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AB 023

**GROUP OF TESTING LABORATORIES  
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**LF**

**TEST REPORT № NT-698/P/LF- 156/08**

**Page 1/4**

## **THERMAL INSULATION LABORATORY**

**02-656 Warsaw, 21Ksawerów Street, phone No (22) 56 64 276 or (22) 56 64 149**

**CLIENT:** BARLINEK INWESTYCJE Sp. z o.o.  
74-320 BARLINEK, ul. Przemysłowa 1.

**PRODUCT:** Three-layer floor board lacquered thickness of 14 mm,  
produced in factory in Barlinek.

According to CARD OF PRODUCT floor board consists of the following layers:

- top layer – natural hardwood of European or exotic origin,
- central layer – pad of HDF or plywood, slips of softwood,
- bottom layer – natural softwood.

**PROPERTIES TESTED:**

1. Thermal conductivity.
2. Thermal resistance.
3. Average density.
4. Relative moisture content mass by mass.
5. Determination of declared and design value of thermal resistance.

A. n. properties are within the scope of accreditation of the Laboratory.

**RECEIVED FOR TESTING:** in 12.12.2008.

**AT RECORD NO.:** LF-156/08, according to management procedure no. 18.

### **DESCRIPTION OF THE SAMPLES:**

Client delivered 10 samples of dimensions (250 x 250) mm, marked with name of the manufacturer and the value of nominal thickness.

**TESTED IN PERIOD:** from 07.01.2009 till 13.01.2009.

### **TESTING METHOD/PROCEDURE:**

1. Determination of thermal conductivity,  $\lambda$  and thermal resistance,  $R$  in steady-state conditions, by one-sample heat flow meter apparatus, according to PN-EN 12664:2002.

Measurements were realized in mean specimen temperature of 20°C, temperature difference over sample thickness 20 K and heat movement vertically up, on 10 samples dimension of (250 x 250) mm.

2. Determination of average density on 10 samples as above – according to Standard PN-EN 1602:1999.
3. Determination of relative moisture content mass by mass on 5 samples dimensions as above – according to Test Procedure PB LF-012/1/08-2006.
4. Calculations of the declared thermal resistance according to Test Procedure PB LF-014/1/08-2007 “Determination of declared values of thermal conductivity and thermal resistance for building materials and products”.
5. Determination of design value of thermal resistance according to Standard PN-EN ISO 10456:2004 “Building materials and products. Procedures for determining declared and design thermal values”.

## TEST RESULTS

1. The results of thermal conductivity, thermal resistance and average density measurements for three-layer floor board lacquered thickness of 14 mm are given in table 1.

Table 1

No/symbol of the sample	Average thermal conductivity W/(m·K)	Thermal resistance m <sup>2</sup> ·K/W	Average density kg/m <sup>3</sup>
1/LF-156/08	0,1160	0,1215	578
2/LF-156/08	0,1104	0,1266	563
3/LF-156/08	0,1157	0,1211	580
4/LF-156/08	0,1174	0,1193	591
5/LF-156/08	0,1069	0,1310	565
6/LF-156/08	0,1060	0,1319	529
7/LF-156/08	0,1121	0,1240	560
8/LF-156/08	0,1236	0,1127	562
9/LF-156/08	0,1037	0,1341	501
10/LF-156/08	0,1045	0,1333	533

In all cases uncertainty on the confidence level 95 % of determination of:

- thermal conductivity – 3 %, according to uncertainty Card LF-2/02,
- density – 0,7 %, according to uncertainty Card LF-4/08.

Changes of samples mass or dimensions, during the thermal conductivity tests, were not observed.

2. The results of relative moisture content mass by mass measurements for three-layer floor board lacquered thickness of 14 mm are given in table 2.

Table 2

No/symbol of the sample	Relative moisture content mass by mass
	%
1/LF-156/08	6,0
2/LF-156/08	6,4
3/LF-156/08	6,2
4/LF-156/08	6,1
5/LF-156/08	6,5

Uncertainty on the confidence level 95 % of determination of relative moisture content – 0,5 % of moisture content value, according to uncertainty Card LF-5/06.

## CALCULATION RESULTS

### 1. Statistic calculation and declared value of thermal resistance

Statistic calculation were performed on 10 test results of thermal resistance:

$$R_m = 0,12555 \text{ m}^2 \cdot \text{K/W}$$

$$s_R = 0,00705 \text{ m}^2 \cdot \text{K/W}$$

For 90 % fractile with 90 % confidence level and number of test results  $j \ n = 10$  coefficient  $k = 2,07$ . Therefore:

$$R_{90,90} = 0,12555 - 0,01459 = 0,11096 \text{ m}^2 \cdot \text{K/W}$$

After rounding to nearest lower value with two decimals the **declared value of thermal resistance for three-layer floor board lacquered thickness of 14 mm** should be taken as:

$$R_D = 0,11 \text{ m}^2 \cdot \text{K/W}.$$

The above value refers to the wood relative moisture content of 6 % mass by mass.



### 2. Conversion to application conditions and design value of thermal resistance

Conversion of the measured value of thermal resistance should be made when test conditions (temperature, moisture) are different from the conditions typical for application. In the case of three-layer floor board lacquered thickness of 14 mm the thermal resistance was measured in mean temperature of 20°C, corresponding with the temperature of the floor in the room and with moisture content obtained after seasoning in the factory. There was assumed

that application conditions will be closed to these during the test and conversion of the thermal resistance value wasn't carried out. Design value of thermal resistance was recognized as equal the declared value.

Finally the **designed value of thermal resistance for three-layer floor board lacquered thickness of 14 mm** should be taken as:

$$R_{obl.} = 0,11 \text{ m}^2 \cdot \text{K/W.}$$

<b>Responsible for the test:</b>  Katarzyna Firkowicz-Pogorzelska, D.Sc.   .....	<b>Head of Testing Laboratory LF:</b>  Robert Geryło, D.Sc.   .....
<b>Warsaw, 28.01.2009</b>	
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