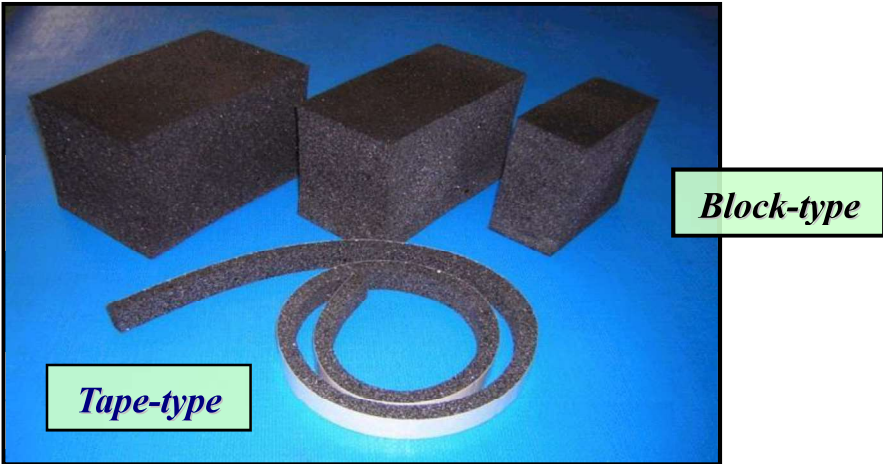


*Denka Elastlution / Thermally Expandable Fire-proof Material*

**Fire-proof Sponge**



**Fire-proof Material**



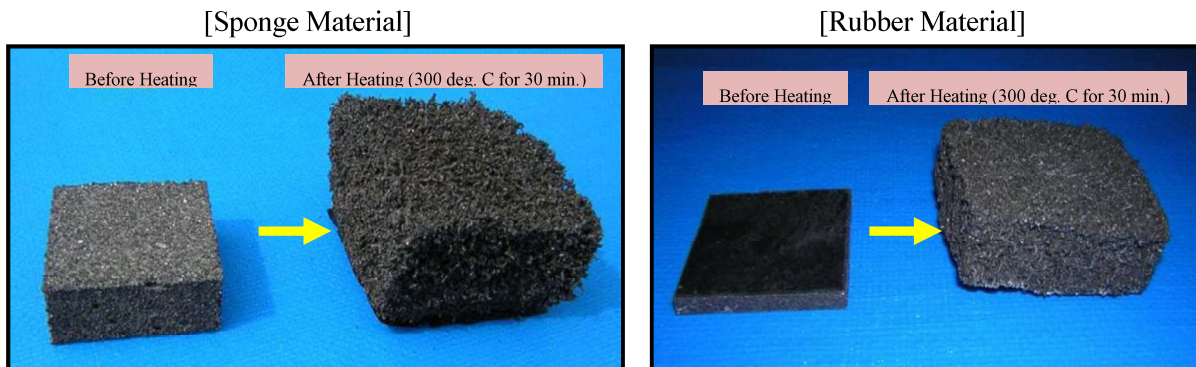
**Denka**

Denka Elastlution Co., Ltd.

## Features

### 1. Excellent Fire Resistance

Thermal expansion starts at 200 deg. C or higher and forms a strong insulating layer. The expansion material fills the gaps and also prevents smoke penetration.



### 2. Easy To Handle

The material comes in several forms; sponge tape, sponge block, rubber tape 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 minimal.

