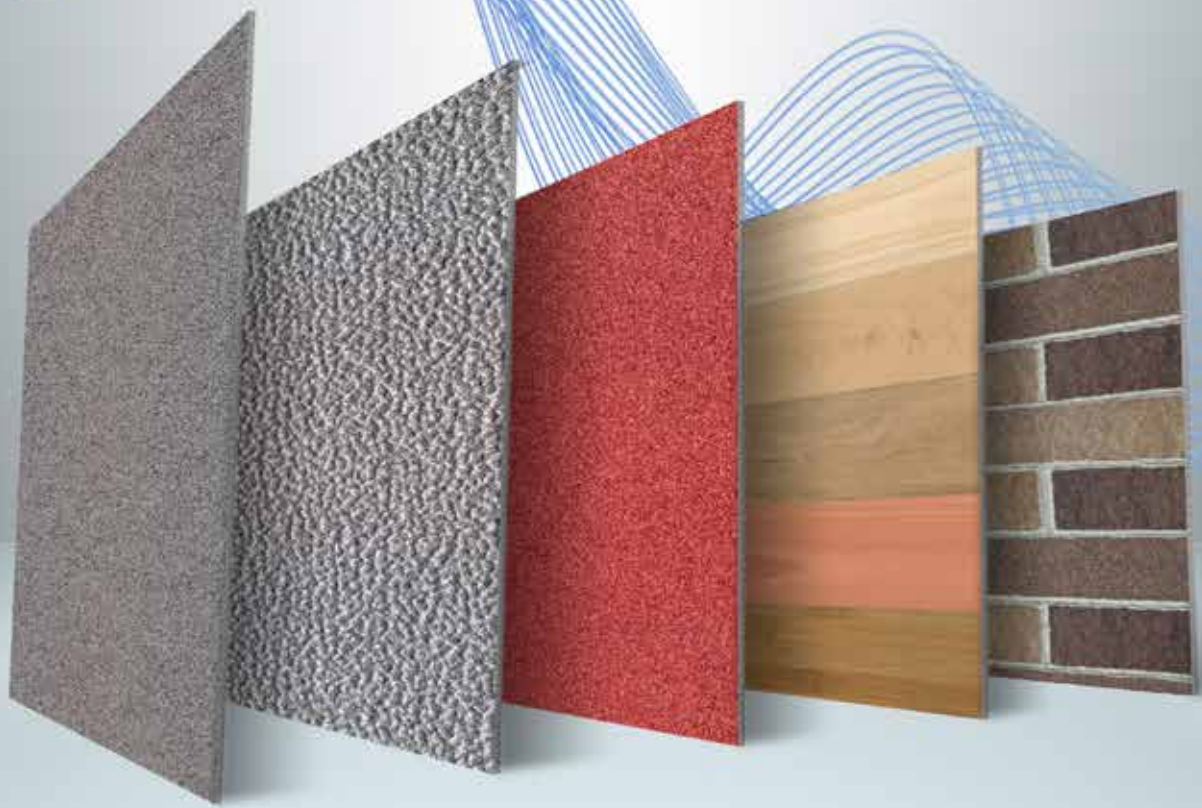


Aluminium Sound-absorbing Plate



POROUS SOUND ABSORPTION MATERIAL

NDC CALME

MADE OF SINTERED ALUMINIUM



CALME PLUS
Standard Brick

CALME
Selective Color
Light Beige

CALME PLUS
Custom-made
Marble

CALME PLUS
Custom-made
Painting



Structure

CALME has approximately 45% porosity. This continuous pore structure generates excellent sound absorbing effect.

NDC CALME is a sintered aluminium sound absorption material. It was created with high sintering technology - pure aluminium powders are sintered in no pressure condition and become a porous plate. It performs at the world highest level as a plate material itself.

Sophisticated beauty and high sound attenuation, which together make it an ideal material for various places.

High Safety

1. Incombustibility

CALME does not burn, produce smoke, or store static electricity.

The relevant approvals are as follows:

■ UL file No. R13582

Acoustical aluminium alloy panels, uncoated or coated types A, B or C.
(UL LLC - global safety consulting and certification company in USA)

■ A1 in accordance with Euroclass 13501-1

(Classification system for reaction to fire properties in Europe)

■ Noncombustible Material Approval Certificate No. NM-9209

(Japanese Minister of Land, Infrastructure, Transport and Tourism)

2. Durability

It can stably deal with uncomfortable noise over a long period, even in a harsh environment that degrades resinous sound absorbing materials in a few years.

3. Safety

It includes neither harmful heavy metals nor toxic substances, and is usable in the places to be concerned about sanitary conditions.

Environment Friendly

With the continuous growth of concerns over the global environment, resources and energy issues, the protection of the environment has high priority in the building industry. CALME keeps its effect semipermanently*1 in general usage.

It is also reusable as general-purpose aluminium materials when disposing.

*1 Depends on the actual usage condition

Unique Appearance

The standard colour is silver grey, but customers can select any other colour as per their preference. Digital print is also available with the latest printing technology. A functional building material is now a part of the interior design.

DESIGN AND PERFORMANCE

Take them both.

IMPROVE YOUR QUALITY OF LIFE

Sound control might sound like it is only related to specific fields, but it is actually all around us in everyday life. It would be much better if underground stations were quiet enough to talk on the phone, or if there was no problem hearing conversation in a crowded restaurant. Our life will be more comfortable just by controlling the sound that echoes in all directions.

CALME can absorb a particular frequency depending on the noise source by changing the width of the air gap*² behind it, which makes CALME effective in everyday life situations, as well as music related places or industrial noise situations.

*² An air gap is necessary to obtain sound absorbing effect

VERY WIDELY USED

CALME is superior in durability including fire resistance, water resistance*³, corrosion resistance and wind pressure resistance. It has been therefore used in wide variety of architectures over the world.

Examples: swimming pool, skating rink, gymnasium, recording studio, music hall, cultural hall, city hall, auditorium, station, cruise ship cabin/engine room, museum, restaurant, welfare facility, school, factory etc.

*³ Except material type A (see P8)

Hall

The reverberation time needs to be adjusted according to the purpose. For instance, music should moderately echo in a music hall, and speech should be clear in an auditorium. The sound that leaks outside of the room also has to be considered.



Station

Stations are noisy in general, and the noise echoes a lot especially in an underground station. It is also important to lessen the noise pollution along railway lines.

Swimming Pool

It is hard to hear others clearly in a swimming pool, but this inconvenience will be resolved by applying CALME. It will not fall from the ceiling with corrosion due to moisture.

*⁴ Condensation needs to be avoided



Restaurant

There is a strong desire for restaurants to be quiet and calming. Maintaining an acoustic environment will definitely improve customer satisfaction.

EASY TO HANDLE

CALME weight is about a half of the weight of a general aluminium plate.

Cutting

We can precut CALME if the dimension is provided. It is not hard to adjust the size when installing, using a utility knife or a chip saw for aluminium.

