

CARBON STRENGTHENING SYSTEMS

The smarter choice for.....
the effective repair and reinforcing
of any type of structure



THE PROCESS OF FABRIC REINFORCEMENT



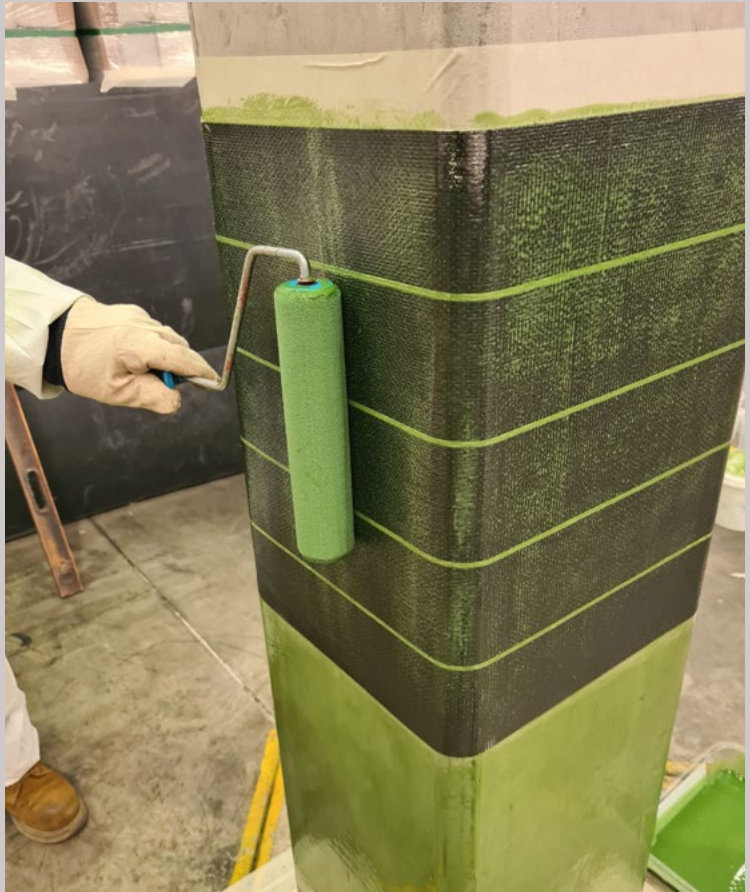
For concrete the process involves grinding, rounding corners, filling holes and smoothing



Application of the self priming impregnating resin Metz C100



The carbon fibre fabric is unrolled into the still wet impregnating resin Metz C100



A final series of rollers first fully embeds the carbon fabric, then completely encapsulates the fabric

FABRIC SPECIFICATIONS

Type	Unidirectional high strength fabric					Unidirectional intermediate modulus typed fabric			Bidirectional high strength fabric	
	UT70-20G	UT70-30G	UT70-40G	UT70-45G	UT70-60G	UM46-30G	UM46-34G	UM46-340G	BT70-20	BT70-30
Model	UT70-20G	UT70-30G	UT70-40G	UT70-45G	UT70-60G	UM46-30G	UM46-34G	UM46-340G	BT70-20	BT70-30
Carbon fiber areal weight (g/m ²)	200	300	400	450	600	300	340	400	Vertical 100 Horizontal 100	Vertical 150 Horizontal 150
Design thickness (mm)*1	0.111	0.167	0.222	0.250	0.333	0.163	0.186	0.217	Vertical 0.056 Horizontal 0.056	Vertical 0.083 Horizontal 0.083
Carbon fiber density (g/cm ³)	1.80	1.80	1.80	1.80	1.80	1.84	1.84	1.84	1.80	1.80
Tensile strength JIS A1191 (N/mm ²)*2	4,686	4,751	4,838	4,809	4,166	3,848	3,607	3,813	Vertical 4,515 Horizontal 4,396	Vertical 3,899 Horizontal 3,951
Young modulus JIS A1191 (kN/mm ²)*2	258	252	254	260	250	440	451	445	259	229
Width (cm)	25,33,50	25,33,50	50*3	50	80	25	25	25	100	100

*2. Tensile strength and Young's modulus are shown by average values and was evaluated according to JIS A 1191.