### 4. Sound-Proof and Vibration-Proof

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

# Fire-proof Property

<Fire-proof sponge>



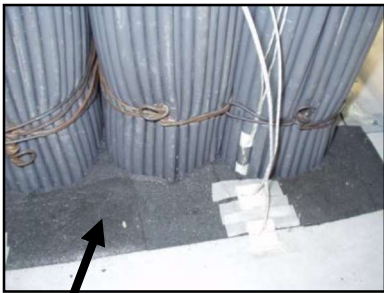
Gas Burner



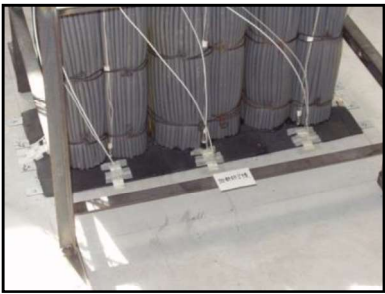
After Heating

# Smoke Barrier Property

<Fire Resistance Test at the Building Materials Center>



<Smoke blocked 5 minutes after generation>

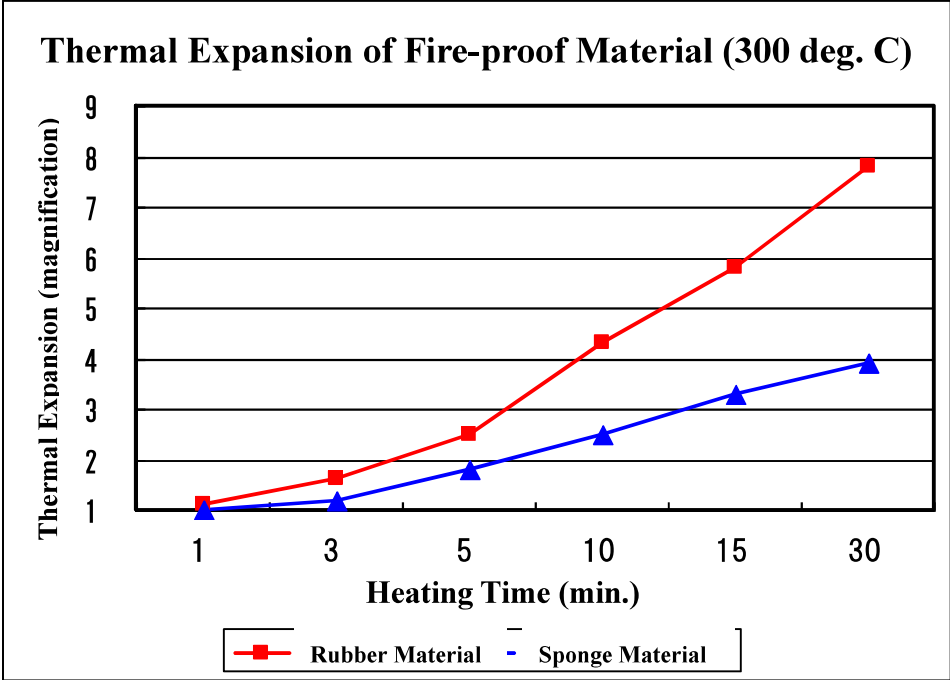


**Fire-proof material**

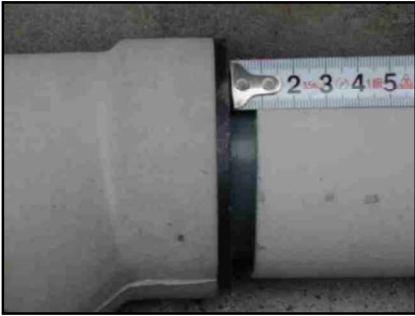


<Smoke generated 15min. after heated.>

# Thermal Expansion Behavior



<8mm Clearance>



<Expanded 20mm to fill the gap>



## *Properties*

### 1. Sponge Material

Test Item	Result		Test Method
Apparent Specific Gravity	0.27		In-house test method
Hardness	Durometer E5-E25		JIS K 6253
Onset Temperature of Thermal Expansion	200 deg. C		In-house test method
Thermal expansion factor	4 Times		In-house test method
Oxygen index	<b>General type 70 &lt; / Durability type 45</b>		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	A65		JIS K 6253
Tensile Strength	1.2 MPa		JIS K 6251
Onset Temperature of Thermal Expansion	200 deg. C		In-house test method
Thermal Expansion Factor	9 Times		In-house test method
Oxygen index	<b>45</b>		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 vehicle applications.

