

Denka Elastlution / Thermal Expansion Composites

Thermal Expansion Sponge



Thermal Expansion Rubber



Denka

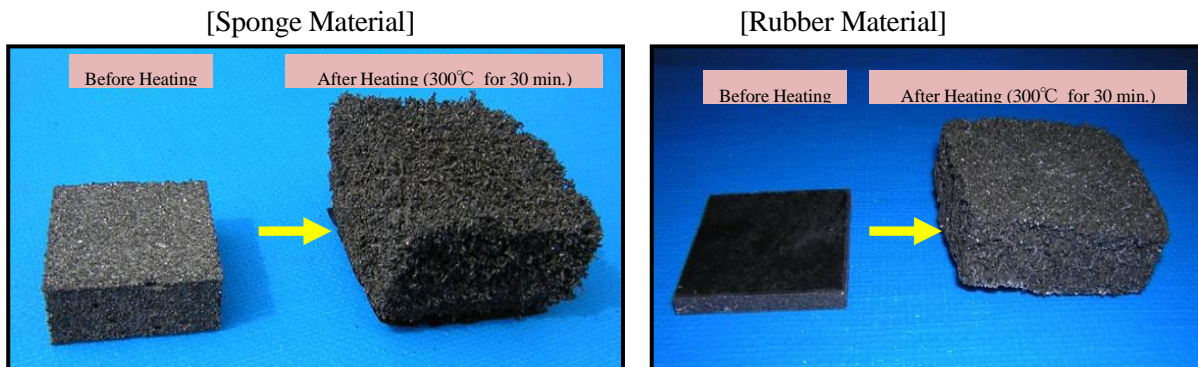
Denka Elastlution Co., Ltd.

Features

1. Excellent Fire Resistance

Thermal expansion starts at 200°C or higher and forms a strong heat insulating layer.

The expansion material fills the gaps and also prevents smoke penetration.



2. Easy To Handle

The material comes in several types; sponge tape, sponge block, rubber tape, putty and rubber sheet, and are excellent in processability with its flexibility.

3. Non-Halogen Type

Since it does not contain halogen compounds, generation of toxic gas is limited.

4. Sound and Vibration Insulation

In addition to its fire resistant property, the product is both sound and vibration insulation, which are useful for residential building applications.

