



## Test Report



**Thermal resistance of an air  
cavity insulated with S.A.ME  
IsoLiving insulation**

FOR SA,ME Srl  
Via dell'Artigianato 14  
06083 Bastia Umbra  
Perugia  
Italy

For the attention of Mr Bruno Sargentini

IDENTIFICATION CSM-4(A) Firm Price Agreement quotation number E06080223 dated 16 August 2006. NPL specimen number R053 was assigned to the SA,ME Srl IsoLiving reflective insulation system.

BASIS OF TEST The NPL Rotatable Wall-Guarded Hot-Box which conforms to the requirements of BS EN ISO 8990:1996, using measurement equipment whose calibration is traceable to National Standards.

UNCERTAINTY The overall measurement uncertainty is estimated to be within  $\pm 7.2\%$  based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

Reference: PP31/E06080223/1

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Date of issue: 23 January 2007

Signed:  (Authorised Signatory)

Checked by:  Name: Ray Williams for Managing Director

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## 1 DESCRIPTION OF THE SPECIMEN


**Table 1: Test element specifications**

NPL Identity Number	R053
Service Number	E06080223
<b>Specimen Details</b>	
Manufacturer's Name	SA,ME Srl
Customer's Description	IsoLiving
Technical Description	This product consists of two layers of bubble polyethylene with an average bubble diameter of 10 mm, sandwiched between two sheets of aluminium film. The total thickness of the product is about 8 mm.
Design of air cavity (See figure 1)	<p>(a) The walls of the cavity were 11 mm thick plywood.</p> <p>(b) The air cavity is 128 mm deep</p> <p>(c) The IsoLiving was fixed in the centre of the air cavity</p> <p>(d) The specimen was kept in its central position by 12 off pillars of expanded polystyrene (cross section 15 mm x 15 mm) fixed to the inside surfaces of cavity walls</p>
Measured Height (m)	1.998
Measured Width (m)	1.003

A sketch of the air cavity is shown in Figure 1.

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### 2 THE APPARATUS

Thermal resistance measurements were made in the NPL Rotatable Wall-Guarded Hot-Box, described in NPL Report CBTLM 25. Where relevant, the equipment and measurement procedures are in accordance with the requirements of BS EN ISO 8990:1996. The main features of the equipment are summarised below.

- The interior dimensions of the hot box are 2.4 m x 2.4 m.
- All surfaces "seen" by the test element are matt black.
- There are twenty five air temperature sensors, 75 mm from the holder panel face, positioned at the centres of squares of equal areas in both the hot and cold boxes.
- The net heat flow direction was horizontal (specimen in vertical position).

### 3 MEASUREMENT PROCEDURES

The method of fixing the insulated quilt in the cavity and in the surround panel is shown in Figure 1. The insulation was fixed in the middle of the 128 mm deep air cavity. It was fixed to the expanded polystyrene surround panel with duct tape. This in turn was covered with aluminium tape where it was fixed to the reflective quilt.

The insulation was kept in its central position during the measurement by expanded polystyrene pillars fixed to in the inside surfaces of both cavity walls; nine of the cold side and 12 on the hot side (see Figure 1). The pillars had a cross section of 15 mm x 15 mm.

The measurements were carried out with the surround panel and air cavity mounted vertically.

Thermal resistance values quoted are the mean of five sets of readings taken at two-hourly intervals. Equilibrium is assumed when the maximum difference between the five thermal resistance values was approximately 2 %.

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### 4 RESULTS

The measurement were carried out on 5 December 2006.

The thermal resistance values of the insulated air cavity with horizontal heat flow are given in Table 2 and a summary of the main experimental parameters are given in Table 3


The test specimen was mounted in surround panel Rothold2

**Table 2: Thermal resistance of the air cavity insulated with S. A. ME Insulation**

NPL Number Customer Identity Specimen description	Mean cavity temperature and Temperature difference across the inner surfaces of the cavity walls  °C	Thermal resistance of the insulated air cavity  (m <sup>2</sup> ·K)/W
R053 - Horizontal heat flow IsoLiving Air cavity insulated with IsoLiving insulation system.	15.96  9.46	1.55

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**Table 3: Measurement data for specimen R053**

<b>R053</b>		
A 128 mm deep air cavity insulated with IsoLiving		
Measurements carried out with a vertical air cavity - with horizontal heat flow		
<b>Specimen dimensions</b>		
Height	1.998	m
Width	1.003	m
Air cavity depth	0.128	m
<b>Measured values</b>		
Mean warm air temperature	22.39	°C
Mean warm inner cavity-surface temperature	20.69	°C
Mean warm baffle temperature	22.06	°C
Mean cold air temperature	10.15	°C
Mean cold inner cavity-surface temperature	11.24	°C
Mean cold baffle temperature	10.24	°C
Power to hot box	22.312	W
Air flow rate in the cold box	5.61	m/s
Air flow rate in the hot box	0.37	m/s
<b>Calculated values</b>		
Heat flux density through specimen	6.113	W/m <sup>2</sup>
Surface temperature difference across inside of cavity	9.46	°C
Measured thermal conductance of insulated cavity	0.65	W/(m <sup>2</sup> ·K)
<b>Thermal resistance of insulated cavity</b>	<b>1.55</b>	<b>(m<sup>2</sup>·K)/W</b>

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**Figure 1: Air cavity design**