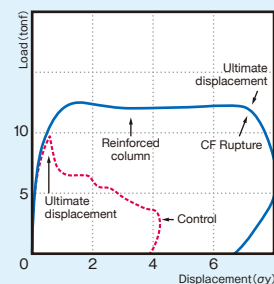
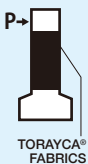
*3. The widths of 25cm and 33cm for UT70-40G, 45G, and 60G are available made-to-order.

- A special misalignment prevention process is applied to help prevent fraying of the cut thread.
- All products are packed in rolls of 50m.

EFFECT OF REINFORCING

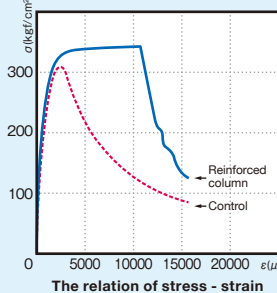
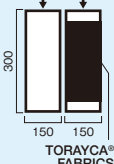
1. Seismic retrofitting of bridge piers and buildings

Apply TORAYCA® FABRICS in the longitudinal direction (bending reinforcing) and the circumferential direction (shear reinforcing), to confine the concrete and thereby increase ultimate displacement to improve seismic performance.



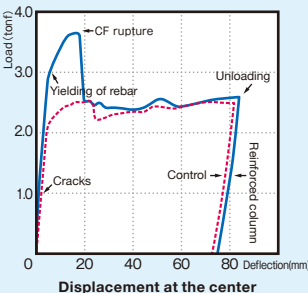
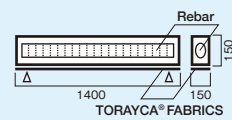
2. Improvement of compressive ductility

Wrap the concrete surface in TORAYCA® FABRICS to create a confined effect, which in turn greatly increases the ultimate strain of the concrete, whereby increasing its ductility.



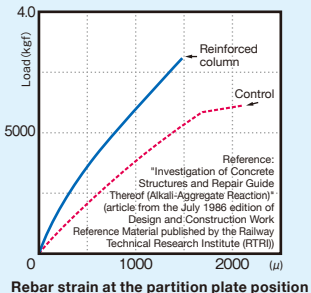
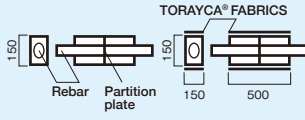
3. Improvement of bending strength

Apply TORAYCA® FABRICS to the tension side of RC beam to improve the bending strength.



4. Reinforcing of cracked parts

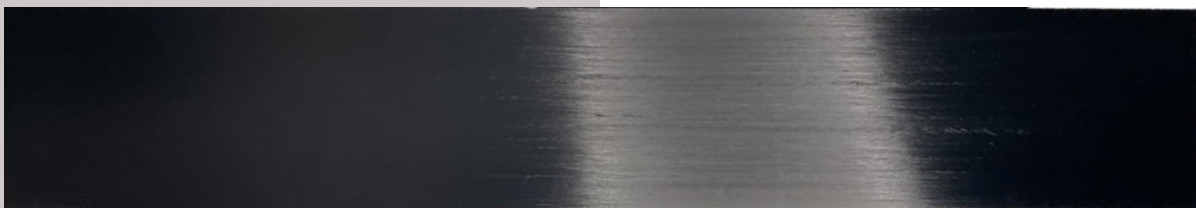
Reducing the strain of the rebar prevents cracks from expanding.



Handling Precautions of TORAYCA® FABRICS

1. Be sure to read the safety information [Safety Data Sheet (SDS)] before using TORAYCA® FABRICS. Also, please check the "TORAYCA® FABRICS Method Safety Precautions" in the TORAYCA® FABRICS method technical material.
2. Fuzz and lint can easily occur while handling TORAYCA® FABRICS, which in turn may cause irritation and itching if contact is made with skin, and can possibly cause respiratory problems if breathed into the throat, trachea, or lungs.
3. TORAYCA® FABRICS is conductive. As such, the user could suffer an electric shock should the cloth come into contact with a power source. Further, fuzz, lint, and cut waste of the carbon fiber can get into electrical outlets and plugs, potentially resulting in a short circuit, whereby potentially causing damage to electric appliances. Therefore, be sure to keep away from power supplies and take care to ensure that no carbon fibers get into electrical outlets, plugs, and electrical appliances.
4. If fuzz and dust will be generated during cutting and processing TORAYCA® FABRICS, be sure to provide local exhaust equipment at the work site in question. Be sure to use a filter for exhaust and use equipment in a way to prevent dust and fuzz from being directly discharged into the atmosphere. Wear protective equipment such as protective glasses, protective gloves and dust masks while working. If the carbon fibers adhere to the skin, rinse with soap and water. If carbon fiber fuzz gets into a worker's eyes or other medical situations occur, please seek medical attention immediately.

