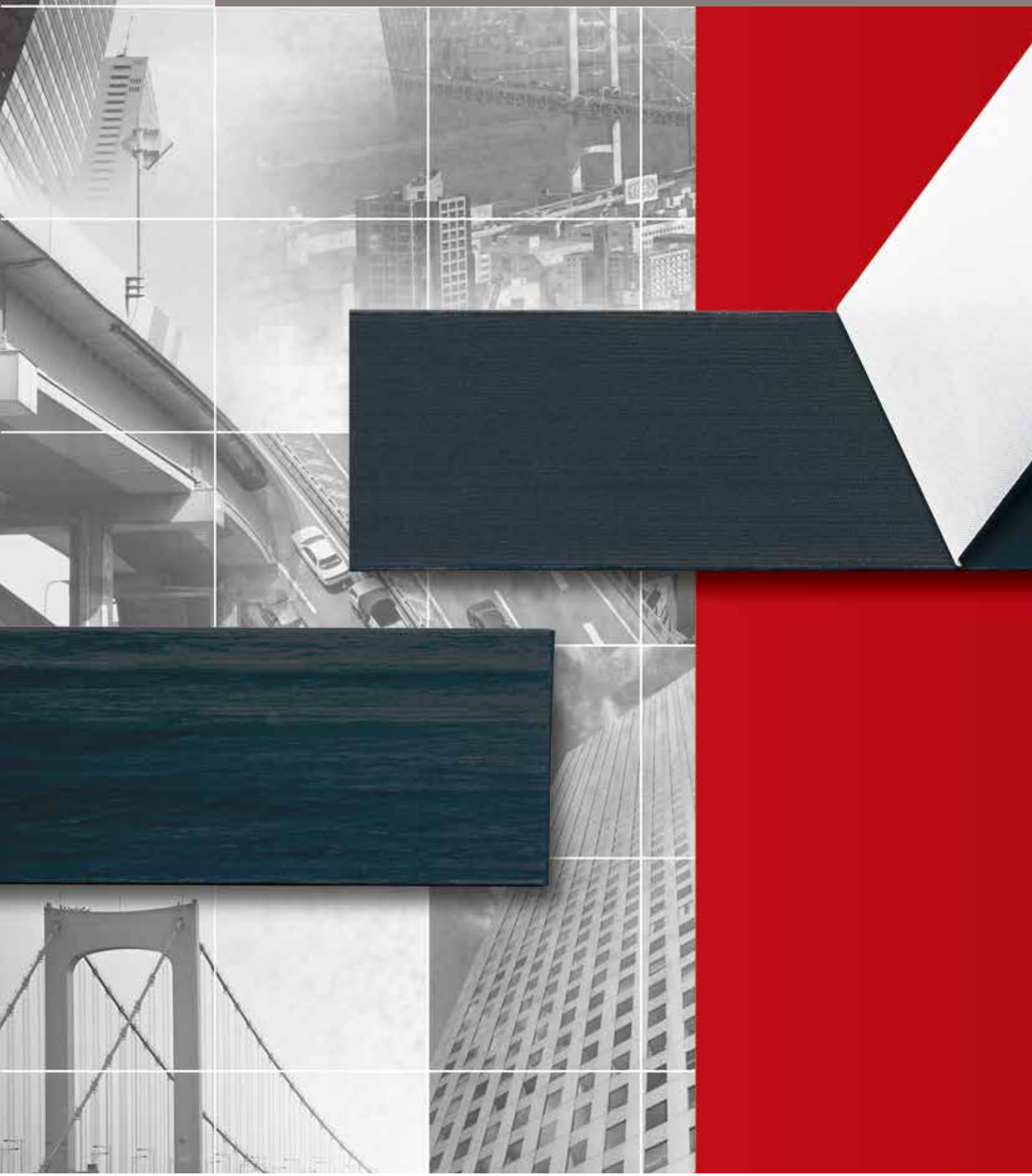
Strengthening method of steel / concrete construction by CFRP strip

e-plate Strengthening Method



MITSUBISHI CHEMICAL INFRATEC CO.,LTD.

Realizing the smooth finish
New-generation e-plate application m

e-plate construction method is the strengthening method that adheres and fixes the carbon fiber reinforced plastic plate that is processed to the plate from carbon fiber in the pultrusion molding method to the existing construction with the epoxy adhesive in paste form.
The reinforcement volume per unit width is considerably improved compared with the existing carbon fiber sheet, so it is possible to obtain the large reinforcement effect by just attaching a sheet of e-plate.

Characteristics

■ Improvement of construction property / reduction of environmental load

e-plate is the light and easily-handled plate-like member. It is just affixed to the repair or reinforcement part with the adhesive in paste form, so you can be released from the drop of resin in the upward work, especially, and it brings out the superior construction property. As the ground processing area and the curing can be reduced, the generation of powder dust upon the construction can be reduced.

