TEST REPORT

Report number: 26/32309385

Date of issue: 13 November 2026

Test requested by: **OPTIMER SYSTEM, S.A.**
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28890 – Loeches (Madrid)

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Test requested: Laboratory measurement of the improvement of impact sound insulation, according to standards UNE-EN ISO 10140-3:2022 and UNE-EN ISO 10140-1:2022 (Annex H).

Sample tested: Floor covering consisting of a multilayer sheet with the trade name ***POLYREFLEX BLH B BIG***, 16 mm nominal thickness, and an 80 mm reinforced mortar slab.

Test date: 10/11/2026

Test performed by: Cristian Torrente

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1.- PURPOSE OF THE MEASUREMENT

Laboratory measurement of the improvement of impact sound insulation, according to test standards UNE-EN ISO 10140-3:2022 and UNE-EN ISO 10140-1:2022 (Annex H), provided by a floor covering consisting of a multilayer sheet with the trade name ***POLYREFLEX BLH B BIG***, 16 mm nominal thickness, and an 80 mm reinforced mortar slab.

2.- MEASUREMENT EQUIPMENT

The equipment used for the acoustic measurements is as follows:

- Spectrum analyser, id no. 170701 (Brüel&Kjær model Pulse LAN-XI)
- Microphone calibrator, id no. 171734 (Norsonic model NOR1256)
- Diffuse-field microphones, id nos. 171714 and 171214 (Brüel&Kjær model 4943)
- Rotating microphone boom, id nos. 171142 (Brüel&Kjær model 3923) and 170692 (Ntek model MB-01)
- Standard tapping machine, id no. 103187 (CESVA model MI005)
- Reverberation time loudspeaker, id no. 171028 (model W5813)
- Amplifier with noise generator and equaliser, id no. 171010 (CESVA model AP602)
- Thermo-hygrometer-barometer, id no. 171282 (PCE model THB-40)
- Tape measure, id no. 103095 (Stanley model Powerlock)
- Distance meter, id no. 170136 (Stanley model TLM130)

3.- MEASUREMENT AND EVALUATION PROCEDURE

3.1. TEST METHOD

The test is carried out according to standards UNE-EN ISO 10140-3:2022 "Measurement of impact sound insulation" together with UNE-EN ISO 10140-1:2022 (Annex H) "Floor coverings. Improvement of impact sound insulation", which are part of the UNE-EN ISO 10140 series "Laboratory measurement of sound insulation of building elements".

The procedure basically consists of measuring the impact sound insulation of a basic construction (basic element) without and with the covering under test applied to it. Both measurements are carried out according to UNE-EN ISO 10140-3:2022.

Two vertically adjacent rooms are used: the upper one, called the "source room", and the lower one, called the "receiving room". The building element under test is placed in the opening between the two rooms. The test procedure consists of measuring, for each frequency band within the range studied, generally from 100 Hz to 5000 Hz, the sound pressure level in the receiving room while the upper side of the test element is excited by a standard impact source (standard tapping machine) placed in at least 4 different positions. The equivalent sound absorption area in the receiving room is calculated from reverberation time measurements.

