CATALOGUE 2022

MINERAL
Fiber Solutions

PERLI WOOL

RANGE OF PERLIWOOL® MORTARS

PERLI WOOL

PERLI WOOL TERMIC

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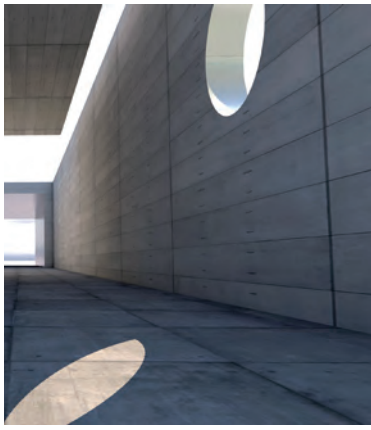
1 ABOUT MINERAL FIBER SOLUTIONS



Mineral Fiber Solutions specialises in the production and supply of products for the passive fire protection and building insulation sector. From the start of our activities, **Mineral Fiber Solutions** has revolved around a policy of continuous improvement. That is why the company has made significant efforts and investment in research, development and innovation, collaborating with the main certification bodies and laboratories.

Through **Mineral Fiber Solutions** we offer you a wide range of products and services, ranging from products for fire protection, thermal insulation, sound insulation, spare parts and machinery accessories to services such as technical support, after-sales service, etc.

One of the defining elements of Mineral Fiber Solutions organisational approach is group work to optimise the benefits provided to customers

Customers have access to technical staff, trained by technicians and engineers, to provide solutions for any area in which **Mineral Fiber Solutions** has the requisite specialisation.

OUR BRANDS

PERLI WOOL

PERLI WOOL TERMIC

END LIQUID

FIX LIQUID

2 PERLIWOOL®

PERLIWOOL® is a new concept in dry-base spray-on mortars, composed of mineral wool and perlite with cement as the sole hydraulic binding agent, used mainly for the fire protection of construction elements.

In addition to being a specially-designed product for fire protection, **PERLIWOOL®** also has outstanding thermal and sound insulation properties.

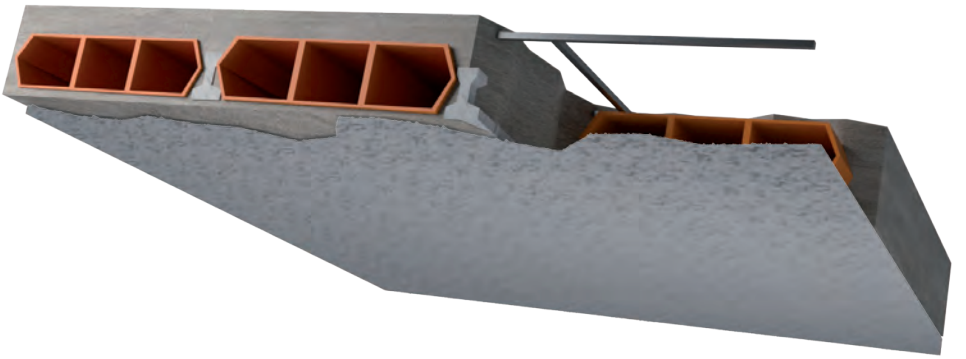
PERLIWOOL® also prevents the formation of water condensation.

PERLIWOOL® does not contain gypsum, plaster or lime in its composition, nor does it include any toxic ingredients.

PERLIWOOL® has a rough appearance and a monolithic texture, once applied. Different finishes may be achieved through light smoothing with a float or roller, and a coat of suitable paint may be applied in order to create different shades for decorative effects, if required.

It is sprayed on directly using an air gun, with a dry process spraying machine, onto the elements to be protected. This, along with its excellent adhesion properties, means that the coating adapts perfectly to the element being protected without cracks or fissures, resulting in a continuous and elastic coating without joins.

Thanks to its small grain size and the absence of any imperfections in the mixture (small stones from the mineral wool), **PERLIWOOL®** may be used in spraying equipment without a grinding system or with the largest nozzle size open. This makes spraying faster and more efficient.



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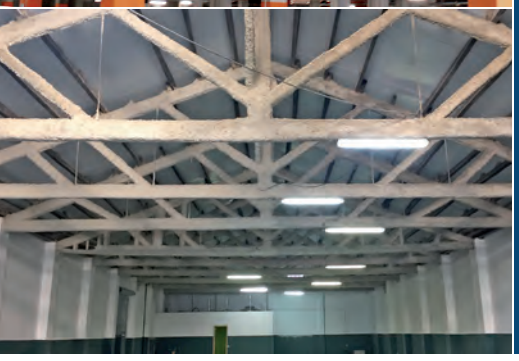
PERLIWOOL®

TECHNICAL SPECIFICATIONS



- Protects steel from the effects of corrosion. (Basic pH: 12).
- Does not contain gypsum, plaster or lime. Does not contain any toxic ingredients or pathogens and is asbestos-free.
- Its physical characteristics prevent the formation of condensation.
- Density: 300 kg/m^3 .
- Reaction to fire rating: A1.
- Flexural strength: 0.4 N/mm^2.
- Compressive strength: 0.4 N/mm^2.
- Coefficient of thermal conductivity: 0.078 W/mhK.
- Material adhesion: 0.019 N/mm^2.
- Sound absorption (15 mm): α_W = 0.60 (H) Class C
- Sound absorption (30 mm): SAA = 0.89
  NRC = 0.90
  α_W = 0.80 (H) Class B
- Sound absorption (50 mm): SAA = 0.97
  NRC = 1.00
  α_W = 1.00 (H) Class A
- Weighted sound reduction: 48.6 dBA.*
- Packaging: 25 kg bags.
- Minimum practical thickness: 10 mm.
- Cure type: Drying.
- Initial set: between 12 and 24 hours, depending on ambient conditions and humidity level.
- Typical substrates: Steel structures, galvanised metal veneers, expanded metal mesh, concrete, brick, fibre cement, etc.
- Testing of a large quantity of solutions in an accredited laboratory.

* Values in situ for a wall composed of 12.5 cm ceramic brick plus spray-on application of PERLIWOOL® with an average thickness of 50 mm.

3 PASSIVE FIRE PROTECTION

**The technical properties of PERLIWOOL®
mean that this product can be used in a wide range
of applications. All have been certified via fire resistance testing
performed by an accredited laboratory.**

EURO CLASSIFICATIONS: REACTION AND RESISTANCE TO FIRE

Euroclasses grade construction products and elements according to their reaction and resistance to fire. The reaction to fire is the response of a material to fire, measured in terms of its contribution to the spread of the fire through its own combustion **PERLIWOOL®**, in accordance with point 1.2 of Royal Decree 842/2013, is considered to be a fire reactivity Class A1 product with no testing requirement. This means that **PERLIWOOL®** is a non-combustible product that contributes nothing to the development of fire. Fire resistance indicates the ability of a construction element to maintain the structural function required of it for a set period of time in addition to retaining its integrity and/or providing thermal insulation. The main Euroclasses for fire resistance are as follows:

R - Indicates the load-bearing or load-carrying capacity of a construction element before the effects of fire. The load-bearing capacity is required exclusively for load-bearing beams and pillars without the function of fire compartmentalisation.
E - Indicates the construction element's integrity under the spread of flames and flow of hot gases under the action of fire.
I - Indicates the thermal insulation of the fire-retardant mortar. This system of classification, in combination with the E (EI) classification is required for non-load bearing walls, ceilings and sealants for which fire compartmentalisation functionality is required. When combined with R and E (REI) it is used for load-bearing walls and slabs for which a fire compartmentalisation functionality is required.
Whether R, EI or REI, they shall always be accompanied by a required time "t". We thus obtain R(t), EI(t) or REI(t). The Spanish Regulation for Fire Safety in Industrial Establishments (RSCIEI) and Construction Technical Code (CTE) are the documents that regulate which elements are to be protected against the action of fire and define the minimum requirements in terms of reaction and resistance to fire thereof.

If a construction system does not meet the minimum standards required by the RSCIEI and CTE, it must be covered with **PERLIWOOL®** fire-retardant mortar in order to meet the requirements. For each particular case we must apply the thickness indicated in the test, which we shall examine in detail in this file.

PASSIVE FIRE PROTECTION

TEST SUMMARY TABLE

DESCRIPTION OF TEST	ACCREDITED LABORATORY/ TECHNICAL REPORT NO.	TEST STANDARD	THICKNESS OF PERLIWOOL® REQUIRED	CLASSIFICATION OBTAINED FROM TESTING
METAL STRUCTURE	18/15079-496 M2 / APPLUS	UNE - ENV 13381-4	ACCORDING TO STRUCTURAL PROFILE MASS TABLE 1.1	FROM R - 30 TO R - 240
CONCRETE STRUCTURE - CONCRETE END PIECES	09/32300329 / APPLUS	UNE - ENV 13381-3	GLOBAL TEST AND TABLE OF EQUIVALENT THICKNESSES. TABLE 2.1	FROM REI 30 TO REI 240
CONCRETE STRUCTURE - CONCRETE END PIECES	17/15079-2364 / APPLUS	UNE - ENV 13381-3	GLOBAL TEST AND TABLE OF EQUIVALENT THICKNESSES. TABLE 2.2	FROM REI 30 TO REI 240
CONCRETE STRUCTURE - BEAMS AND PILLARS	09/32300328 / APPLUS	UNE - ENV 13381-3	GLOBAL TEST AND TABLE OF EQUIVALENT THICKNESSES. TABLE 2.3.	FROM R 30 TO R 240
COMBINED STRUCTURE	19/19582-1987 / APPLUS	UNE - EN 13381-5	GLOBAL TEST AND TABLES OF EQUIVALENT THICKNESSES TABLE 2.4 AND TABLE 2.5	FROM R 30 TO R180 AND EQUIVALENT EI THICKNESS
TIMBER STRUCTURE	19/19582-836 / APPLUS	FprEN 13381-7	38 mm	β_2 (mm/min) = 0.4
VERTICAL SECTIONING EI-180	16/12863-1708 / APPLUS	UNE - EN 13501-2 + A1	57 mm	EI 180
COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK WITH RIBBED MESH)	16/10606-697 / APPLUS	UNE - EN 1363-1 / RSCIEI FIRE SAFETY PROTOCOL	30 mm	EI 60
COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK WITH RIBBED MESH)	16/10606-697 / APPLUS	UNE - EN 1363-1 / RSCIEI FIRE SAFETY PROTOCOL	33 mm	EI 90
PARTITION WALL PROTECTED ROOF JOIN WITH COVERED STRIP (FIREBREAK WITH RIBBED MESH)	15/10329-2308 / APPLUS	UNE - EN 1363-1 / RSCIEI FIRE SAFETY PROTOCOL	56.8 mm	EI 120

3.1 →

PASSIVE FIRE PROTECTION

PROTECTION OF LOAD-BEARING ELEMENTS

3.1.a METAL STRUCTURE

Metal structures protected with **PERLIWOOL®** have been assessed over set periods in accredited laboratories. As a result of the assessment and evaluation carried out, a table of fire resistance classifications for a rolled steel structure is obtained, based on its specifications below:

- Mass of the profile to be protected: this concept links the surface area exposed to the fire with the profile cross-section; depending on the type of profile to be protected, the masses will be between 70 m^{-1} and 340 m^{-1}.
- Protective thickness: will depend on the fire resistance required of the profile.
- Assessed critical temperature: when this temperature is reached, the steel starts to lose its resistant mechanical properties (500^{o}C).
- Position and exposure of profiles: will depend upon the profile function (beams or pillars) and the possible exposure to fire (total or partial).

APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is to be sprayed directly onto the surface to be protected using a dry process spraying machine until the required thickness is obtained.

It is only necessary to use developing agents or mechanical components for the improvement of adhesion in cases where the profile to be protected has extreme dirt, grease, oils, paint remnants, etc. present and which cannot be cleaned easily.

Base test for fire protection of:

METAL STRUCTURES

	Test No. 18/15079-496 M2
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE ENV 13381-4
REQUIRED THICKNESS:	See table 1.1

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

Base test for passive fire protection of:

**METAL STRUCTURES.
BEAMS AND PILLARS**

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI).

CONSTRUCTION TECHNICAL CODE (CTE)

TABLE FOR 500°C (S. UNE EN 13381-4) FOR 4-SIDED PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	19	19	19	19	19	22	31	39	-
80	19	19	19	19	19	26	34	42	-
90	19	19	19	19	20	28	36	44	-
100	19	19	19	19	22	30	38	45	-
110	19	19	19	19	24	31	39	47	-
120	19	19	19	19	25	33	40	48	-
130	19	19	19	19	26	34	41	48	-
140	19	19	19	20	27	35	42	49	-
150	19	19	19	21	28	35	42	50	-
160	19	19	19	21	29	36	43	50	-
170	19	19	19	22	29	36	44	51	-
180	19	19	19	23	30	37	44	-	-
190	19	19	20	23	30	37	44	-	-
200	19	19	20	24	31	38	45	-	-
210	19	19	20	24	31	38	45	-	-
220	19	19	21	24	31	38	45	-	-
230	19	19	21	25	32	39	45	-	-
240	19	19	21	25	32	39	46	-	-
250	19	19	22	25	32	39	46	-	-
260	19	19	22	25	32	39	46	-	-
270	19	19	22	26	32	39	46	-	-
280	19	19	22	26	33	40	46	-	-
290	19	19	23	26	33	40	47	-	-
300	19	19	23	26	33	40	47	-	-
310	19	19	23	26	33	40	47	-	-
320	19	20	23	26	33	40	47	-	-
330	19	20	23	27	33	40	47	-	-

Table 1.1.

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

TABLE FOR 350°C (S. UNE EN 13381-4) FOR 4-SIDED PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	19	19	19	19	23	34	44	-	-
80	19	19	19	19	26	36	46	-	-
90	19	19	19	19	28	38	47	-	-
100	19	19	19	21	30	39	48	-	-
110	19	19	19	22	31	40	49	-	-
120	19	19	19	23	32	41	49	-	-
130	19	19	20	24	33	41	50	-	-
140	19	19	21	25	33	42	50	-	-
150	19	19	21	26	34	42	50	-	-
160	19	19	22	26	34	42	51	-	-
170	19	19	23	27	35	43	51	-	-
180	19	19	23	27	35	43	51	-	-
190	19	19	23	27	35	43	-	-	-
200	19	20	24	28	36	43	-	-	-
210	19	20	24	28	36	44	-	-	-
220	19	20	24	28	36	44	-	-	-
230	19	21	25	28	36	44	-	-	-
240	19	21	25	29	36	44	-	-	-
250	19	21	25	29	37	44	-	-	-
260	19	21	25	29	37	44	-	-	-
270	19	22	25	29	37	44	-	-	-
280	19	22	26	29	37	45	-	-	-
290	19	22	26	29	37	45	-	-	-
300	19	22	26	30	37	45	-	-	-
310	19	22	26	30	37	45	-	-	-
320	19	22	26	30	37	45	-	-	-
330	19	22	26	30	37	45	-	-	-

Table 1.2.

TABLE FOR 400°C (S. UNE EN 13381-4) FOR 4-SIDED PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	19	19	19	19	20	29	39	49	-
80	19	19	19	19	23	32	41	50	-
90	19	19	19	19	25	34	43	-	-
100	19	19	19	19	27	36	44	-	-
110	19	19	19	20	28	37	45	-	-
120	19	19	19	21	29	38	46	-	-
130	19	19	19	22	30	38	47	-	-
140	19	19	19	23	31	39	47	-	-
150	19	19	20	24	32	40	47	-	-
160	19	19	21	24	32	40	48	-	-
170	19	19	21	25	33	40	48	-	-
180	19	19	22	25	33	41	48	-	-
190	19	19	22	26	33	41	49	-	-
200	19	19	22	26	34	41	49	-	-
210	19	19	23	27	34	42	49	-	-
220	19	19	23	27	34	42	49	-	-
230	19	20	23	27	35	42	49	-	-
240	19	20	24	27	35	42	50	-	-
250	19	20	24	28	35	42	50	-	-
260	19	20	24	28	35	42	50	-	-
270	19	21	24	28	35	43	50	-	-
280	19	21	24	28	35	43	50	-	-
290	19	21	25	28	36	43	50	-	-
300	19	21	25	28	36	43	50	-	-
310	19	21	25	29	36	43	50	-	-
320	19	21	25	29	36	43	50	-	-
330	19	22	25	29	36	43	51	-	-

Table 1.3.

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

TABLE FOR 450ºC (S. UNE EN 13381-4) FOR 4-SIDED PILLARS AND BEAMS

Mass	Thickness (mm)								
m -1	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	19	19	19	19	19	26	34	43	-
80	19	19	19	19	20	29	37	46	-
90	19	19	19	19	23	31	39	48	-
100	19	19	19	19	25	33	41	49	-
110	19	19	19	19	26	34	42	50	-
120	19	19	19	19	27	35	43	51	-
130	19	19	19	21	28	36	44	-	-
140	19	19	19	21	29	37	44	-	-
150	19	19	19	22	30	37	45	-	-
160	19	19	19	23	30	38	45	-	-
170	19	19	20	23	31	38	46	-	-
180	19	19	20	24	31	39	46	-	-
190	19	19	21	24	32	39	46	-	-
200	19	19	21	25	32	39	47	-	-
210	19	19	22	25	32	40	47	-	-
220	19	19	22	25	33	40	47	-	-
230	19	19	22	26	33	40	47	-	-
240	19	19	22	26	33	40	48	-	-
250	19	19	23	26	33	41	48	-	-
260	19	19	23	26	34	41	48	-	-
270	19	20	23	27	34	41	48	-	-
280	19	20	23	27	34	41	48	-	-
290	19	20	24	27	34	41	48	-	-
300	19	20	24	27	34	41	48	-	-
310	19	20	24	27	34	42	49	-	-
320	19	20	24	28	35	42	49	-	-
330	19	21	24	28	35	42	49	-	-

Table 1.4.

TABLE FOR 550ºC (S. UNE EN 13381-4) FOR 4-SIDED PILLARS AND BEAMS

Mass	Thickness (mm)								
m -1	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	19	19	19	19	19	19	27	35	-
80	19	19	19	19	19	23	31	38	-
90	19	19	19	19	19	26	33	40	-
100	19	19	19	19	20	28	35	42	-
110	19	19	19	19	22	29	36	44	-
120	19	19	19	19	23	30	38	45	-
130	19	19	19	19	25	32	39	46	-
140	19	19	19	19	25	32	40	47	-
150	19	19	19	19	26	33	40	47	-
160	19	19	19	20	27	34	41	48	-
170	19	19	19	21	28	35	41	48	-
180	19	19	19	21	28	35	42	49	-
190	19	19	19	22	29	36	42	49	-
200	19	19	19	22	29	36	43	50	-
210	19	19	19	23	29	36	43	50	-
220	19	19	20	23	30	37	43	50	-
230	19	19	20	23	30	37	44	50	-
240	19	19	20	24	30	37	44	51	-
250	19	19	21	24	31	37	44	51	-
260	19	19	21	24	31	38	44	-	-
270	19	19	21	25	31	38	45	-	-
280	19	19	21	25	31	38	45	-	-
290	19	19	22	25	32	38	45	-	-
300	19	19	22	25	32	38	45	-	-
310	19	19	22	25	32	39	45	-	-
320	19	19	22	25	32	39	45	-	-
330	19	19	22	26	32	39	46	-	-

Table 1.5.

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

TABLE FOR 350°C (S. UNE EN 13381-4) FOR 3-SIDED BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	23	34	44	-	-
80	20	20	20	20	26	36	46	-	-
90	20	20	20	20	28	38	47	-	-
100	20	20	20	21	30	39	48	-	-
110	20	20	20	22	31	40	49	-	-
120	20	20	20	23	32	41	49	-	-
130	20	20	20	24	33	41	50	-	-
140	20	20	21	25	33	42	50	-	-
150	20	20	21	26	34	42	50	-	-
160	20	20	22	26	34	42	51	-	-
170	20	20	23	27	35	43	51	-	-
180	20	20	23	27	35	43	51	-	-
190	20	20	23	27	35	43	51	-	-
200	20	20	24	28	36	43	51	-	-
210	20	20	24	28	36	44	51	-	-
220	20	20	24	28	36	44	52	-	-
230	20	21	25	28	36	44	52	-	-
240	20	21	25	29	36	44	52	-	-
250	20	21	25	29	37	44	52	-	-
260	20	21	25	29	37	44	52	-	-
270	20	22	25	29	37	44	52	-	-
280	20	22	26	29	37	45	52	-	-
290	20	22	26	29	37	45	52	-	-
300	20	22	26	30	37	45	52	-	-
310	20	22	26	30	37	45	52	-	-
320	20	22	26	30	37	45	52	-	-
330	20	22	26	30	37	45	52	-	-

Table 1.6.

