



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. 415000183-01

ACCREDITED LABORATORY TEST REPORT No. 415000183-01

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: Anhydrite screed + Airium layer with 2x Goldflex mat

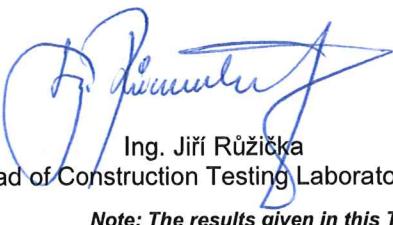
Sample received on: 06.10.2020

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/20a 077/A/20a	Anhydrite floor with floating floor covering Structure of the floor construction: – Agilia Sols A anhydrite screed, thickness 46-47 mm – 2 x Goldflex mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m ²	viz. measuring record on page 5-7

Sampling method used:

The test samples registered under number 083/A/20a and 077/A/20a 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 m²,

A ... equivalent absorption area in the receiving room in m².

V ...the volume of the receiving room in m³,

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 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 ΔL (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 ΔL_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
45/22 44/22	– Anhydrite screed, thickness 46-47 mm – 2 x Goldflex mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m ² , – reference concrete floor thickness 140 mm, 320 kg/m ² .	$R_w (C; C_{tr}) = 61 (-2; -6) \text{ dB}$ $L_{n,w} (C_i) = 51 (-1) \text{ dB}$
46/22	– Anhydrite screed, thickness 46-47 mm – 2 x Goldflex mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m ² .	$\Delta L_w = 29 \text{ dB}$

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:

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

$$L_{n,w} = (50,3 \pm 3,0) \text{ dB} \quad L_{n,w} + C_i = (50,2 \pm 3,0) \text{ dB}$$

$$\Delta L_w = (29,0 \pm 2,2) \text{ dB.}$$

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: 45/22																																																		
Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz, Poland		Test date: 11.04.2022																																																		
Sample description: anhydrite floor with floating floor covering – Anhydrite screed, thickness 46-47 mm – 2 x Goldflex mat thickness 5 mm, – Airium layer thickness 50 mm, 12 kg/m ² , – reference concrete floor thickness 140 mm, 320 kg/m ² .																																																				
Dimensions of the test sample: 3,0 x 3,6 m.																																																				
Area of test element:	10 m ²	Air temperature: 19 °C																																																		
Source room volume:	90 m ³	Relative humidity: 45 %																																																		
Receiving room volume:	75 m ³	Static pressure: 992 hPa																																																		
<table border="1"> <thead> <tr> <th>Freq. (Hz)</th><th>R 1/3 okt. (dB)</th></tr> </thead> <tbody> <tr><td>50</td><td>32,3</td></tr> <tr><td>63</td><td>46,3</td></tr> <tr><td>80</td><td>44,6</td></tr> <tr><td>100</td><td>40,1</td></tr> <tr><td>125</td><td>46,6</td></tr> <tr><td>160</td><td>46,4</td></tr> <tr><td>200</td><td>44,9</td></tr> <tr><td>250</td><td>49,1</td></tr> <tr><td>315</td><td>51,4</td></tr> <tr><td>400</td><td>54,2</td></tr> <tr><td>500</td><td>58,1</td></tr> <tr><td>630</td><td>62,2</td></tr> <tr><td>800</td><td>66,7</td></tr> <tr><td>1000</td><td>70,9</td></tr> <tr><td>1250</td><td>73,9</td></tr> <tr><td>1600</td><td>77,3</td></tr> <tr><td>2000</td><td>>78,3</td></tr> <tr><td>2500</td><td>>76,7</td></tr> <tr><td>3150</td><td>>74,5</td></tr> <tr><td>4000</td><td>>71,3</td></tr> <tr><td>5000</td><td>>65,6</td></tr> <tr> <td colspan="2">Rating according EN ISO 717-1</td><td></td></tr> <tr> <td colspan="2">$R_w (C; C_{tr}) = 61 (-2; -6) \text{ dB}$</td><td></td></tr> </tbody> </table>			Freq. (Hz)	R 1/3 okt. (dB)	50	32,3	63	46,3	80	44,6	100	40,1	125	46,6	160	46,4	200	44,9	250	49,1	315	51,4	400	54,2	500	58,1	630	62,2	800	66,7	1000	70,9	1250	73,9	1600	77,3	2000	>78,3	2500	>76,7	3150	>74,5	4000	>71,3	5000	>65,6	Rating according EN ISO 717-1			$R_w (C; C_{tr}) = 61 (-2; -6) \text{ dB}$		
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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: 44/22

Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz,
Poland Test date: 11.04.2022

Sample description: anhydrite floor with floating floor covering

- Anhydrite screed, thickness 46-47 mm
- 2 x Goldflex mat thickness 5 mm,
- Airium layer thickness 50 mm, 12 kg/m²,
- reference concrete floor thickness 140 mm, 320 kg/m².

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

Area of test element: 10 m²

Air temperature: 19 °C

Source room volume: 90 m³

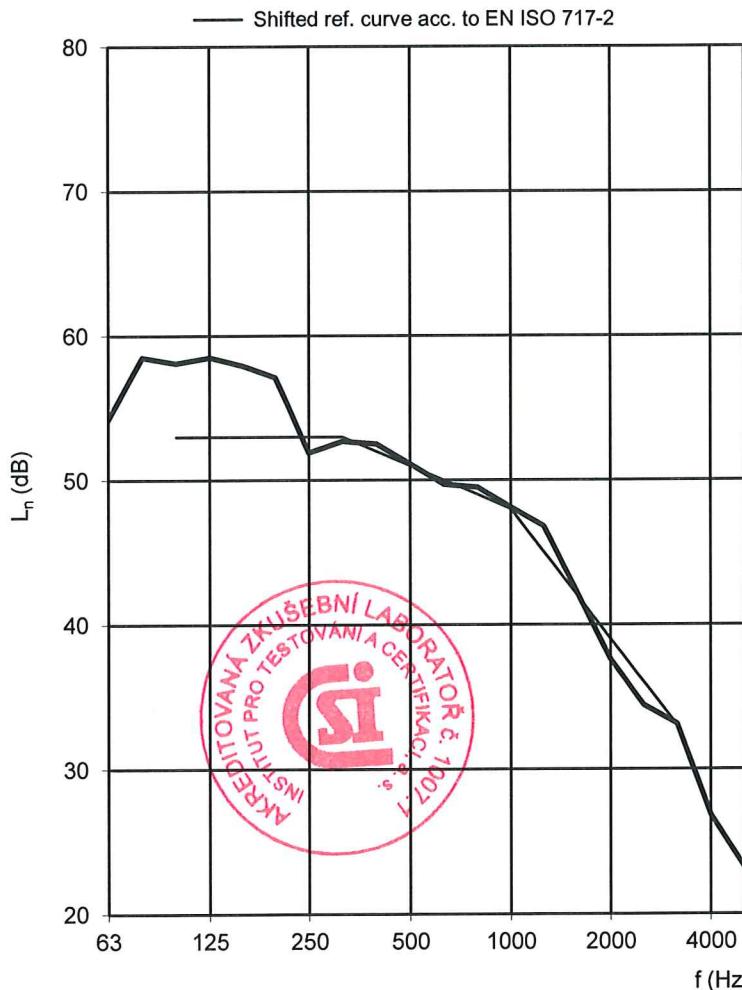
Relative humidity: 45 %

Receiving room volume: 75 m³

Static pressure: 992 hPa

Freq. (Hz)	L _n 1/3 okt. (dB)
50	61,2
63	54,2
80	58,5
100	58,1
125	58,5
160	57,9
200	57,1
250	51,9
315	52,7
400	52,5
500	51,1
630	49,7
800	49,5
1000	48,1
1250	46,8
1600	42,2
2000	37,6
2500	34,4
3150	33,1
4000	26,8
5000	23,2
Rating according EN ISO 717-2	
$L_{n,w} (C) = 51 (-1) \text{ dB}$	