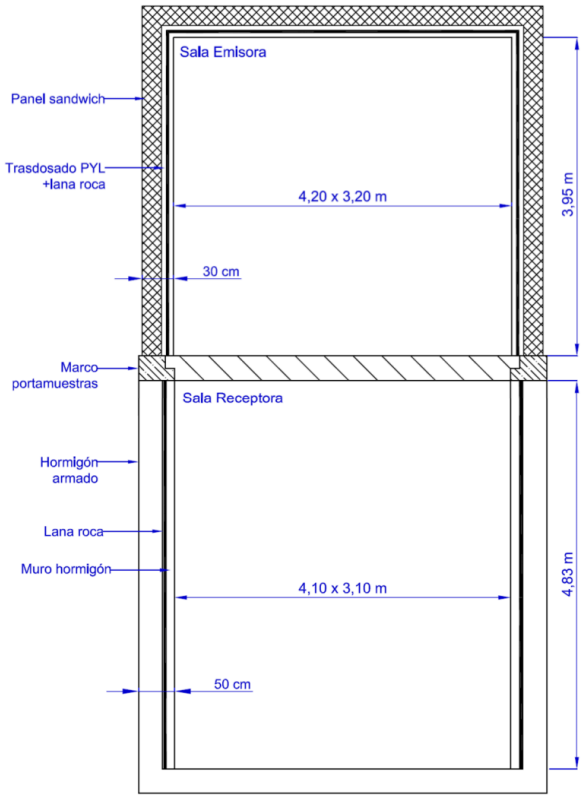


Figure 1. Schematic sketch of the test rooms

Sound pressure level and reverberation time measurements are carried out according to the procedure specified in UNE-EN ISO 10140-4:2022.

The background noise level in the receiving room must be at least 6 dB (and preferably more than 15 dB) below the combined level of signal and background noise in each frequency band.

If the sound pressure level measured in the receiving room does not meet this condition, the correction specified in section 4.3 of UNE-EN ISO 10140-4:2022 must be applied.

For each frequency band, a term depending on the reverberation time and the volume of the receiving room is added to the measured impact sound pressure level (L_i), giving the **normalized impact sound pressure level, L_n**, for each frequency band:

$$L_n = L_i + 10\ Log\ (A / A_0)\ \ [dB]$$

where:

- L_i is the impact sound pressure level, corrected for background noise if necessary, for each frequency band;
- A_0 is the reference equivalent sound absorption area, 10 m²;
- A is the equivalent sound absorption area of the receiving room, defined in UNE-EN ISO 10140-4:2011, calculated as:

$$A = 0.16\ V / T\ \ [m^2]$$

where:

- V is the volume of the receiving room, in m³;
- T is the reverberation time of the receiving room, in seconds. This parameter is defined as the time required for the measured sound pressure level to decrease by 60 dB after the noise source has stopped.

When the difference between the airborne sound pressure level and the impact sound pressure level is less than 10 dB, airborne sound transmission from the source room to the receiving room cannot be neglected. In such cases, the airborne sound correction specified in UNE-EN ISO 10140-3:2022 should be applied to the calculation of L_n.

3.2. IMPROVEMENT OF IMPACT SOUND INSULATION

Standard UNE-EN ISO 10140-1:2022 "Application rules for specific products" specifies, in its Annex H "Floor coverings. Improvement of impact sound insulation", the procedure for determining the improvement of impact sound insulation of coverings intended to improve the impact sound insulation of floors.

The quantity determined is the improvement of impact sound insulation, defined as the **reduction of the normalized impact sound pressure level, ΔL**, resulting from the installation of the covering under test on the reference floor:

$$\Delta L = L_{n0} - L_n \ [dB]$$

where:

- L_{n0} is the normalized impact sound pressure level of the reference floor without the floor covering;
- L_n is the normalized impact sound pressure level of the reference floor with the floor covering.

The standard reference floors are specified in UNE-EN ISO 10140-5:2022, Annex C; there is one heavyweight reference floor and three types of lightweight reference floors. The heavyweight reference floor is generally used, consisting of a reinforced concrete slab with a thickness of 120^{+40}_{-20} mm, preferably 140 mm in the case of newly built laboratories, homogeneous and of uniform thickness.

3.3. PROCEDURE FOR EVALUATING SINGLE-NUMBER QUANTITIES FOR IMPACT SOUND INSULATION

The measurements give values of impact sound insulation as a function of frequency. Standard UNE-EN ISO 717-2:2021 sets out a method by which the frequency dependence of impact sound insulation is converted into a single number characterising the acoustic performance.