TABLE FOR 400°C (S. UNE EN 13381-4) FOR 3-SIDED BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	29	39	49	-
80	20	20	20	20	23	32	41	50	-
90	20	20	20	20	25	34	43	52	-
100	20	20	20	20	27	36	44	53	-
110	20	20	20	20	28	37	45	-	-
120	20	20	20	21	29	38	46	-	-
130	20	20	20	22	30	38	47	-	-
140	20	20	20	23	31	39	47	-	-
150	20	20	20	24	32	40	47	-	-
160	20	20	21	24	32	40	48	-	-
170	20	20	21	25	33	40	48	-	-
180	20	20	22	25	33	41	48	-	-
190	20	20	22	26	33	41	49	-	-
200	20	20	22	26	34	41	49	-	-
210	20	20	23	27	34	42	49	-	-
220	20	20	23	27	34	42	49	-	-
230	20	20	23	27	35	42	49	-	-
240	20	20	24	27	35	42	50	-	-
250	20	20	24	28	35	42	50	-	-
260	20	20	24	28	35	42	50	-	-
270	20	21	24	28	35	43	50	-	-
280	20	21	24	28	35	43	50	-	-
290	20	21	25	28	36	43	50	-	-
300	20	21	25	28	36	43	50	-	-
310	20	21	25	29	36	43	50	-	-
320	20	21	25	29	36	43	50	-	-
330	20	22	25	29	36	43	51	-	-

Table 1.7.

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

TABLE FOR 450°C (S. UNE EN 13381-4) FOR 3-SIDED BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	26	34	43	-
80	20	20	20	20	20	29	37	46	-
90	20	20	20	20	23	31	39	48	-
100	20	20	20	20	25	33	41	49	-
110	20	20	20	20	26	34	42	50	-
120	20	20	20	20	27	35	43	51	-
130	20	20	20	21	28	36	44	51	-
140	20	20	20	21	29	37	44	52	-
150	20	20	20	22	30	37	45	52	-
160	20	20	20	23	30	38	45	53	-
170	20	20	20	23	31	38	46	-	-
180	20	20	20	24	31	39	46	-	-
190	20	20	21	24	32	39	46	-	-
200	20	20	21	25	32	39	47	-	-
210	20	20	22	25	32	40	47	-	-
220	20	20	22	25	33	40	47	-	-
230	20	20	22	26	33	40	47	-	-
240	20	20	22	26	33	40	48	-	-
250	20	20	23	26	33	41	48	-	-
260	20	20	23	26	34	41	48	-	-
270	20	20	23	27	34	41	48	-	-
280	20	20	23	27	34	41	48	-	-
290	20	20	24	27	34	41	48	-	-
300	20	20	24	27	34	41	48	-	-
310	20	20	24	27	34	42	49	-	-
320	20	20	24	28	35	42	49	-	-
330	20	21	24	28	35	42	49	-	-

Table 1.8.

TABLE FOR 500°C (S. UNE EN 13381-4) FOR 3-SIDED BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	22	31	39	-
80	20	20	20	20	20	26	34	42	-
90	20	20	20	20	20	28	36	44	-
100	20	20	20	20	22	30	38	45	-
110	20	20	20	20	24	31	39	47	-
120	20	20	20	20	25	33	40	48	-
130	20	20	20	20	26	34	41	48	-
140	20	20	20	20	27	35	42	49	-
150	20	20	20	21	28	35	42	50	-
160	20	20	20	21	29	36	43	50	-
170	20	20	20	22	29	36	44	51	-
180	20	20	20	23	30	37	44	51	-
190	20	20	20	23	30	37	44	51	-
200	20	20	20	24	31	38	45	52	-
210	20	20	20	24	31	38	45	52	-
220	20	20	21	24	31	38	45	52	-
230	20	20	21	25	32	39	45	52	-
240	20	20	21	25	32	39	46	53	-
250	20	20	22	25	32	39	46	53	-
260	20	20	22	25	32	39	46	-	-
270	20	20	22	26	32	39	46	-	-
280	20	20	22	26	33	40	46	-	-
290	20	20	23	26	33	40	47	-	-
300	20	20	23	26	33	40	47	-	-
310	20	20	23	26	33	40	47	-	-
320	20	20	23	26	33	40	47	-	-
330	20	20	23	27	33	40	47	-	-

Table 1.9.

FIRE RESISTANCE TABLES FOR I AND H CROSS SECTIONS

TABLE FOR 550°C (S. UNE EN 13381-4) FOR 3-SIDED BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	20	27	35	-
80	20	20	20	20	20	23	31	38	-
90	20	20	20	20	20	26	33	40	-
100	20	20	20	20	20	28	35	42	-
110	20	20	20	20	22	29	36	44	-
120	20	20	20	20	23	30	38	45	-
130	20	20	20	20	25	32	39	46	-
140	20	20	20	20	25	32	40	47	-
150	20	20	20	20	26	33	40	47	-
160	20	20	20	20	27	34	41	48	-
170	20	20	20	21	28	35	41	48	-
180	20	20	20	21	28	35	42	49	-
190	20	20	20	22	29	36	42	49	-
200	20	20	20	22	29	36	43	50	-
210	20	20	20	23	29	36	43	50	-
220	20	20	20	23	30	37	43	50	-
230	20	20	20	23	30	37	44	50	-
240	20	20	20	24	30	37	44	51	-
250	20	20	21	24	31	37	44	51	-
260	20	20	21	24	31	38	44	51	-
270	20	20	21	25	31	38	45	51	-
280	20	20	21	25	31	38	45	51	-
290	20	20	22	25	32	38	45	52	-
300	20	20	22	25	32	38	45	52	-
310	20	20	22	25	32	39	45	52	-
320	20	20	22	25	32	39	45	52	-
330	20	20	22	26	32	39	46	52	-

Table 1.10.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

Base test for passive fire protection of:

**METAL STRUCTURES.
BEAMS AND PILLARS**

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI).

CONSTRUCTION TECHNICAL CODE (CTE)

TABLE FOR 350°C (S. UNE EN 13381-4) FOR 4-SIDED SHS PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	25	36	47	-	-
80	21	21	21	21	28	39	50	-	-
90	21	21	21	21	31	41	51	-	-
100	21	21	21	23	33	43	-	-	-
110	21	21	21	25	34	44	-	-	-
120	21	21	21	26	36	45	-	-	-
130	21	21	23	27	37	47	-	-	-
140	22	22	24	28	38	47	-	-	-
150	22	22	25	29	39	48	-	-	-
160	22	22	26	30	40	49	-	-	-
170	22	22	26	31	41	50	-	-	-
180	22	22	27	32	41	51	-	-	-
190	23	23	28	33	42	51	-	-	-
200	23	24	29	33	43	-	-	-	-
210	23	24	29	34	43	-	-	-	-
220	23	25	30	34	44	-	-	-	-
230	23	25	30	35	45	-	-	-	-
240	24	26	31	36	45	-	-	-	-
250	24	26	31	36	46	-	-	-	-
260	24	27	32	36	46	-	-	-	-
270	24	27	32	36	46	-	-	-	-
280	24	27	32	37	46	-	-	-	-
290	24	27	32	37	46	-	-	-	-
300	24	28	32	37	46	-	-	-	-
310	24	28	32	37	47	-	-	-	-
320	24	28	33	37	47	-	-	-	-
330	24	28	33	37	47	-	-	-	-

Table 1.11.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

TABLE FOR 400°C (S. UNE EN 13381-4) FOR 4-SIDED SHS PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	21	31	42	-	-
80	21	21	21	21	25	35	45	-	-
90	21	21	21	21	28	37	47	-	-
100	21	21	21	21	30	39	49	-	-
110	21	21	21	22	32	41	50	-	-
120	21	21	21	24	33	42	51	-	-
130	21	21	21	25	34	43	-	-	-
140	22	22	22	26	35	45	-	-	-
150	22	22	23	27	36	46	-	-	-
160	22	22	24	28	37	46	-	-	-
170	22	22	25	29	38	47	-	-	-
180	22	22	25	30	39	48	-	-	-
190	23	23	26	31	40	49	-	-	-
200	23	23	27	31	41	50	-	-	-
210	23	23	28	32	41	50	-	-	-
220	23	24	28	33	42	51	-	-	-
230	23	24	29	33	42	-	-	-	-
240	24	25	29	34	43	-	-	-	-
250	24	25	30	34	44	-	-	-	-
260	24	25	30	35	44	-	-	-	-
270	24	26	30	35	44	-	-	-	-
280	24	26	31	35	44	-	-	-	-
290	24	26	31	35	44	-	-	-	-
300	24	26	31	35	45	-	-	-	-
310	24	27	31	36	45	-	-	-	-
320	24	27	31	36	45	-	-	-	-
330	24	27	31	36	45	-	-	-	-

Table 1.12.

TABLE FOR 450°C (S. UNE EN 13381-4) FOR 4-SIDED SHS PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	27	37	46	-
80	21	21	21	21	22	31	40	49	-
90	21	21	21	21	25	34	43	-	-
100	21	21	21	21	27	36	45	-	-
110	21	21	21	21	29	38	47	-	-
120	21	21	21	22	31	39	48	-	-
130	21	21	21	23	32	41	49	-	-
140	22	22	22	24	33	42	51	-	-
150	22	22	22	26	34	43	-	-	-
160	22	22	22	27	35	44	-	-	-
170	22	22	23	27	36	45	-	-	-
180	22	22	24	28	37	46	-	-	-
190	23	23	25	29	38	47	-	-	-
200	23	23	25	30	39	47	-	-	-
210	23	23	26	30	39	48	-	-	-
220	23	23	27	31	40	49	-	-	-
230	23	23	27	32	41	49	-	-	-
240	24	24	28	32	41	50	-	-	-
250	24	24	28	33	42	51	-	-	-
260	24	24	29	33	42	51	-	-	-
270	24	24	29	33	42	51	-	-	-
280	24	25	29	34	42	51	-	-	-
290	24	25	29	34	43	-	-	-	-
300	24	25	30	34	43	-	-	-	-
310	24	25	30	34	43	-	-	-	-
320	24	26	30	34	43	-	-	-	-
330	24	26	30	35	43	-	-	-	-

Table 1.13.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

TABLE FOR 500°C (S. UNE EN 13381-4) FOR 4-SIDED SHS PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	24	33	42	-
80	21	21	21	21	21	28	36	45	-
90	21	21	21	21	22	31	39	48	-
100	21	21	21	21	25	33	41	50	-
110	21	21	21	21	27	35	43	-	-
120	21	21	21	21	28	37	45	-	-
130	21	21	21	21	30	38	46	-	-
140	22	22	22	23	31	39	48	-	-
150	22	22	22	24	32	40	49	-	-
160	22	22	22	25	33	42	50	-	-
170	22	22	22	26	34	43	51	-	-
180	22	22	22	27	35	43	-	-	-
190	23	23	23	27	36	44	-	-	-
200	23	23	24	28	37	45	-	-	-
210	23	23	25	29	37	46	-	-	-
220	23	23	25	30	38	47	-	-	-
230	23	23	26	30	39	47	-	-	-
240	24	24	26	31	39	48	-	-	-
250	24	24	27	31	40	49	-	-	-
260	24	24	27	32	40	49	-	-	-
270	24	24	28	32	41	49	-	-	-
280	24	24	28	32	41	49	-	-	-
290	24	24	28	32	41	50	-	-	-
300	24	24	28	33	41	50	-	-	-
310	24	24	29	33	41	50	-	-	-
320	24	25	29	33	42	50	-	-	-
330	24	25	29	33	42	50	-	-	-

Table 1.14.