Cut with a utility knife



1. Mark your desired cut line.



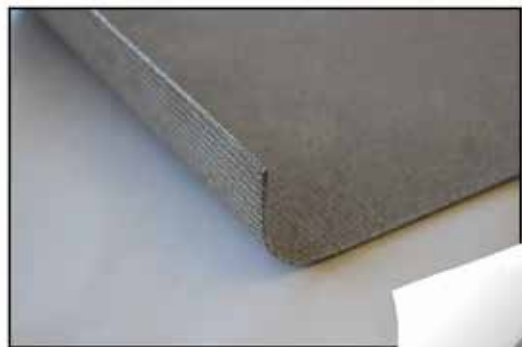
2. Make a notch that is more than half the thickness.



3. Fit the notch to a square corner and move the end up and down to separate it.

Bending

CALME can easily form a large curve (R1m+) by pushing it towards a foundation made by board or wood. Please contact us for a smaller curve or rounding.



Making Holes

Holes that are smaller than $\phi 80$ can be created with a drill or a hole saw. Please contact us for any larger holes.



CHOOSE THE BEST COLOUR

Although it is made of metal, CALME has some warmth in its texture. It matches well to other natural materials such as stones.

We can coat CALME with a selected painting color. We paint it under our facility to avoid decreasing the sound absorption effect.

The color might look a little different on CALME, because it is a porous material. We can provide a sample for you to check the actual color.

Since it is a sintered material, the surface color of each CALME sheet is slightly different. Please see the photos of past projects and understand this feature.



CALME
Selective Color
Dark Gray

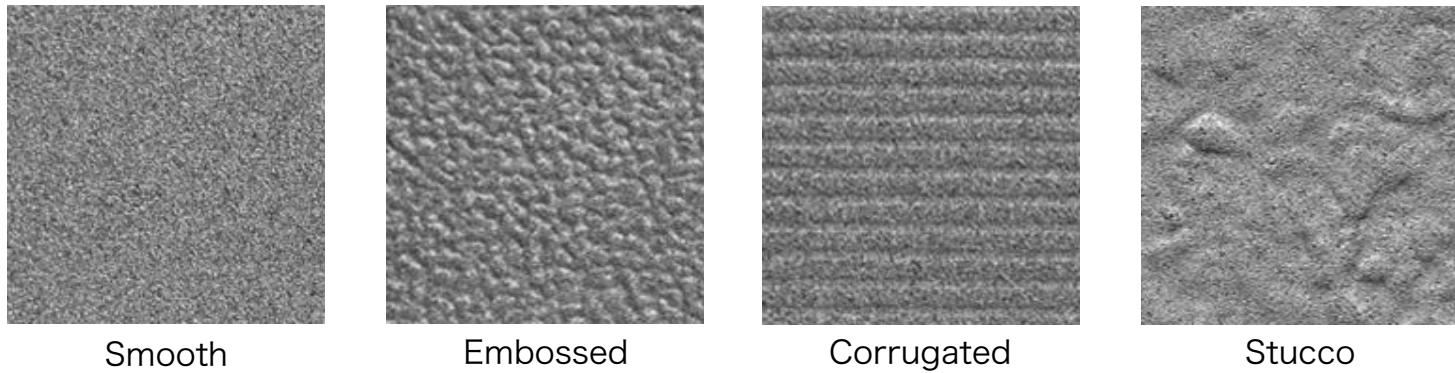
CALME
Selective Color
Beige

CALME
Selective Color
Wine Red

STANDARD SPECIFICATION

WE HAVE BOTH STYLE AND FUNCTION OPTIONS

Surface Texture



Material Type



Type A

Strength: High
Water resistant: No

Suitable for indoor use without humidity.

Type B

Strength: Medium
Water resistant: Medium

Recommended for indoor with slight humidity, or when bending is expected.

Type C

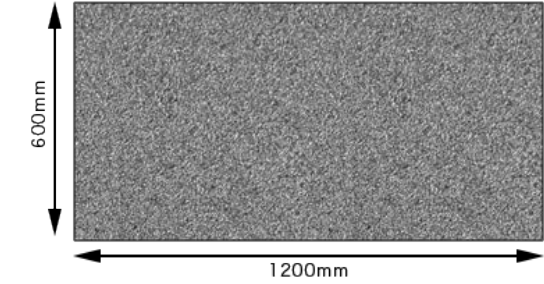
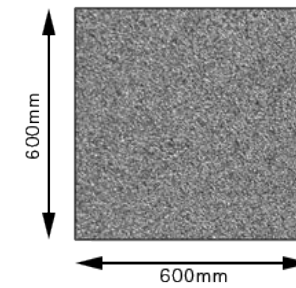
Strength: Low
Water resistant: High

The best for places with high humidity (e.g. swimming pools, underground) or outdoor.

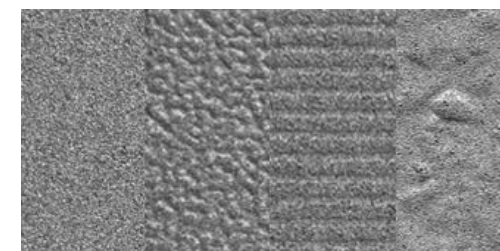
Standard Product Code

THICKNESS (mm)	SIZE (mm)	WEIGHT (kg)		TYPE	PRODUCT CODE				COLOR
		PER SHEET	PER 1m ²		SMOOTH	EMBOSSED	CORRUGATED	STUCCO	
2	600x600	1.2	3.2	A	A2001	A20D1	A20S1	A20T1	Standard or Selective
				B	B2001	B20D1	B20S1	B20T1	
				C	C2001	C20D1	C20S1	C20T1	
	600x1200	2.4	A	A2002	A20D2	A20S2	A20T2		
			B	B2002	B20D2	B20S2	B20T2		
			C	C2002	C20D2	C20S2	C20T2		
3	600x600	1.7	4.8	A	A3001	A30D1	A30S1	A30T1	
				B	B3001	B30D1	B30S1	B30T1	
				C	C3001	C30D1	C30S1	C30T1	
	600x1200	3.4	A	A3002	A30D2	A30S2	A30T2		
			B	B3002	B30D2	B30S2	B30T2		
			C	C3002	C30D2	C30S2	C30T2		

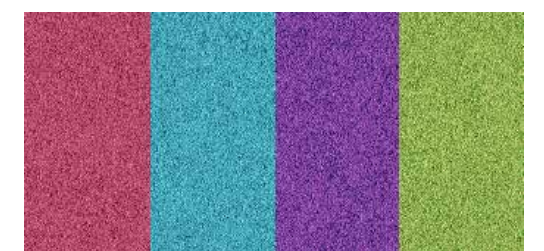
Size



Colour



Standard Color
(Silver Gray)



Selective Color
(Extra charge is required)

※ Standard color is painted to cover uneven color tone that may occur during sintering process. This coating can withstand heat up to 80°C, so please ask us for uncoated sheet(s) if you will use it in a high temperature environment.