Fire Resistant Property

<Fire resistant sponge>



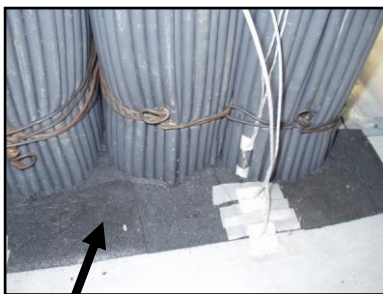
Gas Burner



After Heating

Smoke Barrier Property

<Fire Resistance Test at the Fire Resistance division>



<After heating 20min. shut smoke>

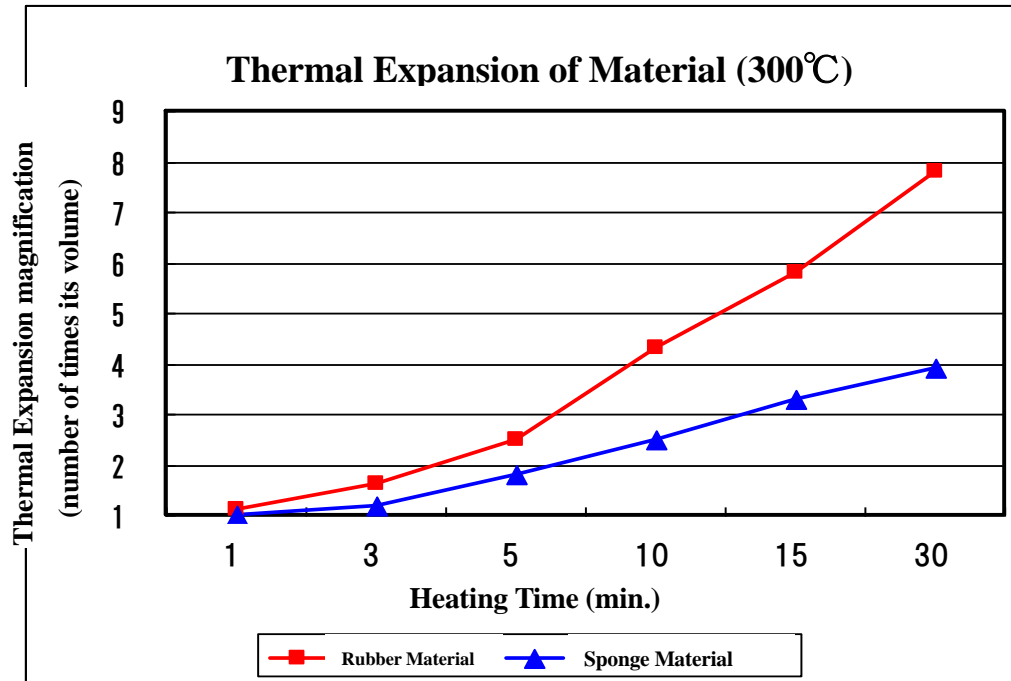


Thermal Expansion Sponge



<After heating 15min. Leak smoke>

Thermal Expansion Behavior



<8mm Clearance. before heating>



<After heating. Expanded 20mm to fill the gap>



<Gas Burner>

Properties

1. Sponge Material

Test Item	Result		Test Method
Apparent Specific Gravity	0.27		JIS K 6268
Hardness	Durometer E5-E25		JIS K 6253
Onset Temperature of Thermal Expansion	200°C		In-house test method
Thermal expansion magnification	4 Times its volume		at 300°C for 30 min
Oxygen index	General type 70 < / Durability type 45		JIS K 7201
Combustion Gas Composition	<u>Under complete combustion</u>	<u>Under incomplete combustion</u>	JIS K 7217
Hydrogen chloride	Not detected	Not detected	
Hydrogen cyanide	Not detected	Not detected	
Ammonia	Not detected	Not detected	
Sulfur oxides	13 mg/g	10 mg/g	
Nitrogen oxides	Not detected	Not detected	
Carbon monoxide	Not detected	Not detected	
Carbon dioxide	800 mg/g	900 mg/g	

2. Rubber Material

Test Item	Result		Test method
Hardness	Durometer A65		JIS K 6253
Tensile Strength	1.2 MPa		JIS K 6251
Onset Temperature of Thermal Expansion	200 °C		In-house test method
Thermal Expansion magnification	9 Times its volume		at 300°C for 30 min
Oxygen index	45		JIS K 7201
Combustion gas composition	<u>Under complete combustion</u>	<u>Under incomplete combustion</u>	JIS K 7217
Hydrogen chloride	Not detected	Not detected	
Hydrogen cyanide	Not detected	Not detected	
Ammonia	Not detected	Not detected	
Sulfur oxides	6 mg/g	7 mg/g	
Nitrogen oxides	Not detected	Not detected	
Carbon monoxide	19 mg/g	60 mg/g	
Carbon dioxide	1200 mg/g	800 mg/g	

ASTM and BSS-standard Test Data

The results from ASTM and BSS standard tests showed low smoke emission, low flame propagation and low toxicity of gas, which makes the material suitable for rail way vehicle applications.

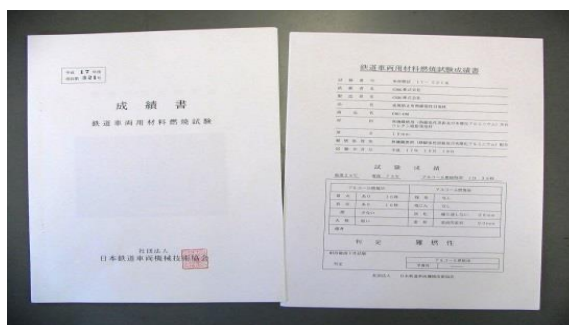
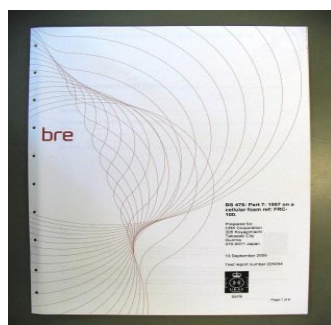
1. Low flame propagation: less flame propagation and flame retardancy during combustion.
→ (Passed ASTM E162)
2. Low smoke emission: generation of smoke is suppressed during combustion.
→ (Passed ASTM E662)
3. Low toxic gas property: suppresses the generation of toxic gas during combustion.
→ (Passed BSS 7239)