From an impact sound curve, the weighted single-number value can be obtained by comparing that curve with the reference spectrum (see the following table), defined between 100 and 3150 Hz:

freq. (Hz)	100	125	160	200	250	315
Ref.	62	62	62	62	62	62
freq. (Hz)	400	500	630	800	1000	1250
Ref.	61	60	59	58	57	54
freq. (Hz)	1600	2000	2500	3150	4000	5000
Ref.	51	48	45	42	- -	- -

Table 3.1: Values of the reference curve for each one-third-octave frequency band

The weighted single-number value is the value of the reference spectrum at 500 Hz after shifting it as explained below.

To evaluate the results of a measurement (L_n, for example), the reference spectrum is shifted in steps of 1 dB (positive or negative) towards the measured curve until the sum of unfavourable deviations, in the frequency range between 100 and 3500 Hz, is as large as possible but not more than 32.0 dB. An unfavourable deviation at a given frequency band occurs when the measurement result is higher than the value of the reference curve in that band.

Applying this evaluation to the curve of the normalized impact sound pressure level, L_n, gives the single-number quantity **weighted normalized impact sound pressure level, $L_{n,w}$**.

The single-number rating according to UNE-EN ISO 717-2:2021 is determined from results (normalized impact sound pressure level, L_n) obtained by laboratory measurement.

3.4. PROCEDURE FOR EVALUATING THE WEIGHTED REDUCTION OF IMPACT SOUND PRESSURE LEVEL, ΔL_W

To obtain the **weighted reduction of impact sound pressure level, ΔL_w**, the measured values of ΔL must be related to a reference floor. A reference floor is defined with the following values of the normalized impact sound pressure level $L_{n,r,0}$:

freq. (Hz)	100	125	160	200	250	315
Ref.	67	67.5	68	68.5	69	69.5
freq. (Hz)	400	500	630	800	1000	1250
Ref.	70	70.5	71	71.5	72	72
freq. (Hz)	1600	2000	2500	3150	4000	5000
Ref.	72	72	72	72	- -	- -

Table 3.2: Values of the normalized impact sound pressure level, in one-third-octave bands

The weighted normalized impact sound pressure level of the reference floor, $L_{n,r,0,w}$, is 78 dB.

The weighted reduction of impact sound pressure level, ΔL_W, is calculated with the following equations:

$$L_{n,r} = L_{n,r,0} - \Delta L$$

$$\Delta L_W = L_{n,r,0,W} - L_{n,r,w} = 78\ dB - L_{n,r,w}\ [dB]$$

where:

- $L_{n,r}$ is the calculated normalized impact sound pressure level of the reference floor with the covering under test;
- $L_{n,r,0}$ is the normalized impact sound pressure level defined for the reference floor (see Table 3.2);
- ΔL is the reduction of impact sound pressure level measured according to UNE-EN ISO 10140-1:2016;
- $L_{n,r,w}$ is the weighted normalized impact sound pressure level calculated for the reference floor with the covering under test;
- $L_{n,r,0,w}$ is obtained according to section 4.3.1 of UNE-EN ISO 717-2:2021 (see section 3.3).

The reduction of impact sound level measured on a concrete slab floor as defined in Annex H of UNE-EN ISO 10140-1:2022, and the single-number quantity ΔL_w, may only be used in relation to similar types of solid floors (concrete, concrete blocks, brick blocks and similar); it is not appropriate to use them for other types of construction.

3.5. CALCULATION OF SPECTRUM ADAPTATION TERMS

The $L_{n,w}$ rating has proved quite suitable for characterising impact noise such as footsteps on timber floors and on concrete floors with effective coverings such as carpets and floating floors. However, it does not sufficiently account for level peaks at discrete (low) frequencies, for example in timber joist floors, or for the behaviour of concrete floors without covering. There is clear evidence that the unweighted impact level of the tapping machine is more representative of the A-weighted impact levels produced by footsteps on all types of floor, while this rating is more restrictive with isolated noise peaks.

An adaptation term C_I is therefore introduced to take this effect into account, given as a separate number that must not be confused with the $L_{n,w}$ value. This term is defined so that, for solid floors with effective coverings, it takes a value close to zero, while for timber joist floors with dominant peaks at low frequencies it is slightly positive. For concrete floors without coverings or with ineffective coverings, it may lie between −15 dB and 0 dB.

