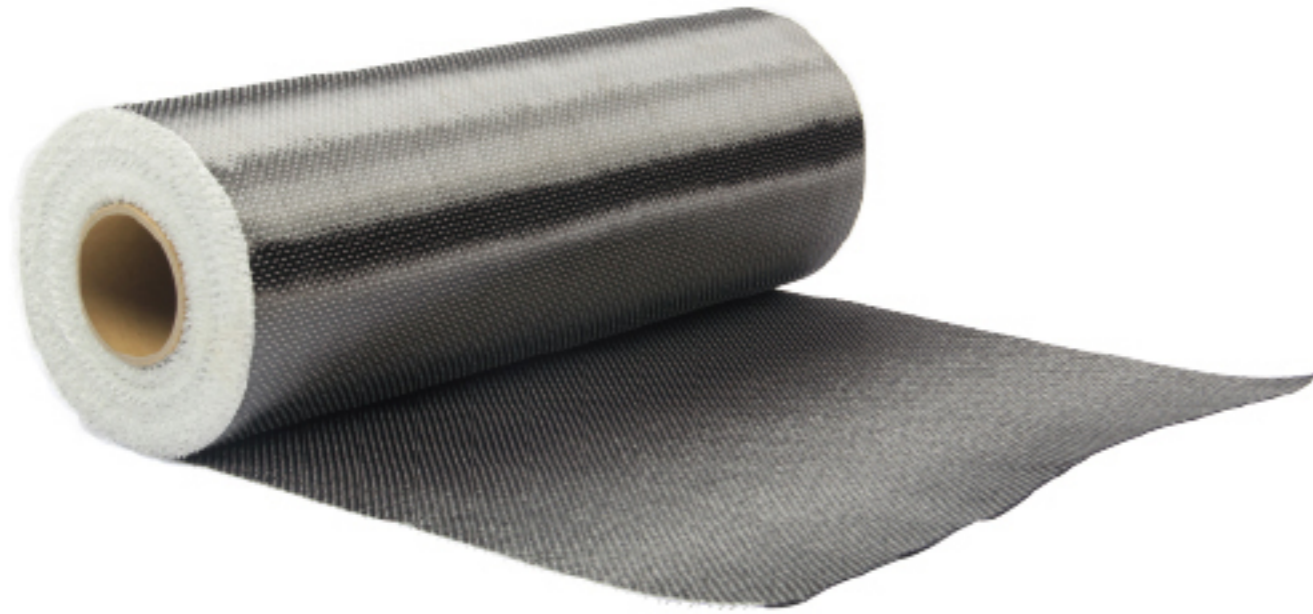


# UD Carbon Fiber Fabric



Carbon fiber not only has high strength and high elastic modulus, but also possesses the characteristics of light self-weight and high durability. First, it was adopted for the aerospace and auto industry applications, followed by the sporting goods and machinery industries. In recent years, as the substitute of reinforcing materials in concrete structures, it has been widely used for seismic strengthening of highway structures, railway and bridge piers, tunnels, and buildings. Currently, it is being explored for structural modifications of highway bridges for increase in traffic volume.

## ▲▲ Advantages of the High-Quality HM Carbon Fiber

- Produced from high-quality international aviation grade yarn, every carbon fiber yarn length kept over 5000 meters to ensure the continuity of the carbon fiber fabrics without damage raw fiber.
- Five world leading Germany imported intelligent production line. Point to point active wafting insertion, no damage or break of filament during the whole production process.
- Independently developed constant tension system, ensures every bunch of raw fiber is kept under constant tension. With low dispersion, high strength, stable properties, the qualification rate by national authority testing organization is 100%.
- The carbon fiber fabric is woven evenly and smooth, moderate soft, good suitability with the impregnated adhesive, which are easy to impregnate. The total adhesive usage is just 15%, less than products by other manufacturers, and the void issues maintained at 80% less than other products.
- Annual production capacity of quality carbon fiber fabric is 5 million square meters, while maintaining a daily stock of over 100,000 square meter to meet any project' s demands, around the world.

## ▲▲ Product Characteristics

- Light self-weight: (1) allows operation in a narrow and tight spaces, (2) minimal impact on the normal use of the structure during construction, and (3) adds almost no additional weight to the existing structure.
- High strength, high modulus: Very effective in flexural strengthening in the form of straight sheets, shear strengthening in the form of closed loop wrapping, U-shaped and side bonding, increase ductility and strength of circular columns in the form of transverse wrapping, and restoration of various complex shape structural elements.
- Suitable for surface of various structural components (beams, columns, ventilation tubes, pipes, walls, etc.).
- Anti-acid alkali and other chemical corrosion and resistance to severe environments.
- Long storage life: allows for long operation projects and extended deadlines.
- It could be used on various types of structural components and systems, e.g. concrete structures, masonry structures, wood structures, steel structures, and many other structural elements and systems.
- High temperature resistance, creep resistance under high permanent loads, high corrosion resistance and excellent seismic strengthening system.