<Example of Measurement Results of the Sponge Type>

Test Item			Result	Specification	Test Method
Flame propagation index (Is)			16	< 35	ASTM E162
Smoke Density (Ds)	With flame	1.5 min.	11	< 100	ASTM E662
		4.0 min.	40	< 200	
	Without flame	1.5 min.	28	< 100	
		4.0 min.	66	< 200	
Toxic Gas Composition (ppm)	CO		300	< 3500	BSS 7239
	NO ₂		<1.5	< 100	
	HCN		<1	< 150	
	HF		2	< 200	
	HCl		<1	< 500	
	SO ₂		10	< 100	
Flame-Propagation Length (inch)			0.5	< 4	ASTM C1166

Results of Burning Tests of Materials for Railways (BS)

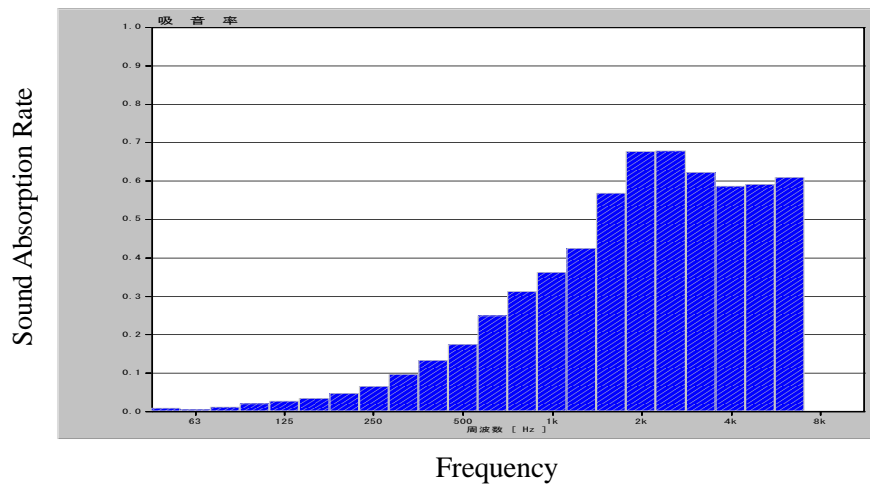
1. Class 2 obtained in BS476:Part 7 test
2. Acquired flame retardancy category in the material burning test for railway vehicles



Sound Absorption Properties of Sponge Material

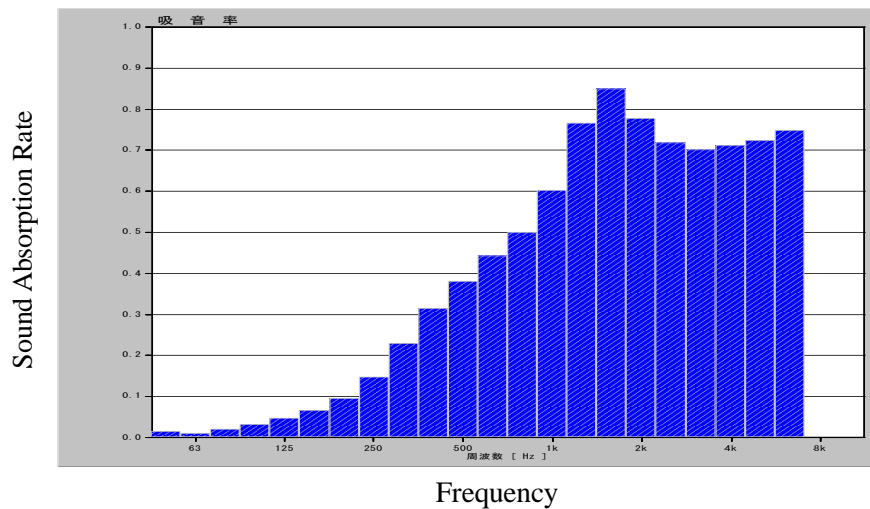
Measuring instrument: acoustic analysis system

