



**International  
Standard**

**ISO 10077-2**

**Thermal performance of windows,  
doors and shutters — Calculation of  
thermal transmittance —**

**Part 2:  
Numerical method for frames**

**AMENDMENT 1**

*Performance thermique des fenêtres, portes et fermetures —  
Calcul du coefficient de transmission thermique —*

*Partie 2: Méthode numérique pour les encadrements*

*AMENDEMENT 1*

**Third edition  
2017-06**

**AMENDMENT 1  
2024-12**

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This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 2, *Calculation methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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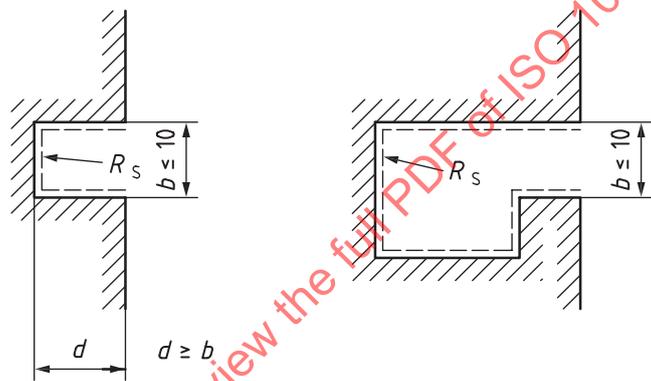
# Thermal performance of windows, doors and shutters — Calculation of thermal transmittance —

## Part 2: Numerical method for frames

### AMENDMENT 1

#### 6.4.2.4.1

Replace Figure 10 with the following figure and key:



Dimensions in millimetres

#### Key

$R_s$  surface resistance

**Figure 10 — Examples for slightly ventilated cavities and grooves with small cross section**

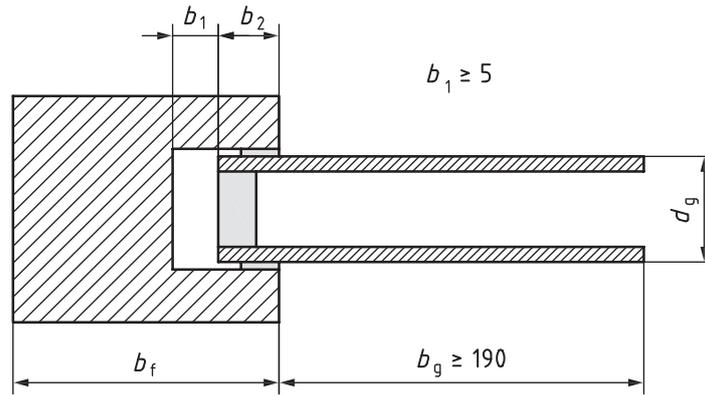
#### B.3

Replace the NOTE with the following:

NOTE Currently in this document, there are no choices between methods and the required input data foreseen that are to be kept open for completion as explained in B.1. To satisfy the need for congruence with all other EPB standards and to make explicitly clear that in this document there are no choices kept open, this annex and Annex A are retained.

#### F.2

Replace Figure F.2 with the following figure and key:



**Key**

- $b_f$  width of the frame
- $b_g$  width of the glazing
- $d_g$  thickness of the glazing

**Figure F.2 — Schematic of profile section with glazing installed**

**H.2**

Replace Table H.1 with the following table:

**Table H.1 — Boundaries**

Key	Surface resistance, $R_s$ m <sup>2</sup> ·K/W	Temperature, $\theta$ °C
A adiabatic boundary	infinity	—
B external surface resistance	see Annex E	0
C internal surface resistance	see Annex E	20

Add the following key to Figure H.1:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- d EPDM
- e polyamide 6,6 with 25 % glass fibre
- h aluminium<sup>a</sup>
- <sup>a</sup> All surfaces have emissivity 0,9 except for Figure H.2.