### ▲▲ Application Range

→→ Load increase as a result of

1. Increase in loads in commercial buildings
2. Increase in traffic weight and volume on bridges
3. Installation of heavy equipment in industrial facilities
4. Increase of vibration in structures
5. Change in building function/use

→→ Improve structural condition

1. Reduce deformations
2. Reduce stresses in existing structural elements
3. Limit or arrest crack propagation

→→ Seismic retrofitting

1. Columns wrapping reinforcement for improving ductility and shear strength
2. Masonry walls reinforcement for improving out-of-plane bending and in-plane shear strengths
3. Beam and slab reinforcement

→→ Change structural system (structural alterations)

1. Change the location of wall and/or column
2. Cut-out floor slab opening

→→ Aged and damaged structures

1. Aging of old deteriorated construction materials
2. Corrosion of steel bars in concrete
3. Vehicles collision impact on structures (impact damage)

→→ Structural deficiencies due to design or construction errors

1. Lack of adequate well-detailed reinforcing bars
2. Inadequate member cross section
3. Substandard concrete material strength

### ▲▲ Technical Parameters

Model	Specification	Strength Grade		Thickness
		High Strength Grade I	High Strength Grade II	
HM-20	200g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.111mm
HM-30	300g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.167mm
HM-43	430g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.240mm
HM-45	450g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.250mm
HM-53	530g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.294mm
HM-60	600g/m <sup>2</sup>	High Strength Grade I	High Strength Grade II	0.333mm
Width: 100mm, 150mm, 200mm, 250mm, 300mm, 500mm, other width can be customized.				
Weave: Unidirectional				
Color: Black				

### ▲▲ Performance Indexes

Project Name	Grade I Technical Properties	Grade II Technical Properties
Standard Value of Tensile Strength (ASTM D3039) (MPa)	4100	3400
Tensile Elastic Modulus (ASTM D3039) (MPa)	2.4 × 10 <sup>5</sup>	2.2 × 10 <sup>5</sup>
Elongation at Break (ASTM D3039) (%)	1.6	1.5
Flexural Strength (ASTM D7264) (MPa)	1000	900
Shear Strength (ASTM D2344) (MPa)	80	70
FRP to Concrete Bonding Strength (MPa)	≥2.5, concrete cohesion failure	
Density (g/cm <sup>3</sup> )	1.8	