(B & K 3560D PULSE Systems & Vertical Injection Sound Absorption Rate Measurements)



Thickness of Sponge Material

10mm



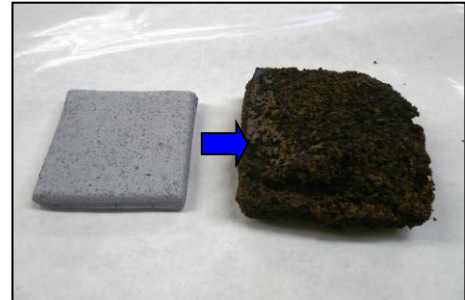
Thickness of Sponge Material

20mm

The results show sound absorption characteristics equivalent to those of ordinary foams

Putty Type

Thermal Expansion Putty



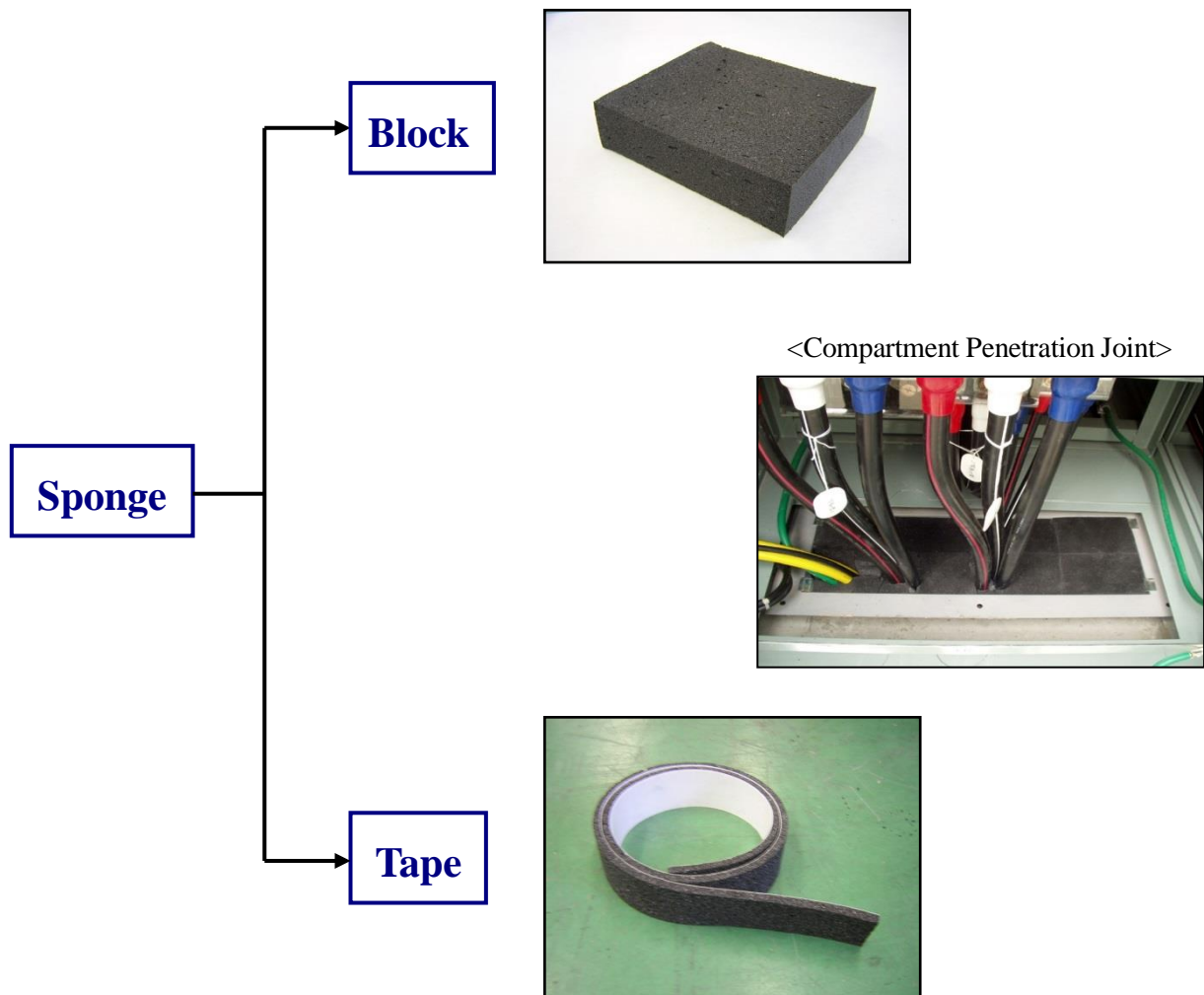
<After heating at 300°C for 30 minutes>

- Features
 - Flexibility and good workability.
