SEKISUI

Sekisui's Thermal Expansion Fire-Resistant Material

Fi-Block™

SEKISUI CHEMICAL CO.,LTD.

FIRE PROTECTION MATERIALS DIVISION

2-10-4 Toranomon, Minato-ku, Tokyo 105-8566 JAPAN
Telephone: +81-3-6748-6452
Fax: +81-3-6748-6541

E-mail: fi-block@sekisui.com

Intumescent Material

"Fi-Block" expands in fire to perform a fire-resistant function.

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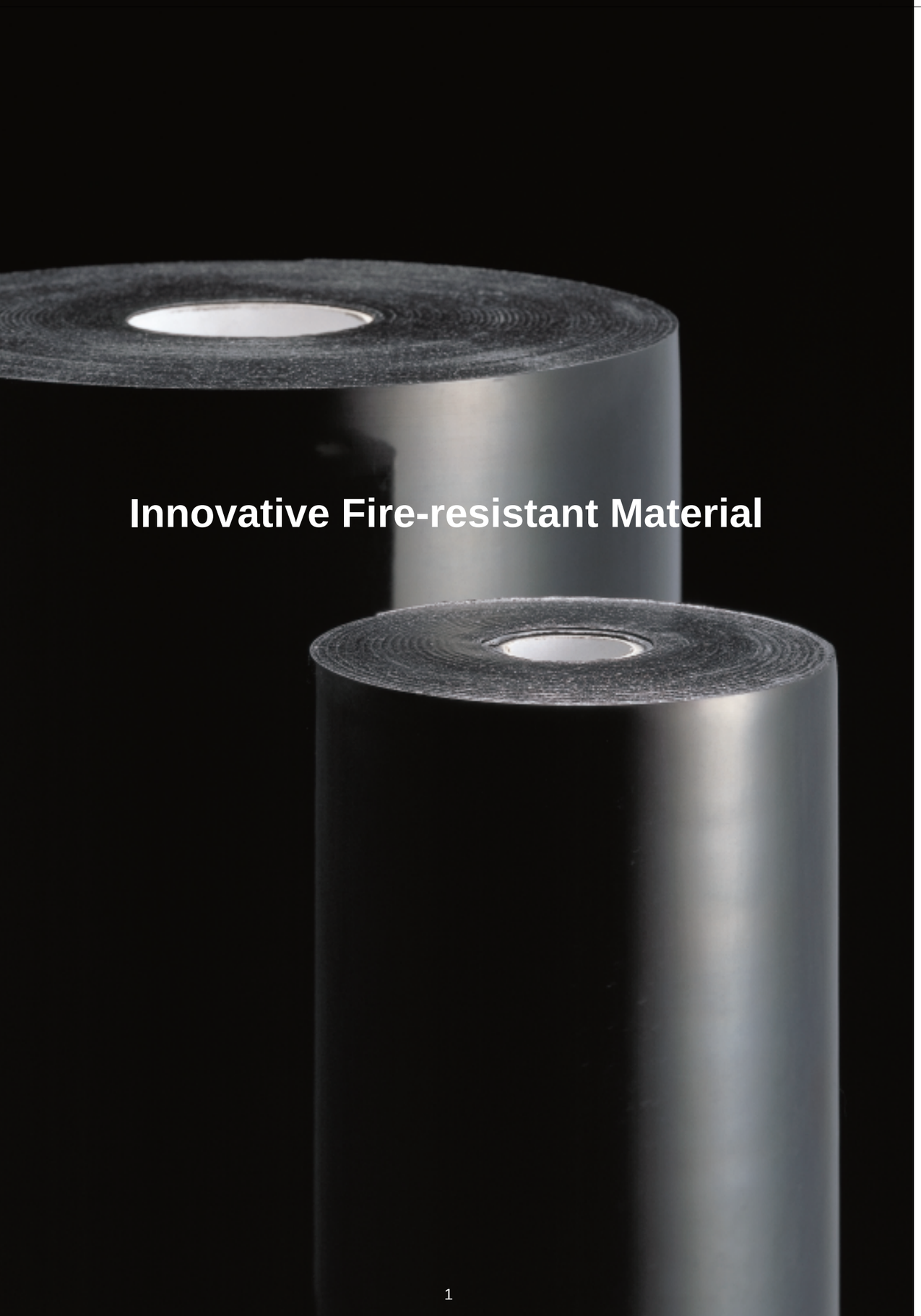
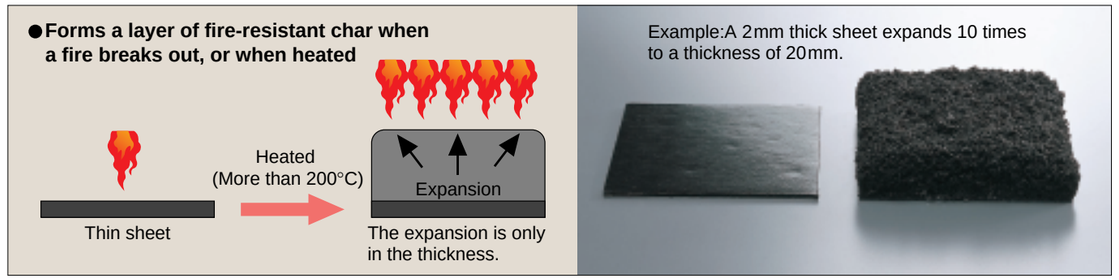


