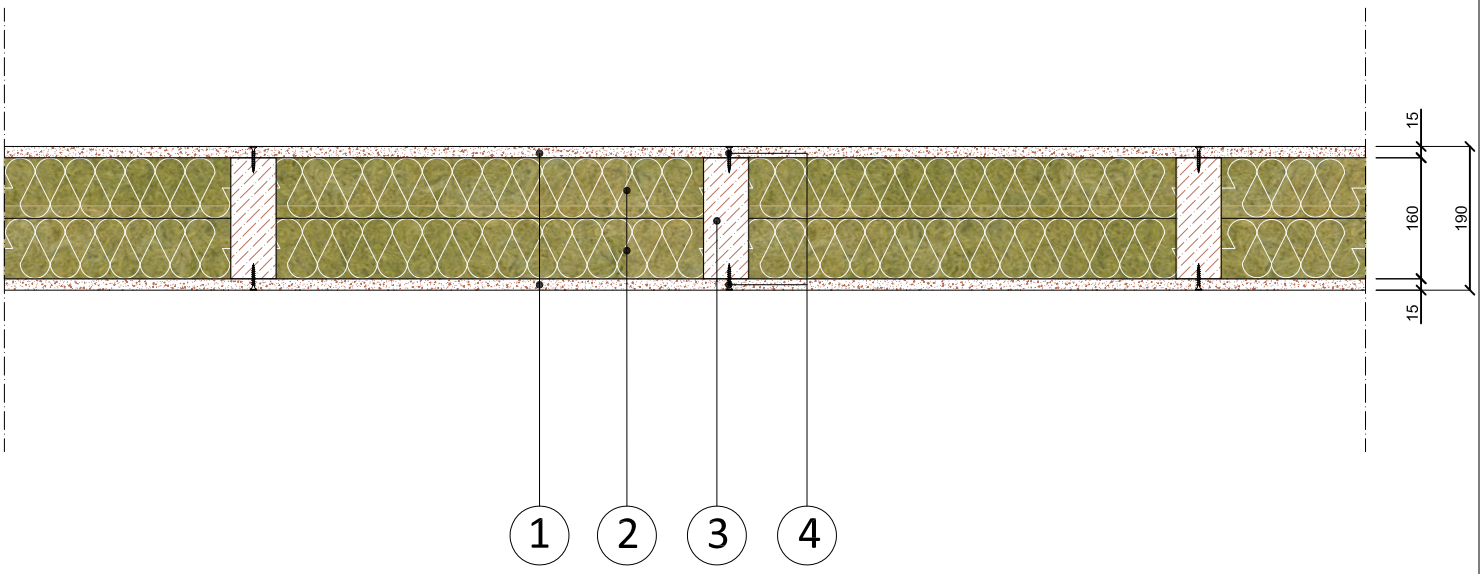
Parete in legno timber frame Rw=46,3 dB sp. 190 mm

R_w (C,C_{tr}) = 46,3(-3,-9) dB



N.	Descrizione	Description
1	Pannelli in OSB, sp. 15 mm	OSB panel, th. 15 mm
2	Pannelli in lana di roccia ROCKWOOL Timberock, sp. 80 mm	ROCKWOOL Timberrock stonewool panel, th. 80 mm
3	Montanti in legno d'abete, dim. 160 x 80 mm	Timber studs, 160x80 mm
4	Fissaggio meccanico	Screw fasteners

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REPORT N. 115-2016-IAP

UNI EN ISO 10140-2:2010

LABORATORY MEASUREMENT OF SOUND INSULATION OF BUILDING ELEMENTS

MEASUREMENT OF AIRBORNE SOUND INSULATION

Issue place and date: Cerea (VR), 09/13/2016

Committee: Rockwool Italia S.p.A.

Committee address: via Londonio, 2 - 20154 Milano - Italy

Sample delivery date: 07/18/2016

Sample provenance: Rockwool Italia S.p.A.