NEW DIMENSION IN SOUND ABSORPTION

CALME PLUS will improve the acoustic environment and enhance beautiful interior design at the same time. An advanced technology achieved high quality printing on porous material.



CALME PLUS
Standard Wood

CALME PLUS



WOOD

Wood is one of the most popular materials for interior wall and ceiling cladding. We prepared 5 styles, and each style has 3 random patterns for them to seem natural when several sheets are installed together.

IMAGE	STYLE	SIZE	CODE
	Cypress	600 x 80 mm	B20MK1H
	Birch		B20MK1K
	Oak		B20MK1N
	Cherry		B20MK1S
	Bamboo		B20MK1T

BRICK

We have 5 colour tone selection. Each style has 3 random patterns so they seem natural even when you put sheets with same style next to each other.

IMAGE	STYLE	SIZE	CODE
	Yellow	200 x 60 mm	B20RK12E
	Orange		B20RK13E
	Brown		B20RK14E
	Beige		B20RK16E
	Red		B20RK17E



STONE

They are exactly the same colour tone, but have slightly different patterns. It will look relatively natural when installing more than 2 sheets.

IMAGE	SIZE	CODE
	600 x 600 mm	B2001K1S1
		B2001K1S2
		B2001K1S3

CUSTOM-MADE

We can print any original or copyright free images. The whole wall can be decorated by using several sheets for one huge image. The image needs to be high quality for a better finish.

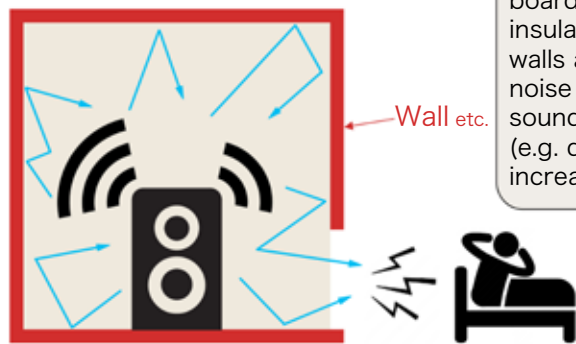
IMAGE	SIZE	CODE
Original Image or Copyright Free Image	Free	B2001K10

Comfortable Acoustic Environment

Music studios and concert halls are not the only places to be concerned about sound. Many buildings, including houses and offices need acoustic designs for their varied purposes. When the sound absorption effect in a room is not enough, the noise within the room increases itself. However, using sound absorption material eventually lessens the noise outside as well. Sound absorption is therefore important for both inside and outside comfortability.

SOUNDPROOF

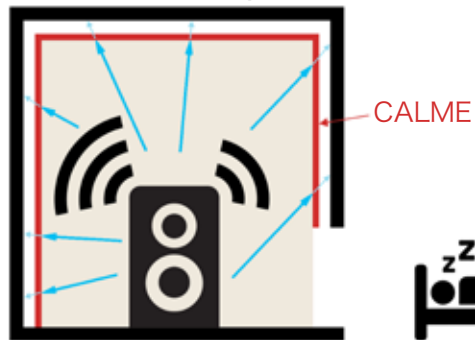
Sound Insulation



Usually covering a noise source with board or concrete is called sound insulation. The sound reflects off the walls and increases, which means the noise level does not get lower. The sound that leaks from any clearance (e.g. doors, windows, air vents) also increases.



Sound Absorption



Applying sound absorption makes sound insulation work properly. It makes the sound decrease inside the room, which also allows less sound to leak outside of the room.

Combining sound insulation and sound absorption for effective soundproofing!

Suitable Reverb Control

Outside, sound is almost not reflected, most sounds we hear will directly reach us. Contrarily inside a room, we hear sound that is reflected by the floor, wall, ceiling or a furniture as well as direct sound. Thus the same sound sounds differently outside than it does inside.

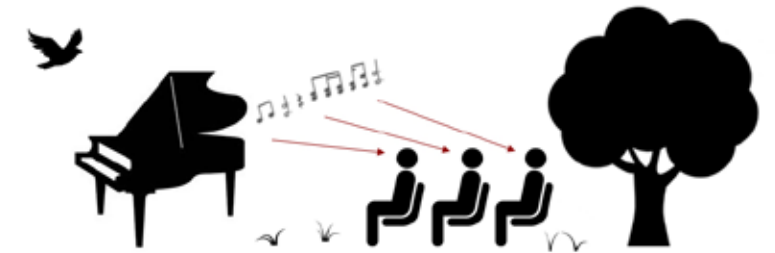
Reverberation sound appears when there is a lot of reflected sound, which causes us to hear echoes even after the sound stops. It is measured and described by its time; the amount of time until the energy of the sound drops to 1/1,000,000 than from when the sound was created.

Sound absorption is important especially in a wide space where the reverberation time tends to be long, or a space with rigid walls that easily reflects sound. Reverberation sound is necessary when listening to music for rich sound, but it should not be too long or it can be very destructive. For places to hold a conversation, long reverberation time will cause trouble hearing each other clearly.

Sound absorption shortens the reverberation time and makes it appropriate, which helps us to have a better acoustic environment.