Add the following key to Figure H.2:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- D emissivity 0,1
- a insulation panel
- d EPDM
- e polyamide 6,6 with 25 % glass fibre
- h aluminium<sup>a</sup>
- a All surfaces have emissivity 0,9 except for Figure H.2.

Add the following key to Figure H.3:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- d EPDM
- e polyamide 6,6 with 25 % glass fibre
- h aluminium<sup>a</sup>
- a All surfaces have emissivity 0,9 except for Figure H.2.

Add the following key to Figure H.4:

**Key**

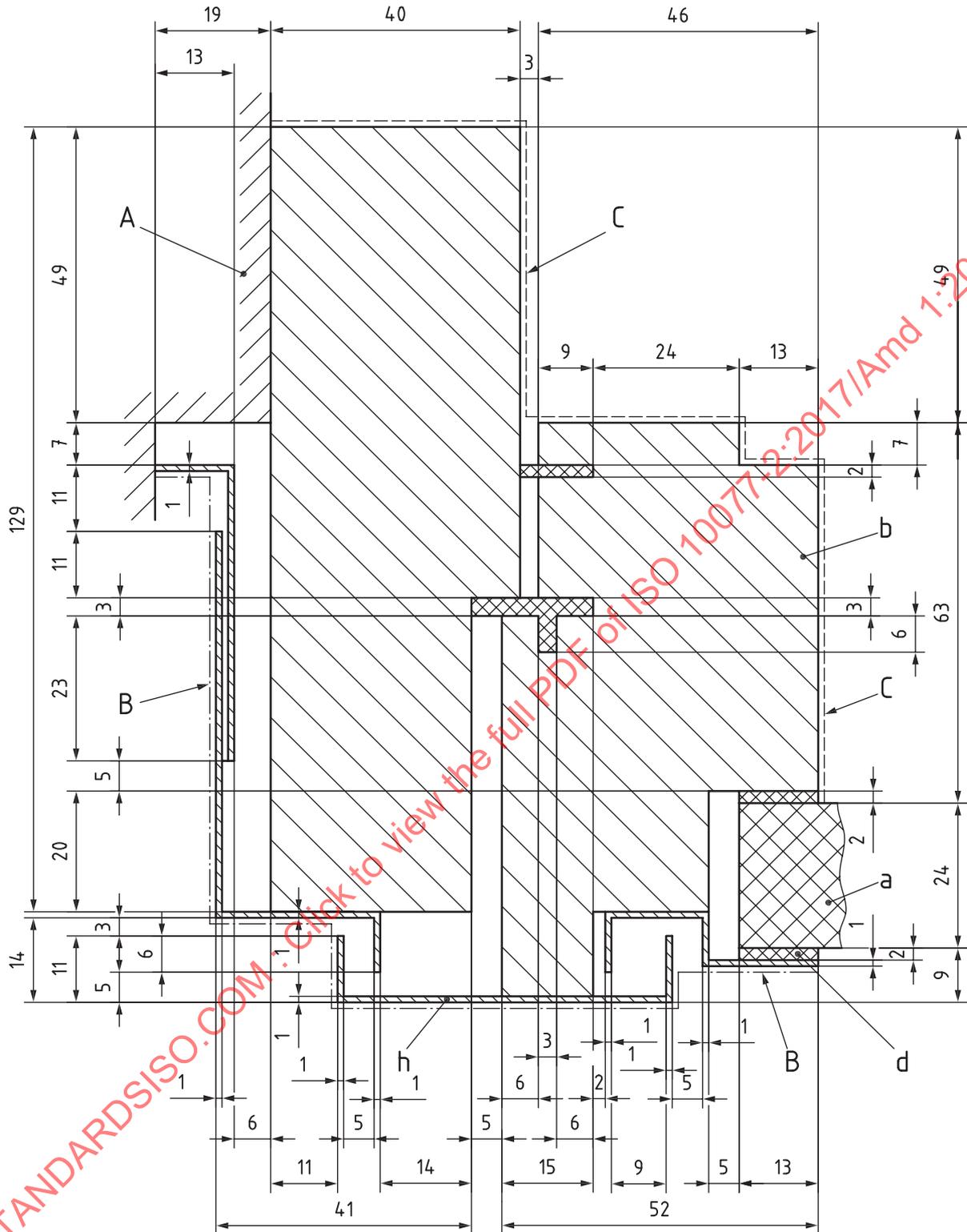
- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- c PVC
- d EPDM
- g steel