Sample installation date: 07/19/2016

Sample installed in laboratory by: TL (sampling made by the committee)

Test date: 07/22/2016

Test location: Z Lab S.r.l. – Via Pisa, 5/7 – 37053 Cerea (VR) – Italia

Sample denomination: "ROCKWOOL REDArt ETICS ON TIMBERFRAME SUPPORT"
"TELAIO IN LEGNO ISOLATO CON LANA DI ROCCIA ROCKWOOL E CHIUSO CON PANNELLI OSB"

LAB N° 1416

PREPARED	VERIFIED	APPROVED
Antonio Scofano	Antonio Scofano	Antonio Scofano

Sample description

The base wall is composed by Timberframe panel, ETICS system and lining with ROCKWOOL stonewool insulation.
Il campione sottoposto a prova è costituito da un sistema di isolamento formato da pannelli in lana di roccia posati tra i montanti del telaio in legno, chiusura con pannelli in OSB

Sample dimensions are:

Height* *Altezza totale*	2980 mm
Length* *Larghezza totale*	3600 mm
Thickness* *Spessore totale*	110 mm
Acoustic usable surface *Superficie acustica utile*	10.7 m^2

Test specimen is made of:
Il campione è costituito da:

- Oriented strand board (OSB) wood panels with the following specifications:
  Pannelli OSB a base di legno aventi le seguenti caratteristiche dimensionali:
  - nominal length = 1250 mm
    lunghezza nominale
  - nominal width = 3000 mm
    altezza nominale
  - nominal thickness = 15 mm
    spessore nominale
  - density = 550 kg/m^3
    densità nominale
- Timberframe structure realized by TECNOWOOD S.R.L consisting of timber elements, section 160 x 60 mm:
  Struttura a telaio prodotta da TECNOWOOD S.R.L realizzata tramite elementi in legno d'abete di sezione rettangolare 160x60 mm:
  - density = 500 kg/m^3;
    densità nominale degli elementi in legno
- Insulation layer composed by stonewool panels called ROCKWOOL Timberock instaleld in double layer, thickness 80+80 mm, with the following properties:
  Strato di materiale isolante formato dall'accostamento di pannelli in lana di roccia ROCKWOOL Timberock posati in doppio strato, spessore 80+80 mm:
  - length = 1200 mm
    lunghezza nominale
  - width = 565 mm
    altezza nominale
  - thickness = 80 mm
    spessore nominale
  - density = 70 kg/m^3
    densità nominale
- Oriented strand board (OSB) wood panels with the following specifications:
  pannelli OSB a base di legno aventi le seguenti caratteristiche dimensionali:
  - nominal length = 1250 mm
    lunghezza nominale
  - nominal width = 3000 mm
    altezza nominale
  - nominal thickness = 15 mm
    spessore nominale
  - density = 550 kg/m^3
    densità nominale

(*) nominal data provided by the sample manufacturer
(**) data measured by test element sampling

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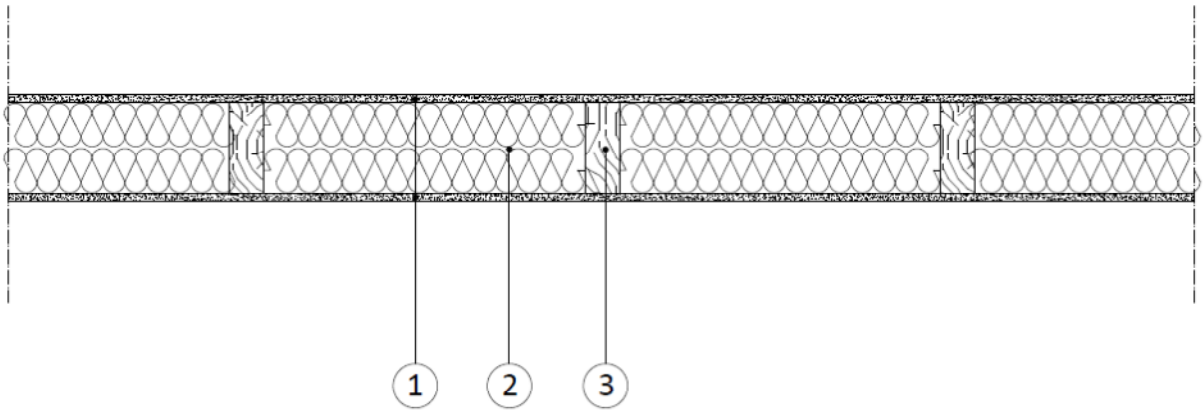

