



INSTITUT PRO TESTOVÁNÍ A CERTIFIKACI, a. s.  
třída Tomáše Bati 299, Louky, 763 02 Zlín



CSI Division – Centre of Civil Engineering  
Construction Testing Laboratory Zlín, K Cihelně 304, 764 32 Zlín - Louky



Testing laboratory No. 1007.1 accredited by ČIA according to ČSN EN ISO/IEC 17025:2018

Page: 1/7 No. 415000183-04

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## ACCREDITED LABORATORY TEST REPORT No. 415000183-04

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**Client:** Lafarge Cement S.A.  
VAT: PL5261060765

**Address:** Warsawska 110, 28-366 Małogoszcz, Poland

**Test:** Laboratory measurement of airborne and impact sound insulation,  
measurement of the improvement of impact sound insulation according  
standards EN ISO 10140-2, ČSN EN ISO 10140-3, ČSN EN ISO 10140-1,  
Annex H

**Subject of the test:** Cement iX screed + Airium layer with Ethafoam mat

**Sample received on:** 06.10.2020

**Report elaborated by:** Ing. Miroslav Figalla

**Place and date of issue:** Zlín, 01.07.2022

**Annex:** The technical description of the floor construction – 1 page



  
Ing. Jiří Růžička  
Head of Construction Testing Laboratory Zlín

  
Ing. Petra Hrdinová  
Head of Accredited Testing Laboratory

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#### Subject of the test:

**Table No. I – Description and identification of the test Subject**

ITC's identification number	Identification of the test Subject/sample by client	Description
083/A/20b 077/A/20b	Cement floor with floating floor covering  Structure of the floor construction: – Cement iX screed, thickness 46-47 mm – Ethafoam mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m <sup>2</sup>	viz. measuring record on page 5-7

#### Sampling method used:

The test samples registered under number 083/A/20b and 077/A/20b were delivered to the laboratory by the customer. The laboratory is not responsible for the sampling procedure.

#### Work requested:

Laboratory measurement of airborne sound insulation, impact sound insulation measurement and the improvement of impact sound insulation.

#### Testing method used:

1. Laboratory measurement of airborne sound insulation according to standard EN ISO 10140-2, EN ISO 717-1, EN ISO 10140-1, EN ISO 10140-4.
2. Laboratory measurement of impact sound insulation according to standard ČSN EN ISO 10140-3.
3. Laboratory measurement of the improvement of impact sound insulation according to standard ČSN EN ISO 10140-1, Annex H.

#### Test conditions:

##### Airborne sound insulation

Measuring is performed in sound chambers meeting the requirements of the ČSN EN ISO 10140-5 standard. The tested element is mounted between the source and receiving room into a measuring opening for vertical elements. A steady sound is generated in the source room with continuous spectrum in the 100 to 5000 Hz band. Mean sound levels of acoustic pressure are measured in the source and receiving room (in dB). Sound reduction index is determined by the relation

$$R = L_1 - L_2 + 10 \log \frac{S}{A} \quad (\text{dB}), \quad A = \frac{0,16 V}{T}$$

where  $L_1$  is the average sound pressure level in the source room,

$L_2$  .. average sound pressure level in the receiving room,

$S$  ... area of the test specimen in m<sup>2</sup>,

$A$  ... equivalent absorption area in the receiving room in m<sup>2</sup>.

$V$  ... the volume of the receiving room in m<sup>3</sup>,

$T$  ... reverberation time in the receiving room in seconds.

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A single-number quantity, weighted sound reduction index  $R_w$ , and spectrum adaptation terms  $C$ ,  $C_{tr}$  are determined from the values of sound reduction index  $R$  in third-octave bands 100 to 3150 Hz, using the reference curve and method according to ČSN EN ISO 717-1.

#### Impact sound insulation

A normalised impact source is placed on the measured floor. Mean levels of acoustic pressure in the receiving room (lower room) in individual third octave bands in the range of 100 (50) to 5000 Hz are measured. A normalized impact sound level  $L_n$  is calculated using the following equation

$$L_n = L_i + 10 \log \frac{A}{A_0} \quad (\text{dB}),$$

where  $L_i$  is a mean level of acoustic pressure in the receiving room,

$A$  ... equivalent absorption area in the receiving room in  $\text{m}^2$ ,

$A_0$  .. reference value,  $A_0 = 10 \text{ m}^2$ .

A single-number quantity, weighted normalized impact sound level  $L_{n,w}$ , and spectrum adaptation term  $C_i$ , are determined from the values of normalized impact sound level  $L_n$  in third-octave bands 100 to 3150 Hz, using the reference curve and method according to ČSN EN ISO 717-2.