TABLE FOR 550°C (S. UNE EN 13381-4) FOR 4-SIDED SHS PILLARS AND BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	20	20	20	20	20	21	29	37	-
80	21	21	21	21	21	25	33	41	-
90	21	21	21	21	21	28	36	44	-
100	21	21	21	21	22	30	38	46	-
110	21	21	21	21	24	32	40	48	-
120	21	21	21	21	26	34	42	50	-
130	21	21	21	21	28	36	44	-	-
140	22	22	22	22	29	37	45	-	-
150	22	22	22	22	30	38	46	-	-
160	22	22	22	23	31	39	47	-	-
170	22	22	22	24	32	40	48	-	-
180	22	22	22	25	33	41	49	-	-
190	23	23	23	26	34	42	50	-	-
200	23	23	23	27	35	43	51	-	-
210	23	23	23	27	36	44	-	-	-
220	23	23	24	28	36	45	-	-	-
230	23	23	25	29	37	45	-	-	-
240	24	24	25	29	38	46	-	-	-
250	24	24	26	30	38	47	-	-	-
260	24	24	26	30	39	47	-	-	-
270	24	24	26	31	39	47	-	-	-
280	24	24	27	31	39	48	-	-	-
290	24	24	27	31	40	48	-	-	-
300	24	24	27	31	40	48	-	-	-
310	24	24	27	32	40	48	-	-	-
320	24	24	28	32	40	48	-	-	-
330	24	24	28	32	40	49	-	-	-

Table 1.15.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

TABLE FOR 350°C (S. UNE EN 13381-4) FOR 3-SIDED SHS BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	21	21	21	21	25	36	47	-	-
80	22	22	22	22	28	39	50	-	-
90	22	22	22	22	31	41	51	-	-
100	22	22	22	23	33	43	53	-	-
110	22	22	22	25	34	44	-	-	-
120	22	22	22	26	36	45	-	-	-
130	23	23	23	27	37	47	-	-	-
140	23	23	24	28	38	47	-	-	-
150	23	23	25	29	39	48	-	-	-
160	23	23	26	30	40	49	-	-	-
170	23	23	26	31	41	50	-	-	-
180	24	24	27	32	41	51	-	-	-
190	24	24	28	33	42	51	-	-	-
200	24	24	29	33	43	52	-	-	-
210	24	24	29	34	43	53	-	-	-
220	24	25	30	34	44	53	-	-	-
230	25	25	30	35	45	-	-	-	-
240	25	26	31	36	45	-	-	-	-
250	25	26	31	36	46	-	-	-	-
260	25	27	32	36	46	-	-	-	-
270	25	27	32	36	46	-	-	-	-
280	25	27	32	37	46	-	-	-	-
290	25	27	32	37	46	-	-	-	-
300	25	28	32	37	46	-	-	-	-
310	25	28	32	37	47	-	-	-	-
320	25	28	33	37	47	-	-	-	-
330	25	28	33	37	47	-	-	-	-

Table 1.16.

TABLE FOR 400°C (S. UNE EN 13381-4) FOR 3-SIDED SHS BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	21	21	21	21	21	31	42	52	-
80	22	22	22	22	25	35	45	-	-
90	22	22	22	22	28	37	47	-	-
100	22	22	22	22	30	39	49	-	-
110	22	22	22	22	32	41	50	-	-
120	22	22	22	24	33	42	51	-	-
130	23	23	23	25	34	43	53	-	-
140	23	23	23	26	35	45	-	-	-
150	23	23	23	27	36	46	-	-	-
160	23	23	24	28	37	46	-	-	-
170	23	23	25	29	38	47	-	-	-
180	24	24	25	30	39	48	-	-	-
190	24	24	26	31	40	49	-	-	-
200	24	24	27	31	41	50	-	-	-
210	24	24	28	32	41	50	-	-	-
220	24	24	28	33	42	51	-	-	-
230	25	25	29	33	42	52	-	-	-
240	25	25	29	34	43	52	-	-	-
250	25	25	30	34	44	53	-	-	-
260	25	25	30	35	44	53	-	-	-
270	25	26	30	35	44	53	-	-	-
280	25	26	31	35	44	53	-	-	-
290	25	26	31	35	44	-	-	-	-
300	25	26	31	35	45	-	-	-	-
310	25	27	31	36	45	-	-	-	-
320	25	27	31	36	45	-	-	-	-
330	25	27	31	36	45	-	-	-	-

Table 1.17.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

TABLE FOR 450°C (S. UNE EN 13381-4) FOR 3-SIDED SHS BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	21	21	21	21	21	27	37	46	-
80	22	22	22	22	22	31	40	49	-
90	22	22	22	22	25	34	43	52	-
100	22	22	22	22	27	36	45	-	-
110	22	22	22	22	29	38	47	-	-
120	22	22	22	22	31	39	48	-	-
130	23	23	23	23	32	41	49	-	-
140	23	23	23	24	33	42	51	-	-
150	23	23	23	26	34	43	52	-	-
160	23	23	23	27	35	44	53	-	-
170	23	23	23	27	36	45	-	-	-
180	24	24	24	28	37	46	-	-	-
190	24	24	25	29	38	47	-	-	-
200	24	24	25	30	39	47	-	-	-
210	24	24	26	30	39	48	-	-	-
220	24	24	27	31	40	49	-	-	-
230	25	25	27	32	41	49	-	-	-
240	25	25	28	32	41	50	-	-	-
250	25	25	28	33	42	51	-	-	-
260	25	25	29	33	42	51	-	-	-
270	25	25	29	33	42	51	-	-	-
280	25	25	29	34	42	51	-	-	-
290	25	25	29	34	43	52	-	-	-
300	25	25	30	34	43	52	-	-	-
310	25	25	30	34	43	52	-	-	-
320	25	26	30	34	43	52	-	-	-
330	25	26	30	35	43	52	-	-	-

Table 1.18.

TABLE FOR 500°C (S. UNE EN 13381-4) FOR 3-SIDED SHS BEAMS

Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	21	21	21	21	21	24	33	42	-
80	22	22	22	22	22	28	36	45	-
90	22	22	22	22	22	31	39	48	-
100	22	22	22	22	25	33	41	50	-
110	22	22	22	22	27	35	43	52	-
120	22	22	22	22	28	37	45	53	-
130	23	23	23	23	30	38	46	-	-
140	23	23	23	23	31	39	48	-	-
150	23	23	23	24	32	40	49	-	-
160	23	23	23	25	33	42	50	-	-
170	23	23	23	26	34	43	51	-	-
180	24	24	24	27	35	43	52	-	-
190	24	24	24	27	36	44	53	-	-
200	24	24	24	28	37	45	-	-	-
210	24	24	25	29	37	46	-	-	-
220	24	24	25	30	38	47	-	-	-
230	25	25	26	30	39	47	-	-	-
240	25	25	26	31	39	48	-	-	-
250	25	25	27	31	40	49	-	-	-
260	25	25	27	32	40	49	-	-	-
270	25	25	28	32	41	49	-	-	-
280	25	25	28	32	41	49	-	-	-
290	25	25	28	32	41	50	-	-	-
300	25	25	28	33	41	50	-	-	-
310	25	25	29	33	41	50	-	-	-
320	25	25	29	33	42	50	-	-	-
330	25	25	29	33	42	50	-	-	-

Table 1.19.

FIRE RESISTANCE TABLES FOR HOLLOW SECTIONS

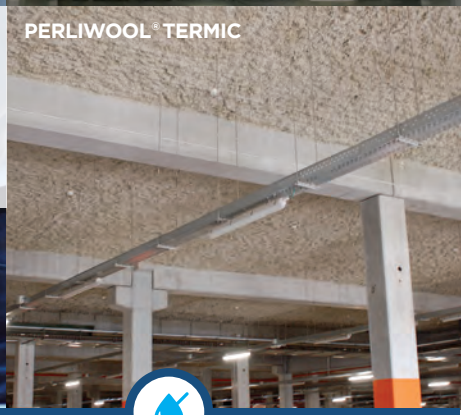
TABLE FOR 550°C (S. UNE EN 13381-4) FOR 3-SIDED SHS BEAMS

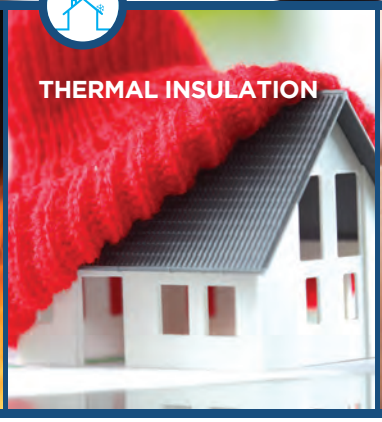
Mass	Thickness (mm)								
m $^{-1}$	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
70	21	21	21	21	21	21	29	37	-
80	22	22	22	22	22	25	33	41	-
90	22	22	22	22	22	28	36	44	-
100	22	22	22	22	22	30	38	46	-
110	22	22	22	22	24	32	40	48	-
120	22	22	22	22	26	34	42	50	-
130	23	23	23	23	28	36	44	52	-
140	23	23	23	23	29	37	45	53	-
150	23	23	23	23	30	38	46	-	-
160	23	23	23	23	31	39	47	-	-
170	23	23	23	24	32	40	48	-	-
180	24	24	24	25	33	41	49	-	-
190	24	24	24	26	34	42	50	-	-
200	24	24	24	27	35	43	51	-	-
210	24	24	24	27	36	44	52	-	-
220	24	24	24	28	36	45	53	-	-
230	25	25	25	29	37	45	-	-	-
240	25	25	25	29	38	46	-	-	-
250	25	25	26	30	38	47	-	-	-
260	25	25	26	30	39	47	-	-	-
270	25	25	26	31	39	47	-	-	-
280	25	25	27	31	39	48	-	-	-
290	25	25	27	31	40	48	-	-	-
300	25	25	27	31	40	48	-	-	-
310	25	25	27	32	40	48	-	-	-
320	25	25	28	32	40	48	-	-	-
330	25	25	28	32	40	49	-	-	-

Table 1.20.