Simbolo	Descrizione
1	pannello in OSB - spessore 15 mm
2	pannello in lana di roccia ROCKWOOL Timberock sp. 80 mm
3	Montante in legno d'abete - sezione 160 x 80 mm

Symbol	Description
1	OSB panel - 15 mm th.
2	ROCKWOOL Timberock stonewool panel, 80 mm th.
3	Timber studs - 160 x 80 mm

Standards references

UNI EN ISO 10140-2:2010	*Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation.*
UNI EN ISO 717-1:2013	*Acoustics – Acoustic insulation verification in buildings and in building elements* *Part 1: Airborne sound insulation.*

Test environment description

The test environment structure is made of reinforced concrete, wholly insulated from the laboratory through anti-vibration supports. In particular, this environment consists of a source room and a receiving room, both characterized by an irregularly-shaped volume, free of any parallel partition. The rooms are separated by a 100 cm thick test frame.

The dimensional data are listed below:

Average source room dimensions (L x W x H)	700 X 500 X 330 cm
Average receiving room dimensions (L x W x H)	770 X 560 X 370 cm

Test equipment and instruments

Instrument	Model	Serial number
Sound Level Meter	LARSON DAVIS L&D 2900B	1080
Microphone	GRAS 40AQ	204027
Preamplifier	LARSON DAVIS L&D PRM900C	1267
Calibrator	LARSON DAVIS L&D CAL200	3852
Omnidirectional source	LOOKLINE D301	DO900159
Termohygrometer	DELTA OHM HD2301.0	09020599
Temperature and humidity sensor	DELTA OHM HP472AC R	09028736
Tape	STANLEY POWERLOCK 33-442	13/946
Microclimate with pressure gauge	DELTA OHM HD 32.1	MSP430F4618

Environmental data during the test

	Source room	Receiving room
Volume	122.8 m^3	163.9 m^3
Average temperature	27,0 ± 1.0 °C	27.7 ± 1.0 °C
Average relative humidity	51.5 ± 2.0 %	51.4 ± 2.0 %
Atmospheric pressure	101.2 kPa ± 1 hPa	
Sample area	10.7 m^2	

Measurement method

The airborne sound insulation test between two rooms is based on the difference between the average sound pressure level in the source room (L_1) and the one detected in the receiving room (L_2). The acoustic source (which produces pink noise) has been operated within the source room in 3 different positions, while the microphone is located in 5 different positions, both in the source room and in the receiving room. A measurement for each source-microphone combination has been performed, for a total of 15 measurements in the source room and 15 in the receiving room. The integration time, for each measure, has been at least 15 s.

Having detected the average level of sound pressure in the receiving environment, the source is switched off, in order to allow the background noise level measurement, L_b. The spectrum corrections, L_2, which need to be calculated for each spectrum frequency component, are equal to:

$$L_2 = L_2 - 1{,}3\ \text{[dB]} \quad \text{if} \quad L_2 - L_b \leq 6\ \text{dB}$$

$$L_2 = 10 \cdot \log(10^{(L_2/10)} - 10^{(L_b/10)})\ \text{[dB]} \quad \text{if} \quad 6 < L_2 - L_b < 10\ \text{dB}$$

