



공간에
ZERO
를 더한다

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 ※ Regarding the certificate status, refer to each product catalog.
 ※ ® is the registered trademark of Byucksan Cor.



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■ BSKCVA 18 12 1P



Economical, eco-friendly heat insulation
 sound-absorbing material

BYUCKSAN **Glass Wool**®



Economical, eco-friendly heat insulation
sound-absorbing material

BYUCKSAN Glass Wool®

Byucksan Glass Wool is
an eco-friendly building
material that considers
'nature' and 'people'.



Nature

More than 90% of glass as the main raw material is recycled to save resources, reduce carbon dioxide, and save energy.

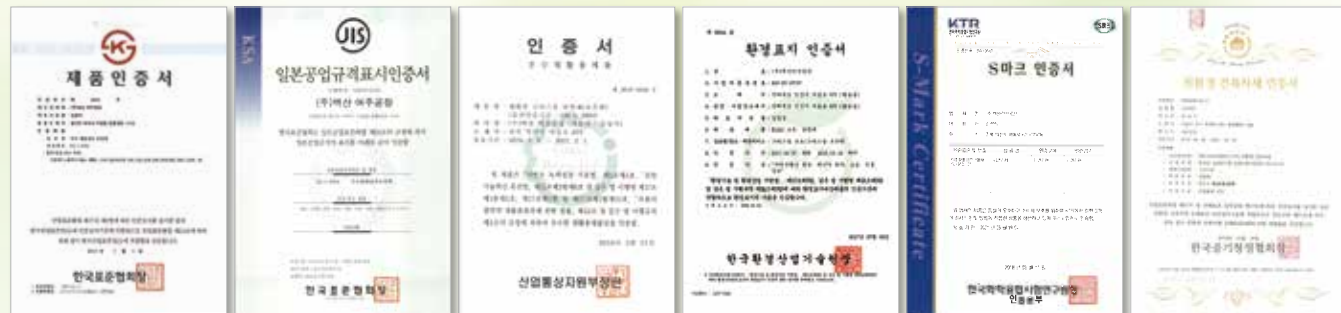


People

Complies with the formaldehyde emission standard F☆☆☆☆ of the JIS (Japanese Industrial Standard) and provides an excellent "Sick house syndrome" prevention effect by minimizing the emission of pollutants such as HCHO, TVOC, and 5VOC.

Certification acquisition status of BYUCKSAN Glass Wool®

- KS Product Certificate
- JIS Certificate
- GR Certificate
- Eco Label Certificate
- S Mark Certificate
- Eco-friendly building material certificate



Classifications



BV0062



American
Bureau of
Shipping



Nippon Kaiji
Kyokai



DNV GL



Lloyd's Register



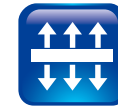
Korean Register
of Shipping
Association



Bureau Veritas

※ Certification details may vary by manufacturing factory. Please consult with your sales representative for more information.

BYUCKSAN Glass Wool® Features



Thermal insulation

The cooling and heating cost can be reduced significantly – since a lot of air is contained inside the product – with its amazing insulation and heat insulation effect that is about 40 times that of cement concrete and 12 times that of earth wall.



Cost-effective

The transportation cost can be reduced as the product is easy to store and transport using compressed packaging; the construction cost can also be reduced by shortening the construction period thanks to excellent constructability.



Durable

Protects construction materials from strong shock or vibration with its high level of independence thanks to its high tensile strength.



Eco-friendly

An eco-friendly product that uses recycled materials such as waste glass, with many official certificates acquired regarding eco-friendliness such as eco-friendly building material certification, Eco mark, S mark, and GR certification.



Nonflammable

Damage due to fire can be minimized with its nonflammable and fire prevention functions.



Sound-absorbing

Helps create a quiet and cozy environment by blocking external noise with its excellent sound absorption capability.