PERLI WOOL
PERLI WOOL TERMIC

RANGE OF PERLIWOOL® MORTARS, MORE THAN A SPRAY-ON MORTAR





	Continuous coating without joins	Highly adaptable to the various shapes of elements to be treated	Thermal insulator	Sound absorbent	Fire resistance	Reaction to fire rating A1. Non-flammable, zero-burn	Helps to prevent surface condensation	100% recyclable	Contributes to energy savings and the reduction of CO_2 emissions	Weather-resistant Produced from inorganic products
PERLI WOOL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PERLI WOOL TERMIC	✓	✓	✓	✓		✓	✓	✓	✓	✓

MINERAL Fiber Solutions

T +34 932 552 830
mineralfsol@mineralfsol.com
MINERALFSOL.COM

3.1 →

PASSIVE FIRE PROTECTION

PROTECTION OF LOAD-BEARING ELEMENTS

3.1.b CONCRETE STRUCTURE

Concrete structures protected with **PERLIWOOL®** have been assessed over set periods in accredited laboratories.

Construction Technical Code in the Basic Document for Fire Safety (DB-SI) section SI 6: Structural fire resistance and in Annex SI C: Reinforced concrete structural fire resistance, provides guidance and defines the minimum requirements in terms of fire resistance in concrete structures.

These sections define for each R, EI or REI fire resistance rating the minimum thickness of concrete and the minimum distance of the frame beam from the surface being exposed to the fire.

For cases in which the concrete end piece, beam or pillar is neither of the required minimum thickness nor the minimum distance from the reinforcement axis with the face exposed to the fire, these elements may be protected with **PERLIWOOL®** fire-retardant mortar using the different tables of equivalent thickness.

The equivalent thickness is added to the actual thickness and the minimum actual distance from the reinforcement axis with the face exposed to fire to meet the required fire resistance objective.

Base test for passive fire protection of:

REINFORCED CONCRETE STRUCTURE: WALLS, SOLID SLABS, BIDIRECTIONAL SLABS, UNIDIRECTIONAL SLABS, BEAMS AND PILLARS.

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI).

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 09/32300329	Test No. 17/15079-2364	Test No. 09/32300328	Test no. 19/19582-1987
ACCREDITED LABORATORY:	APPLUS	APPLUS	APPLUS	APPLUS
APPLICABLE STANDARD:	UNE ENV 13381-3	UNE EN 13381-3	UNE ENV 13381-3	UNE ENV 13381-5
REQUIRED THICKNESS:	See table 2.1	See table 2.2	See table 2.3	See tables 2.4 and 2.5

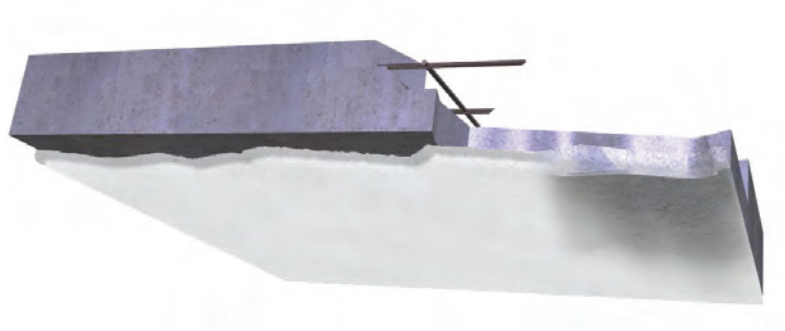


TABLE OF EQUIVALENT CONCRETE THICKNESSES FOR CONCRETE SLABS. TEST No. 09/32300329*

THICKNESS OF **PERLIWOOL®**	Equivalent thickness of concrete (mm)					
	30'	60'	90'	120'	180'	240'
10.9 mm	68	74	87	96	93	89

Table 2.1

TABLE OF EQUIVALENT CONCRETE THICKNESSES FOR CONCRETE SLABS. TEST No. 17/15079-2364

THICKNESS OF **PERLIWOOL®**	Equivalent thickness of concrete (mm)					
	30'	60'	90'	120'	180'	240'
15 mm	53	64	69	70	67	61

Table 2.2

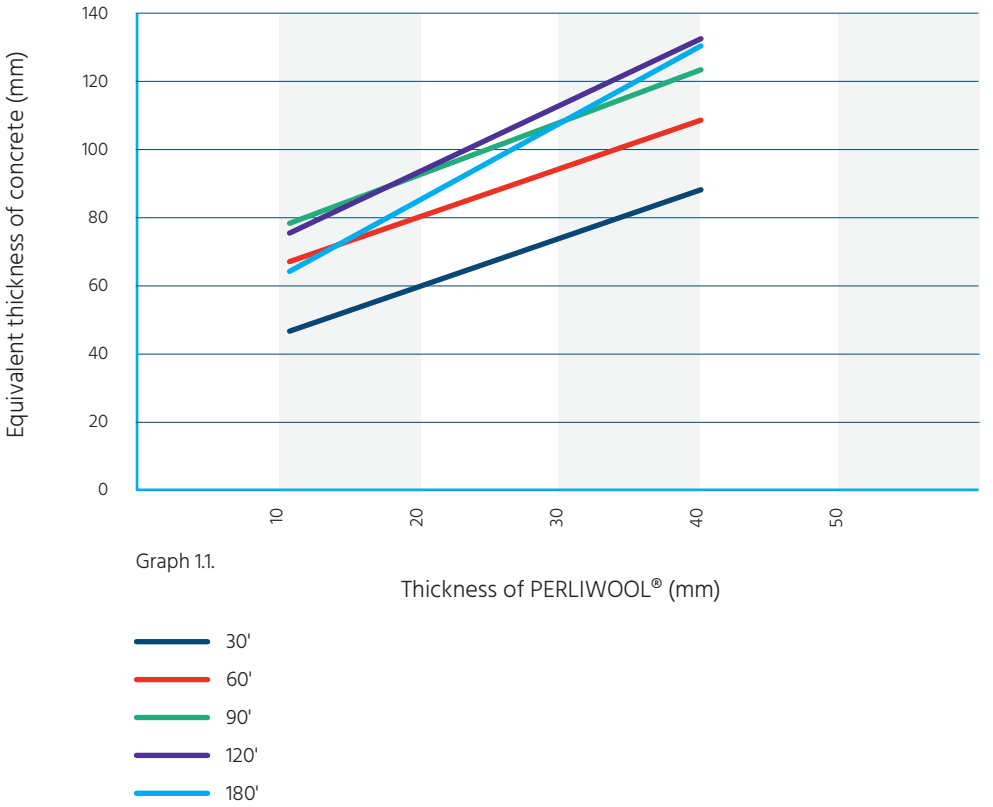
TABLE OF EQUIVALENT CONCRETE THICKNESSES FOR CONCRETE BEAMS AND PILLARS. TEST No. 09/32300328

THICKNESS OF **PERLIWOOL®**	Equivalent thickness of concrete (mm)					
	30'	60'	90'	120'	180'	240'
11 mm	48	67	76	75	65	-
40 mm	90	110	122	132	130	128

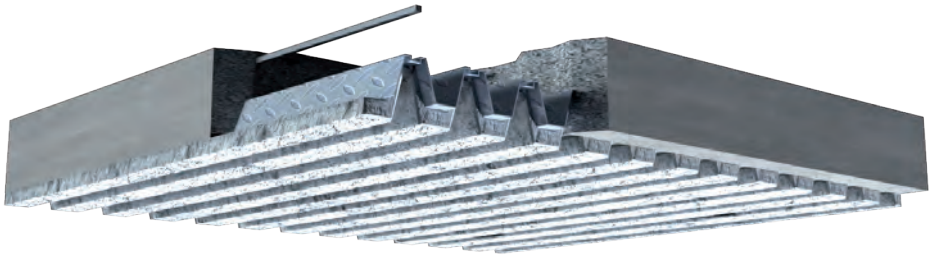
Table 2.3.

* Installation of 0.3 mm thickness ribbed metal mesh is required.

GRAPH DEPICTING THE EQUIVALENT THICKNESS OF CONCRETE/THICKNESS OF PERLIWOOL®



Graph 1.1.

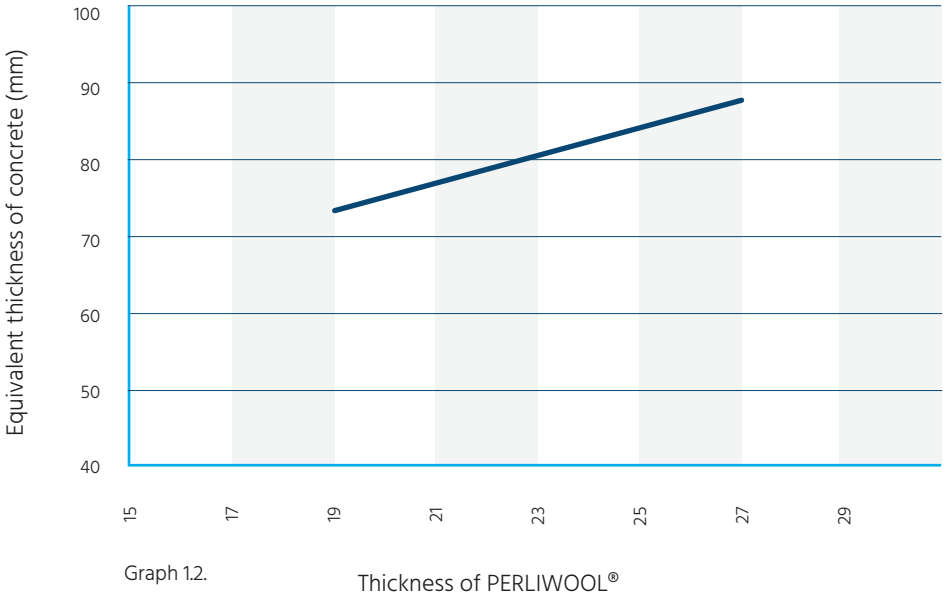


COMBINED STRUCTURE. TABLE OF EQUIVALENT CONCRETE THICKNESSES FOR COMBINED FORMAT CONCRETE COMPRESSION LAYERS TEST NO. 19/19582-1987

THICKNESS OF **PERLIWOOL®**	Equivalent thickness of concrete (mm)
19 mm	72
27 mm	88

Table 2.4

GRAPH DEPICTING THE EQUIVALENT THICKNESS/THICKNESS OF PERLIWOOL®



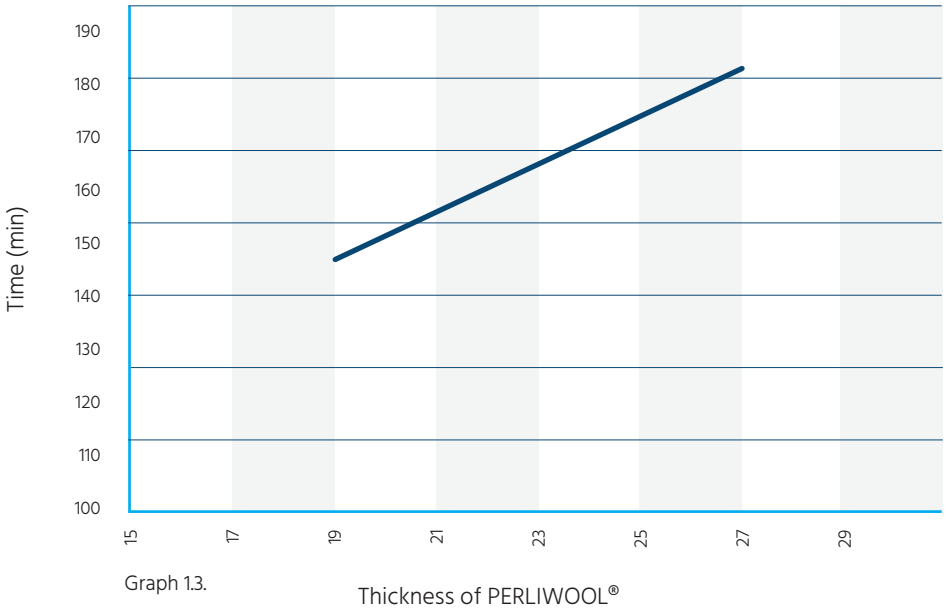
Graph 1.2.