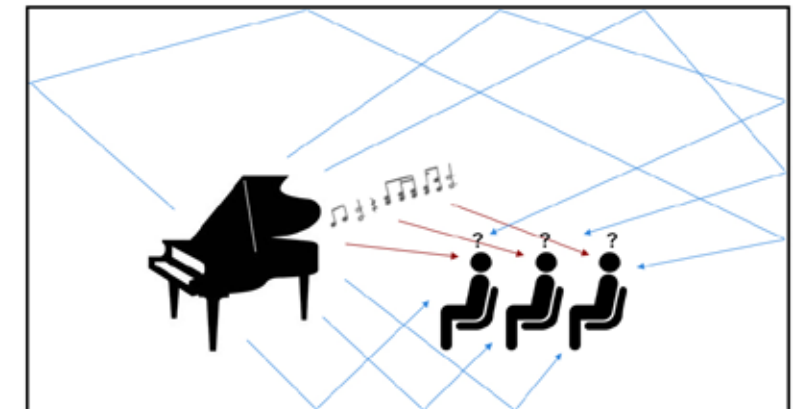
Outdoor

Hear ONLY Direct Sound

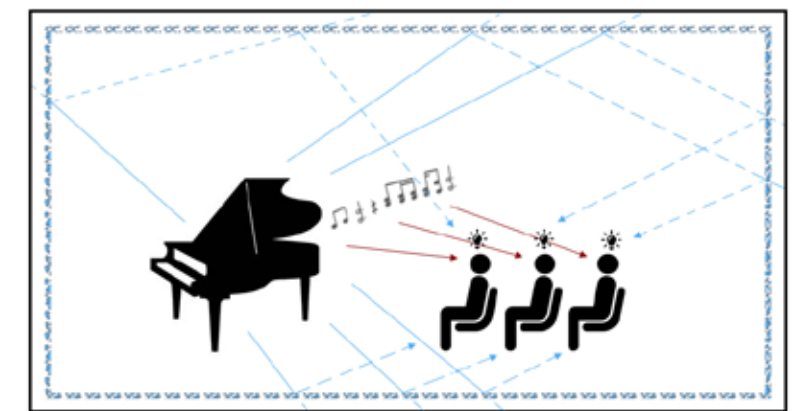


Indoor

Hear BOTH Direct and Reflected Sound

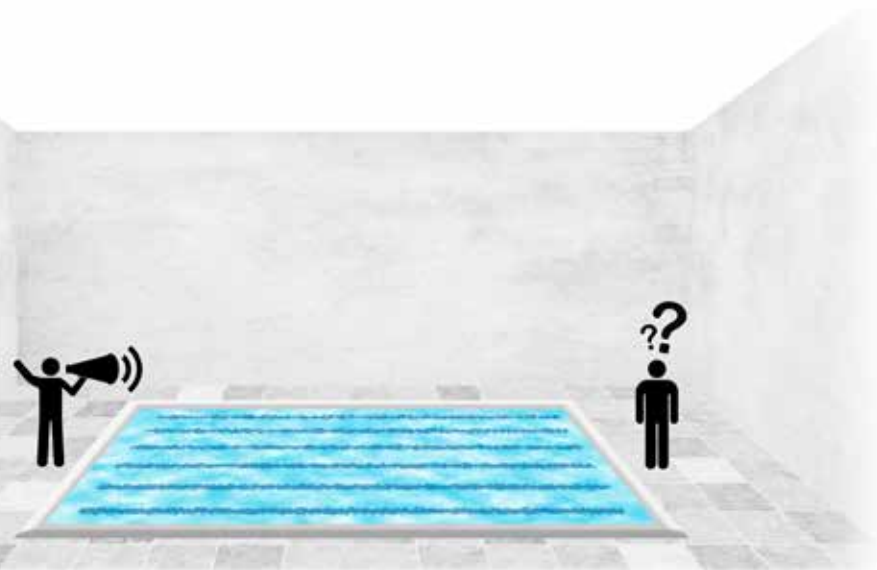


Reverberation time becomes appropriate with sound absorption.

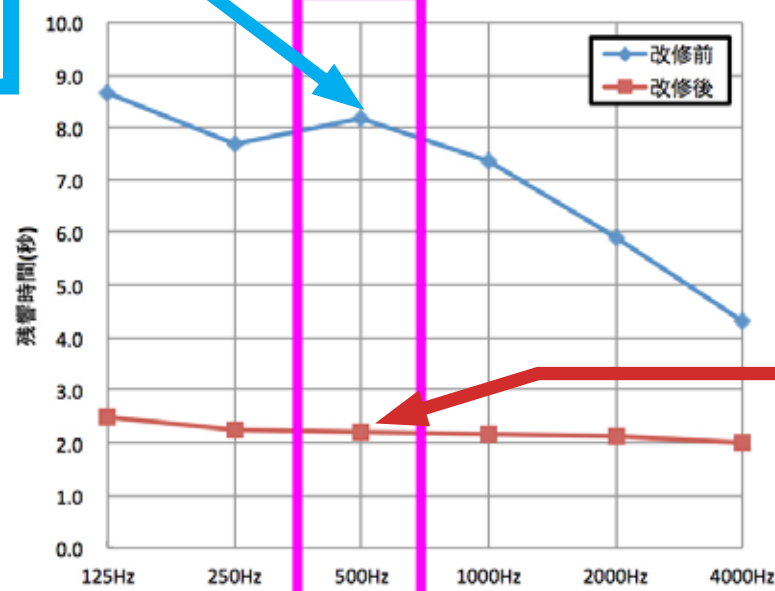


THE EFFECT OF SOUND ABSORPTION

How do we actually experience the effect when we use CALME?
 For instance, the voices echo a lot in an indoor swimming pool in general. It is hard to have a conversation at distance. In our past project for an indoor swimming pool, the reverberation time was shortened from about 8 seconds to about 2 seconds by installing CALME, which made it possible to talk to people on the other side of the pool.



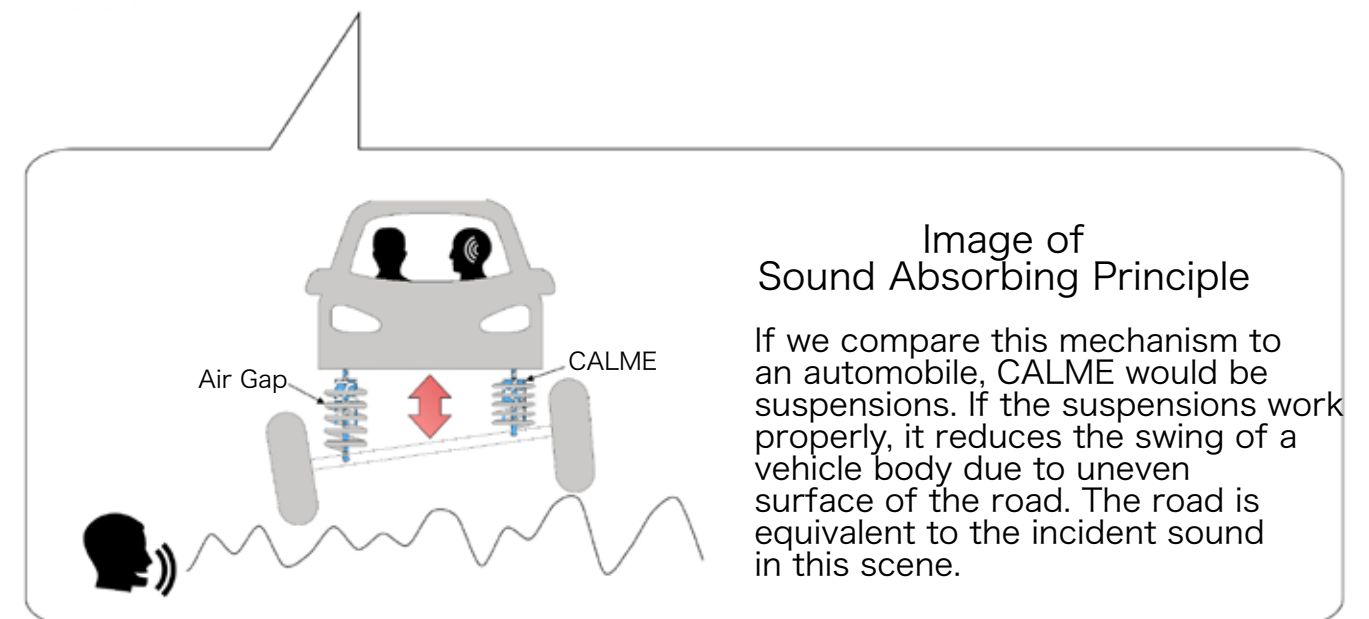
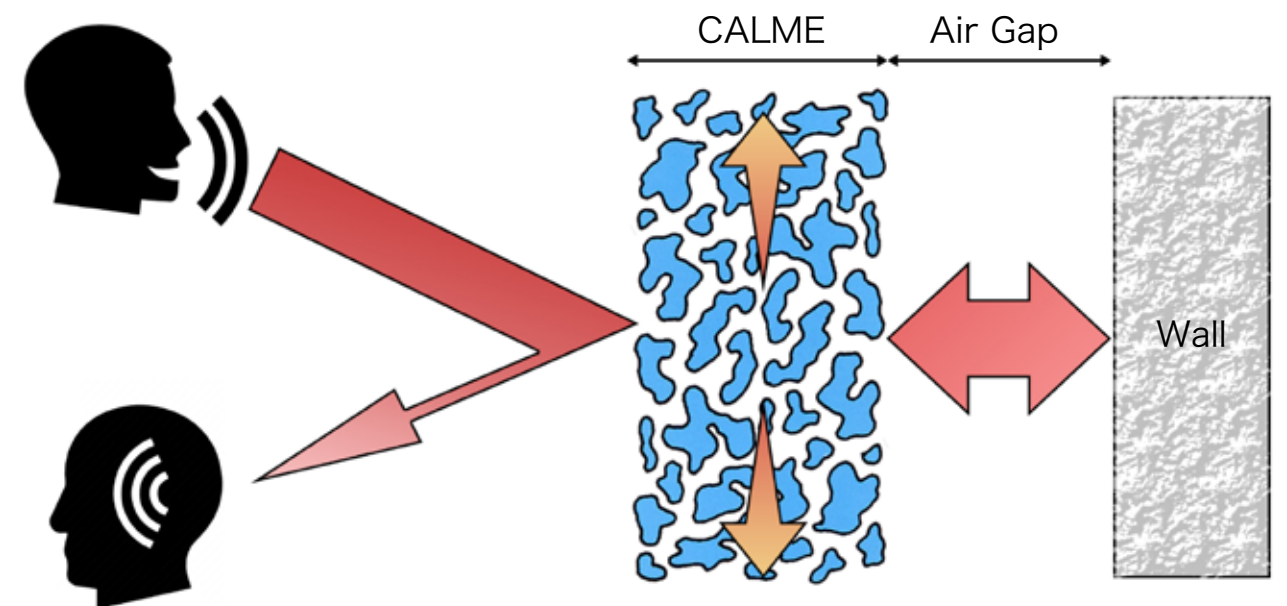
BEFORE
 Average Reverb time(500Hz)
8.18secs