Uses of BYUCKSAN Glass Wool®

Insulator for
construction



Sound
absorbing
Material for
construction



Heat insulating
Material for the
industry



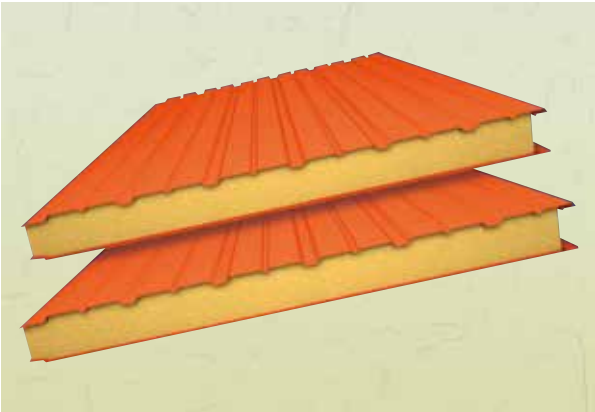
Sound
absorbing
Material for the
industry



Cold insulating
Material for
shipbuilding



01 Glass Wool Panel Core



Glass Wool Panel Core is an eco-friendly, nonflammable material used as a core material for the sandwich panel. **Fireproof zone and fireproof structure** can be constructed since no toxic gas is generated and flame does not spread in the event of fire.



Uses

- Large marts, houses, shops
- Factories, warehouses, fire protection areas, and all buildings with risk of fire



Board specification and property of matter

Density (Kg/m³)	Standard Specification			Thermal Conductivity W/m · k	Thermal shrinkage temperature (°C)	Related standards (KS)
	Thickness (mm)	Width (m)	Length (m)	KS Standard		
				Average temperature - 20 °C		
48	72 84 100	1 1.1	2 2.5	0.034 or lower	350 or higher	L 9102 (2014)
64				0.034 or lower	400 or higher	
70				0.034 or lower		



Products with other special standards and attachments can be made to order after discussing the possibility of production.



02 Glass Wool Eco



Glass Wool Eco is an eco-friendly product that **emits zero formaldehyde (HCHO)**, helping ensure clean air and pleasant environment.



Uses

- House (ceiling, wall), general buildings



Board specification and property of matter

Density (Kg/m³)	Standard Specification			Thermal Conductivity W/m · k	Thermal shrinkage temperature (°C)	Related standards (KS)
	Thickness (mm)	Width (m)	Length (m)	KS Standard		
				Average temperature - 20 °C		
24	25	1	20	0.037 or lower	300 or higher	KS L 9102 (2014)
	50	1	10			
32	50	1	10	0.036 or lower		



Products with other special standards and attachments can be made to order after discussing about the possibility of production.



03 Glass Wool Mat



Glass Wool Mat is used for various purposes such as insulation, heat conservation, and sound absorption and can be used conveniently on complex surfaces as well. **Shipping costs can be reduced**, and it can be stored easily using compressed packaging.




Uses

- House (ceiling, wall), general buildings, PC



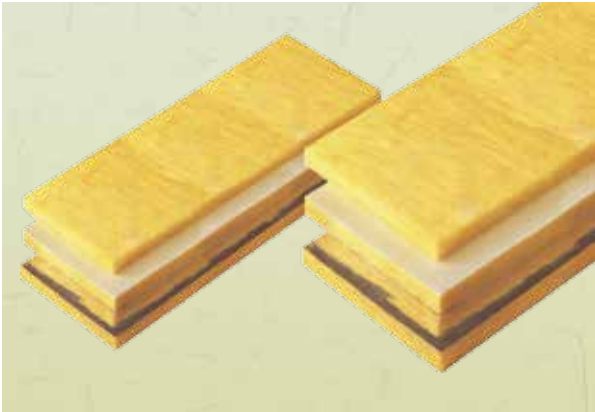
Board specification and property of matter

Density (Kg/m³)	Standard Specification			Thermal Conductivity W/m · k	Thermal shrinkage temperature (°C)	Related Standards (KS)
	Thickness (mm)	Width (m)	Length (m)	KS Standard		
				Average temperature - 20 °C		
24	25	1	20	0.037 or lower	300 or higher	KS L 9102 (2014)
	50	1	10			
32	50	1	10	0.036 or lower		

 Products with other special standards and attachments can be made to order after discussing about the possibility of production.
※ Attachments : Silver foil, soft silver foil (PVC), aluminum foil, etc.