LOAD-BEARING CAPACITY TEMPERATURE OF FORMED SHEET STEEL (TIME REQUIRED TO REACH 350°C)

THICKNESS OF PERLIWOOL®	Time for specification T 350°C (min)
19 mm	145
27 mm	181

Table 2.5

GRAPH OF TIME REQUIRED TO INCREASE SPECIFICATION TEMPERATURE TO 350°C/THICKNESS OF PERLIWOOL®



Graph 1.3.

APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is to be sprayed directly onto the surface to be protected, using a dry process spraying machine until the required thickness is obtained.

It is only necessary to use developing agents or mechanical components for the improvement of adhesion in cases where the surface area to be protected has extreme dirt, grease, oils, paint remnants, etc. present and which cannot be cleaned easily.

3.1 →

PASSIVE FIRE PROTECTION

PROTECTION OF LOAD-BEARING ELEMENTS

3.1.c TIMBER STRUCTURE

Timber structures protected with **PERLIWOOL®**have been assessed over set periods in accredited laboratories. Testing was carried out at APPLUS in order to determine the contribution of timber structural members to fire resistance in accordance with test standard FprEN 13381-7. In the test conducted, it was concluded that the rate of charring of timber protected by 38 mm of **PERLIWOOL®** mortar was equal to 0.4 mm/min. The test was terminated after 152 minutes without failure of the fire protection system, either due to lack of adhesion or the maximum temperature recorded.

Construction Technical Code in the Basic Document for Fire Safety (DB-SI) section SI 6: Structural fire resistance and in Annex SI E: Timber concrete structural fire resistance, provides guidance and defines the minimum requirements in terms of fire resistance in timber structures. It is important to bear in mind that the verification of the load-bearing capacity of a timber structural element is carried out according to the methods established in the DB SE-M of the Technical Building Code.

APPLICATION ON THE SUBSTRATE TO BE PROTECTED

Prior to the spray application of **PERLIWOOL®** mortar, timber should be covered with a metallic triple torsion mesh. After that, the **PERLIWOOL®** mortar is sprayed directly onto it using a dry process spraying machine until the required thickness is obtained.

Base test for passive fire protection of:

TIMBER STRUCTURES

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI).

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 19/19582-836
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	FprEN 13381-7
AVERAGE THICKNESS REQUIRED:	38 mm
START OF CHARRING:	64 minutes
CHARRING RATE:	β_2 (mm/min) = 0.4

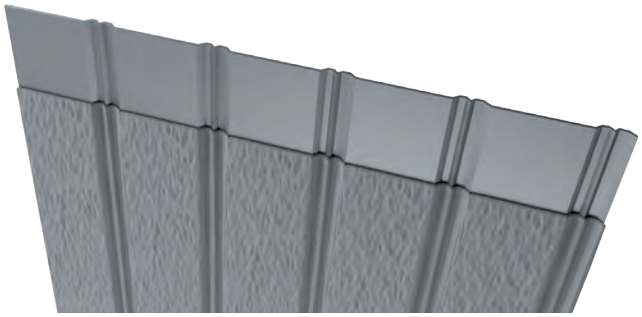
3.2 →

PASSIVE FIRE PROTECTION

PROTECTION OF NON LOAD-BEARING ELEMENTS

3.2.a VERTICAL SECTIONING EI-180

A test was carried out in APPLUS to ascertain the fire resistance of a 3000 x 3000 mm vertical partition, composed of a corrugated galvanized steel sheet covered with **PERLIWOOL®** mortar. The protection was applied with an average thickness of 57 mm. The result obtained was an EI of 180 minutes and the test was carried out in accordance with the UNE-EN 13501-2 + A1 standard.



APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is sprayed directly onto the corrugated galvanized steel sheet mounted on 45 x 35 x 0.6 mm uprights spaced at regular 600 mm intervals. The uprights are in turn secured to 48 x 30 x 0.55 mm channels.

It is only necessary to use developing agents or mechanical components for the improvement of adhesion in cases where the corrugated galvanised steel sheet to be protected is insufficiently secured which does not prevent bending, grease, oils, paint remnants, etc. and which cannot be cleaned easily.

Base test for passive fire protection of:

VERTICAL SECTIONING EI-180

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI)

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 16/12863-1708
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE-EN 13501-2 + A1
AVERAGE THICKNESS REQUIRED:	57 mm
FIRE RESISTANCE:	EI-180

3.2 →

PASSIVE FIRE PROTECTION

PROTECTION OF NON LOAD-BEARING ELEMENTS

3.2.b COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK) EI-60

A test was carried out in APPLUS to ascertain the fire resistance of a partition assembly with a roof by means of a strip covered with **PERLIWOOL®** mortar. The protection was applied with an average thickness of 30 mm. The result obtained was an EI of 60 minutes and the test was carried out in accordance with the UNE-EN 1363-1 standard and the RSCIEI application guidelines.. Annex B. October 2007 Edition.

APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is sprayed directly onto the 0.3 mm thick ribbed mesh adhering to the angles by means of three 80 mm master omega profiles using a dry process spraying machine until the required thickness is obtained. The angles must be anchored to the partition. The strip must comply with the requirements of the Spanish Regulation for Fire Safety in Industrial Establishments (RSCIEI).

Base test for passive fire protection of:

COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK), 25° SLOPE

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI)

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 16/10606-697
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE-EN 1363-1 AND RSCIEI
APPLICATION GUIDELINE (RSCIEI):	Annex B. October 2007 Edition
REQUIRED THICKNESS:	30 mm
FIRE RESISTANCE:	EI-60

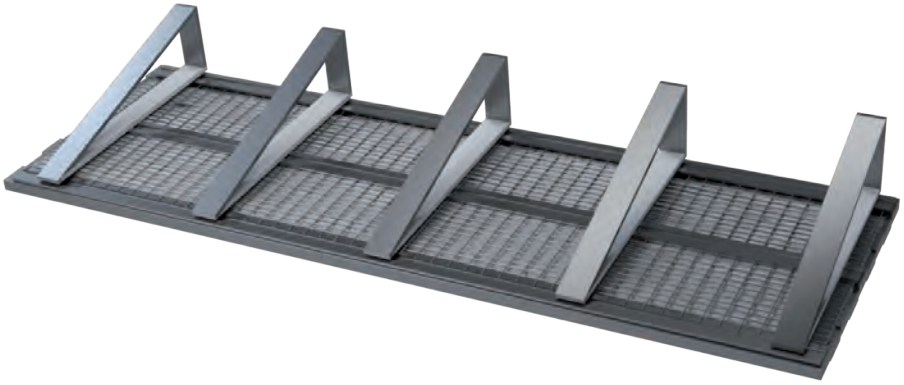
3.2 →

PASSIVE FIRE PROTECTION

PROTECTION OF NON LOAD-BEARING ELEMENTS

3.2.c COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK) EI-90

A test was carried out in APPLUS to ascertain the fire resistance of a partition assembly with a roof by means of a strip covered with **PERLIWOOL®** mortar. The protection was applied with an average thickness of 33 mm. The result obtained was an EI of 90 minutes and the test was carried out in accordance with the UNE-EN 1363-1 standard and the RSCIEI application guidelines.. Annex B. October 2007 Edition.



APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is sprayed directly onto the 0.3 mm thick ribbed mesh adhering to the angles by means of three 80 mm master omega profiles using a dry process spraying machine until the required thickness is obtained. The angles must be anchored to the partition. The strip must comply with the requirements of the Spanish Regulation for Fire Safety in Industrial Establishments (RSCIEI).

Base test for passive fire protection of:

COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK), 0° SLOPE

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI)

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 16/10606-697
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE-EN 1363-1 AND RSCIEI
APPLICATION GUIDELINE (RSCIEI):	Annex B. October 2007 Edition
REQUIRED THICKNESS:	33 mm
FIRE RESISTANCE:	EI-90

3.2 →

PASSIVE FIRE PROTECTION

PROTECTION OF NON LOAD-BEARING ELEMENTS

3.2.d COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK) EI-120

A test was carried out in APPLUS to ascertain the fire resistance of a partition assembly with a roof by means of a strip covered with **PERLIWOOL®** mortar. The protection was applied with an average thickness of 56.8 mm. The result obtained was an EI of 120 minutes and the test was carried out in accordance with the UNE-EN 1363-1 standard and the RSCIEI application guidelines.. Annex B. October 2007 Edition.

APPLICATION ON THE SUBSTRATE TO BE PROTECTED

PERLIWOOL® is sprayed directly onto the 0.3 mm thick ribbed mesh adhering to the angles by means of three 80 mm master omega profiles using a dry process spraying machine until the required thickness is obtained. The angles must be anchored to the partition. The strip must comply with the requirements of the Spanish Regulation for Fire Safety in Industrial Establishments (RSCIEI).