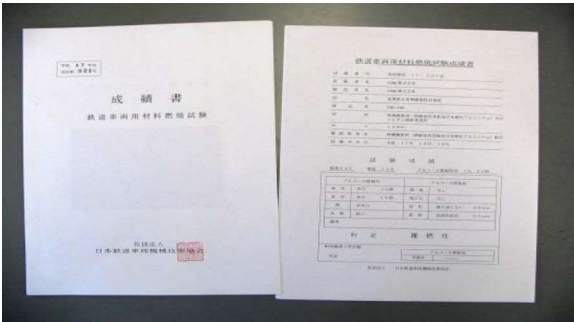
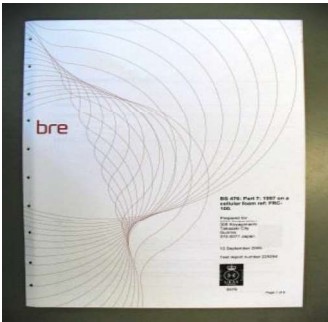
1. Low-flame propagation: less flame-propagation and flame retardancy during combustion.  
→ (Passed ASTM E162)
2. Low smoke emission: generation of smoke is suppressed during combustion.  
→ (Passed ASTM E662)
3. Low toxic gas property: suppresses the generation of toxic gas during combustion.  
→ (Passed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

<Example of Measurement Results of the Sponge Material>

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 Components (ppm)	CO		300	< 3500	BSS 7239
	NO <sub>2</sub>		<1.5	< 100	
	HCN		<1	< 150	
	HF		2	< 200	
	HCl		<1	< 500	
	SO <sub>2</sub>		10	< 100	
Flame-Propagation Length (inch)		0.5		< 4	ASTM C1166

## *Results of Burning Tests of Materials for Railways (BS)*

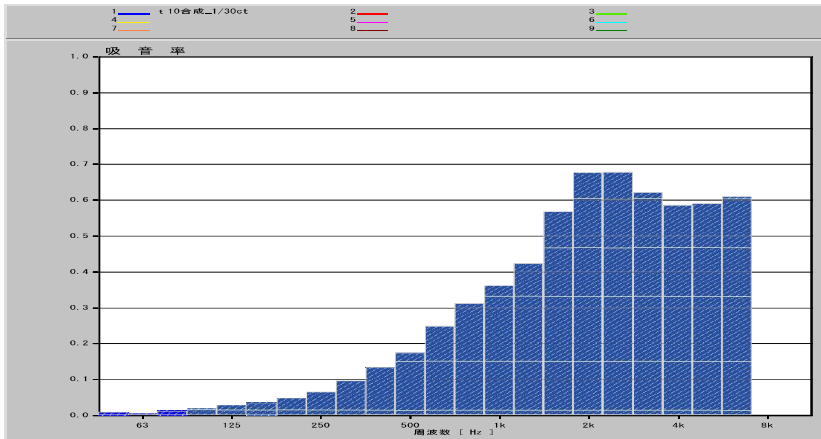
1. Class 2 obtained in BS476:Part 7 test
2. Acquired flame retardancy category in the material burning test for railway vehicles



## Sound Absorption Properties of Sponge Material

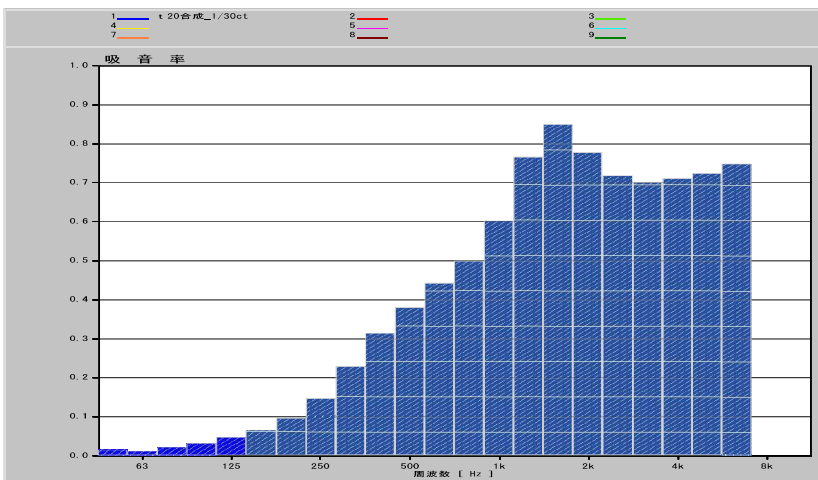
Measuring instrument: acoustic analysis system