$C_{1,50-2500} = 2 \text{ dB}$



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: 46/22
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Customer: Lafarge Cement S.A., Warsawska 110, 28-366 Małogoszcz,
Poland Test date: 11.04.2022

Sample description: anhydrite floor with floating floor covering

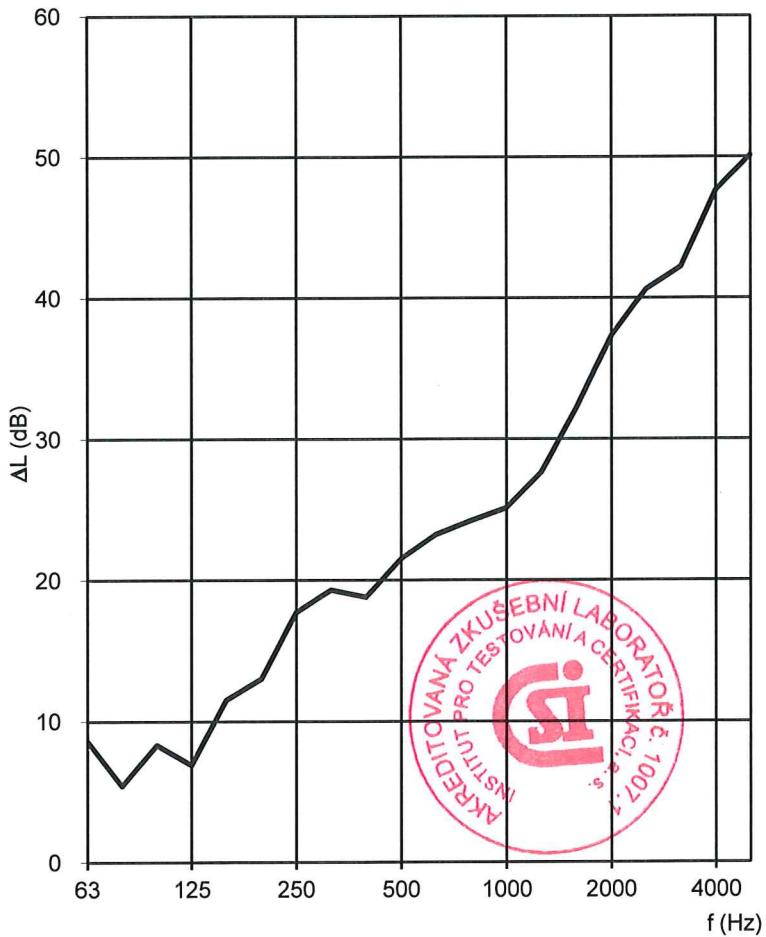
- Anhydrite screed, thickness 46-47 mm
- 2 x Goldflex mat thickness 5 mm,
- Airium layer thickness 50 mm, 12 kg/m²,
- reference concrete floor thickness 140 mm, 320 kg/m².

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

Area of test element:	10 m ²	Air temperature:	19 °C
Source room volume:	90 m ³	Relative humidity:	45 %
Receiving room volume:	75 m ³	Static pressure:	992 hPa

Freq. (Hz)	L _{n,o} 1/3 okt. (dB)	ΔL 1/3 okt. (dB)
50	67,6	6,4
63	62,9	8,6
80	63,7	5,4
100	7	8,3
125	65,6	6,9
160	69,6	11,5
200	69,9	13,0
250	69,5	17,7
315	72,0	19,3
400	71,1	18,8
500	72,7	21,5
630	72,8	23,2
800	73,6	24,2
1000	73,2	25,1
1250	74,2	23,2
1600	74,3	32,2
2000	74,6	37,3
2500	74,8	40,6
3150	75,0	42,2
4000	74,2	47,6
5000	73,1	50,1
Rating according EN ISO 717-2		
ΔL_w = 29 dB		