LAMINATE STRIPS



Laminate strips available for reinforcing from Metz are carbon-reinforced polymer impregnated and made from uni-directional carbon fibre. A range of sizes are available to suit your application.

Metz Epoxy adhesives are fully compatible with the carbon strips. Where required to recess carbon strips in negative moment areas Metz has a full range of epoxy mortars and concretes.

The application process involves concrete preparation by grinding or potentially recessing concrete slab tops to avoid steps in top surface levels.

Areas of application:

- Slab & beam strengthening
- Walls, chimneys
- Box culverts
- Post fitting to slab openings
- Bridge decks, beams
- Timber & steel structures

LAMINATE SPECIFICATIONS

Type	TL510	TL520	ML520
Thickness (mm)	1.0	2.0	2.0
Width (mm)	50	50	50
Weight (g/m)	80	160	160
Density	1.6	1.6	1.6
Tensile strength* (N/mm ²)	3232	2964	2365
Young's modulus* (kN/mm ²)	169	169	301
CF weight per unit length (g/m)	60	120	120
CF weight per unit area (g/m ²)	1,200	2,400	2,400

※Tensile strength and Young's modulus are shown by average values and was evaluated according to JIS A 1191.

●The values are representative and not guaranteed.

●Dimensions : W50mm x L50m/per roll (standard) Unit type : 50m rolls attached to a belt (Diameter per roll : 0.6 to 2.0).

●Product other than standard type will be custom order.

MATERIAL PERFORMANCE

CF laminate

Performance verified products	Product class	Nominal sheet width (mm)	Nominal sheet thickness				Tensile strength (N/mm ²)	Young's modulus (kN/mm ²)
			1.0 mm	1.2 mm	1.5 mm	2.0 mm		
Torayca Laminate manufactured by Toray Industries, Inc	High strength	50	TL510	—	—	TL520	2,400以上	167 ± 17
	Moderate elasticity	50	—	—	—	ML520	1,500以上	285 ± 40

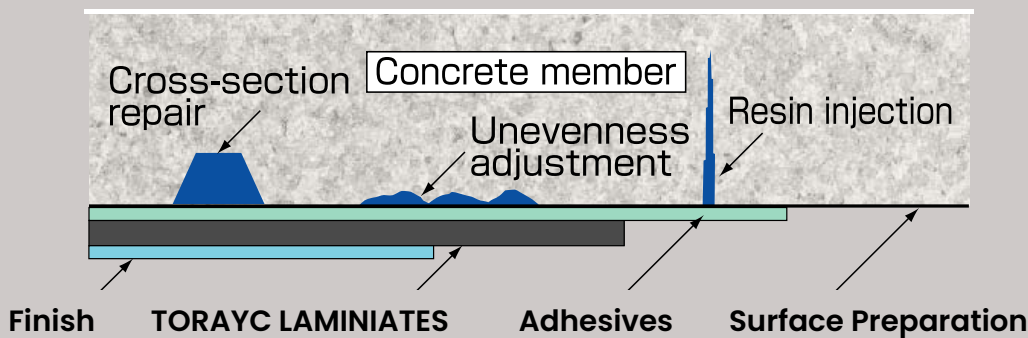
Adhesive

※Adhesive strength Fc denotes concrete compressive strength (N / m m2)

Product	Tensile strength (N/mm ²)	Tensile shear adhesive strength (N/mm ²)	Bending strength (N/mm ²)	Compressive modulus (N/mm ²)
AURF86S	24.5	17.2	59.6	5.350

※This product was evaluated according to JIS A 6024 and was confirmed to be in compliance with the standard.