04 Glass Wool Board



As a board-shaped product with enhanced strength and durability, **Glass Wool Board** is used for various purposes such as buildings, industrial facilities, and ships owing to **its excellent insulation and sound absorption performance**.




Uses

- General buildings, buildings, vehicles, ships, sound facilities



Board specification and property of matter

Density (Kg/m³)	Standard specification			Thermal conductivity W/m · k	Thermal shrinkage temperature (°C)	Related standards (KS)
	Thickness (mm)	Width (m)	Length (m)	KS Standard		
				Average temperature - 20 °C		
32	50	1	2	0.036 or lower	300 or higher	KS L 9102 (2014)
40	50	1	2	0.035 or lower	350 or higher	
48	50	1	2	0.034 or lower		
64	50	1	2	0.034 or lower	400 or higher	

 Products with other special standards and attachments can be made to order after discussing about the possibility of production.
※ Attachments: Silver foil, soft silver foil (PVC), aluminum foil, etc.



05 Free Mat Board



Free Mat Board is a product that seals the ordinary mat board by covering it with polyethylene vinyl. It is easy to install, and costs can be reduced since no separate moisture-proof layer is needed when constructing the outer wall.



Uses

- Insulation of apartment walls and general buildings



Board specification and property of matter

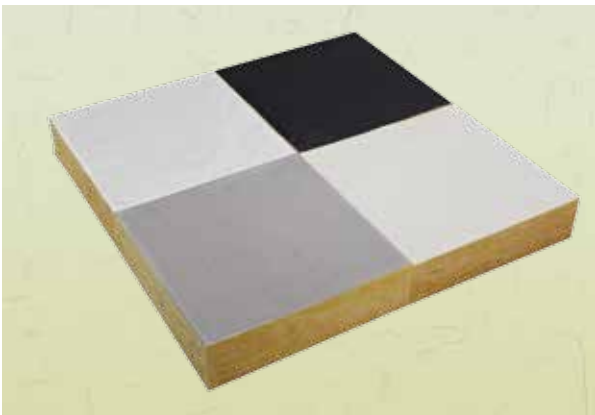
Item		For boards	For roll products
Dimension	Width (mm)	900 ~ 1200	900 ~ 1200
	Length (mm)	900 ~ 3000	5000 ~ 20000
	Thickness (mm)	25 ~ 150	25 ~ 150
	Density (kg/m³)	24 ~ 32	24
Dimension after compression		-	430 Ø
Vinyl wrap	Vinyl specification	0.03mm	0.03mm
	Shape	4-sided, 6-sided sealing	4-sided sealing
Average temperature - 20 °C		W/m · k	0.034 ~ 0.037
			0.034 ~ 0.044



Products with other special standards and attachments can be made to order after discussing about the possibility of production.



06 G/C Board



G/C board is designed to reduce noise that occurs in a place requiring acoustic functions and consideration on insulation, such as music hall, movie theater, gymnasium, and air conditioning room. This product is made by attaching glass cloth to one side of the Glass Wool Board product.



Uses

- Cinema, machine room, audio control room, gymnasium, meeting room, computer room, etc.



Board specification and property of matter

Density (Kg/m³)	Standard specification		Remarks
	Thickness (mm)	Width/Length (m)	
32 / 48 / 64	50~100	1,000 × 2,000	Glass Wool + Glass Cloth (Attachment)



Products with other special standards and attachments can be made to order after discussing about the possibility of production.



Sound absorption coefficient

Density	250Hz	500Hz	1,000Hz	2,000Hz	Average sound absorption rate (NRC)
32K	0.72	1.18	1.17	1.03	1.02
48K	0.71	1.26	1.16	1.04	1.04
64K	0.83	1.24	1.14	1.02	1.05

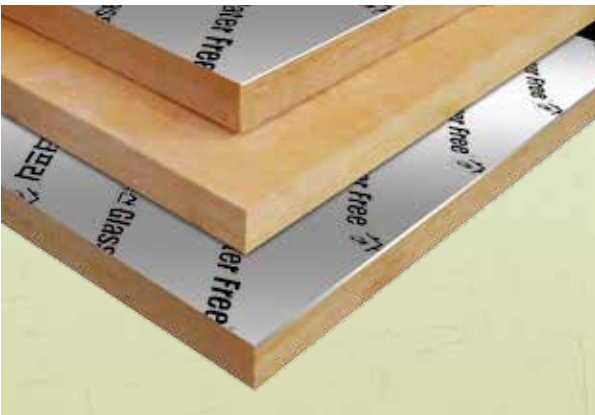
* Testing organization and date: Fire Insurers Laboratories of Korea (2018.04.12)



For more details on sound absorption performance, please check the test report.