Add the following key to Figure H.5:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- b soft wood
- d EPDM

Replace Figure H.6 with the following figure and key:



**Key**

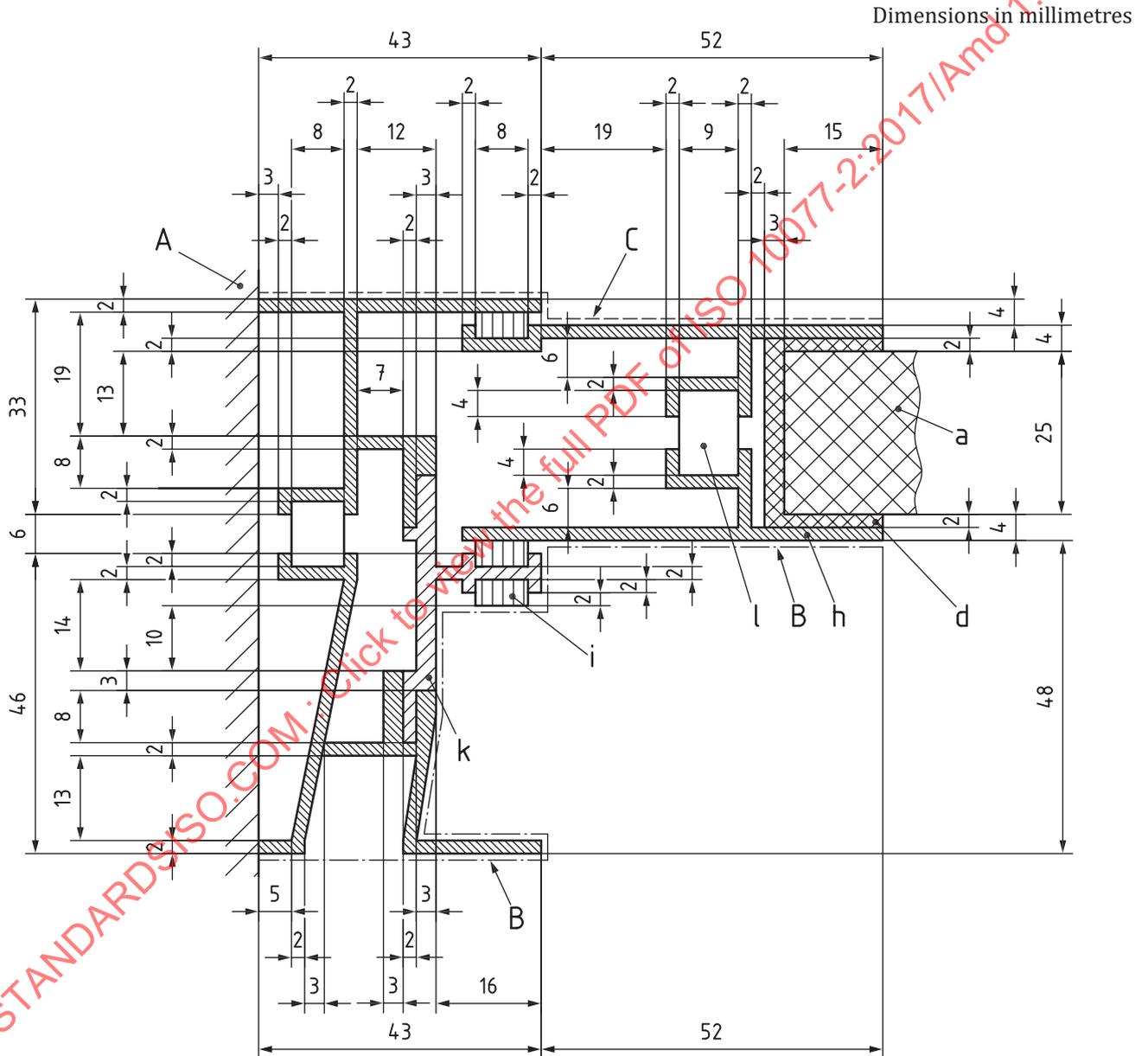
- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel

- b soft wood
- d EPDM
- h aluminium

NOTE The projected frame width,  $b_f$ , is 89 mm.