If requirements must take these effects into account, they should be expressed as the sum of $L_{n,w}$ and C_I.

The results of a measurement of L_n in one-third-octave bands in the frequency range 100 Hz to 2500 Hz are added energetically to obtain $L_{n,sum}$. The adaptation term C_I is calculated with the following equation:

$$C_I = L_{n,sum} - 15 - L_{n,w} \quad [dB]$$

The spectrum adaptation term is calculated to one decimal place and then rounded to the nearest integer.

A spectrum adaptation term for a flat response of the impact sound reduction is also determined. This spectrum adaptation term $C_{I,\Delta}$ is calculated as:

$$C_{I\Delta} = C_{I,r;0} - C_{I,r} \quad [dB]$$

where:

- $C_{I,r}$ is the spectrum adaptation term for the reference floor with the covering under test;
- $C_{I,r,0}$ is the spectrum adaptation term for the reference floor $L_{n,r,0}$ ($C_{I,r,0}$ = −11 dB).

3.6. UNCERTAINTY OF RESULTS

The uncertainty associated with the test has been calculated and is available to the applicant. The expanded measurement uncertainty U has been obtained by multiplying the standard measurement uncertainty by the coverage factor k such that the coverage probability is approximately 95%.

4.- DESCRIPTION OF THE STANDARD FLOOR AND THE STANDARD TAPPING MACHINE

The standard base element used is the heavyweight reference floor according to the requirements of Annex C of UNE-EN ISO 10140-5:2022. It is a homogeneous reinforced concrete slab, 140 mm thick, of uniform thickness.

The impact source is a standard tapping machine that meets the requirements of UNE-EN ISO 10140-5:2022, Annex E.

5.- DESCRIPTION OF THE SAMPLE

The main characteristics of the test sample are given below. References/models and information marked with (*) are supplied by the applicant. LGAI Technological Center, S.A. is not responsible for documentation and/or information supplied by the applicant, and such information is not covered by the accreditation. The technical information supplied by the applicant is attached in the Annex.

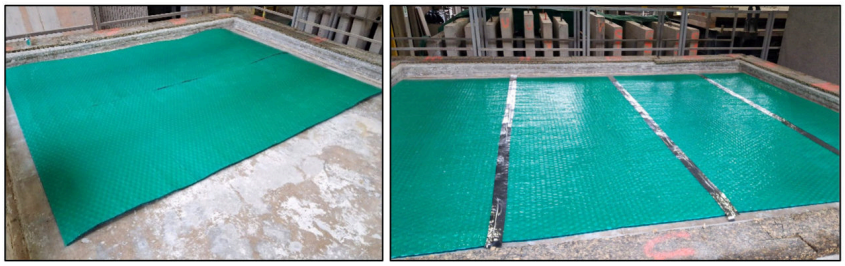
Applus sample no.	48042
Sample type	Floor covering
Manufacturer	OPTIMER SYSTEM, S.A.
Model / reference	***POLYREFLEX BLH B BIG***
Delivered by	OPTIMER SYSTEM, S.A.
Date of receipt	03/11/2026
Sample area	10.08 m² – 3.60 × 2.80 m
Test opening	12.71 m² – 4.10 × 3.10 m
Sample thickness	≈236 mm (base floor: 140 mm; floor covering: ≈96 mm)
Mass per unit area, *m* (estimated)	≈499.2 kg/m² (base floor: ≈350 kg/m²; covering: ≈149.2 kg/m²)
Mounting	In the opening of a precast concrete frame (sample-holder frame)
Composition	– Base floor: heavyweight reference floor, standard floor according to Annex C of UNE-EN ISO 10140-5:2022. Reinforced concrete slab, 140 mm thick. – Floor covering, 3.60 × 2.80 m, consisting of (from bottom to top): ○ Multilayer sheet with the trade name ***POLYREFLEX BLH B BIG***, 16 mm nominal thickness, made of two outer layers of large polyethylene bubbles (8 mm), heat-welded to an inner aluminium sheet. Sheet strips sealed with 75 mm polypropylene tape, *POLI-FLIX P. (*)* ○ Reinforced mortar slab, 80 mm thick. Reinforcement: steel mesh 15 × 15 cm, Ø6 mm.
Test arrangement	According to the specifications in section 6 of UNE-EN ISO 10140-3:2022 and Annex H of UNE-EN ISO 10140-1:2022