07 Glass Wool Water-Free



As an inorganic insulating material exclusive for external insulation, Byucksan “Glass Wool Water-Free” minimizes absorption and moisture transmission when installing dry-type outer walls by improving the water repellency of existing glass wool products.



Uses

- Roof surface of the building, piloti ceiling surface, wall surface, etc.



Product specifications and properties

Density (Kg/m³)	Standard specification			Thermal conductivity W/m · k KS Standard (average temperature - 20°C)	Thermal shrinkage temperature (°C)	Short-term absorptiveness (kg/m², 24hr)	Long-term absorptiveness (kg/m², 28 days)
	Thickness (mm)	Width (m)	Length (m)				
40	150	1,000	2,000	0.035 or lower	350 or higher	1.0 or lower	3.0 or lower
48	120			0.034 or lower			

* Property standard: KS L 9102



Please consult with the sales representative for the production of other special specifications.



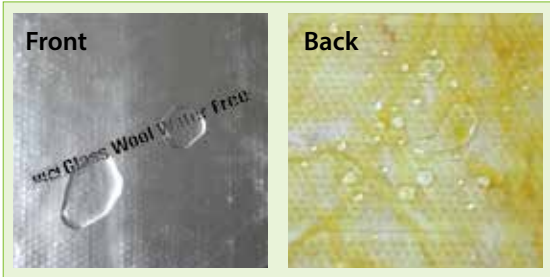
Difference in absorptiveness between general glass wool and Glass Wool Water-Free

General glass wool



Moisture is absorbed into glass wool, and some of it flows down.

Glass Wool Water-Free



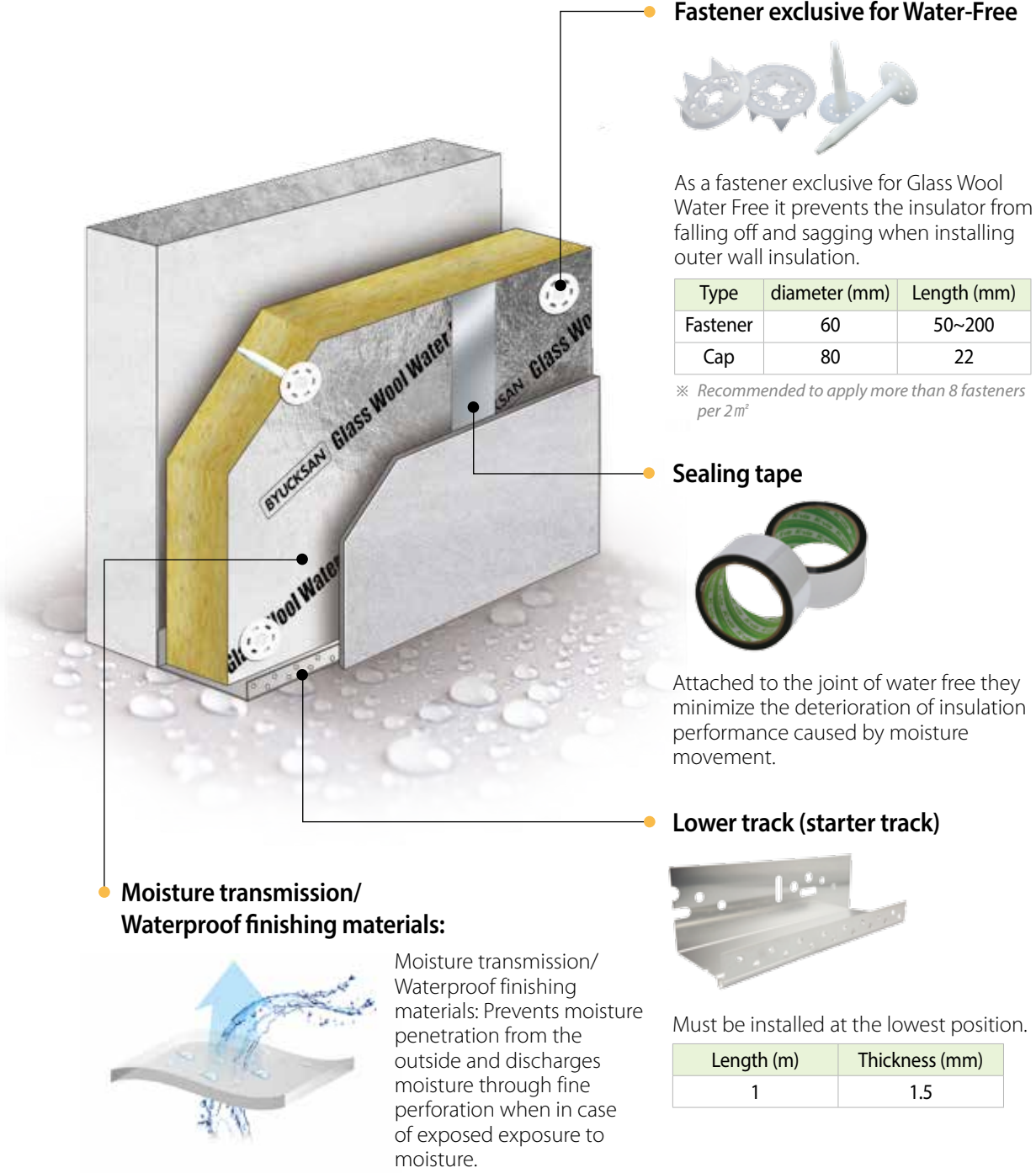
Moisture is not absorbed into Glass Wool Water-Free but forms a water droplet structure and then dries naturally.