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



Thickness of Sponge Material

10mm

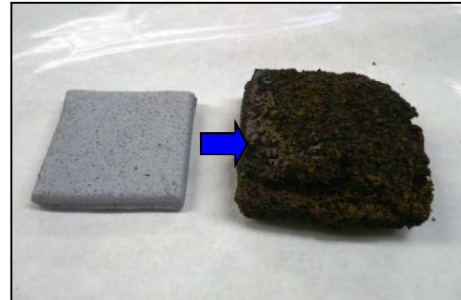


20mm

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

## Putty Material

### Thermal Expansion Fire-proof Putty



<After heat treatment at 300 deg. C for 30 minutes>

- Features

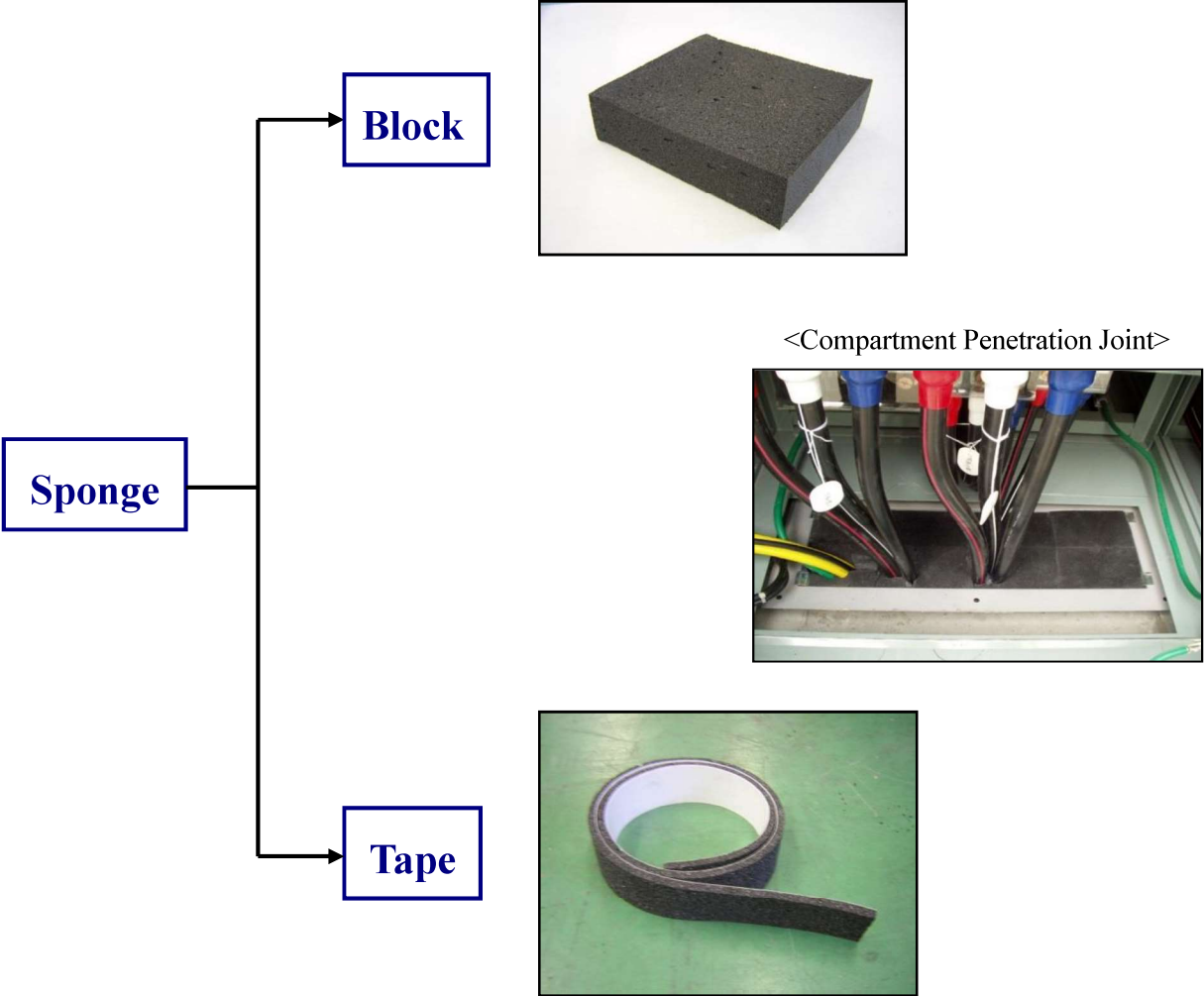
- Flexibility and good workability.
- Thermal expansion starts from 200 deg. C due to the heat of fire, and the volume expands by about 10 times.
- After thermal expansion, it retains a firm shape and completely closes void.
- It does not contain harmful components such as asbestos and halogen.

