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## TEST REPORT

**CUSTOMER: SEALED AIR HELLAS, S.A.**  
**PERSON REQUEST THE TEST: MANEL PENARROYA**  
**ADDRESS: 32.011 SCHIMATARI VIOTIAS, GREECE**

**MATERIAL TESTED: THERMAL INSULATORS  
REF. « REFLECTIX »**  
**PURPOSE OF THE REQUEST: THERMAL RESISTANCE TEST  
(UNE-EN ISO 8990:1997)**

**DATE OF RECEIPT: 11.05.2009**  
**TEST STARTING DATE: 03.06.2009**  
**TEST COMPLETION DATE: 08.06.2009**  
**DATE REPORT ISSUED: 16.06.2009**

The results included in this report only refer to the material received and subjected to testing in this Research Centre on the dates indicated.

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## FEATURES OF THE SAMPLES

On the 11<sup>th</sup> of May 2009, CIDEMCO received samples of reflexive insulator from the company SEALED AIR HELLAS, S.A. The sample to be tested is referenced as "REFLECTIX". The test specimen to be tested is of (1,475 x 1,225 x 25) mm in size, including a pre-frame as shown in the following image:

### « REFLECTIX »



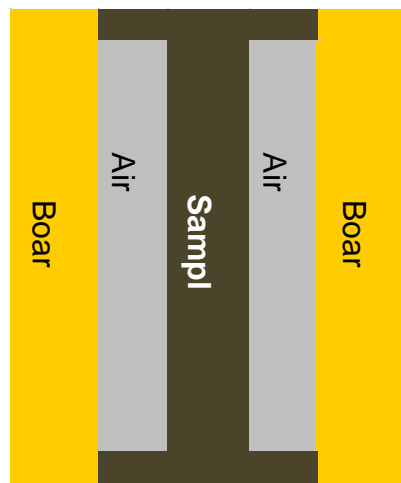
## TEST REQUESTED

The test requested has been that determining **Thermal Resistance ( $m^2K/W$ )** of the set of agglomerate board of 15 mm in thickness, and sample and agglomerate board of 15 mm in thickness, using the test method described in the UNE-EN ISO 8990:1997 standard «*Determining steady-state thermal transmission properties. Hot guarded and calibrated box method*» and in the standard ASTM C 1224-01 Apdo. 9.7 «*Standard Specification for Reflective Insulation for Building Applications. Test Methods: Thermal Performance*».

## TEST CARRIED OUT

To carry out the test, a test specimen has been prepared comprising two agglomerate boards of (1,475 x 1,225 x 15) mm in size, in whose interior the sample "REFLECTIX" has been fitted with two air chambers of 8 mm on each side. The test specimen includes a pre-frame which establishes the thickness of the 8 mm air chamber.

An outline of the test is shown below:



Due to the lack of any specific regulations governing this type of product and by agreement with the customer, the test method described in the UNE-EN ISO 8990:1997 standard has been used, determining the heat flow through the sample and the temperatures on the external surfaces of the agglomerate boards, in order to then calculate the thermal resistance using this data of the set of agglomerate board + sample + agglomerate board.

Thermal resistance «R» has been determined in a climatic chamber in which the test specimen has been placed between two environments at different temperatures. These environments simulate exterior and interior conditions, and the temperatures in both cases have remained constant and controlled  $\pm 0.5^{\circ}\text{C}$ .

Once heat transmission conditions have been attained in a stable state, the surface temperature data is then gathered on the outside face of the two agglomerate boards (°C), in addition to the heat flow through the test specimen (W/m<sup>2</sup>). A statistical mean of the surface temperature values and the heat flow are obtained from this data. The calculation of the value «R» (W/m<sup>2</sup>.K) corresponds to average values calculated during the test.

## RESULTS

Thermal resistance «R» has been calculated in the direction perpendicular to that of the surface area of the test specimen.

Any edge effect has been eliminated, given that the surfaces of the perimeter have been insulated with expanded polystyrene of 25 cm in thickness.

Once the system reflects stability from the thermal point of view – in other words, once fluctuations in temperatures and heat flow are negligible – the mean temperatures are then recorded on the surfaces of the agglomerate boards in addition to the mean heat flow in the direction perpendicular to the test element.

Atmospheric temperatures of the two climatic chambers and the surface temperatures of the agglomerate have been as follows:

|                               | « Board + Sample + Board »   |
|-------------------------------|------------------------------|
| Cold atmospheric temperature: | <b>(6.0 ± 0.5)°C</b>         |
| Heat atmospheric temperature: | <b>(24.0 ± 0.5)°C</b>        |
| Cold surface temperature:     | <b>(8.0 ± 0.5)°C</b>         |
| Heat surface temperature:     | <b>(21.2 ± 0.5)°C</b>        |
| Thermal gradient:             | <b>(13.2 ± 1.0)°C</b>        |
| Heat flow:                    | <b>13.96 W/m<sup>2</sup></b> |

As for thermal resistance «R» of the set of agglomerate board of 15 mm in thickness + sample + agglomerate of 15 mm in thickness, the calculation is as follows:

|                                     |
|-------------------------------------|
| <b>Set «Board + Sample + Board»</b> |
| <b>1.11 m<sup>2</sup>K/W</b>        |

From this test result may be calculated theoretical thermal resistance «R» of the sample by considering the thermal conductivity of an agglomerate board of 600 kg/m<sup>3</sup> to be 0.14 W/mK, in accordance with the UNE-EN 12524:2000 standard.

Therefore, **Thermal Resistance** «R» calculated for each of the samples is as follows:

|  |
|--|
| <b>« REFLECTIX with 2 air chambers<br/>of 8mm»</b> |
| <b>0.90 m<sup>2</sup>K/W</b>                       |

Equivalent of 3 cm of thickness to insulation with conductivity of 0.035 W/mK.