gates .....	39
8 Calculation of insulation thicknesses for pipelines .....	39
Annex A (normative) Determination of design values for masonry made from masonry units as in DIN EN 771.....	43
A.1 General .....	43
A.2 Extrapolation of the dry values of thermal conductivity $\lambda_{10,dry,unit}$ of units at the upper limit of the declared density and determination of $\lambda_{10,dry,unit,100\%}$ .....	43
A.3 Influence of moisture content and determination of $\lambda_{design,unit,100\%}$ .....	45
A.4 Consideration of the influence of joints and determination of $\lambda_{design,mas,100\%}$ .....	45
A.4.1 Numerical calculations.....	45
A.4.2 Simplified method for composite components as in DIN EN ISO 6946 .....	45
A.4.3 Tabular method .....	45

<b>A.5</b>	<b>Classification of thermal conductivity <math>\lambda_{\text{design,mas,100\%}}</math> and determination of the design value <math>\lambda_{\text{p}}</math> .....</b>	<b>46</b>
	<b>Bibliography .....</b>	<b>47</b>
<b>Tables</b>		
<b>Table 1</b>	<b>— Design values for thermal conductivity and guideline values for water vapour resistance factors .....</b>	<b>12</b>
<b>Table 2</b>	<b>— Line 5 of Table 1 for thermal insulating materials in accordance with harmonized European Standards .....</b>	<b>23</b>
<b>Table 3</b>	<b>— Moisture content in equilibrium of building materials .....</b>	<b>27</b>
<b>Table 4</b>	<b>— Conversion factors for wall building materials .....</b>	<b>28</b>
<b>Table 5</b>	<b>— Conversion factors for thermal insulation .....</b>	<b>29</b>
<b>Table 6</b>	<b>— Thermal resistances of floors and ceilings .....</b>	<b>29</b>
<b>Table 7</b>	<b>— Design value for the thermal transmittance of external doors <math>U_{\text{D,BW}}</math> as a function of the design features .....</b>	<b>32</b>
<b>Table 8</b>	<b>— Air permeability as a function of design features of windows, window doors and external doors .....</b>	<b>32</b>
<b>Table 9</b>	<b>— Correction factors <math>\Delta U_{\text{g}}</math> for calculating the design values <math>U_{\text{g,BW}}</math> .....</b>	<b>33</b>
<b>Table 10</b>	<b>— Total solar energy transmittance and light transmittance as a function of the design features, the <math>U_{\text{g}}</math> value and the thermal transmittance .....</b>	<b>34</b>
<b>Table 11</b>	<b>— Correction factors <math>c</math> as a function of the emissivity <math>\varepsilon_{\text{n}}</math> .....</b>	<b>35</b>
<b>Table 12</b>	<b>— Guideline values for light transmittance <math>\tau_{\text{D65}}</math>, <math>U_{\text{t}}</math>- and <math>g</math>-values .....</b>	<b>37</b>
<b>Table 13</b>	<b>— Design value <math>U_{\text{D,BW}}</math> as a function of design features .....</b>	<b>39</b>
<b>Table 14</b>	<b>— Determination of insulation thicknesses while maintaining the minimum requirement of the German Energy Savings Ordinance (EnEV) – 100 % requirement .....</b>	<b>40</b>
<b>Table 15</b>	<b>— Determination of insulation thicknesses while maintaining the minimum requirement of the German Energy Savings Ordinance (EnEV) – 50 % requirement .....</b>	<b>42</b>
<b>Table A.1</b>	<b>— Gradients of the thermal conductivity- density curve .....</b>	<b>44</b>
<b>Table A.2</b>	<b>— Determination of <math>\lambda_{\text{design,mas,100\%}}</math> for masonry with various joint materials .....</b>	<b>46</b>