#### Improvement of impact sound insulation

Improvement of impact sound insulation by floor covering is determined based on measurement of normalized impact sound level of a bare floor, thickness 140 mm and the same floor with the tested covering. Measurement was performed by laboratory method in acoustic chambers that comply with requirements of ČSN EN ISO 10140-5.

Improvement of impact insulation by floor  $\Delta L$  (reduction of transmitted impact noise) is determined from the relation:

$$\Delta L = L_{n0} - L_n \quad (\text{dB}),$$

where  $L_{n0}$  ... is normalized impact sound pressure level in the receiving room without the floor covering  
(dB),

$L_n$  ... normalized impact sound pressure level in the receiving room with the measured floor covering  
(dB).

Based on the measured values and in accordance with standard ČSN EN ISO 717-2, Annex A, a single-number value is determined – the weighted impact sound improvement  $\Delta L_w$ .

#### Measuring equipment

- Norsonic RTA 840 analyzer	M 07 2024
- B. K. measuring microphone	M 07 2002
- acoustic calibrator B.K.	M 07 2015
- tapping machine B.K.	I 10 780
- power amplifier AM-39	I 05160
- omnidirectional sound source	I 52346

#### Testing laboratory:

Tests were made on Workplace no. 1 - K Cihelně 304, 764 32, Zlín – Louky.

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**Test results:**

Reg. No.	Product tested	Test results
54/22 53/22	<ul style="list-style-type: none"><li>– Cement iX screed, thickness 46-47 mm</li><li>– Ethafoam mat thickness 5 mm,</li><li>– Airium layer thickness 50 mm, 12 kg/m<sup>2</sup>,</li><li>– reference concrete floor thickness 140 mm, 320 kg/m<sup>2</sup>.</li></ul>	$R_w(C; C_{tr}) = 61 (-2; -7) \text{ dB}$ $L_{n,w}(C_l) = 51 (0) \text{ dB}$
55/22	<ul style="list-style-type: none"><li>– Cement iX screed, thickness 46-47 mm</li><li>– Ethafoam mat thickness 5 mm,</li><li>– Airium layer thickness 50 mm, 12 kg/m<sup>2</sup>.</li></ul>	$\Delta L_w = 28 \text{ dB}$

The courses of sound reduction index, normalized impact sound pressure level and improvement of impact sound insulation depend on the frequency, and further measurement data are shown in standard measuring records on pages 5 - 7.

**Uncertainty of measurement**

The measurement uncertainty is expressed in accordance with ČSN EN ISO 12999-1 using a standard deviation of reproducibility. Measurement results including uncertainty are as follows:

$$R_w = (61,1 \pm 2,4) \text{ dB} \quad R_w + C = (59,1 \pm 2,6) \text{ dB} \quad R_w + C_{tr} = (54,5 \pm 3,0) \text{ dB}$$

$$L_{n,w} = (50,3 \pm 3,0) \text{ dB} \quad L_{n,w} + C_l = (50,8 \pm 3,0) \text{ dB}$$

$$\Delta L_w = (28,6 \pm 2,2) \text{ dB.}$$

The values are determined for the expansion factor  $k = 2$ , which corresponds to a confidence level of 95% for the two-sided interval.