Innovative Fire-resistant Material

"Fi-Block" is a new type of fire-resistant material that expands in fire.

Fi-Block™

"Fi-Block" is thin, flexible organic fire-resistant material made using Sekisui Chemical's plastics technology. It differs from conventional, inorganic fire-resistant material because the heat generated by a fire causes it to expand, allowing it to perform its fire-resistant, fire prevention function rapidly and efficiently



In its ordinary state, the material comes in a thin sheet and is attached as tape, making it easy to bend and cut. The potential for applications in fire-resistant design is unlimited, as it is the optimum material for narrow or small spaces. We offer two types of material for different uses: butyl "Fi-Blok" or epoxy "Fi-Block".

Features

(1) Expandable

This material will not expand in normal, room temperature conditions, but when heated to more than 200°C, it will expand from 5 to 40 times its original size to form a fire-resistant char (It can be adjusted or designed to conform to the use required.) It has great insulating characteristics, and fulfills ISO 834 requirements by withstanding the heat of a fire for two hours, preventing loss by fire.

(2) Easy to use

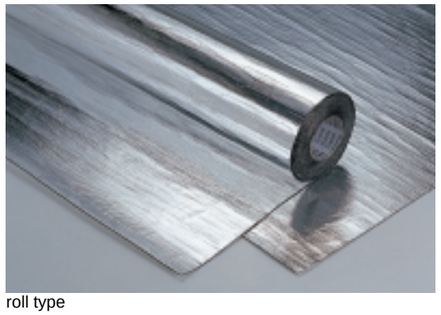
Its thin, flexible shape makes it easy to bend or cut. It also can be easily installed in narrow or small spaces, which have always been hard to deal with.

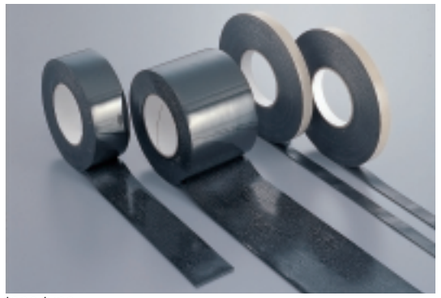
(3) Adhesive

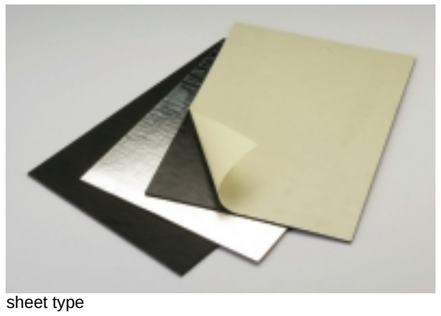
The butyl "Fi-Block" has adhesiveness, facilitating provisional installation or layering with other materials. Layering it with different surface coverings enables a strong or flexible design as needed.
The epoxy "Fi-Block"can have adhesiveness by our processing.