AFTER
 Average Reverb time(500Hz)
2.12secs

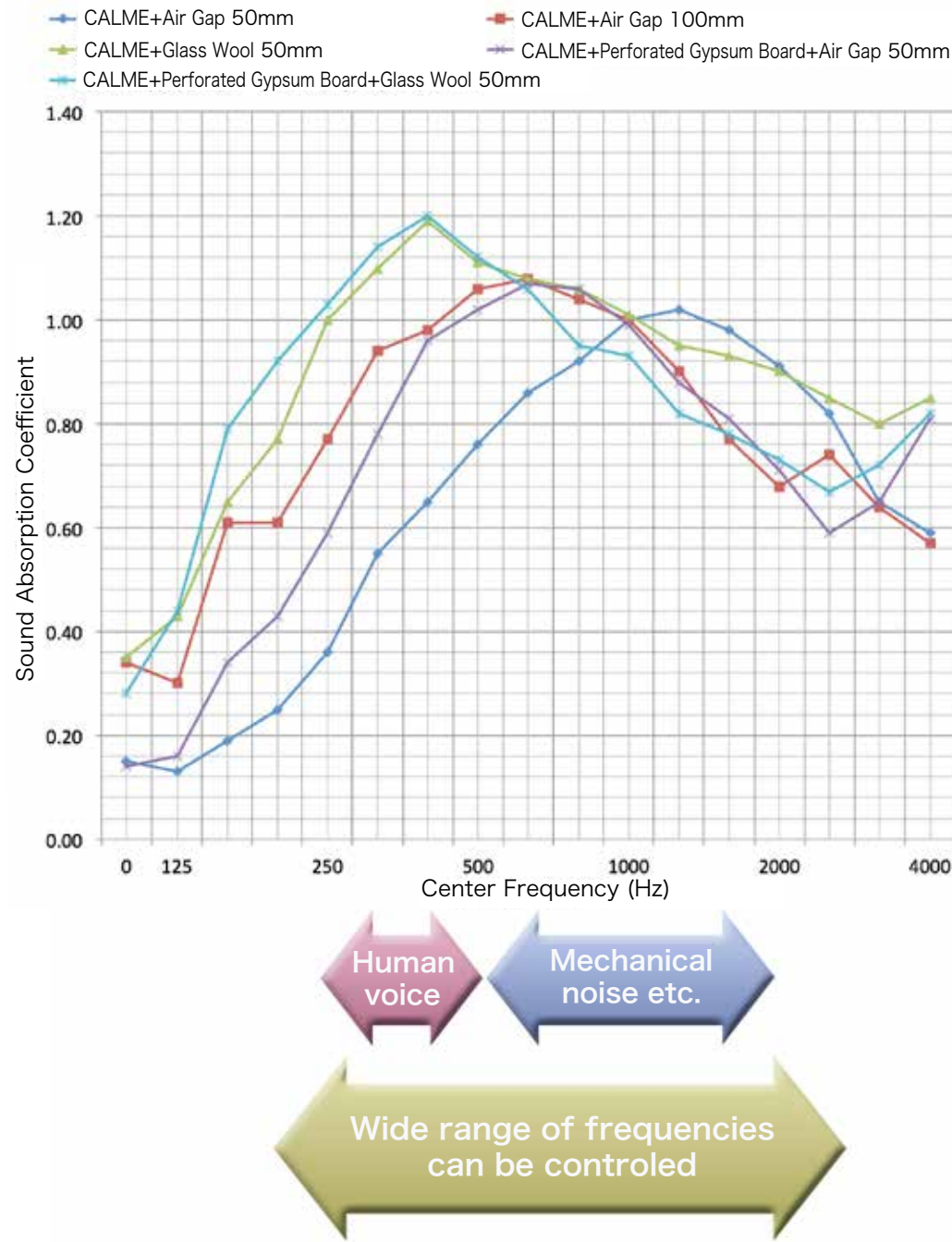
HOW IT WORKS

Why CALME absorbs sound?
 We explain the mechanism here.



Sound Absorption Characteristic

The peak of sound absorption moves towards a lower frequency when widening the air gap or filling the gap with another porous material, which allows us to maximise the effect depending on the type of noise. Glass wool is a common sound absorbing material, however we are unable to use it by itself and need something to cover its surface. The covering material will intercept the air flow and decreases its' effect. CALME does not need anything to cover itself, because it is safe and beautiful by itself.