Covering type	Category II, according to Annex H of UNE-EN ISO 10140-1:2022
Sample mounting (by / date)	Applus Laboratories – LGAI Technological Center / 09/11/2026
Construction details	See Figures 1 and 2

To determine the improvement of impact sound insulation provided by the floor covering, the impact sound insulation of the standard reference floor alone was measured (23/02/2026) and, separately, with the floor covering installed (10/11/2026).



Images 1 and 2: *POLYREFLEX BLH B BIG*

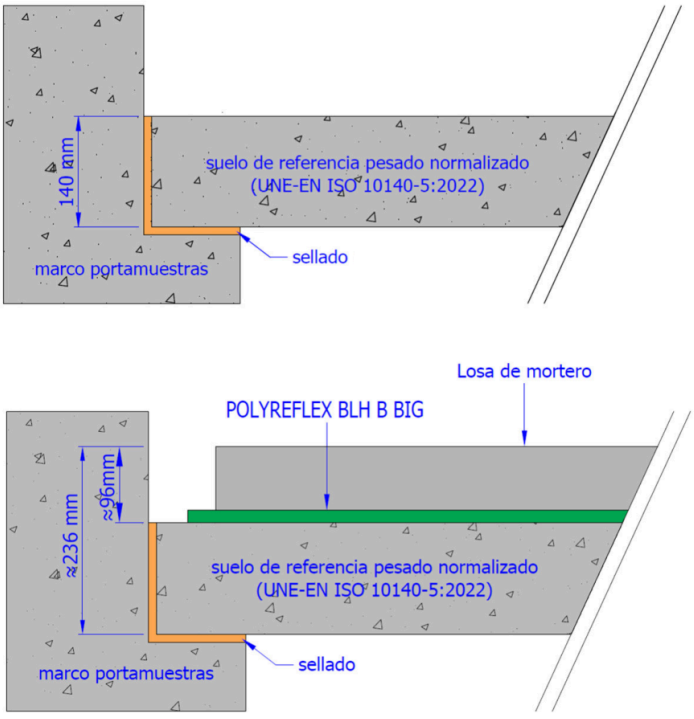


Images 3 and 4: Installation of the sample



Image 5: Sample installed and ready for testing

The following figures show the sections of the constructions tested.



Figures 1 and 2: Reference floor, and reference floor with the floor covering

6.- TEST CONDITIONS

6.1. STANDARD BASE FLOOR (HEAVYWEIGHT REFERENCE FLOOR ACCORDING TO UNE-EN ISO 10140-5:2022, ANNEX C)

	Source room	Receiving room
Room volume	53.1 m^3	62.9 m^3
Ambient conditions	Temperature: 16.2 ±0.4 ºC	Temperature: 15.2 ±0.4 ºC
	Humidity: 60.7 ±4.6 %	Humidity: 66.8 ±4.6 %
	Static pressure: 1007.3 ±1.1 hPa	

6.2. STANDARD BASE FLOOR + FLOOR COVERING

	Source room *	Receiving room
Room volume	52.1 m^3	62.9 m^3
Ambient conditions	Temperature: 19.4 ±0.4 ºC	Temperature: 19.2 ±0.4 ºC
	Humidity: 64.7 ±4.6 %	Humidity: 63.9 ±4.6 %
	Static pressure: 996.4 ±1.1 hPa	

* the floor covering (test sample) is located in the source room.