(4) Environmentally friendly

It contains no halogen compounds, which can be environmentally friendly and there are no concerns of toxic gas emissions when heated. The material does not disperse dust during installation, so it is safe for workers and other people nearby.


roll type


tape type


sheet type

You’re sure to find more ways to use"Fi-Block"

Fi-Block™

"Fi-Block" is rich in potential.It keeps the safety of buildings and vehicles, retards the spread of fires, protects equipment and facilities, and saves space.

Using this material on the interior of passenger seats, around engines, and on the walls of freight compartments increases safety, saves space, and reduces weight.

Wrap it around fuel tanks and engines and use it to prevent the spread of fire in case of an accident.

Install it around the bulkheads and piping on passenger ships, oil tankers, and other vessels to prevent the spread of fire if one breaks out.

Use it to protect cables and prevent the ignition from the electronic equipment.

Use it to protect bridges and tunnels.

Use it on walls, roofs, columns, beams, floors and other locations.

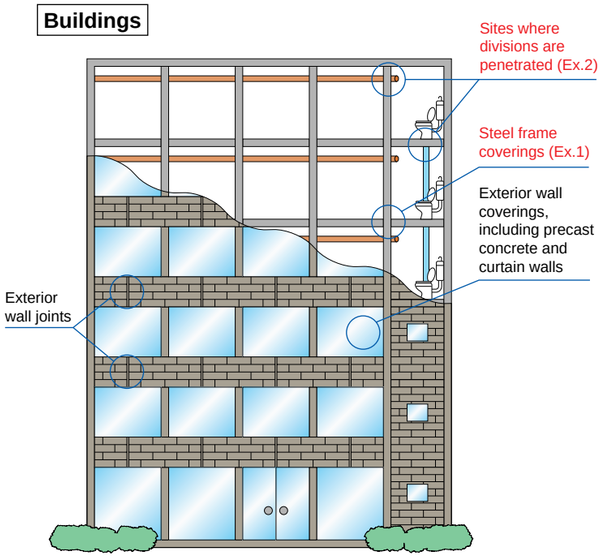
Application Examples of Easy Installation in Buildings and Housing

Fi-Block™

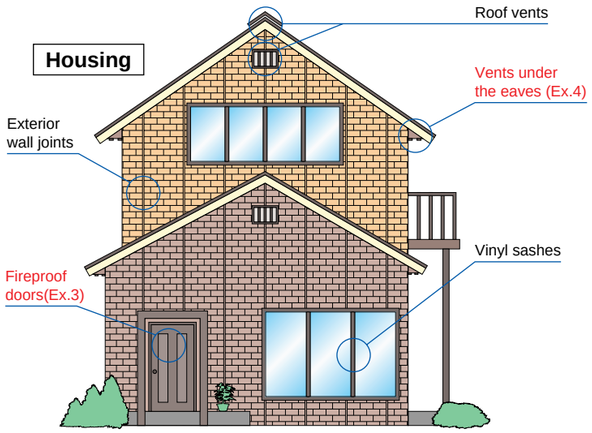
More companies are using the material in the housing and construction materials sector, which requires exceptional fire-resistive and fire-protection performance.

"Fi-Block" is exceptionally thin, flexible, easy to use, and safe. We are working with our Fire-Resistance Design Center to evaluate the material's performance from the standpoint of product design. It has been used in a wide range of fire-resistant structures in housing, and for construction material.