 - Thermal expansion starts from 200°C due to the heat of fire, and the volume expands by about 10 times.
 - After thermal expansion, it retains a firm shape and completely closes void.
 - It does not contain harmful components such as asbestos and halogen.

- Physical Property

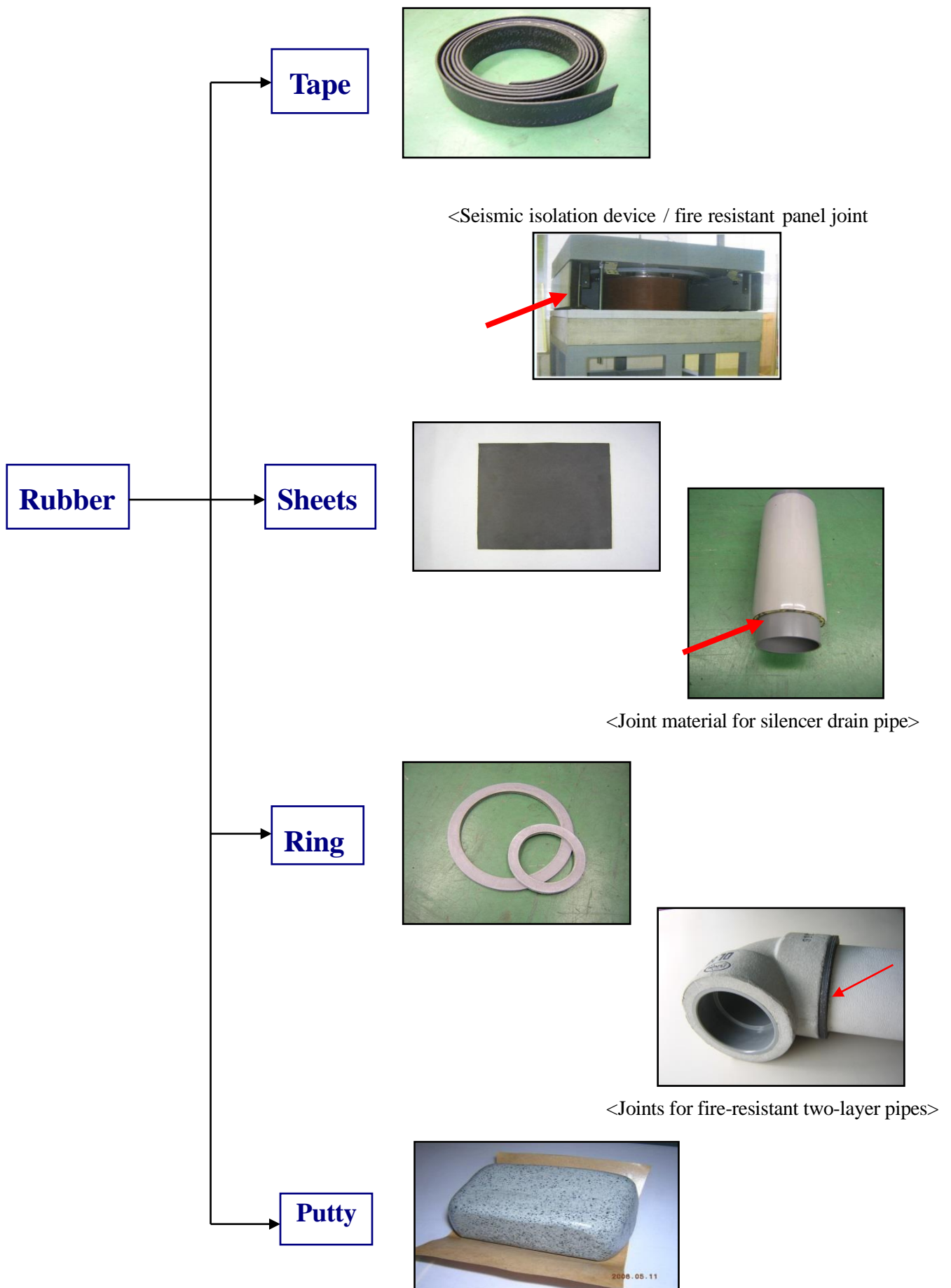
Item	Test method	Results
Hue Color	Visual inspection	Gray or black
Specific gravity	JIS K 6268	1.5 [—]
Penetration degree	JIS K 2207	76 [1/10mm]
Oxygen index	JIS K 7201	54 [%]
Thermal expansion magnification	300 °C × 30min	12 times its volume