SCHEMATIC OF CROSS SECTIONS



TORAY CA" LAMINATES-handling precautions

1. Before using TDRAYCA" LAMINATES and the adhesive resin be sure to consult the safety information provided in the Safety Date Sheet (SDS)and the "Laminate method safety precautions "provided in the "Technical documentation for the TORAYCA" LAMINATES method"
2. Although the adhesive resin used is a general epoxy resin it could, in certain circumstances, be harmful to human health.
3. Handling TDRAYCA" LAMINATES can generate carbon dust and fly that can attach to the skin causing irritation and itchiness or be inhaled and enter the respiratory system and cause harm to the body.
4. TDRAYCA" LAMINATES is electrically conductive and there is a danger of electric shock if it gets in contact with electricity. In addition, airborne fiber particles can attach to plugs or penetrate electric equipment and cause a short circuit. Do not allow contact with electric current sources and prevent particles from penetrating electric equipment.
5. When there is the possibility of dust and fly being generated during the cutting and processing of TDRAYCA" LAMINATES, make sure the work area is well ventilated. The exhaust system must always be equipped with a filter to prevent particles from being released directly into the atmosphere. When handling carbon fiber, wear a mask, safety goggles, gloves and other protective equipment. Use running water and soap to remove any particles attached to the skin. If fiber gets into the eyes or there is inhalation exposure get medical attention immediately.

SPECIAL SHAPES

Multiple shapes are possible, including local manufacture in Australia for custom applications beyond standard structural concrete strengthening. Please contact us for a potential solution to your strengthening and rehabilitation requirements, or any need to produce composite structural elements using carbon and the Metz range of compatible adhesives.



METZ EPOXIES

Metz manufactures a range of compatible epoxy adhesives and fillers to accompany our carbon strengthening range.

Metz C100: 2 part epoxy resin system for adhering and wetting out carbon fibre reinforcing.

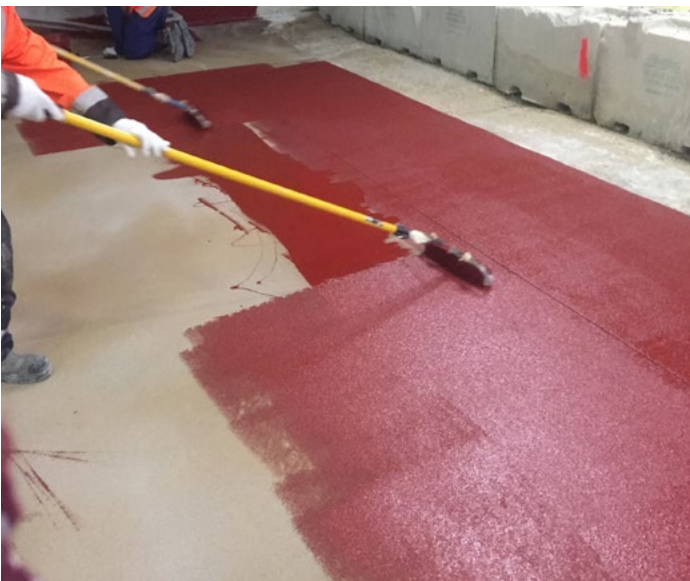
Metz C200: 2 part epoxy adhesive system for adhering carbon laminate strips including underside of slabs.

Metz C250: 3 part epoxy filling materials for horizontal slab-top application >2mm.



OVERCOAT OPTIONS

Metz has a range of overcoat options no matter the application. Metz laminating resins and adhesive putties are fully compatible with our range of epoxy and epoxy novolac overcoats. So whether it is simply aesthetics, or concern about atmospheric corrosion, even the most aggressive chemical attack in an industrial environment Metz has a solution for your project.



ABOUT METZ

Metz has been a supplier and manufacturer of specialist building materials since it was founded in Melbourne on the 25th of June 1953. Metz today remains a proudly Australian owned company. Our Quality Accredited manufacturing facility is still located in Melbourne, with our head office in Sydney and a branch office in Brisbane. From these three offices we operate Australia-wide as well as exporting materials to Asia, the Pacific and the Middle East.

In Australia a core difference between Metz and our competitors is the ability to offer our clients a unique single point of responsibility - local material manufacture combined with full installation services. The ability to install all the materials we offer means Metz's material knowledge, practical site experience and therefore technical responsiveness is unsurpassed.

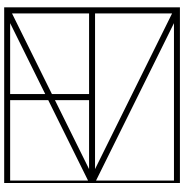
In overseas markets Metz regularly send experienced supervisors for training of our distributor network and for ensuring quality installations are achieved on site.

Please contact one of the Metz offices or your local distributor for any further assistance.



Your local Metz Distributor:-

REV: 02/24



Metz Specialty Materials Pty Ltd
Metz Project Services Pty Ltd

metz.net.au

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27- 29 Liberty Rd, Huntingwood NSW 2148, Australia
Melbourne - Office/Factory
6 University Place, Clayton North VIC 3168, Australia
Brisbane
Unit 16, 42 Smith Street, Capalaba QLD 4157, Australia