Buildings



Housing

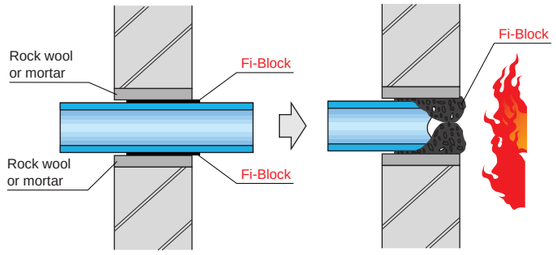


Ex.2

Sites where divisions are penetrated

Just wrap it around the object

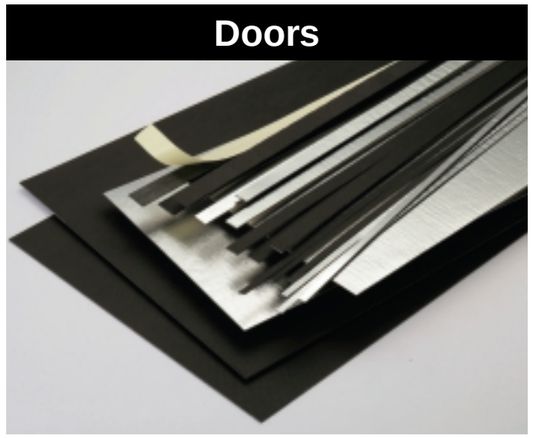
Normal circumstances **During fires**



- It seals the areas of penetration during fires to prevent the fire's spread.

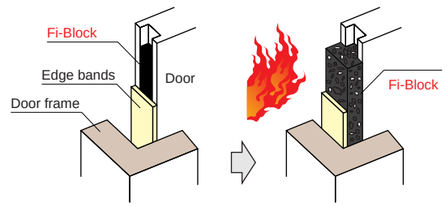
Ex.3

Doors



Tape and sheet shapes

Normal circumstances **During fires**

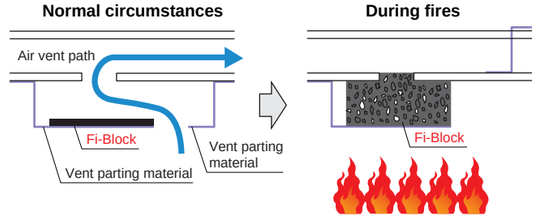


- It expands during fires to seal off the spaces in the frame, prevents the spread of fires, and retards the combustion of the wooden core.

Ex.4

Vents

Normal circumstances **During fires**



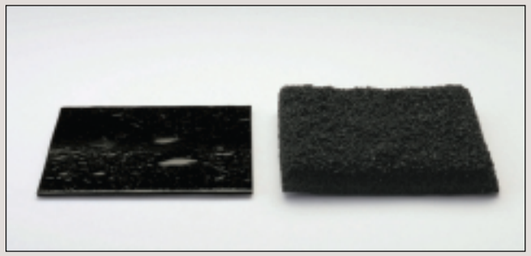
- It expands during fires to seal off the spaces in the air vent path, preventing the spread of fires.

TECHNICAL DATA

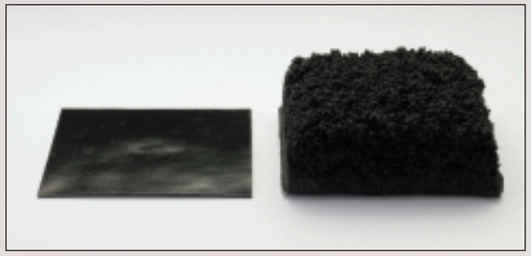
Fi-Block™

1. Expansion Performance

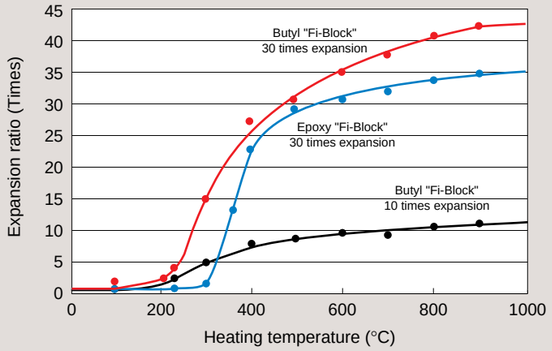
It expands when the heat reaches 200°C.