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Sound reduction according to EN ISO 10140-2		Reg. No: 54/22																																																
Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz, Poland		Test date: 14.04.2022																																																
Sample description: Cement floor with floating floor covering – Cement screed, thickness 46-47 mm – Ethafoam mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m <sup>2</sup> , – reference concrete floor thickness 140 mm, 320 kg/m <sup>2</sup> .																																																		
Dimensions of the test sample: 3,0 x 3,6 m.																																																		
Area of test element:	10 m <sup>2</sup>	Air temperature: 19 °C																																																
Source room volume:	90 m <sup>3</sup>	Relative humidity: 45 %																																																
Receiving room volume:	75 m <sup>3</sup>	Static pressure: 991 hPa																																																
<p>Shifted ref. curve acc. to ČSN EN ISO 717-1</p> <table border="1"> <thead> <tr> <th>Freq. (Hz)</th> <th>R 1/3 okt. (dB)</th> </tr> </thead> <tbody> <tr><td>50</td><td>32,1</td></tr> <tr><td>63</td><td>46,4</td></tr> <tr><td>80</td><td>40,2</td></tr> <tr><td>100</td><td>41,1</td></tr> <tr><td>125</td><td>45,6</td></tr> <tr><td>160</td><td>45,7</td></tr> <tr><td>200</td><td>44,3</td></tr> <tr><td>250</td><td>48,7</td></tr> <tr><td>315</td><td>50,8</td></tr> <tr><td>400</td><td>54,5</td></tr> <tr><td>500</td><td>57,7</td></tr> <tr><td>630</td><td>61,3</td></tr> <tr><td>800</td><td>67,0</td></tr> <tr><td>1000</td><td>71,8</td></tr> <tr><td>1250</td><td>73,5</td></tr> <tr><td>1600</td><td>76,1</td></tr> <tr><td>2000</td><td>&gt;77,7</td></tr> <tr><td>2500</td><td>&gt;76,2</td></tr> <tr><td>3150</td><td>&gt;73,3</td></tr> <tr><td>4000</td><td>&gt;69,0</td></tr> <tr><td>5000</td><td>&gt;64,3</td></tr> <tr><td colspan="2">Rating according EN ISO 717-1</td></tr> <tr><td colspan="2"><math>R_w (C; C_{tr}) = 61 (-2; -7) \text{ dB}</math></td></tr> </tbody> </table> <p><math>C_{100-5000} = -1 \text{ dB}, C_{tr,100-5000} = -7 \text{ dB}</math>  <math>C_{50-3150} = -2 \text{ dB}, C_{tr,50-3150} = -9 \text{ dB}</math>  <math>C_{50-5000} = -1 \text{ dB}, C_{tr,50-5000} = -9 \text{ dB}</math></p>			Freq. (Hz)	R 1/3 okt. (dB)	50	32,1	63	46,4	80	40,2	100	41,1	125	45,6	160	45,7	200	44,3	250	48,7	315	50,8	400	54,5	500	57,7	630	61,3	800	67,0	1000	71,8	1250	73,5	1600	76,1	2000	>77,7	2500	>76,2	3150	>73,3	4000	>69,0	5000	>64,3	Rating according EN ISO 717-1		$R_w (C; C_{tr}) = 61 (-2; -7) \text{ dB}$	
Freq. (Hz)	R 1/3 okt. (dB)																																																	
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Date: 01.07.2022	Prepared by: Ing. Miroslav Figalla	Signature:																																																

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**Normalized impact sound pressure level in according to EN ISO 10140-3**

Reg. No: 53/22

Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz,  
Poland Test date: 14.04.2022

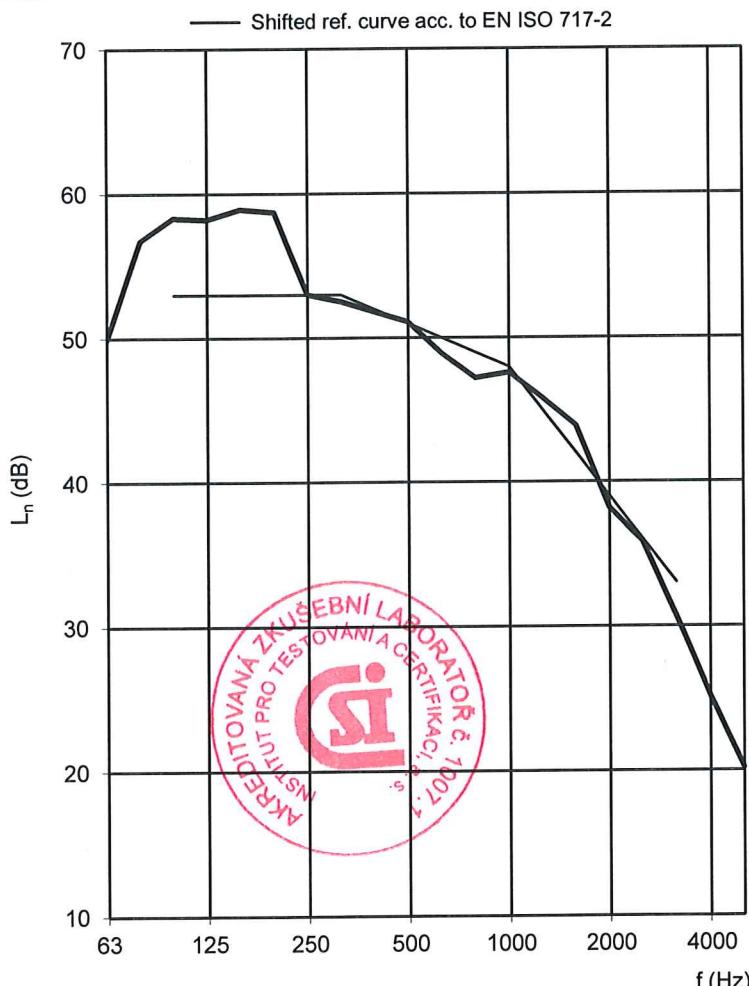
Sample description: Cement floor with floating floor covering  
– Cement screed, thickness 46-47 mm  
– Ethafoam mat thickness 5 mm,  
– Airium layer thickness 50 mm, 12 kg/m<sup>2</sup>,  
– reference concrete floor thickness 140 mm, 320 kg/m<sup>2</sup>.  
Dimensions of the test sample: 3,0 x 3,6 m.