NOTE 1:

The airborne sound pressure level and the impact sound pressure level differ by less than 10 dB (the condition $L_i - (L_{TS} - D) \geq 10$ dB is not met in all frequency bands), so airborne sound transmission from the source room to the receiving room cannot be neglected. For this reason, the airborne sound correction specified in section 5.4 of UNE-EN ISO 10140-3:2022 has been applied to the calculation of L_n.

NOTE 2:

In the bands marked with the symbol "≥", the value of ΔL should be understood as a minimum value and may be slightly higher. In these frequency bands the difference between the background noise level and the combined signal-plus-background level was less than 6 dB, so a correction of 1.3 dB has been applied to the L_n value.

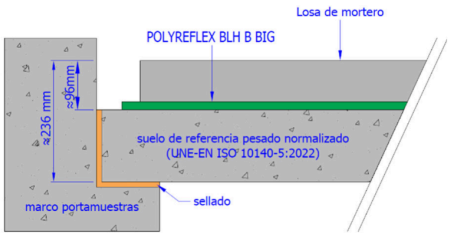
It has been verified that a slight decrease of L_n in those frequency bands would not increase the single-number value ΔL_w.

7.- RESULTS

Reduction of impact sound pressure level, according to ISO 10140 (all parts)

Applicant: OPTIMER SYSTEM, S.A.

Sample tested:
Floor covering consisting of a multilayer sheet with the trade name ***POLYREFLEX BLH B BIG***, 16 mm nominal thickness, and an 80 mm reinforced mortar slab, installed on a heavyweight reference floor (standard floor according to UNE-EN ISO 10140-5:2022, Annex C).



Mass per unit area, *m*: ≈499.2 kg/m² (≈149.2 kg/m² floor covering)

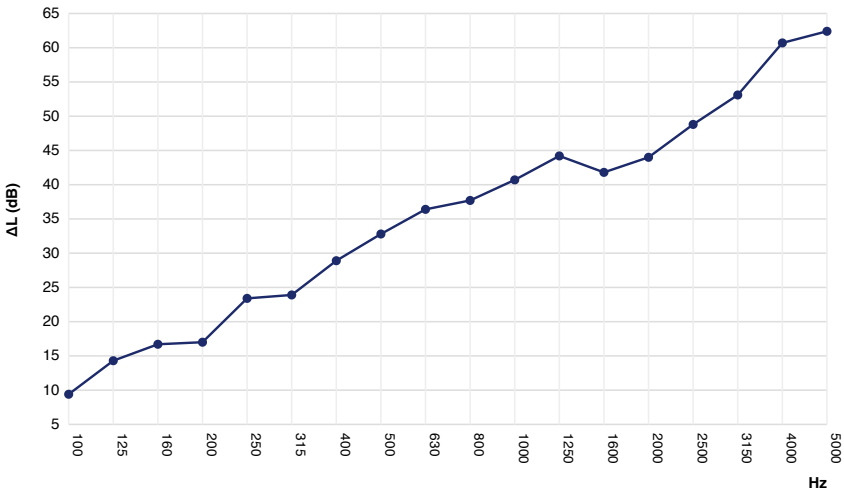
Sample area: 10.08 m² – 3.60 × 2.80 m

Test date: 10/11/2026 (base floor: 23/02/2026)

Frequency (Hz)	$L_{n,0}$ (dB)	ΔL (dB)
100	59.7	9.4
125	68.9	14.3
160	71.8	16.7
200	71.3	17.0
250	70.7	23.4
315	70.5	23.9
400	73.3	28.9
500	73.5	32.8
630	74.8	36.4
800	73.8	37.7
1000	73.4	40.7
1250	74.0	44.2
1600	74.5	41.8
2000	75.2	44.0
2500	75.0	48.8
3150	74.6	53.1
4000	73.5	≥ 60.7
5000	71.4	≥ 62.4

For the frequency bands marked with "≥", see NOTE 2 on the previous page.