Figure H.6 — Roof window frame section and insulation panel

Replace Figure H.7 with the following figure and add the following key:



**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- d EPDM

- h aluminium<sup>a</sup>
- i pile weather stripping (polyester mohair)
- k polyamide
- l PU (Polyurethan-Hartschaum)
- a All surfaces have emissivity 0,9 except for Figure H.2.

NOTE The projected frame width,  $b_f$ , is 95 mm.

**Figure H.7 — Sliding window frame section and insulation panel**

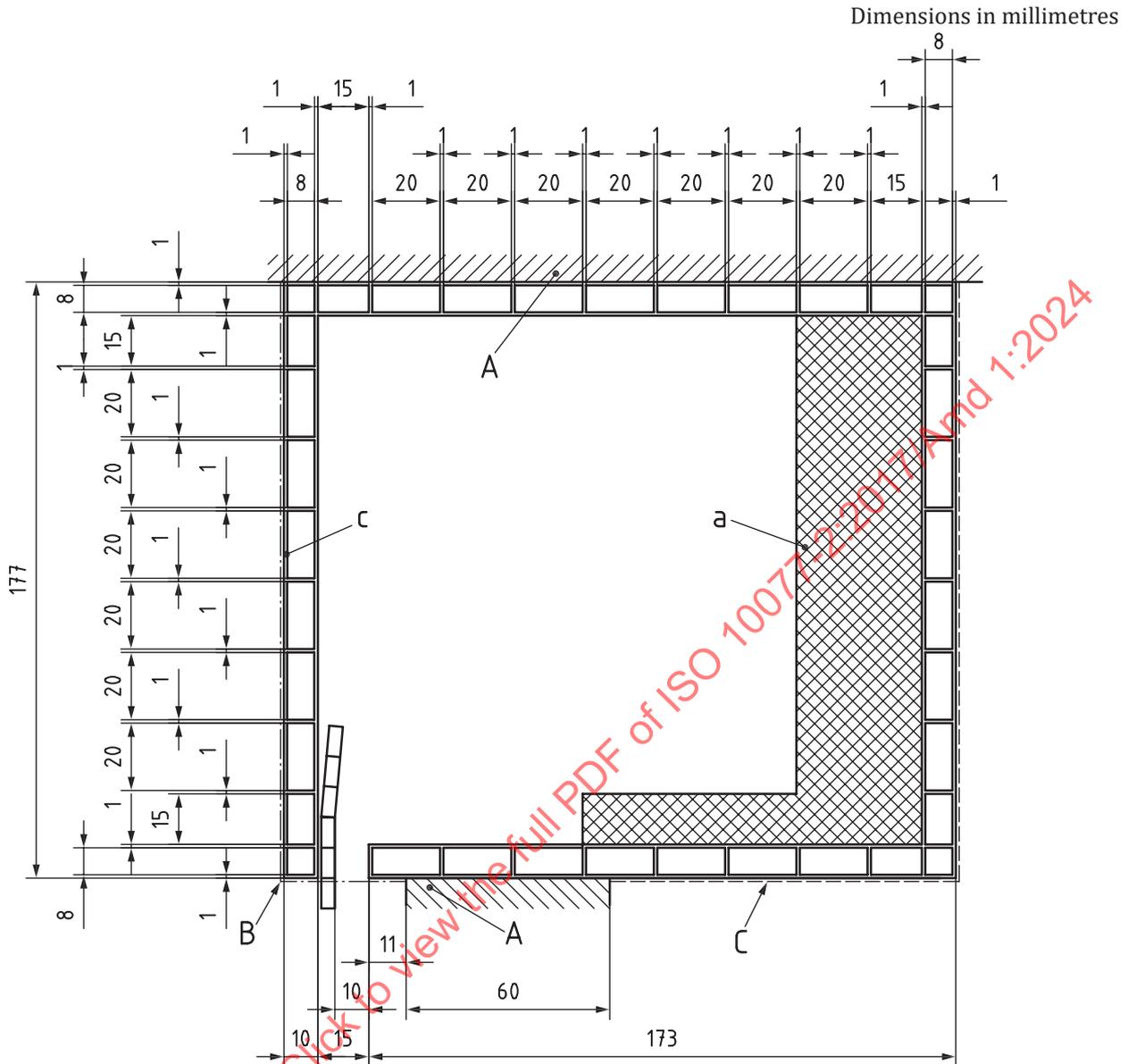
Add the following key to Figure H.8:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- c PVC
- d EPDM