Durability & Weatherability



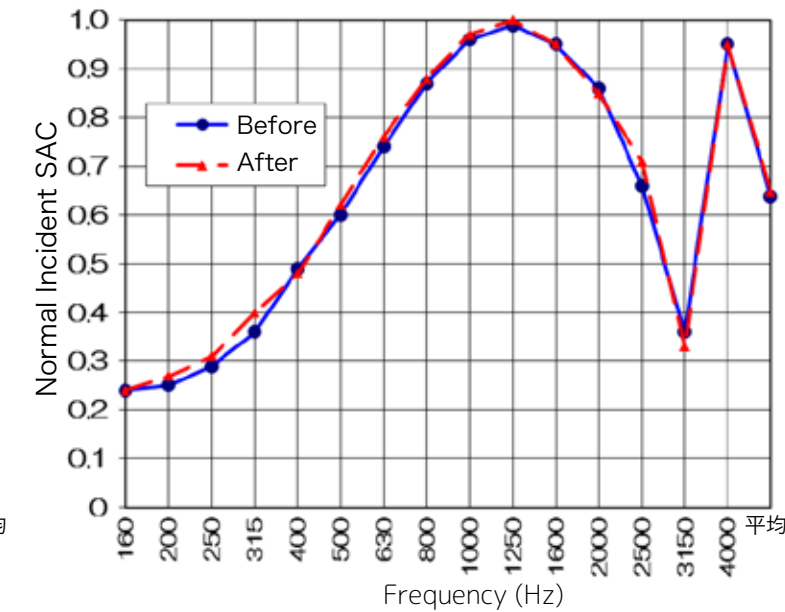
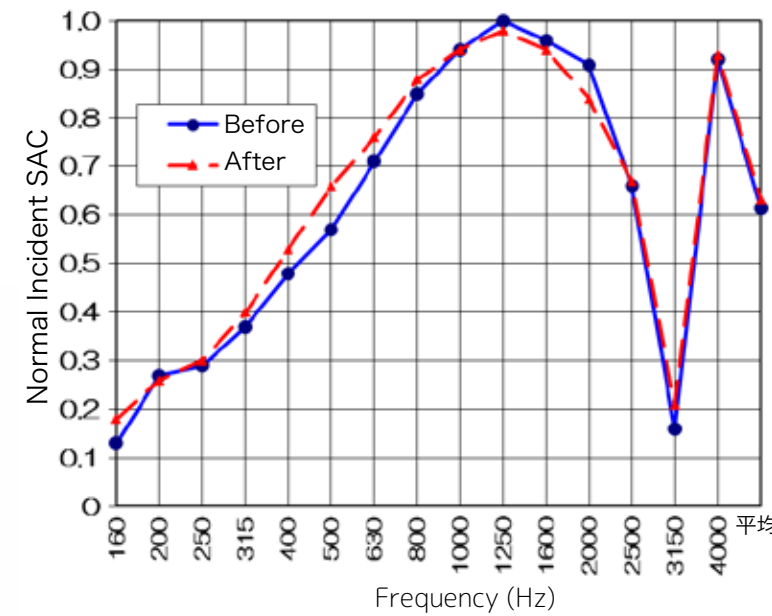
Salt Water Spray Test (Tested for 2000 hours)

It is a standardised test method to evaluate corrosion resistance of materials. Materials without durability will have corrosion and rust on the surface.

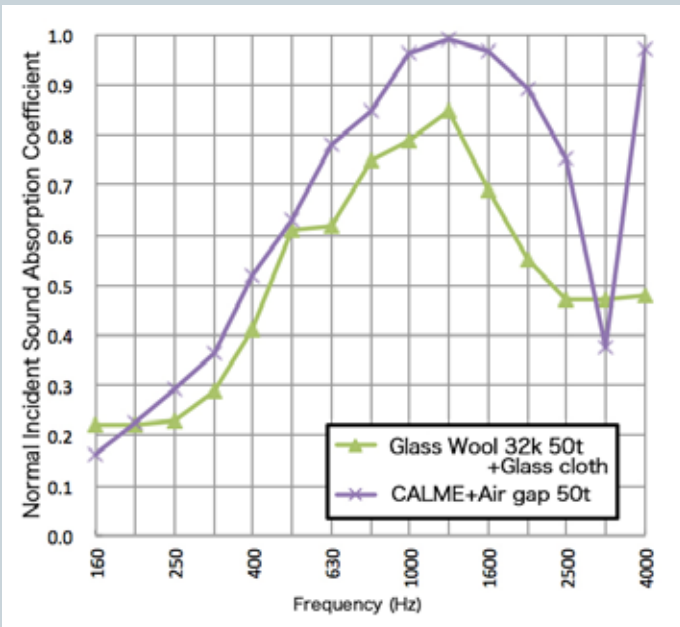


Sunshine Weather Meter (Tested for 2000 hours)

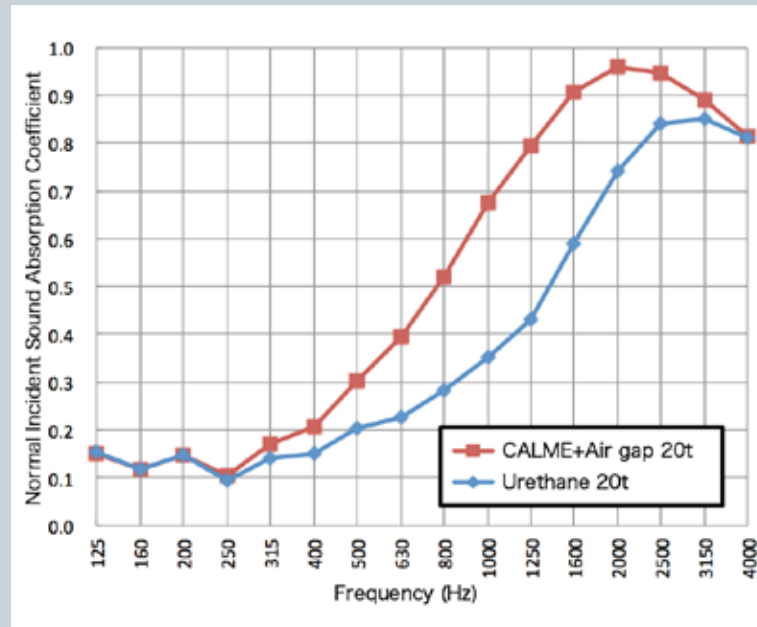
This test accelerates deterioration and discoloration in an apparatus that reproduces the outdoor environment and evaluate weather resistance.