- Physical Property

Item	Test method	Results
Hue	Visual inspection	Gray or black
Specific gravity	JIS K 6268	1.5
Penetration degree	JIS K 2207	76
Oxygen index	JIS K 7201	54
Thermal expansion factor	300 deg.C×30min	12 times

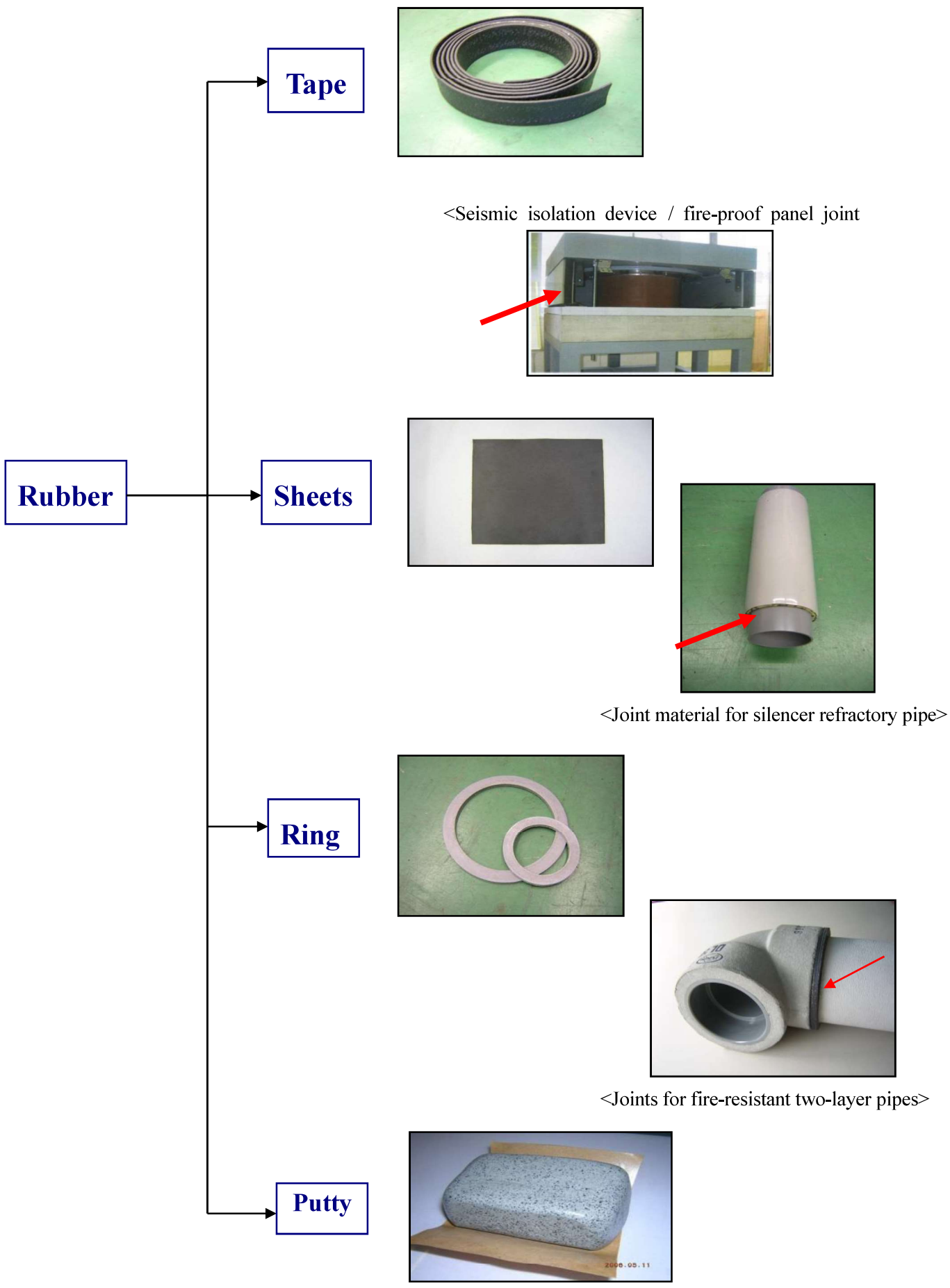


*Examples of Applications for Fire-proof Materials*



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





## *Construction*

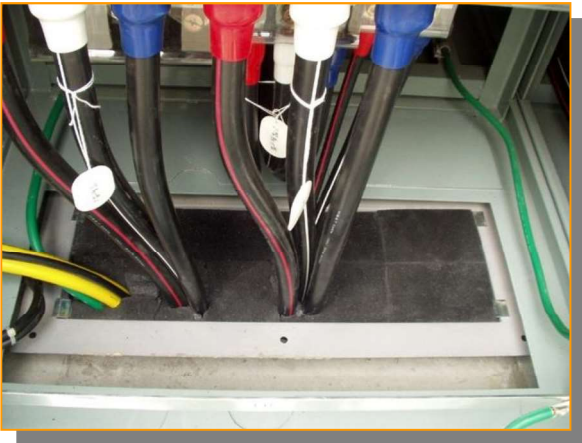
- Expandable Sponge Filling Method