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The reverberation time calculation, T allows to determinate the sound reduction index, R or the sound insulation for small elements $D_{n,e}$. These parameters result from the application of the following formulas:

$$R = L_1 - L_2 + 10 \cdot \log(S/A) \text{ [dB]}$$

$$D_{n,e} = L_1 - L_2 + 10 \cdot \log(A_0/A) \text{ [dB]}$$

where:
S: is the free test area opening in which the test element is installed, expressed in m^2;
A_0: reference equivalent sound absorption area, equal to 10 m^2;
A: equivalent sound absorption area in the receiving room, calculated by the Sabine equation:

$$A = 0{,}16 \cdot (V/T) \quad [m^2]$$

where V is the volume of the receiving environment, in m^3.
Basing on the values calculated for each one-third octave frequency band from 100 Hz to 3150 Hz, the experimental curve has been evaluated and compared with the reference one, which is provided within the standard UNI EN ISO 717-1.
Then, the curves comparison method is applied, up to the point where the sum of the unfavorable differences between relative curves values is on the reference curve less than or equal to 32 dB. The value corresponding to the 500 Hz frequency has subsequently been evaluated: this value is the index of evaluation of the apparent sound reduction index R_w (or the normalized acoustic index for small elements $D_{n,e,w}$).

Measured values

f [Hz]	L_1 [dB]	L_2 [dB]	L_b [dB]	T [s]	R [dB]
Frequency	*Source room level*	*Receiving room level*	*Background noise*	*Reverberation time*	*Sound reduction index*
50	81.9	68.0	42.4	7.69	18.9
63	81.8	65.1	32.3	4.33	19.1
80	79.4	63.9	24.7	4.51	18.2
100	87.3	66.0	19.3	2.84	21.8
125	90.6	69.5	20.0	2.42	21.1
160	90.1	63.2	18.8	2.85	27.6
200	88.0	53.6	14.7	2.04	33.6
250	89.4	50.3	11.5	1.91	38.1
315	89.3	45.1	10.6	2.06	43.4
400	90.0	41.8	9.6	1.98	47.3
500	90.6	40.2	6.1	2.12	49.7
630	91.2	36.8	6.1	2.18	53.9
800	91.9	35.2	5.9	2.09	56.0
1000	91.7	33.9	4.6	2.02	56.9
1250	90.8	32.4	4.3	2.02	57.6
1600	92.7	37.7	4.3	2.05	54.2
2000	95.1	45.4	4.3	2.00	48.8
2500	93.7	46.3	4.4	1.96	46.4
3150	91.6	41.8	4.8	1.84	48.5
4000	95.3	39.7	5.7	1.73	54.0
5000	91.6	31.2	7.1	1.52	58.3

(**)Applied correction for background noise according to UNI EN ISO 10140-4:2010. §4.3.
(***) Uncertainty is calculated with a covering factor k = 1.96. corresponding to a 95% trust level.