Compare with Glass Wool

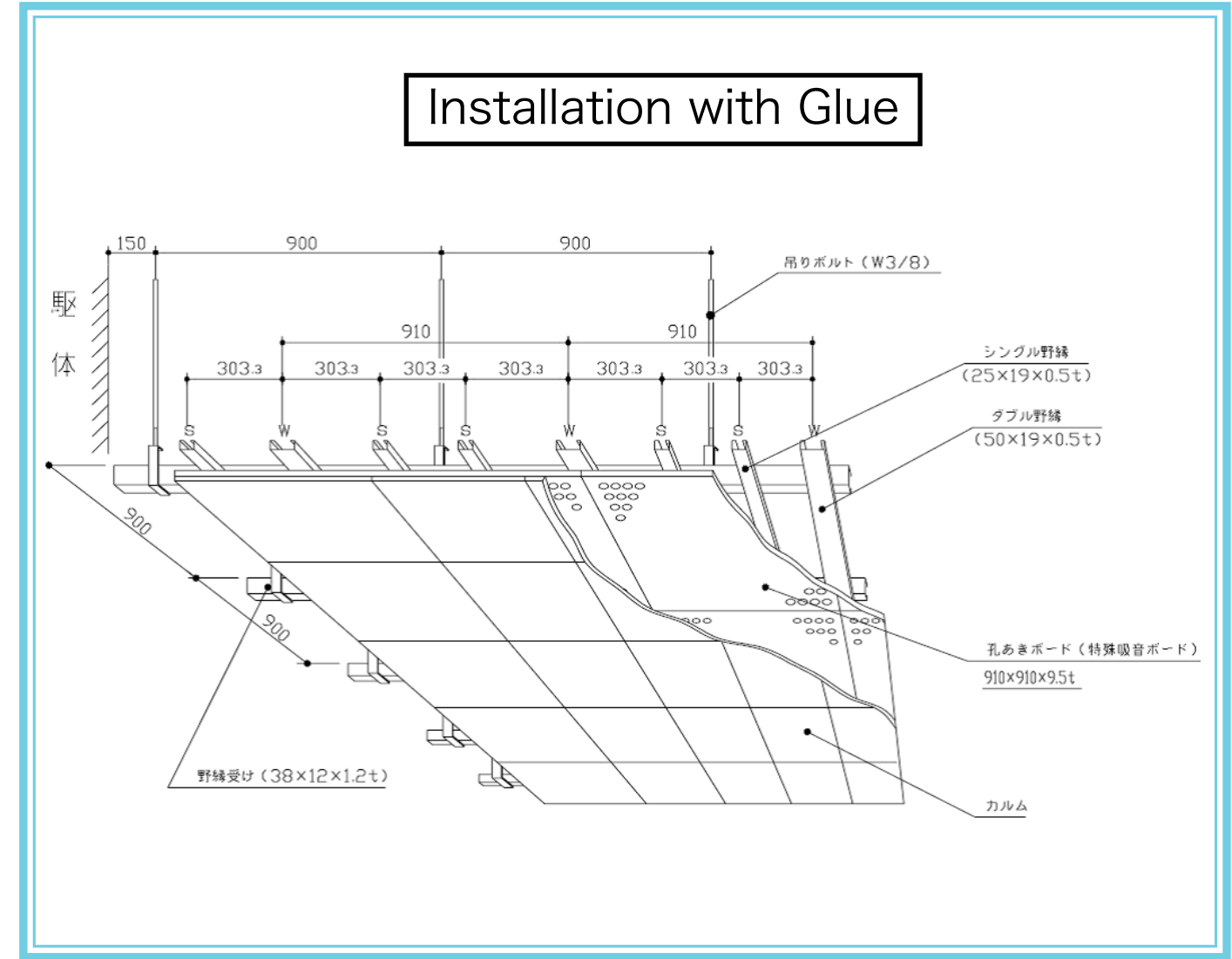
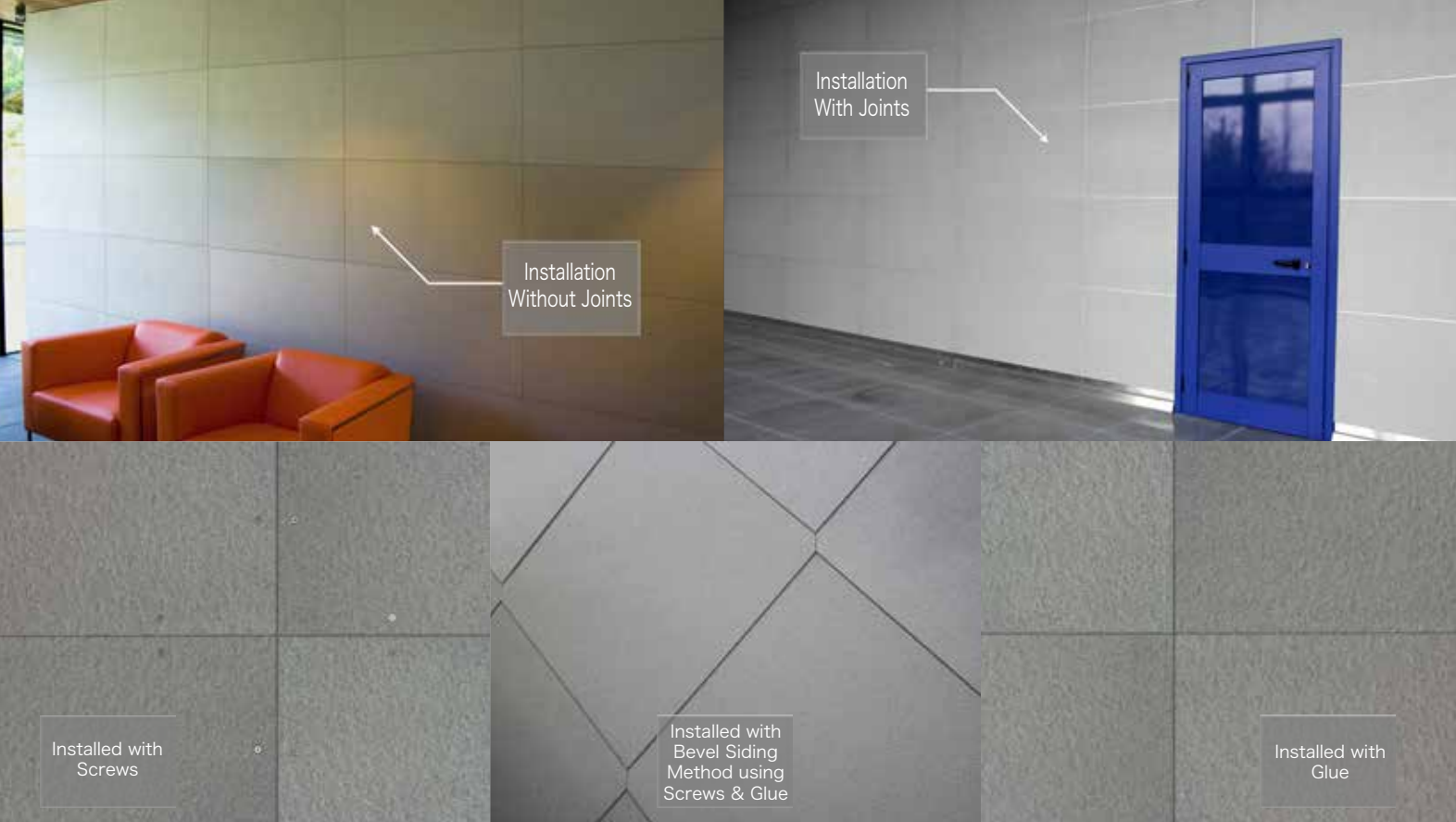