■ Stable construction quality / improvement of construction efficiency

You are in no danger of impregnation failure, floating, swollenness, and resin breaching that are the problems in the existing carbon fiber sheet attachment construction.
The construction can be carried out efficiently at the place where the pipe crosses each other or the repair space is limited.

■ Shortening of construction period / low cost

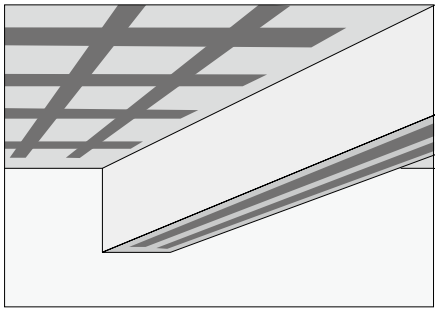
One sheet of high-elasticity e-plate is equivalent to nine high-elasticity carbon fiber sheets*.
As the both of intensity and rigidity are superior, it is not necessary to attach it to the whole surface of construction by many layers like the carbon fiber sheet. The both of work rate and the quantity of reinforcement material can be reduced considerably, it is possible to shorten the construction period and reduce the cost.

* Comparison between HM520 and high-elasticity carbon fiber sheet

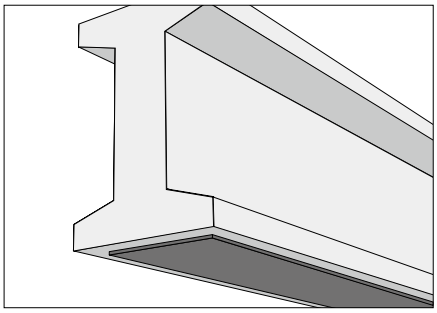
Example of floor slab strengthening

Example of silo strengthening

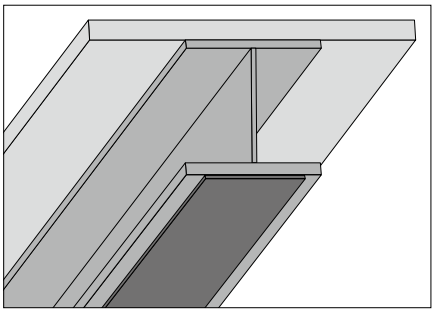
Images of strengthening



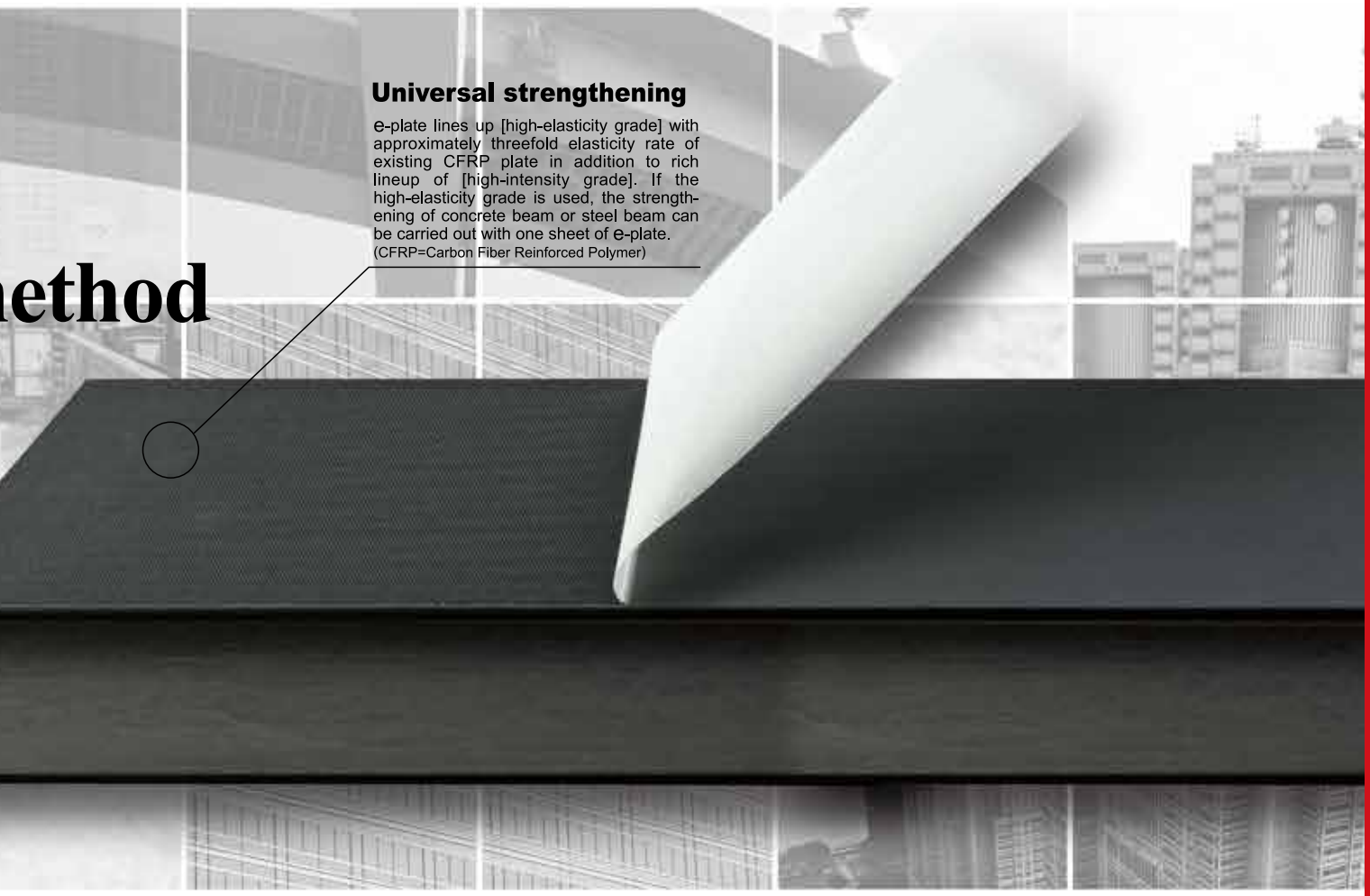
Building field: bending strengthening of joist or floor slab



