

**Determination of installed thermal resistance into a roof and into a wall of
ATI MIX OUATE DE CELLULOSE according to EN ISO 6946:2017**

(test name)

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

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

Product name: ATI MIX OUATE DE CELLULOSE: APRO EXCELLENCE + PAVACELL P 80

(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 , ($\text{m}^2 \cdot \text{K} / \text{W}$)
Flat roof ($\alpha = 0^\circ$)	EN ISO 6946:2017	6.10
Pitched roof ($\alpha = 30^\circ$)		6.16
Pitched roof ($\alpha = 45^\circ$)		6.19
Wall ($\alpha = 90^\circ$)		6.34

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: Ventilated air layer 20 mm (external surface resistance R_{se});
Metallized membrane, $\varepsilon = 0.25^*$;
Multilayer reflective insulation product **APRO** (test report no. 065 SF/23 U);
Metallized reinforced perforated film, $\varepsilon = 0.15^*$;
Unventilated air layer 20 mm;
Cellulose fiber panel "Pavacell P" 80 mm, $\lambda_{ref} = 0.039 \text{ W}(\text{m} \cdot \text{K})$; $R = 2.05 (\text{m}^2 \cdot \text{K}) / \text{W}^{**}$
* Declared by the manufacturer
** Dossier / File P233719 – Document DEC / 1

Additional information: Application, 2023-08-25

Annex: Annex 1. 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)

J. Ramanauskas

(n., surname)

(signature)

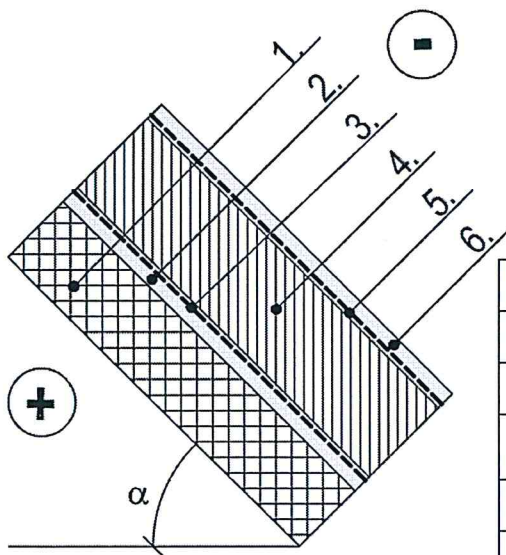
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Annex 1: Calculation results

Table 1: Products R- values

Product	Thermal resistance R, (m ² ·K)/W
Pavacell P 80 (Dossier / File P233719 – Document DEC / 1)	R = 2.05
APRO (test report n° 065 SF/23 U)	R_{core90/90} = 3.52
<p>“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 $S_{R-prod} = \sqrt{\frac{\sum(R_i - R_{average})^2}{n-1}}$);</p>	



Temperature regime 20°C / 0°C	
1.	PAVACELL P, 80 mm
2.	Unventilated Air cavity #1, 20 mm
3.	Metallized reinforced perforated film, ε ₁ = 0.15 230406 Emissivité Film armé micro-perforé
4.	APRO, 100 mm
5.	Metallized membrane, ε ₂ = 0.25 230406 Emissivité Ecran HPV métallisé
6.	Ventilated Air cavity #2, 20 mm

Figure 1. Roof construction design

Table 2: Roof construction calculation results for slope α = 0° (EN ISO 6946)

ATI MIX OUATE DE CELLULOSE installed on roof			
Angle: α = 0°	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	PAVACELL P 80	2.05	m ² ·K/W
	Unventilated Air cavity # 1	0.3663	m ² ·K/W
	Metallized reinforced perforated film		
	APRO	3.52	m ² ·K/W
	Metallized membrane		
	Ventilated Air cavity # 2 (the thermal resistance of external surface R _{se})	0.1624	m ² ·K/W
	R Total	6.10	m²·K/W

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

ATI MIX OUATE DE CELLULOSE installed on roof			
Angle: $\alpha = 30^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	PAVACELL P 80	2.05	m ² ·K/W
	Unventilated Air cavity # 1	0.4006	m ² ·K/W
	Metallized reinforced perforated film		
	APRO	3.52	m ² ·K/W
	Metallized membrane		
	Ventilated Air cavity # 2 (the thermal resistance of external surface R_{se})	0.1866	m ² ·K/W
	R_{Total}	6.16	m²·K/W

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

ATI MIX OUATE DE CELLULOSE installed on roof			
Angle: $\alpha = 45^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	PAVACELL P 80	2.05	m ² ·K/W
	Unventilated Air cavity # 1	0.4202	m ² ·K/W
	Metallized reinforced perforated film		
	APRO	3.52	m ² ·K/W
	Metallized membrane		
	Ventilated Air cavity # 2 (the thermal resistance of external surface R_{se})	0.2017	m ² ·K/W
	R_{Total}	6.19	m²·K/W

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

ATI MIX OUATE DE CELLULOSE installed on wall			
Angle: $\alpha = 90^\circ$	Layer	R value	Unit
Ascendant Heat Flux (Winter period)	PAVACELL P 80	2.05	m ² ·K/W
	Unventilated Air cavity # 1	0.4927	m ² ·K/W
	Metallized reinforced perforated film		
	APRO	3.52	m ² ·K/W
	Metallized membrane		
	Ventilated Air cavity # 2 (the thermal resistance of external surface R_{se})	0.2733	m ² ·K/W
	R_{Total}	6.34	m²·K/W

Requirements for calculation validity:

- Calculations of R values are valid for a pitched roof (α is generally from 0° to 90°).
- Calculations of R values are valid when APRO is installed in agreement with the installation guidelines described into the manufacturer brochure.

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