Base test for passive fire protection of:

COVERED PARTITION ASSEMBLY PROTECTED WITH COVERED STRIP (FIREBREAK), 25° SLOPE

Suitable for installations regulated by:

SPANISH REGULATION FOR FIRE SAFETY IN INDUSTRIAL ESTABLISHMENTS (RSCIEI)

CONSTRUCTION TECHNICAL CODE (CTE)

	Test No. 15/10329-2308
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE-EN 1363-1 AND RSCIEI
APPLICATION GUIDELINE (RSCIEI):	Annex B. October 2007 Edition
REQUIRED THICKNESS:	56.8 mm
FIRE RESISTANCE:	EI-120

PERLIWOOL®, MORE THAN A FIRE-RETARDANT MORTAR

- **PERLIWOOL®** provides protection against the action of fire demonstrated through a large number of fire resistance tests simulating various fire scenarios.
- **PERLIWOOL®** has a reaction to fire rating of A1, which means that it is a non-combustible product that is fire-resistant.
- **PERLIWOOL®** retains its properties over a long period of time, as it is manufactured using natural inorganic products.
- **PERLIWOOL®** is a powerful thermal insulator, contributing to energy savings and a reduction in CO_2 emissions.
- **PERLIWOOL®** is recyclable, even after application
- **PERLIWOOL®** is environmentally friendly, and **PERLIWOOL®** generates no waste in production, with 100% of surplus material being recycled.
- **PERLIWOOL®** is a highly efficient sound absorber, helping to regulate reverberations (echoes) and the high levels of ambient sound pressure in rooms.
- **PERLIWOOL®** helps to control water condensation.

4 THERMAL INSULATION

PERLIWOOL® is a product with outstanding physical properties that help to increase the level of thermal insulation in the areas in which it is applied.

As it is a spray-on product, it forms a continuous coating, thus avoiding the difficult-to-remedy thermal bridges generated by other systems.

With **PERLIWOOL®**, it is easier to achieve the energy-saving objectives defined in the various applicable standards. This could result in a reduction in air conditioning costs with a safe and comfortable room.

Apply more **PERLIWOOL®** and increase the level of thermal insulation in addition to obtaining the required level of fire resistance.

λ PERLIWOOL®: 0.078 W/mK

PERLIWOOL® THERMAL RESISTANCE AND TRANSMITTANCE AS A FUNCTION OF THE APPLICATION THICKNESS.

PERLIWOOL® THICKNESS (in mm)	10	20	30	40	60	80	100	110	120
THERMAL RESISTANCE R	0.13	0.26	0.38	0.51	0.77	1.03	1.28	1.41	1.54
THERMAL TRANSMITTANCE U	7.80	3.90	2.60	1.95	1.30	0.98	0.78	0.71	0.65

PERLIWOOL® IS A PRODUCT WITH OUTSTANDING PHYSICAL PROPERTIES THAT HELP TO INCREASE THE LEVEL OF THERMAL INSULATION IN THE AREAS IN WHICH IT IS APPLIED.

	Test No. 18/15718-73
ACCREDITED LABORATORY:	APPLUS
APPLICABLE STANDARD:	UNE-EN 12667

5 SOUND ABSORPTION

The basic composition of **PERLIWOOL®** is rock wool, one of the most efficient porous sound absorbers on the market.

In addition to being used for its fire resistance, **PERLIWOOL®** helps to control the reverberations generated inside a room, reflecting a low percentage of incident sound.

With **PERLIWOOL®**, you can have more comfortable and healthy environments inside very busy rooms.

PERLIWOOL® HELPS TO CONTROL THE REVERBERATIONS GENERATED INSIDE A ROOM, REFLECTING A LOW PERCENTAGE OF INCIDENT SOUND.

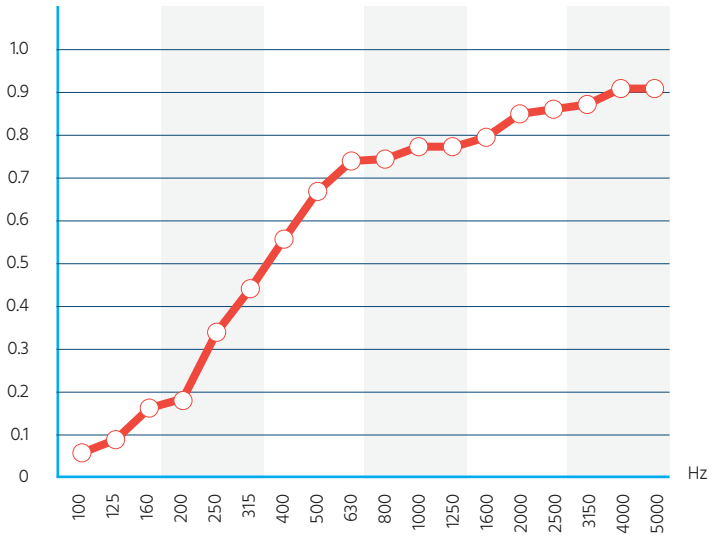
RESULTS. TEST No. 20/21824-232 carried out at APPLUS.

Measurement of sound absorption in accordance with UNE-EN ISO 354:2004

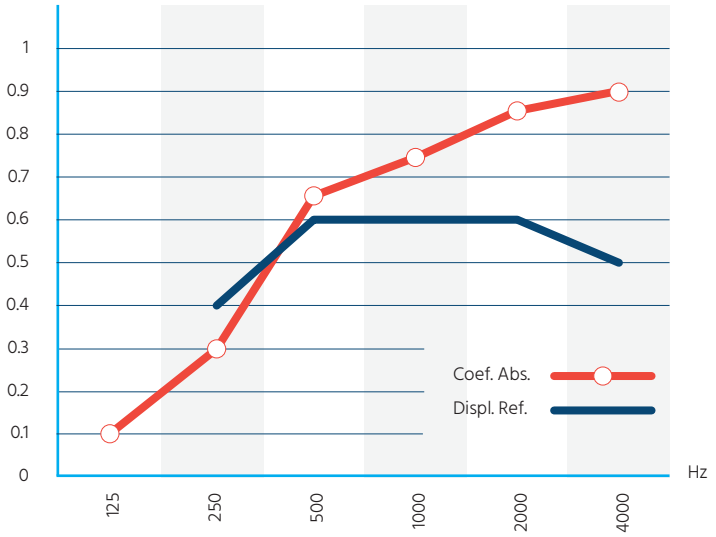
Test sample:
Sprayed with **PERLIWOOL®** mortar to a thickness of 15 mm.

Sample area, *S*: 10.93 m² - 3020 x 3620 mm

SOUND ABSORPTION COEFFICIENT α_S	
Frequency (Hz)	α_S
100	0.05
125	0.09
160	0.15
200	0.19
250	0.33
315	0.43
400	0.56
500	0.68
630	0.74
800	0.75
1000	0.78
1250	0.78
1600	0.80
2000	0.84
2500	0.85
3150	0.88
4000	0.91
5000	0.91



PRACTICAL SOUND ABSORPTION COEFFICIENT α_p	
Frequency (Hz)	α_p
125	0.10
250	0.30
500	0.65
1000	0.75
2000	0.85
4000	0.90



WEIGHTED SOUND ABSORPTION COEFFICIENT (EN ISO 11654)
α_w = 0.60 (H)

SOUND ABSORPTION CLASSES IN ACCORDANCE WITH α_w (EN ISO 11654)
A (>0.85)
B (0.80 to 0.85)
C (0.60 to 0.75)
D (0.30 to 0.55)
E (0.15 to 0.25)
Unclassified (<0.15)

It is strongly recommended to use the "Weighted sound absorption coefficient" unique assessment index (α_w) in combination with the full sound absorption coefficient curve.

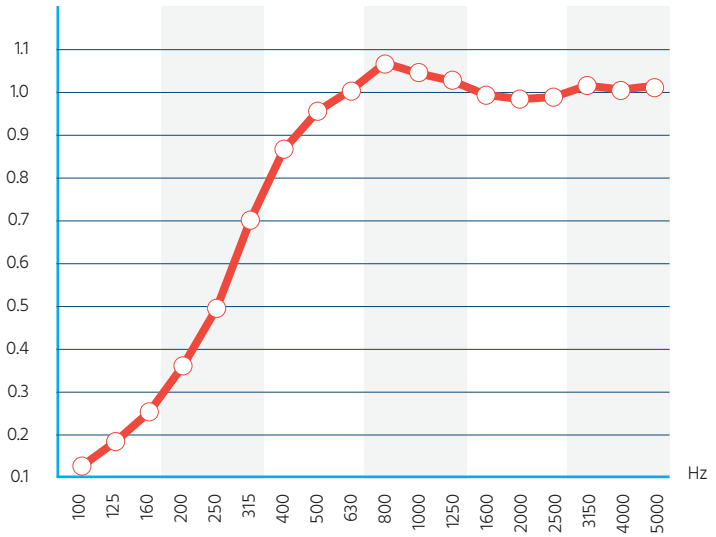
RESULTS. TEST No. 18/16416-237 carried out at APPLUS.

Measurement of sound absorption in accordance with UNE-EN ISO 354

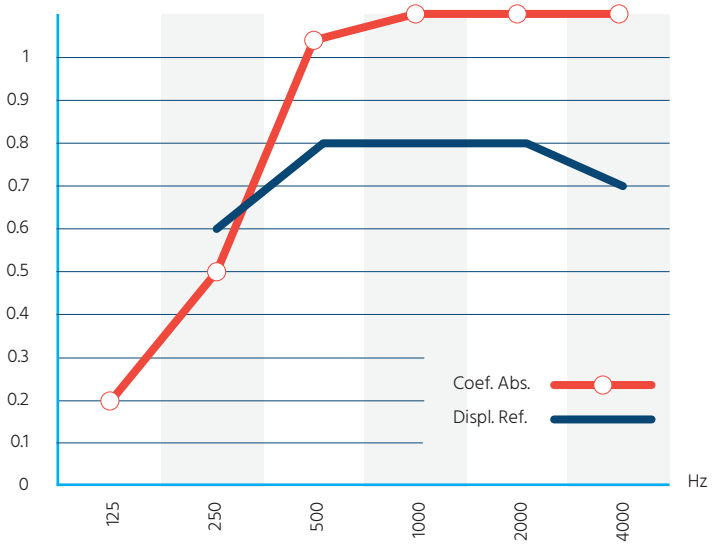
Test sample:
Sprayed mortar with commercial reference **PERLIWOOL®** with a nominal thickness of 30 mm. Average thickness of 35 mm.

Sample area, *S*: 11.07 m² - 3.04 x 3.64 m

SOUND ABSORPTION COEFFICIENT α_S	
Frequency (Hz)	α_S
100	0.11
125	0.18
160	0.25
200	0.37
250	0.49
315	0.91
400	0.86
500	0.94
630	1.00
800	1.05
1000	1.04
1250	1.02
1600	0.99
2000	0.98
2500	0.99
3150	1.02
4000	1.00
5000	1.00



PRACTICAL SOUND ABSORPTION COEFFICIENT α_p	
Frequency (Hz)	α_p
125	0.20
250	0.50
500	0.95
1000	1.00
2000	1.00
4000	1.00



WEIGHTED SOUND ABSORPTION COEFFICIENT (EN ISO 11654)
α_w = 0.80 (H)

SOUND ABSORPTION CLASSES IN ACCORDANCE WITH α_w (EN ISO 11654)
A (>0.85)
B (0.80 to 0.85)
C (0.60 to 0.75)
D (0.30 to 0.55)
E (0.15 to 0.25)
Unclassified (<0.15)

It is strongly recommended to use the "Weighted sound absorption coefficient" unique assessment index (α_w) in combination with the full sound absorption coefficient curve.