Reduction of impact sound pressure level, ΔL



UNE- EN ISO 717-2:2021	$L_{n,0,w}$ = 81 dB	$L_{n,w}$ = 45 dB	$L_{n,r,w}$ = 44 dB	**ΔL_w = 34 dB**
	$C_{I,0}$ = -11 dB	C_I = 1 dB	$C_{I,r}$ = 2 dB	$C_{I\Delta}$ = -13 dB

The results refer exclusively to the measurements made on the sample, product or material delivered to LGAI Technological Center on the date indicated and tested under the conditions stated in this document.

ANNEX. TECHNICAL INFORMATION SUPPLIED BY THE APPLICANT

POLYREFLEX®

BLH B BIG
FICHA TÉCNICA



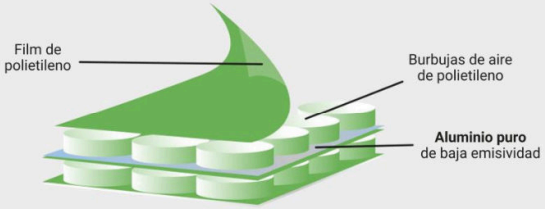
Dimensiones:
24m² (1,20 m x 20 m)

Peso: 1200 g / m²

RESISTENCIA TÉRMICA (R)

De Núcleo:
0.40 m²·K/W (ETA/ETE 13-0525)

En Forjados:
1.92 m²·K/W (*)



DATOS TÉCNICOS

Emisividad: 0.05 (ETA/ETE 13-0525) (UNE-EN 16863:2024)
Reflectividad: 0.95 (UNE-EN ISO 22097:2023)
Resistencia térmica del Núcleo: 0.40 m²·K/W (ETA/ETE 13-0525) (UNE-EN 16863:2024)
Resistencia térmica teórica estimada en forjados: 1.92 m²·K/W (*)
Cuenta con barrera contra el gas radón
Resistente a difusión del vapor de agua (ETA/ETE 13-0525) (UNE-EN ISO 22097:2023)
Clasificación al fuego: Clase B-s1, d0 (dentro de un sistema) / Euroclase F (EN 13501-1:2002) (Expuesto)
Vida útil Estimada de 25 años

(*) Valor obtenido mediante estimación teórica de resistencias térmicas superficiales en la capa interna reflexiva con materiales de baja emisividad según CTE y norma UNE EN ISO 6946:2021. Eludimos la responsabilidad en caso que los resultados no sean los esperados como consecuencia de una mala o inadecuada instalación.

COMPOSICIÓN

Lamina multifunción que aporta aislamiento térmico reflexivo, atenuación acústica y una barrera al gas radón para suelos. Está constituida por dos capas externas de burbujas de polietileno de gran tamaño (8 mm), termo soldada en toda su superficie a una lámina interna de aluminio.

APLICACIÓN

- Aislamiento bajo forjados.
- Aislamiento térmico bajo capa de compresión y cubiertas planas.
- Barrera acústica auxiliar y capa de protección frente a impactos ligeros en suelos.
- Protección auxiliar frente a humedad y radón (en sistemas compatibles).

ALGUNAS DE LAS VENTAJAS

- Corta los flujos de calor por radiación y por conducción.
- Producto termo soldado en toda la superficie a una película interna de aluminio para garantizar la hermeticidad del conjunto y evitar la entrada de polvio, suciedad, y humedad en las cámaras de aire internas del material.
- Lamina aluminizada protegida en el interior, mantieniendo sus propiedades de baja emisividad y actuando contra la transmisión por radiación.
- Fácil y rápido de instalar y utilizar.
- No absorbe agua ni se degrada.
- Material seguro, no es tóxico ni irritante.

RESISTENCIA TÉRMICA TEÓRICA ESTIMADA AL COMBINARSE CON OTROS AISLANTES EN FORJADOS

BLH F + EPS 40 mm:	BLH F + Lana Mineral 40 mm:	BLH F + XPS 100 mm:
2,97 m²·K/W	3,03 m²·K/W	4,78 m²·K/W

Optimer System