Civil engineering field : bending strengthening of girder



Bending strengthening of steel construction



ethod

Universal strengthening

e-plate lines up [high-elasticity grade] with approximately threefold elasticity rate of existing CFRP plate in addition to rich lineup of [high-intensity grade]. If the high-elasticity grade is used, the strengthening of concrete beam or steel beam can be carried out with one sheet of e-plate.
(CFRP=Carbon Fiber Reinforced Polymer)

* e plate has two types ; peel ply product and rough finishing product.

Performance table

e-plate

■ **High-intensity grade**

	GM512	GM520	GM1012
Young's modulus (kN/mm²)	170 (156)		
Tensile strength (N/mm²)	2,400		
Thickness (mm)	1.2	2.0	1.2
Width (mm)	50	50	100
CFRP cross-section area (mm²)	60	100	120

■ **High-elasticity grade**

	HM512	HM520	HM1020	HM1040
Young's modulus (kN/mm²)	450			
Tension strength (N/mm²)	1,200			
Thickness (mm)	1.2	2.0	2.0	4.0
Width (mm)	50	50	100	100
CFRP cross-section area (mm²)	60	100	200	400

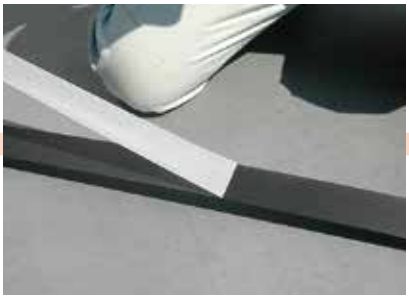
Epoxy adhesive

	Epotherm e (For concrete)	L-600 (For steel)	Remark
Compressive strength (N/mm²)	≧50	≧50	JIS K 7181
Young's modulus (N/mm²)	≧1000	≧1000	JIS K 7181
Lap shear strength (N/mm²)	≧10	≧10	JIS K 6850

Application procedure

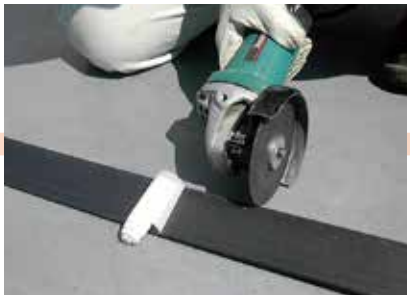
1. Ground processing

Retouch the roughness and remove the laitance and taint on the concrete surface using the disk sander.



2. Peeling off the protection cloth

Peel off the protection cloth on the surface of e-plate (only the peel ply product).



3. Cutting e-plate

Cut out e-plate by the predefined length and number of sheet.

4. Applying the adhesive (concrete surface)

Apply the adhesive on the concrete surface evenly.

5. Applying the adhesive (e-plate surface)

Apply the adhesive on e-plate surface evenly using the adhesive coating applicator.

6. Attaching e-plate

Attach e-plate to the predefined position using the pressure bonding roller etc.

Packing style

- **e-plate**

Shipment unit

- High-intensity grade : 50m / wound in ring shape and the belt is applied (diameter 0.6 to 0.9m)
- High-elasticity grade : Long type of 2.5 to 4.0m (only HM512 is the ring shape with 1.8m of diameter) (for the product exceeding 4.0m, please contact us)

- **Epotherm e (For concrete)** F☆☆☆☆non- formaldehyde
  Specification : epoxy adhesive for CFRP
  Shipment unit : 15kg set (main agent : 10kg can, hardener : 5kg can)

- **L-600 (For steel)** F☆☆☆☆non- formaldehyde
  Specification : epoxy adhesive for CFRP
  Shipment unit : 15kg set (main agent : 10kg can, hardener : 5kg can)

* Epotherm e does not require the primer as a general rule.

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