Area of test element: 10 m<sup>2</sup>  
Source room volume: 90 m<sup>3</sup>  
Receiving room volume: 75 m<sup>3</sup>

Air temperature: 19 °C  
Relative humidity: 45 %  
Static pressure: 991 hPa

Freq. (Hz)	L <sub>n</sub> 1/3 okt. (dB)
50	56,6
63	49,9
80	56,7
100	58,3
125	58,2
160	58,9
200	58,7
250	53,0
315	52,5
400	51,8
500	51,1
630	48,9
800	47,2
1000	47,6
1250	45,8
1600	43,9
2000	38,2
2500	35,8
3150	30,6
4000	25,1
5000	20,2
Rating according EN ISO 717-2	
<b>L<sub>n,w</sub> (C<sub>1</sub>) = 51 (0) dB</b>	

C<sub>1,50-2500</sub> = 1 dB



Date: 01.07.2022

Prepared by: Ing. Miroslav Figalla

Signature:

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**Reduction of impact sound pressure level according to EN ISO 10140-2** | Reg. No: 55/22

Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz,  
Poland Test date: 14.04.2022

Sample description: concrete floor with floating floor covering  
– Cement screed, thickness 46-47 mm  
– Ethafoam mat thickness 5 mm,  
– Airium layer thickness 50 mm, 12 kg/m<sup>2</sup>,  
– reference concrete floor thickness 140 mm, 320 kg/m<sup>2</sup>.

Dimensions of the test sample: 3,0 x 3,6 m.