Glass Wool Water-Free



Specification and description of subsidiary materials



Item	Value
Moisture transmission performance	393g/m²·24hr
SD-Value(value of moisture transmission resistance)	0.102m

※ The results related to moisture transmission are reference values. Please check the report sheet.

※ SD-Value : A value that converts moisture transmission with to air layer thickness

※ Please use dedicated subsidiary materials when installing Glass Wool Water-Free.

Glass Wool Water-Free

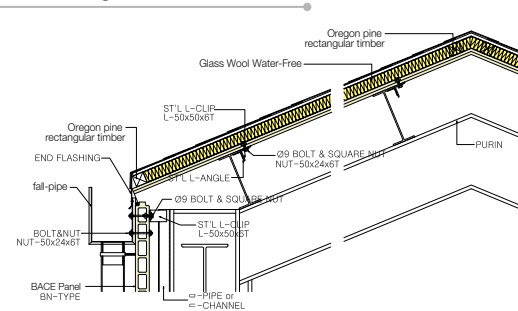
Installing Byucksan Glass Wool Water-Free on the outer wall



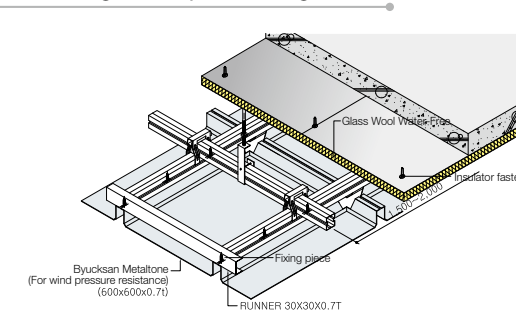
※ More than 8 pieces/2m² are recommended, when fixing Glass Wool Water-Free fasteners. (based on the wall)