Examples of Applications for Fire Resistant Materials



<Fire Wall Joint Material for Taiwanese **Shinkansen** Trains >





Construction

- Expandable Sponge Filling Method

Simply fill the fire resistant sponge that expands in response to heat in floors and walls.

- Features

- The material is easy to install when adding new cables in tenant work and more, and reduces running costs.
- The construction speed is fast since the material only requires simple filling.
- There is not many onsite work and only produces a small amount of left-over materials.

<Floor Penetration>



<Wall Penetration>



- Construction Process



Removal of fire resistant sponge



Cabling Work



Construction Completion

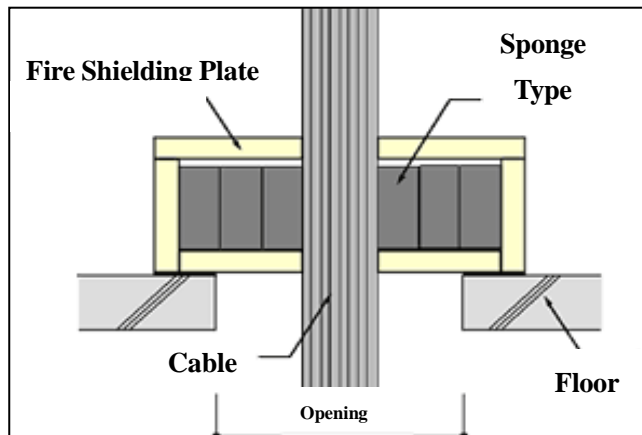


Refill

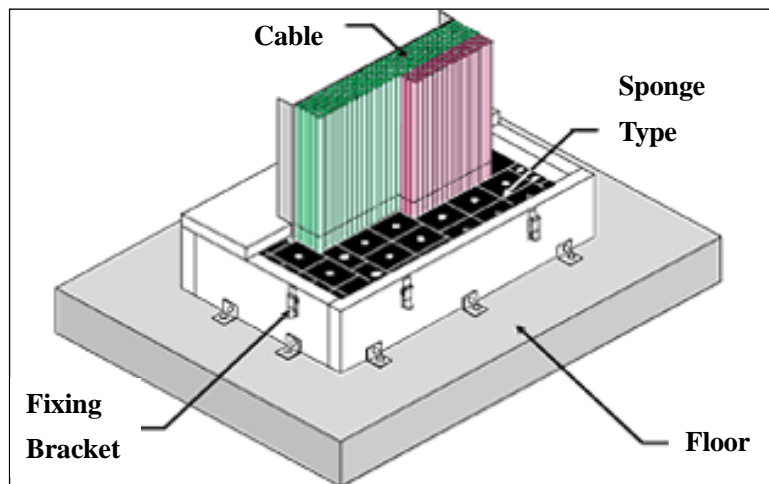


Cut into the shape of additional cables

<Cross-sectional image (when applied and installed on floor)>



<Configuration Image Diagram>



Shape / Dimension

Variety	Type	Thickness (mm)	Width (mm)	Length (mm)	Remark
Rubber	Tape	2~10	10~50	*	No adhesive seal
		1~3	10~1000	*	Pressure-sensitive adhesive seal
	Sheet	1~3	1000	*	
Sponge	Block	100	150	300	
	Tape	*			
Putty	-	*			

* The product can be manufactured in a shape that meets your requirements.

Consult us regarding the shape and the presence or absence of an adhesive seal.

For inquiries, contact us as below.

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