

**Determination of installed thermal resistance into a roof and into a wall of
COMBI TOITURE according to EN ISO 6946:2017**

(test name)

Test method: Determination of installed thermal resistance into a roof and into a wall of COMBI TOITURE according to EN ISO 6946:2017

(number of normative document or test method, description of test procedure, test uncertainty)

Product name: COMBI TOITURE

(identification of the specimen)

Customer: SAS ATI FRANCE, 146 Avenue du Bicentenaire – FR-01120 Dagneux, France

(name and address of enterprise)

Manufacturer: SAS ATI FRANCE, 146 Avenue du Bicentenaire – FR-01120 Dagneux, France

Calculation results:

Roof slope angle, α	Calculation method reference no.	Calculation result, R , ($m^2 \cdot K$)/W
Pitched roof ($\alpha = 0^\circ$)	EN ISO 6946:2017	7.53
Pitched roof ($\alpha = 30^\circ$)		7.66
Pitched roof ($\alpha = 45^\circ$)		7.73
Wall ($\alpha = 90^\circ$)		8.02

R value for others pitched sloop (different α value) can be determined by linear interpolation between two calculated R values

Calculation made by: Building Physics Laboratory, Institute of Architecture and Construction of Kaunas University of Technology

(Name of the organization)

Products used in calculation: Multilayer reflective insulation product PRO A; PRO B (110 mm) (test report no. 129 SF/22 U)

Declared thickness of product PRO A; PRO B – 80±10 mm

Additional information: Application, 2022-06-09

Annex: Annex I. Calculation results

(the numbers of the annexes should be pointed out)

Head of Laboratory: _____

(approves the test results)

K. Banionis

(n., surname)

(signature)

Calculated by _____

(calculation made by)

A. Stonkuvienė

(n., surname)

(signature)

Validity – the named data and results refer exclusively to the tested and described specimens.

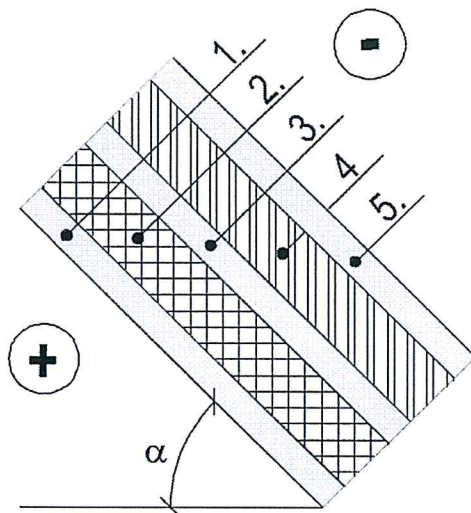
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Annex 1: Calculation results

Table 1: Products R- values

Product	Thermal resistance R, (m ² ·K)/W
PRO A (test report No. 129 SF/22 U)	R_{core90/90} = 3.25
PRO B (test report No. 129 SF/22 U)	R_{core90/90} = 3.25

*"R_{core90/90}" is the declared R core value following EN 16012 + A1.
"R_{core90/90}" is calculated on 4 results of 4 samples came from 4 different fabrication dates following EN 16012 + A1 (and using the fractile 90/90 calculation rules $S_{R-product} = \sqrt{\frac{\sum(R_i - R_{average})^2}{n-1}}$);*



Temperature regime 20°C / 0°C	
1.	Unventilated Air cavity #1, 20 mm
2.	PRO A, 110 mm
3.	Unventilated Air cavity #2, 20 mm
4.	PRO B, 110 mm
5.	Ventilated Air cavity #3, 20 mm

Figure 1. Roof construction design

Table 2: Roof construction calculation results for slope $\alpha = 0^\circ$ (EN ISO 6946)

COMBI TOITURE installed on roof			
Angle: $\alpha = 0^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	Unventilated Air cavity # 1	0.4373	m ² ·K/W
	PRO A	3.25	m ² ·K/W
	Unventilated Air cavity # 2	0.4485	m ² ·K/W
	PRO B	3.25	m ² ·K/W
	Ventilated Air cavity # 3	0.1475	m ² ·K/W
	R Total	7.53	m²·K/W

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Table 3: Roof construction calculation results for slope $\alpha = 30^\circ$ (EN ISO 6946)

COMBI TOITURE installed on roof			
Angle: $\alpha = 30^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	Unventilated Air cavity # 1	0.4869	$\text{m}^2 \cdot \text{K/W}$
	PRO A	3.25	PRO A
	Unventilated Air cavity # 2	0.5009	$\text{m}^2 \cdot \text{K/W}$
	PRO B	3.25	$\text{m}^2 \cdot \text{K/W}$
	Ventilated Air cavity # 3	0.1673	$\text{m}^2 \cdot \text{K/W}$
	R Total	7.66	$\text{m}^2 \cdot \text{K/W}$

Table 4: Roof construction calculation results for slope $\alpha = 45^\circ$ (EN ISO 6946)

COMBI TOITURE installed on roof			
Angle: $\alpha = 45^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	Unventilated Air cavity # 1	0.5163	$\text{m}^2 \cdot \text{K/W}$
	PRO A	3.25	$\text{m}^2 \cdot \text{K/W}$
	Unventilated Air cavity # 2	0.5319	$\text{m}^2 \cdot \text{K/W}$
	PRO B	3.25	$\text{m}^2 \cdot \text{K/W}$
	Ventilated Air cavity # 3	0.1793	$\text{m}^2 \cdot \text{K/W}$
	R Total	7.73	$\text{m}^2 \cdot \text{K/W}$

Table 5: Wall construction calculation results for slope $\alpha = 90^\circ$ (EN ISO 6946)

COMBI TOITURE installed on wall			
Angle: $\alpha = 90^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	Unventilated Air cavity # 1	0.6301	$\text{m}^2 \cdot \text{K/W}$
	PRO A	3.25	$\text{m}^2 \cdot \text{K/W}$
	Unventilated Air cavity # 2	0.6536	$\text{m}^2 \cdot \text{K/W}$
	PRO B	3.25	$\text{m}^2 \cdot \text{K/W}$
	Ventilated Air cavity # 3	0.2338	$\text{m}^2 \cdot \text{K/W}$
	R Total	8.02	$\text{m}^2 \cdot \text{K/W}$

Requirements for calculation validity:

- Calculations of R values are valid for a pitched roof (α is generally from 30° to 90°).
- Calculations of R values are valid when COMBI TOITURE is installed from the internal side of the Roof or the external part of the Roof.
- Calculations of R values are valid when COMBI TOITURE is installed in agreement with the installation guidelines described into the manufacturer brochure.

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