Drawings by Byucksan Glass Wool Water-Free installation part

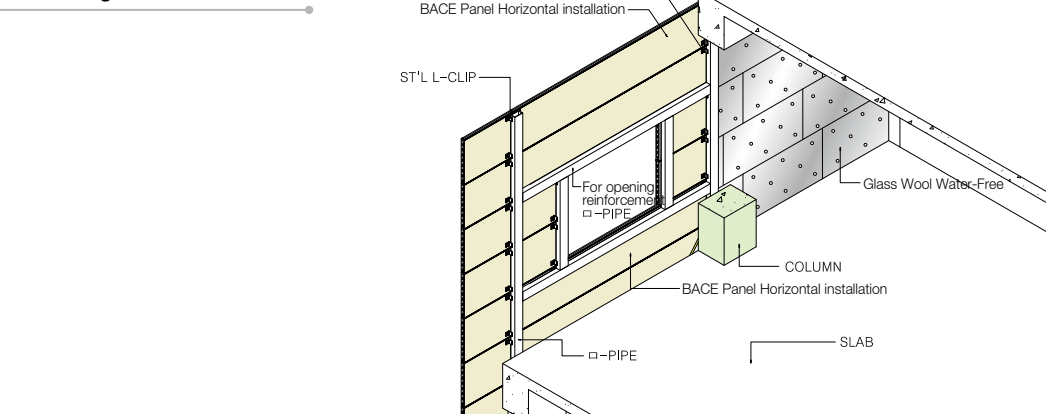
Installing on the roof surface



Installing on the piloti ceiling surface



Installing on the wall surface

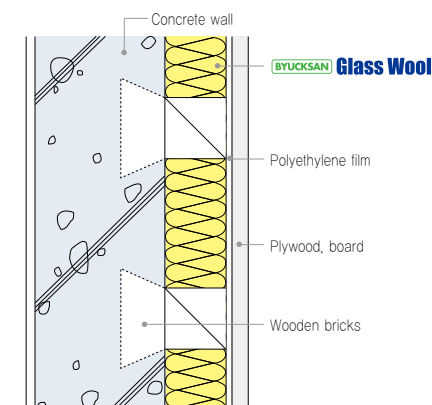


※ The drawing may be different depending on the structure of the building. Please consult with the sales representative when applying the product.

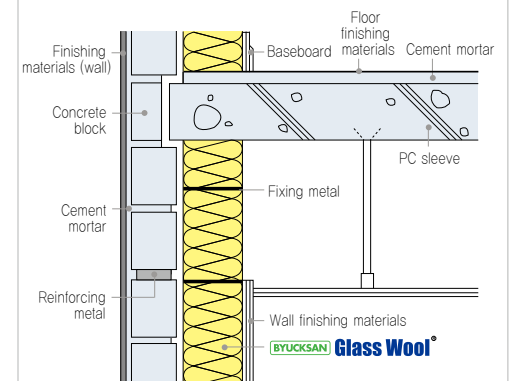
Byucksan Glass Wool installation method (general case)

Wall construction method

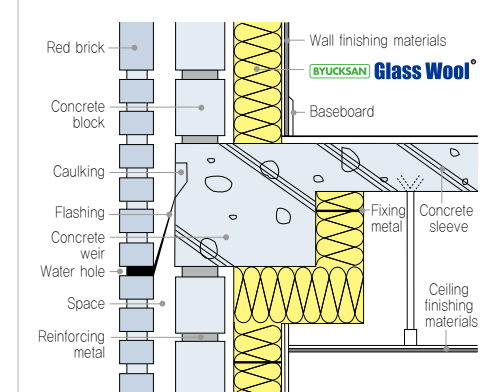
- Install wooden bricks on the same side as the concrete wall.
- Cure the wall concrete until the desired strength is obtained.
- Clean the surface to glue Glass Wool.
- Fix furring strips to wooden bricks with nails.
- Fix Glass Wall between furring strips without gaps.
- Spread a polyethylene film (moisture-proof layer) on Glass Wool and attach the finishing material or finishing base material like boards.
- The length and length overlap of the polyethylene film should be 15cm or more or 5cm or more when connecting with adhesive.