Replace Figure H.9 with the following figure and add the following key:

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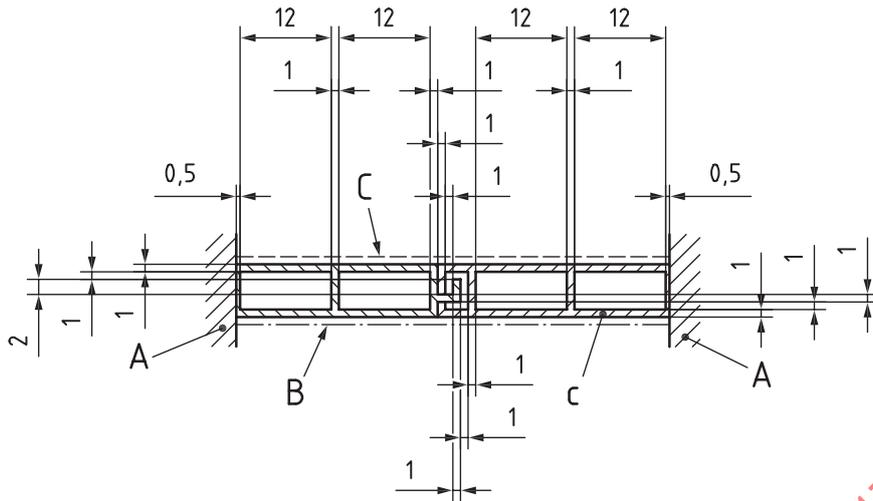
**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- c PVC

NOTE The shutter box width,  $b_{sb}$ , is 177 mm.

**Figure H.9 — Roller shutter box**

Replace Figure H.10 with the following figure and add the following key:



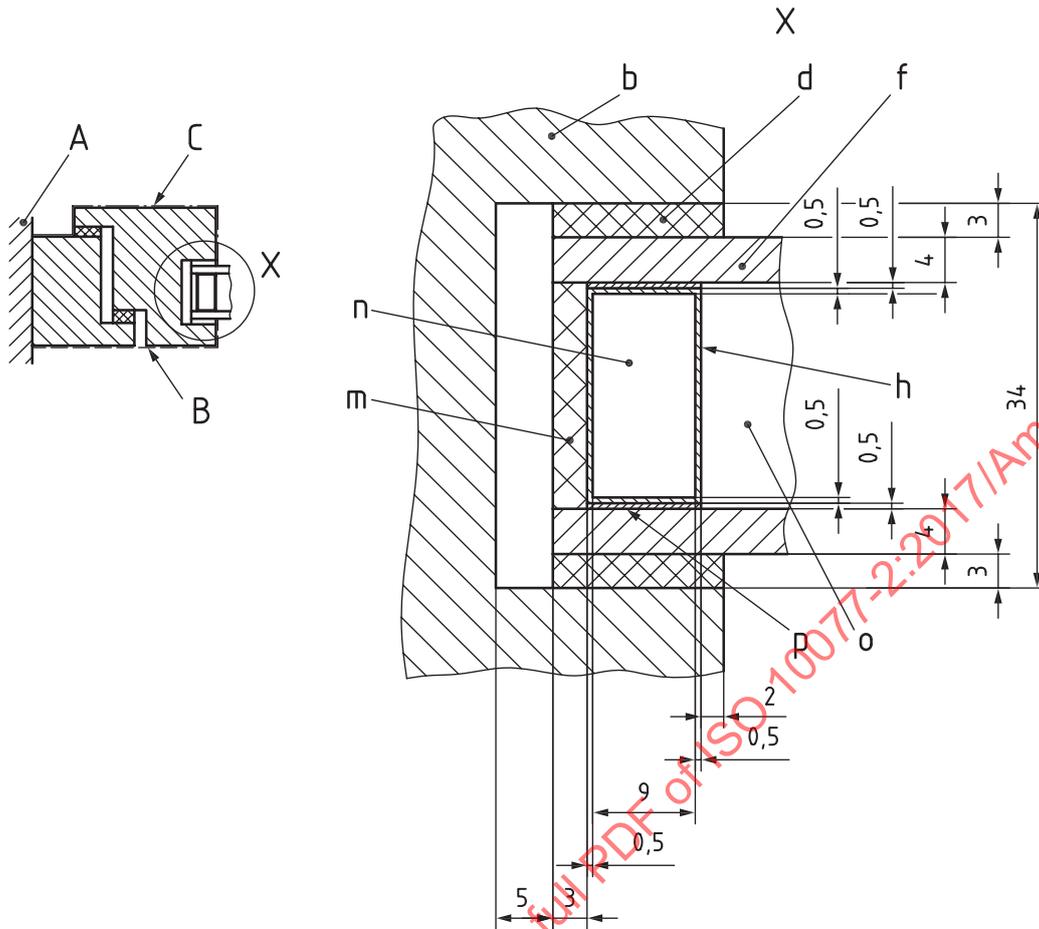
**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- c PVC

**Figure H.10 — PVC shutter profile**

Replace Figure H.11 with the following figure and add the following key:

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**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- b soft wood
- d EPDM
- f glass
- h aluminium<sup>a</sup>
- m polysulfide
- n silica gel (desiccant)
- o gas filling
- p polysobutylene
- <sup>a</sup> All surfaces have emissivity 0,9 except for Figure H.2.

NOTE See Figure H.5.

**Figure H.11 — Example for the determination of a linear thermal transmittance of a wood frame section and of a glazing with  $U_g = 1,3 \text{ W}/(\text{m}^2 \cdot \text{K})$  with a conventional glass edge system**

**H.3**

Replace Table H.3 with the following table:

Table H.3 — Calculated thermal conductance  $L^{2D}$  and thermal transmittance

Example	$L^{2D}$ W/(m·K)	$U_f$ W/(m <sup>2</sup> ·K)
Figure H.1	0,539	3,11
Figure H.2	0,508	2,83
Figure H.3	0,252	1,35
Figure H.4	0,400	1,86
Figure H.5	0,344	1,34
Figure H.6	0,407	2,07
Figure H.7	0,637	4,44
Figure H.8	0,281	1,23
Figure H.9	0,188	1,06
Figure H.10	0,208	3,64

NOTE To avoid rounding errors the values are given to three significant figures.

I.2

Add the following key to Figure I.1:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- d EPDM
- e polyamide 6,6 with 25 % glass fibre
- h aluminium<sup>a</sup>
- <sup>a</sup> All surfaces have emissivity 0,9.

Add the following key to Figure I.2:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- b soft wood
- d EPDM
- h aluminium<sup>a</sup>
- <sup>a</sup> All surfaces have emissivity 0,9.