Compare with Urethane



Mechanical Properties

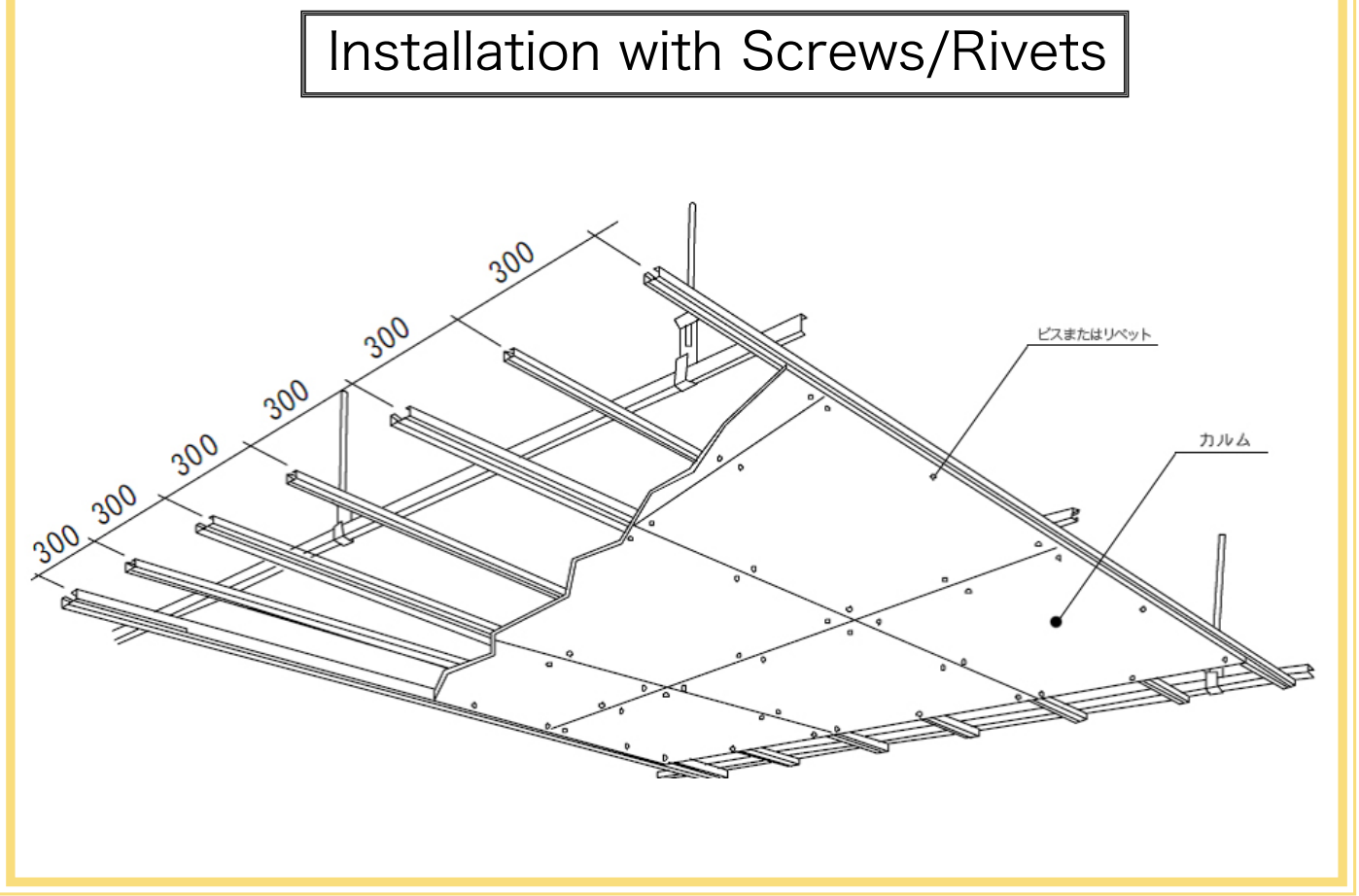
	Type A	Type B	Type C
Tensile Strength (MPa)	19.6	12.9	9.8
Elongation (%)	2.0	2.5	1.0
Porosity (%)	45		
Density (kg / m ³)	1.59 x 10 ³		
Thermal Conductivity (°C)	4.02 x 10 ⁵ J/m hr		
Thermal Expansion (°C)	29.9 x 10 ⁻⁶	—	28.6 x 10 ⁻⁶



■ INSTALLATION

Method	Substrate	Fixing
Glue	1. Ceiling: ceiling joist Wall: Stud 2. High opening material (e.g. gypsum board, honeycomb)	1. Silicon elasticity glue 2. Strong double-sided tape
Screw or Rivet	Ceiling: ceiling joist, Wall: Stud	1. Flat countersunk head screw (Approx. size: $\phi 3 \times 15$) 2. Rivet (size: 4-3)

- Installation with Glue:
This method is suitable for low ceilings, walls, and places, where the screws/rivets, should not appear on the surface. CALMEPLUS should also be installed with this method. The high opening material under CALME is a waste substrate to give strength and a better finish. The double-sided tape is for temporary adhesion to help glue to dry stably.
- Installation with Screws/Rivets:
This method is suitable for high ceilings, swimming pools, gyms and any outside installation.
- When you want to install with joints, we suggest to put craft tapes (approx. 15mm width) at the joints under the CALME for more a perfect finish.
- Please use stainless steel or aluminium substrate when you install CALME in a swimming pool. Insulation is necessary to avoid electric corrosion if you use stainless steel.
- Condensed water would make CALME discoloured and corroded. Please have enough insulation and ventilation to keep away from condensation.
- CALME expands by heat more than than steel or other materials, because it is made of aluminium. It would deform if the tempretuer of the usage environment is dramatically different to the construction environment. It expands 0.6mm/1200mm by 20 degrees rise.
- We have an installation guide for examples of the end part finishing structures.
- We recommend wearing gloves for your safety and fouling prevention.
- The surface colour of each CALME is slightly different because it is a sintered material. We group CALME with an optical inspection machine and display on the cartons.



CAUTION

- CALME is a building material with a number of excellent performances such as sound absorbing performance and design, however, appropriate design and construction are essential in order to fully demonstrate these performance.
- The information on this catalogue is the latest at December, 2017. It may be changed without notice
- The technical data on this catalogue is based on test results of your company or public agencies. It may change depending on product variation and usage conditions.
- The product colour may be slightly different from photos and samples.
- Synthetic images are included in a part of the photos in this catalogue.
- CALME with texture may appear as colour difference when you see it from different directions.
- The lacquer for selective colours and the ink for CALME PLUS are water based. Please do not rub with a wet cloth to avoid discoloration.
- Disclaimers - We do not take any responsibility for any trouble due to:
 - ① Design or construction.
 - ② Substrate and/or bonding materials.
 - ③ A natural disaster, fire, or any other inevitability.
 - ④ Aging and degradation over time.
 - ⑤ Intention or negligence of a user and/or a third party.
 - ⑥ Water leakage and/or indoor condensation.

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