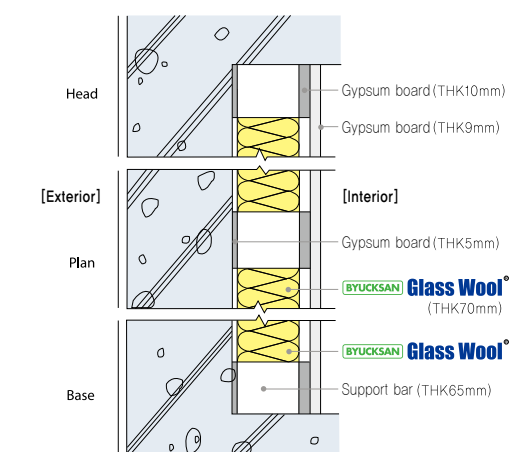
Concrete block bearing wall



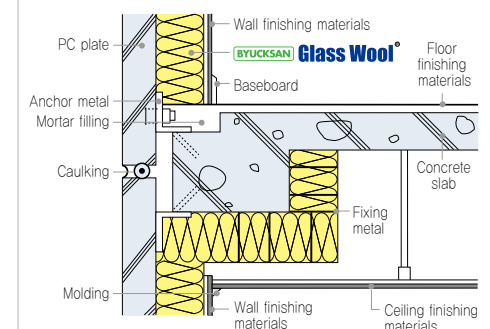
Red brick and block double wall



Detailed diagram of side wall construction using the perforation construction method

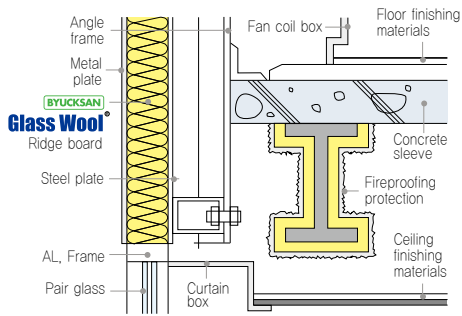


Precast plate wall

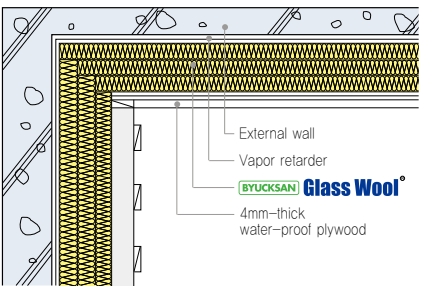


Byucksan Glass Wool installation method (general case)

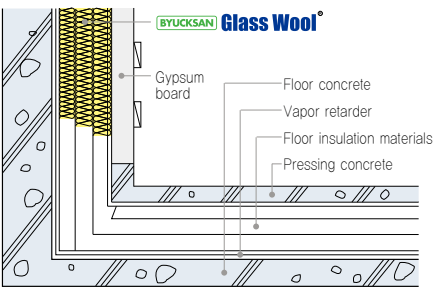
Metal and glass curtain wall



Wall, ceiling joint details

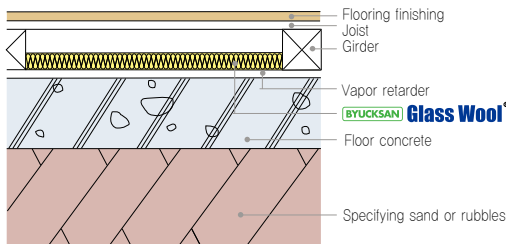


Floor, baseboard, wall joint details



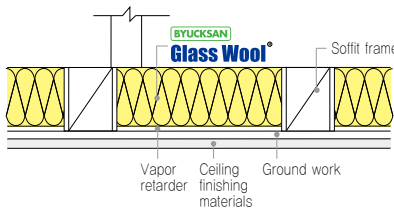
Floor construction method

- Spread out rubble or sand and harden it evenly.
- Pour concrete on the floor and trowel and cure before the concrete dries.
- After curing, clean the floor concrete surface.
- Overlap the polyethylene films and make sure that the overlap length is at least 15 cm and films are not heaved.
- Arrange girders at the predetermined intervals. Take care not to damage the underlying molybdenum film. If it is accidentally torn or punctured, attach the moisture-resistant tape to it.
- Install Glass Wool between the girders.
- Fix the sleeper on the girder and install the floorboard.
- Be sure to insulate the joint between the floor and wall.
- Please use 20kg/m³, 22mm Glass Wool or more.