Example:The butyl "Fi-Block" expands roughly 10 times.

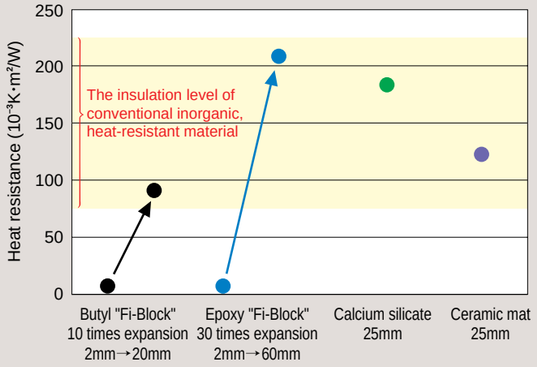


Example:The epoxy "Fi-Block "expands roughly 30 times.



2. Insulation Performance

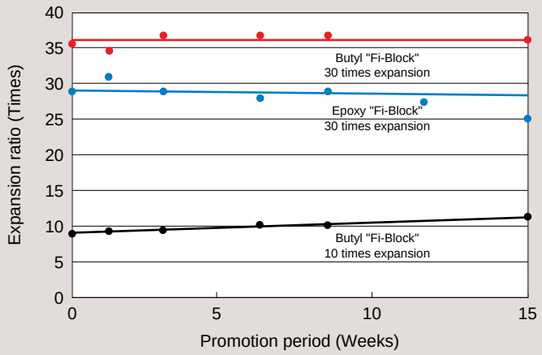
When this 2 mm sheet expands, it provides exceptional insulating performance equivalent to inorganic fire-resistant material 25 mm thick.



∗Heat resistance figures indicate the difficulty of heat conduction. The higher the numbers, the more resistance there is to heat conduction. Heat resistance is calculated using the following formula:
Heat resistance (K·m²/W) = Material thickness (m) / Heat conduction ratio (W/m·K)

3. Long-term Performance Stability

No major change in the expansion ratio is observed under environmental conditions at high temperature and high humidity (80°C, 85% RH).

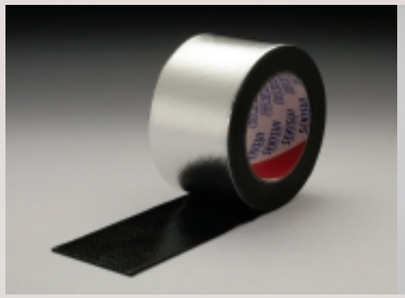


4. Safety

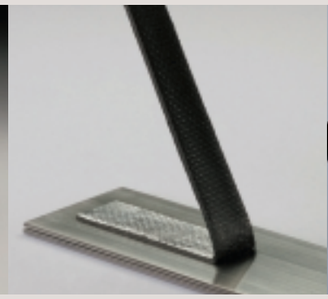
This environmentally friendly material limits VOC. None of the 14 materials designated by the Ministry of Health, Labor, and Welfare (Japan) as contributing to the “sick house” phenomenon is used as primary materials or in the manufacturing process.