Add the following key to Figure I.3:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- c PVC
- d EPDM
- g steel

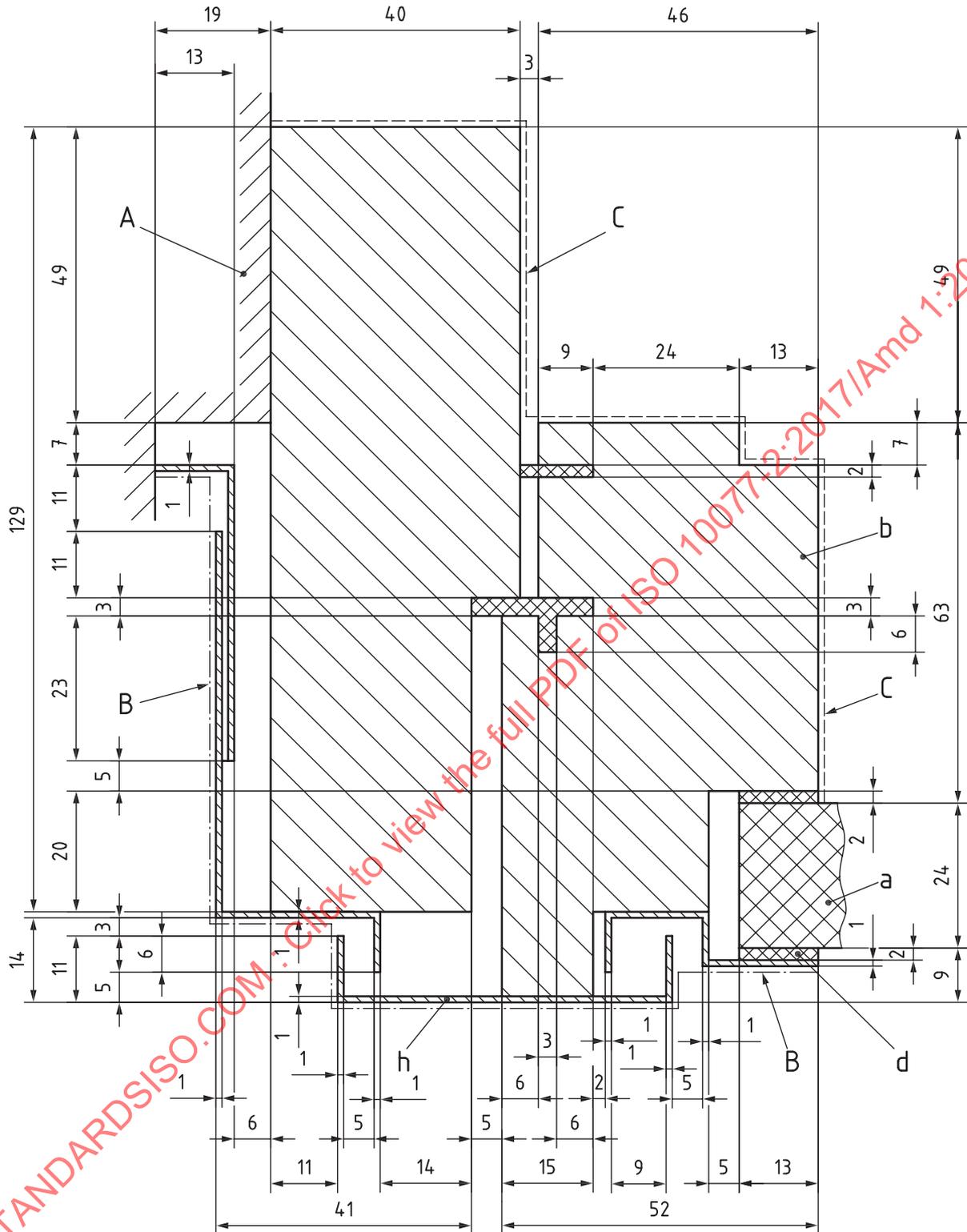
Add the following key to Figure I.4:

**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- b soft wood
- d EPDM

Replace Figure I.5 with the following figure:

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**Key**

- A adiabatic boundary
- B external surface resistance
- C internal surface resistance
- a insulation panel
- b soft wood