C_{l,Δ} = -12 dB, C_{l,r} = 1 dB



Date: 01.07.2022

Prepared by: Ing. Miroslav Figalla

Signature:

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



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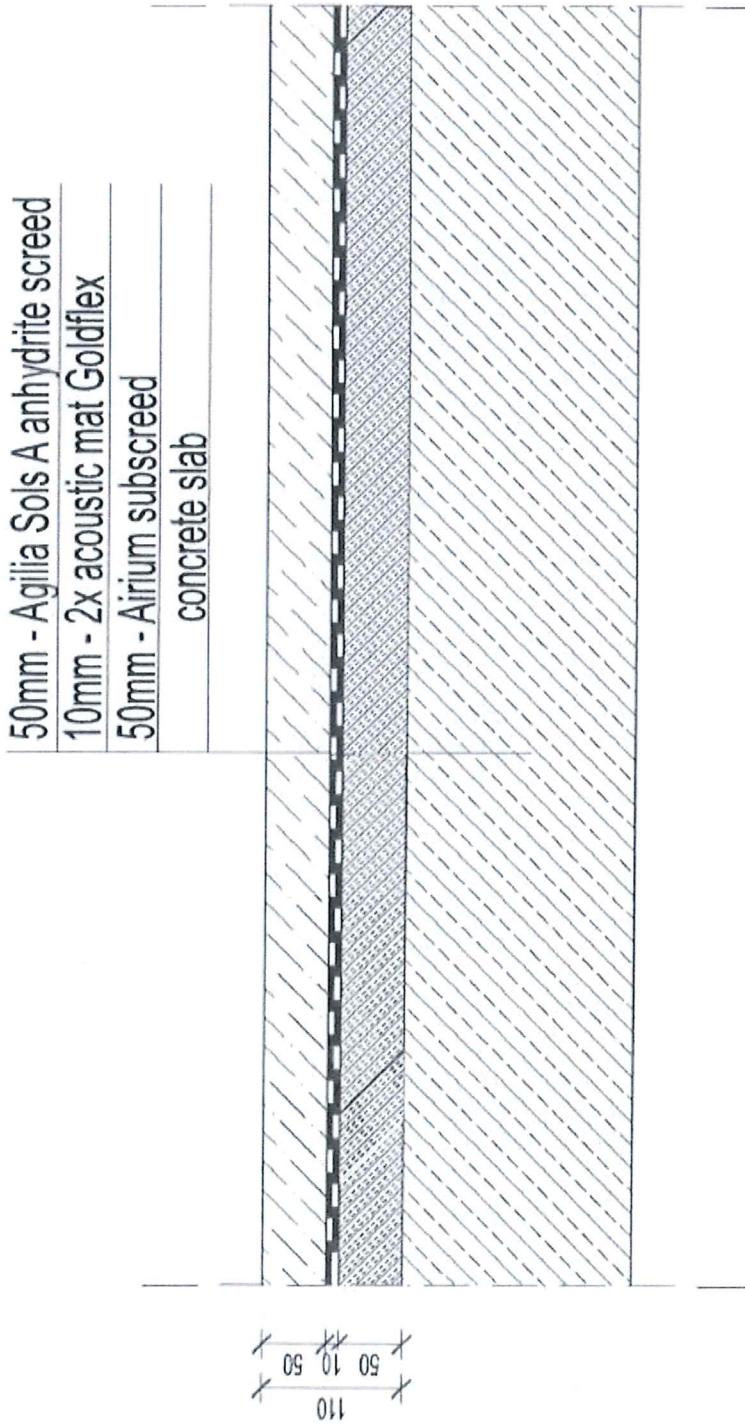
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Agilia Sols A anhydrite screed + Airium floor with 2x Goldflex mat



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