Simply fill the fire-proof 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-proof sponge**



**Cabling Work**

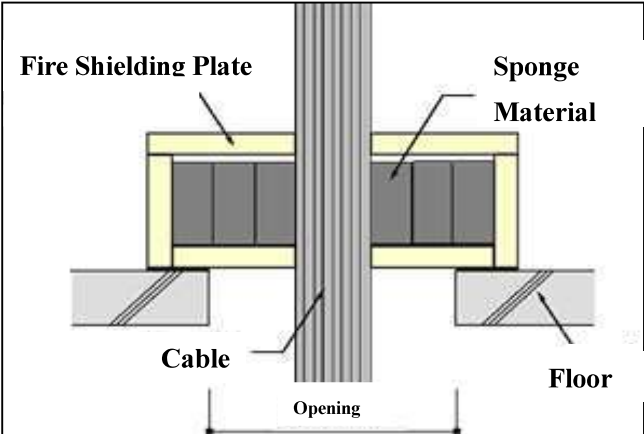


**Construction Completion**

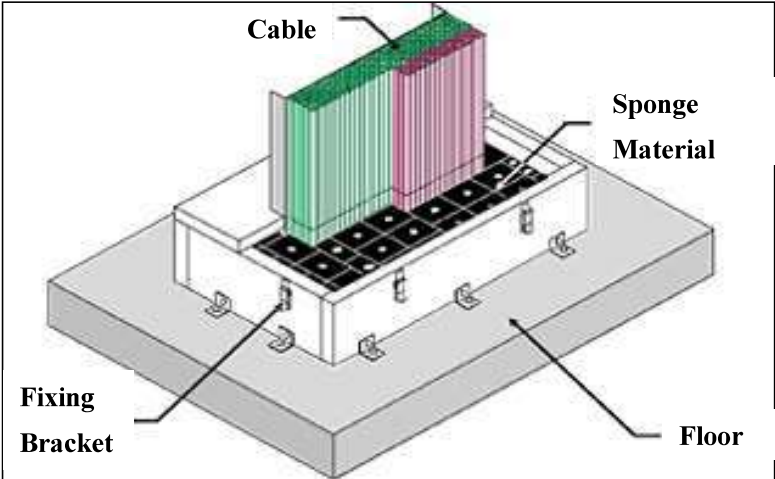
**Refill**

**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	* 1	No adhesive seal
		1~3	10~1000	* 1	Pressure-sensitive adhesive seal
	Sheeting	1~3	1000	* 1	
Sponge	Block	100	150	300	
	Tape	* 1			
Putty	-	* 1			

\*1 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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