Insulation construction using the ceiling method

- Form a layer of insulating materials by attaching the ceiling base material to the soffit frame.
- (For the existing soffit, work inside the ceiling as a rule, if possible.)
- Cut Glass Wool into the size that fits tightly between the soffit frames.
- Do not cut the moisture-proof layer as much as possible and lay it over the soffit frame loosely in the longitudinal direction. Polyethylene or PVC film is used, and joints should be more than 15cm long. When gluing the films, the overlapping area should be over 5cm long.
- Press and insert the cut Glass Wool into the soffit frame on the moisture barrier.



Heat conduction

- Heat conduction: Heat moves from the high temperature part to the low temperature part of an object.
- Formula for conducted heat quantity: If the thermal conductivity of an object is 1kcal/mh °C, it means that 1kcal of heat is transferred per hour when the heat transfer cross section is 1m², the thickness is 1m, and the temperature difference between the front and rear is 1°C.

Formula for conducted heat quantity of Glass Wool Board & Mat

Thickness of insulator	X	$\frac{\lambda}{\alpha} \times \frac{\theta_o - \theta_s}{\theta_s - \theta_r}$
Heat emission	Q	$\frac{\theta_o - \theta_r}{\frac{1}{\alpha} + \frac{X}{\lambda}}$
Surface temperature	θ_s	$\frac{Q}{\alpha} + \theta_r$

λ	Thermal conductivity (kcal/mh°C)
θ_o	Internal temperature (°C)
θ_r	Outdoor temperature (°C)
θ_s	Surface temperature (°C)
α	Surface combined heat transfer coefficient (kcal/m²h/°C) Generally, it is calculated as $\alpha=10$ for heat insulation/ $\alpha=7$ for cold insulation.
Q	Heat emission (kcal/m²h)
X	Thickness of insulator (m)

Heat insulation

• When using Byucksan Glass Wool BMG-24

If the internal temperature $\theta_o = 200^\circ\text{C}$
external temperature $\theta_r = 20^\circ\text{C}$
surface temperature $\theta_s = 40^\circ\text{C}$

Thermal conductivity $\lambda = 0.027,1 + 0.000,16 \times \frac{200 + 40}{2} = 0.046,3$

Cold insulation thickness $X = \frac{0.046,3}{10} \times \frac{200 - 40}{40 - 20} = 0.037,0\text{m} (\approx 40\text{ mm})$

Heat loss at this time $Q = \frac{(200 - 20)}{1/10 + 0.040 / 0.046\ 3} = 187\text{ kcal/m}^2\text{h}$

In contrast, the heat loss and surface temperature ($\lambda = 57\text{ kcal/mh}^\circ\text{C}$ of the steel plate) if 5 mm thick steel plate is used only without Glass Wool are as follows:<?>

$Q = \frac{(200 - 20)}{1/10 + 0.005 / 57} = 1.798\text{ kcal/m}^2\text{h}$

$\theta_s = 1.798 / 10 + 20 = 199.8^\circ\text{C}$

※ 10 times more heat loss if Glass Wool is not used.

Cold insulation

• When using Byucksan Glass Wool BMG-24

If the internal temperature $\theta_o = -20^\circ\text{C}$
outdoor temperature $\theta_r = 30^\circ\text{C}$
relative humidity is 85%

Since the saturated water vapor pressure is 31.824 mmHg when the outside temperature is 30°C, the water vapor pressure at 85% humidity is 31.824x0.85 = 27.05mmHg, and the dew point temperature at this time is 27.2°C.

Thermal conductivity λ

$= \lambda \text{ at } 0^\circ\text{C} + \lambda \text{ temperature change rate} \times (\text{internal temperature} + \text{dew point temperature})/2$
 $= 0.027,1 + 0.000,16 \times (-20 + 27.2) / 2$
 $= 0.027,6\text{ kcal/mh}$

Cold insulation thickness $X = \frac{0.027,6}{7} \times \frac{-20 - 27.2}{27.2 - 30} = 0.066,5\text{ m} (\approx 70\text{ mm})$

Infiltrating heat quantity at this time $Q = \frac{(200 - 20)}{1/7 + 0.07 / 0.027,6} = -18.7\text{ kcal/m}^2\text{h}$

※ 10 times more heat loss if Glass Wool is not used.

Incombustibility

Item	Property of matter	Test method
Outer wall of the living room	Noncombustible material	KS F 2271 : 2016 Ks F ISO 1182 : 2016