Area of test element: 10 m<sup>2</sup>

Air temperature: 19 °C

Source room volume: 90 m<sup>3</sup>

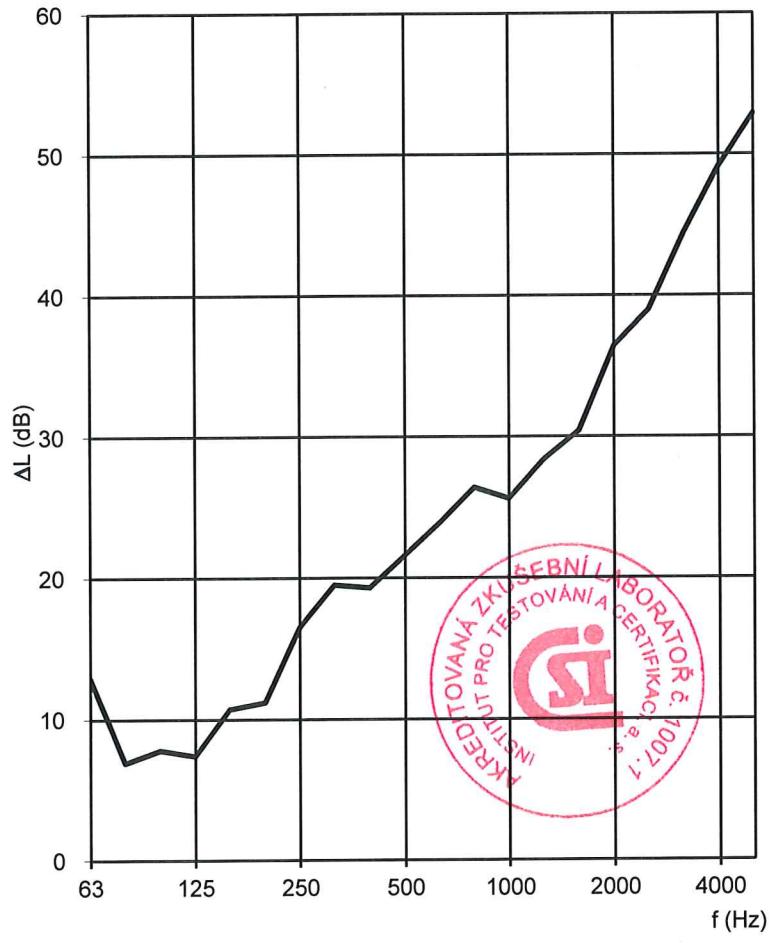
Relative humidity: 45 %

Receiving room volume: 75 m<sup>3</sup>

Static pressure: 991 hPa

Freq. (Hz)	L <sub>n,o</sub> 1/3 okt. (dB)	ΔL 1/3 okt. (dB)
50	67,6	10,9
63	62,9	12,9
80	63,7	6,9
100	66,1	7,7
125	65,6	7,3
160	69,6	10,6
200	69,9	11,2
250	69,5	16,4
315	72,0	19,4
400	71,1	19,3
500	72,7	21,5
630	72,8	23,9
800	73,6	26,3
1000	73,2	25,5
1250	74,2	28,3
1600	74,3	30,3
2000	74,6	36,4
2500	74,8	38,9
3150	75,0	44,3
4000	74,2	49,0
5000	73,1	52,8
Rating according EN ISO 717-2		
<b>ΔL<sub>w</sub> = 28 dB</b>		

C<sub>i,Δ</sub> = -12 dB, C<sub>i,r</sub> = 1 dB



Date: 01.07.2022

Prepared by: Ing. Miroslav Figalla

Signature:

..... End of the test report.....

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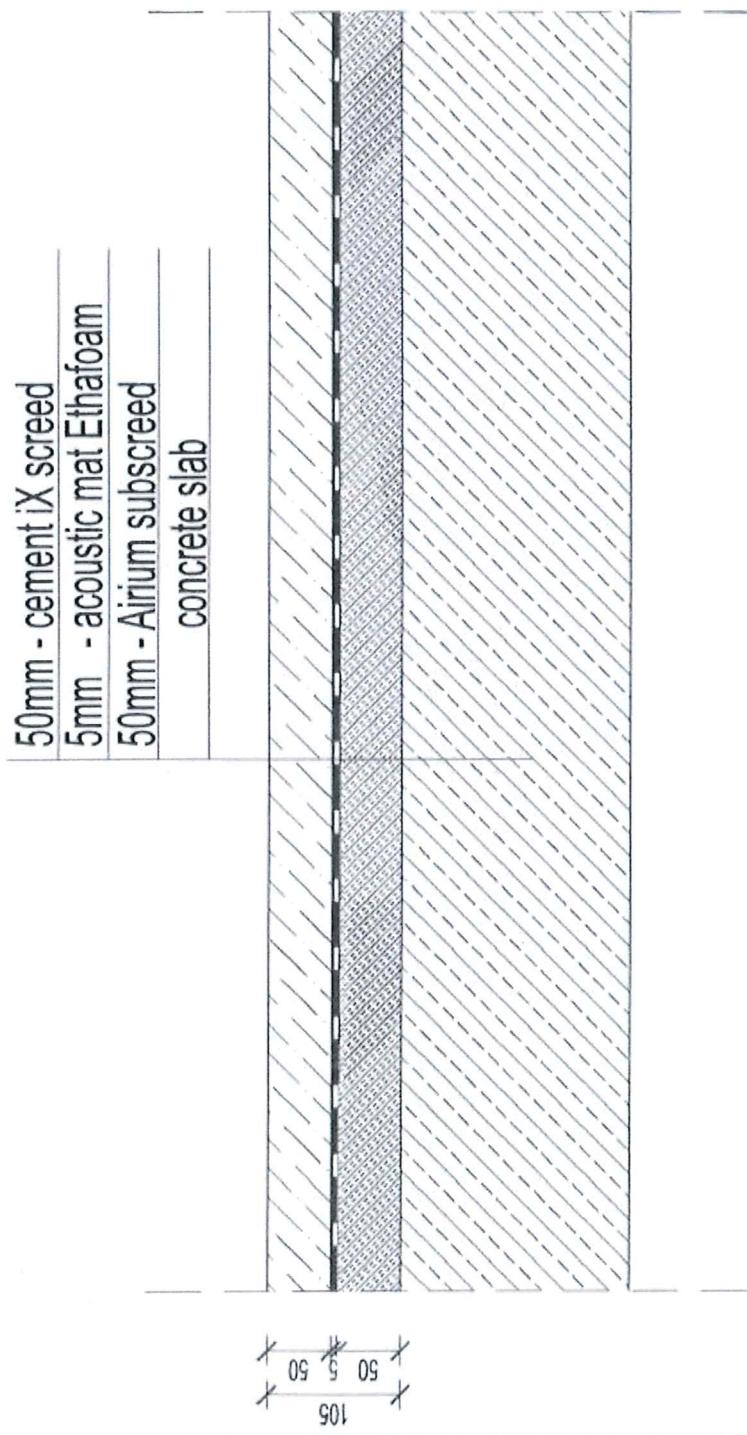
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## Cement iX screed + Airium floor with Ethafoam mat



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