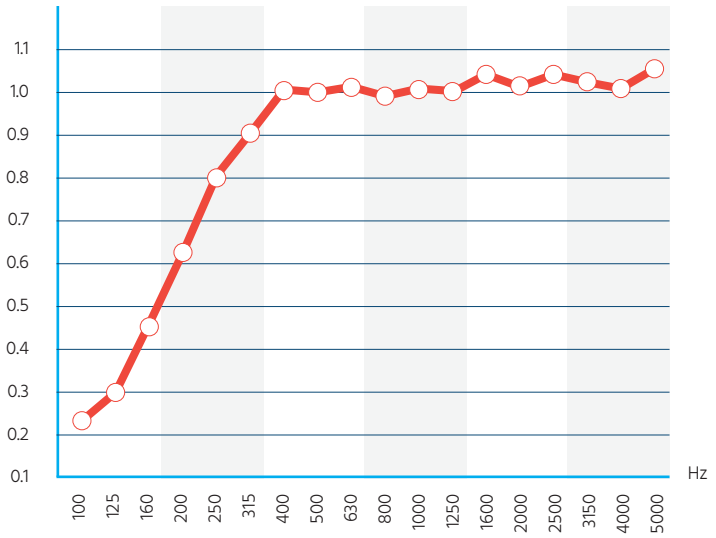
RESULTS. TEST No. 18/16416-238 carried out at APPLUS.

Measurement of sound absorption in accordance with UNE-EN ISO 354

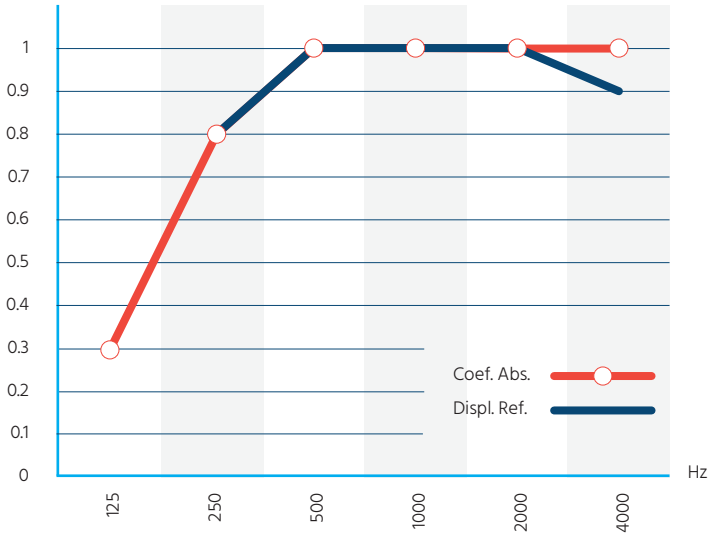
Test sample:
Sprayed mortar with commercial reference **PERLIWOOL®** with a nominal thickness of 50 mm. Average thickness of 54 mm.

Sample area, *S*: 11.34 m² - 3.09 x 3.67 m

SOUND ABSORPTION COEFFICIENT α_S	
Frequency (Hz)	α_S
100	0.23
125	0.30
160	0.45
200	0.63
250	0.80
315	0.69
400	1.01
500	1.00
630	1.02
800	0.98
1000	1.02
1250	1.00
1600	1.05
2000	1.02
2500	1.05
3150	1.04
4000	1.02
5000	1.07



PRACTICAL SOUND ABSORPTION COEFFICIENT α_p	
Frequency (Hz)	α_p
125	0.30
250	0.80
500	1.00
1000	1.00
2000	1.00
4000	1.00



WEIGHTED SOUND ABSORPTION COEFFICIENT (EN ISO 11654)
α_w = 1.00 (H)

SOUND ABSORPTION CLASSES IN ACCORDANCE WITH α_W (EN ISO 11654)
A (>0.85)
B (0.80 to 0.85)
C (0.60 to 0.75)
D (0.30 to 0.55)
E (0.15 to 0.25)
Unclassified (<0.15)

It is strongly recommended to use the "Weighted sound absorption coefficient" unique assessment index (α_w) in combination with the full sound absorption coefficient curve.

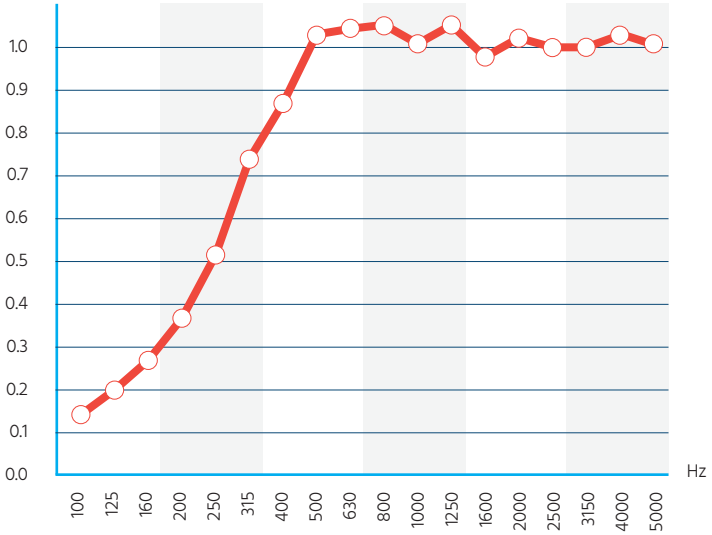
RESULTS. TEST No. 18/16416-239 carried out at APPLUS.

Sound absorption measurement in accordance with ASTM C423-09a

Test sample:
Sprayed mortar with commercial reference **PERLIWOOL®** with a nominal thickness of 30 mm. Average thickness of 35 mm.

Sample area, *S*: 7.36 m^2 - 2.42 x 3.04 m

SOUND ABSORPTION COEFFICIENT α	
Frequency (Hz)	α
100	0.13
125	0.20
160	0.28
200	0.38
250	0.51
315	0.73
400	0.88
500	1.01
630	1.03
800	1.04
1000	1.01
1250	1.03
1600	0.99
2000	1.02
2500	1.00
3150	1.00
4000	1.02
5000	1.01



MEAN SOUND ABSORPTION
SAA = 0.89

NOISE REDUCTION COEFFICIENT
NRC = 0.90

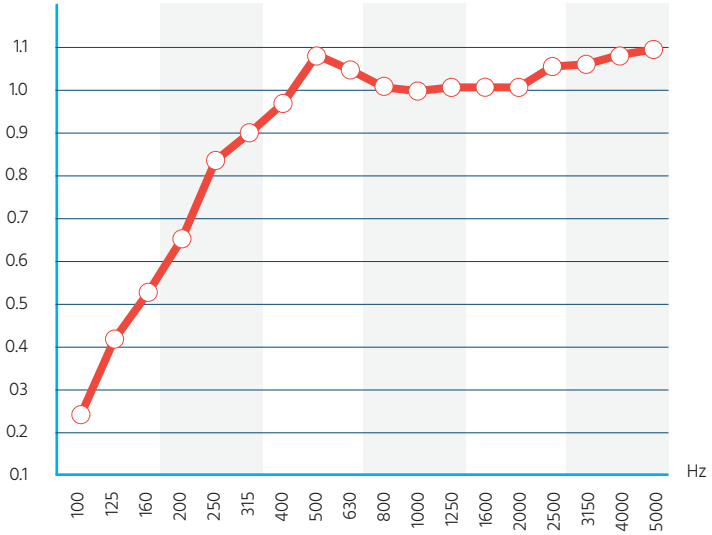
RESULTS. TEST No. 18/16416-240 carried out at APPLUS.

Sound absorption measurement in accordance with ASTM C423-09a

Test sample:
Sprayed mortar with commercial reference **PERLIWOOL®** with a nominal thickness of 50 mm. Average thickness of 54 mm.

Sample area, *S*: 7.60 m² - 2.46 x 3.09 m

SOUND ABSORPTION COEFFICIENT α	
Frequency (Hz)	αs
100	0.24
125	0.41
160	0.52
200	0.66
250	0.84
315	0.90
400	0.98
500	1.07
630	1.03
800	1.01
1000	0.98
1250	1.03
1600	1.02
2000	1.03
2500	1.05
3150	1.06
4000	1.07
5000	1.09



MEAN SOUND ABSORPTION	NOISE REDUCTION COEFFICIENT
SAA = 0.97	**NRC = 1.00**

6 WATER CONDENSATION CONTROL

Thanks to the thermal insulation provided by **PERLIWOOL®**, we are able to ensure that the dew point is not reached in any of the various rooms, thus avoiding any possible surface condensation. We recommend using **PERLIWOOL®** with fire-retardant vapour barriers to prevent any possible interstitial condensation.

Since **PERLIWOOL®** is a product that resists the formation of mildew, it may be applied in areas where conditions are suitable for the formation of this fungal growth.

PERLIWOOL® RESISTS THE FORMATION OF MILDEW. MAY BE APPLIED TO AREAS WHERE CONDITIONS ARE SUITABLE FOR THE FORMATION OF THIS FUNGAL GROWTH.

7 PERLIWOOL® FINISHES

PERLIWOOL®
an original finish

PERLIWOOL® PROVIDES A WIDE RANGE OF FINISHES SUITED TO DIFFERENT TASTES. THE MOST COMMON FINISHES ARE:

Exposed **PERLIWOOL®** finishes:

- Classic or rustic finish: Once sprayed on, **PERLIWOOL®** forms a rough continuous coating, resulting in a rustic finish.
- Smooth finish: Wet-state **PERLIWOOL®** can be flattened and moulded to suit, resulting in a smooth and original finish.
- Finish with **END LIQUID: END LIQUID** is a liquid finishing product which hardens the mortar. **END LIQUID** is fire-retardant, making it ideally suited to applications with a Fire Resistance requirement.

Non-exposed **PERLIWOOL®** finishes:

PERLIWOOL® may be covered with practically any dry or wet-process partitioning system or any false ceiling system currently available on the market, and installation systems independent of those for the mortar.

MINERAL
Fiber Solutions

MINERAL FIBER SOLUTIONS, S.L.

T +34 932 552 830
mineralfsol@mineralfsol.com

MINERALFSOL.COM

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