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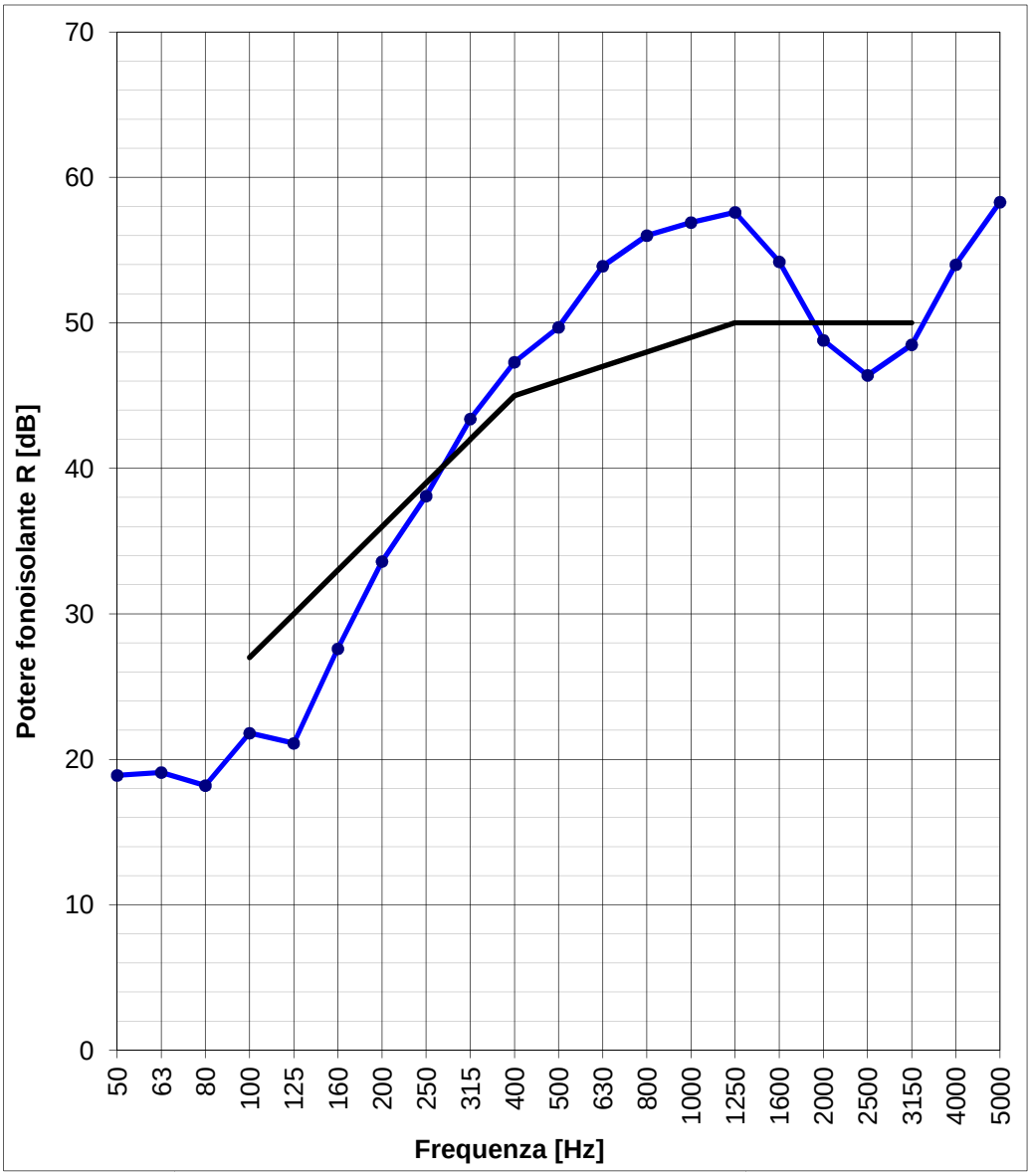
Sound reduction index. R. according to UNI EN ISO 10140-2:2010

Sample description: "ROCKWOOL REDArt ETICS ON TIMBERFRAME SUPPORT"
"TELAIO IN LEGNO ISOLATO CON LANA DI ROCCIA ROCKWOOL E CHIUSO CON PANNELLI OSB"

Specimen area: 10.7 m^2

Rooms volume: Emitting 122.8 m^3 Receiving 163.9 m^3

f	R
[Hz]	[dB]
50	18.9
63	19.1
80	18.2
100	21.8
125	21.1
160	27.6
200	33.6
250	38.1
315	43.4
400	47.3
500	49.7
630	53.9
800	56.0
1000	56.9
1250	57.6
1600	54.2
2000	48.8
2500	46.4
3150	48.5
4000	54.0
5000	58.3



Evaluation of conformity according to ISO 717-1

R_w (C;C_{tr}) = 46.3 (-3 ; -9) dB $C_{50\text{-}3150}$ = -4 dB; $C_{50\text{-}5000}$ = -3 dB; $C_{100\text{-}5000}$ = -2 dB

Evaluation based on laboratory measurement results by means of a technical method.

$C_{tr.50\text{-}3150}$ = -12 dB; $C_{tr.50\text{-}5000}$ = -12 dB; $C_{tr.100\text{-}5000}$ = -9 dB

Laboratory Manager Ing. Antonio Scofano

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