●VOC Emission Speed (μg·m²/h)

	Butyl "Fi-Block" 10 times expansion	Butyl "Fi-Block" 30 times expansion	Epoxy "Fi-Block" 30 times expansion	Vinyl chloride decorative plywood
Toluene	0.4	0.2	1.6	725.6
Xylene	Less than 0.1	Less than 0.1	1.8	1197.6
TVOC	210.0	95.0	482.0	4245.0



2mm thick tape



Adhesion tape

1mm thick tape

Category	Trial methods∗2		Physical values∗1 Butyl type 10 times	Butyl type 30 times	Epoxy type 30 times	Remarks
Bulk specific gravity	Specific gravity meter		1.60	1.66	1.50	
Expansion ratio	Sekisui method / Heating for 20 minutes at 600°C		10 times	35 times	30 times	
Insulation properties	Heat conductivity ratio	Before expansion	0.46W/m·K	—	0.47W/m·K	Calcium silicate: 0.14 W/m·K Rock wool: 0.20 W/m·K
		After expansion	0.22W/m·K	—	0.29W/m·K	
Combustion properties	Oxygen index (according to JIS K7201)		44	40	60	Polyethylene: 17 Vinyl chloride: 40
	Non-combustible material certification number (ISO 5660)		NM-0057	—	—	Less than 2 mm thick
	UL fire resistance tests (according to UL-94)		—	—	Corresponds to V-0	2 mm thick
Dynamics properties	Tensile elongation (according to JIS K6251)		150%	195%	20%	2 mm thick
	Tensile strength (according to JIS K6251)		9N/cm²	35N/cm²	63N/cm²	
	Bending and elastic modulus (according to JIS K7171)		—	—	20N/cm²	
Adhesiveness	Peel strength for adhesion to SUS at 180° (according to JIS Z 0237)	Mild adhesion type	15N/25mm	5N/25mm	—	
		Adhesion processed type	—	14N/25mm	18N/25mm∗3	
Safety	Combustion gas emission volume (Combustion: 1g/m³)	Carbon monoxide	58ppm	—	36ppm	Nylon: 309 ppm
		Carbon dioxide	197ppm	—	560ppm	Nylon: 505 ppm

∗1: The values for properties are representative and not standard.
∗2: Evaluation at our company's facilities
∗3: For PET film / T Peel strength

●Basic Specifications∗4

Base resin	Expansion ratio∗5	Surface material∗6	Thickness∗6
Butyl rubber (mild adhesion tape)	10 times	Aluminum foil layered paper Aluminum laminated glass cloth	0.5–6mm
	30 times		
Epoxy resin (leaf sheets)	30 times	Non-woven polyester cloth	1–2mm

◎Application with adhesive agent is possible as required.
◎Inquire separately about sizes.

∗4: Basically, made to order
∗5: Nominal, not actual values
∗6: We accept requests based on your inquiries.

Solution for your Fire-Resistant Needs

SEKISUI CHEMICAL CO., LTD. conducts performance evaluations of all types at our Fire-Resistance Design Center. We offer proposals and technical support for specific designs capable of fulfilling your requirements for different fire-resistant and fire prevention uses.

■**Horizontal furnace**
JIS A 1302
(Grade 2 fire protection)
JIS A 1304 (1 hour fire resistance)
ISO-834 (1 to 2 hours of fire protection and resistance)
Effective heat area: 1000 x 1600 x 1300 (H) mm

●Uses: Columns, beams, floors, roofs

■**Vertical furnace**
JIS A 1302
(Grade 2 fire protection)
JIS A 1304 (1 hour fire resistance)
ISO-834 (1 to 2 hours of fire protection and resistance)
Effective heat area: 1000 x 1000 mm

●Uses: Walls, fireproof doors, under eaves, sashes

■**Cone Calorimeters**
ISO-5660 (Heat volume, heat speed)
Size of test piece: 100 x 100 mm

●Uses: Noncombustible trials, semi-noncombustible trials,
fire resistance trials

Highlights of "Fi-Block"

- **Innovative, fire-resistant material**
- **Intumescent:Expands up to 40 times**
- **Easy installation**
- **Available in various forms and sizes**
- **Multiple applications**
- **Long-term performance stablity**
- **Environmetally friendly**

Fi-Block™