### ▲▲ Operation process

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surface treatment



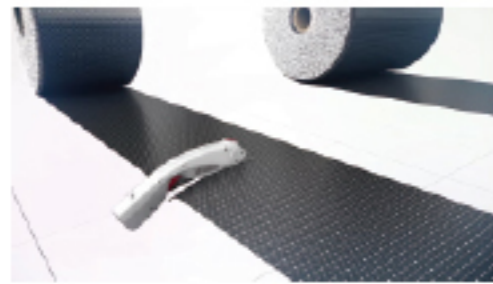
applying primer



levelling



applying epoxy resin adhesive



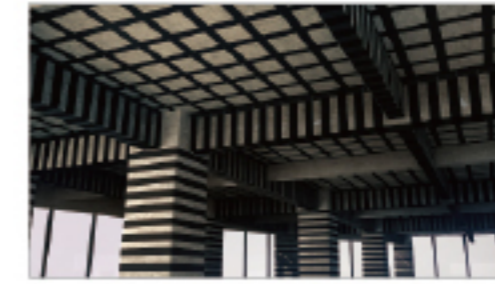
cutting carbon fiber cloth



pasting carbon fiber cloth



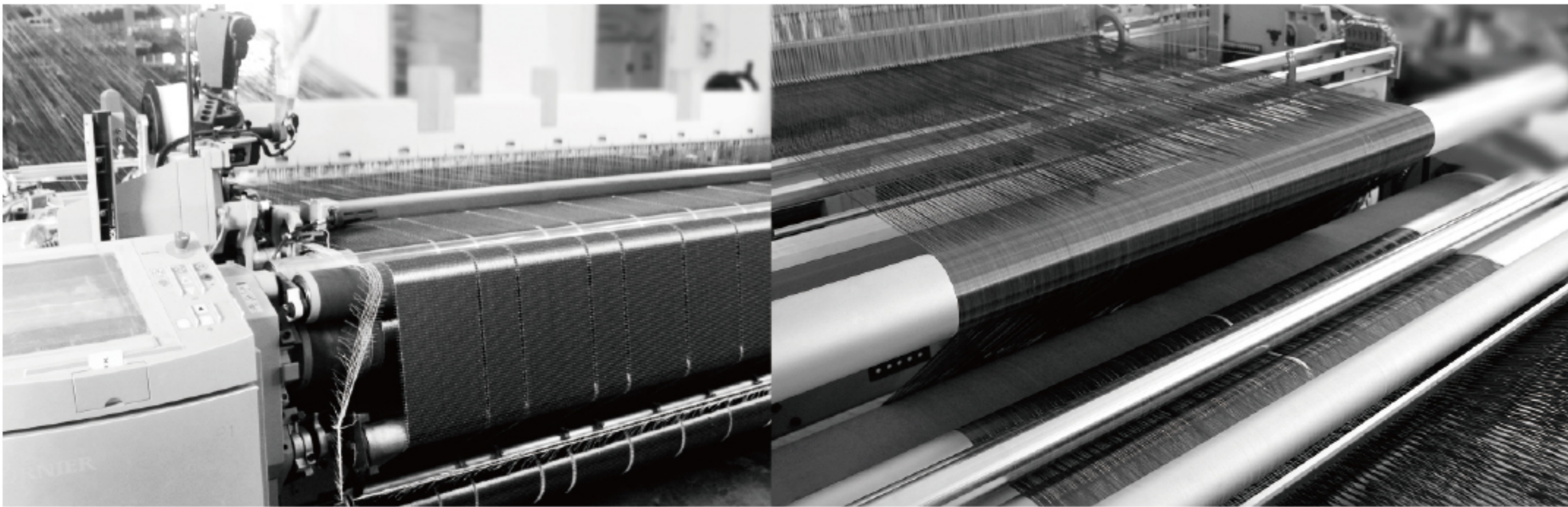
applying adhesive again



curing and protecting

### ▲▲ Package

1. For this product heavy-duty carton packages are used.
2. The total area package is 60m<sup>2</sup> for 100mm, 150mm, 200mm, 300mm width.
3. The total area package is 50m<sup>2</sup> for 250mm, 500mm width.







### ▲▲ Transportation and Storage

- This product should be stored in a dry, cool and well-ventilated environment. It should not be exposed to rain or impact by sharp objects.
- During transportation and storage, carbon fiber materials shall not be compressed or exposed to direct sunlight and/or rain.

### ▲▲ Safety Measures

- The construction workers should take all necessary protective measures (such as wearing masks, gloves, goggles, etc.).  
Safety measures should be taken on site to keep the site clean and prevent fire hazards.
- Carbon fiber is conductive, safety measures should be taken to prevent electric shocks.
- Carbon fiber sheets should not be bent during transportation, handling, and cutting process.



# Carbon Fiber Adhesive

Carbon fiber adhesive includes carbon fiber primer HM-180, carbon fiber levelling adhesive HM-180CE, carbon fiber impregnating adhesive HM-180C3P. Primer HM-180, used for improving the properties of the concrete surface, which is in direct contact with the carbon fiber system. Levelling Adhesive HM-180CE, used for levelling and repairing physical defect on the concrete surface of the existing structure. Impregnating Adhesive HM-180C3P, used for impregnating carbon fibers and bonding the carbon fiber fabric to concrete surface.



## ▲▲ Product Advantages

- Use of the advanced nano material technology to improve the product' s overall performance, and ensure the thixotropic and other properties are better so fibers could be easily coated.
- Use of low viscosity two components A style modified epoxy resin, and adjusted polarity of the functional group to improve penetrability.
- Adoption of very advanced formula, which makes the adhesive coupling-reaction takes place with different substrates, the bond strength improved by at least 18%, along with achieving higher durability.
- No organic volatile, no filler, good suitability. Compared with other products, it saves at least 15% in usage.
- Advanced high speed dual planetary power mixing equipment, which results in the raw materials being mixed evenly. Meanwhile, the use vacuum treatment ensures no air bubble created, which extends the shelf life of the product and improves the stability of its performance.
- Product passed several safety tests, e.g. Non-toxic testing, Horizontal firing test, Non ethanediamine test, Acute oral toxicity test etc.

## ▲▲ Product Characteristics

- Primer HM-180: low viscosity, good liquidity, strong penetration ability, can well infiltrate and bond the crack and defects on the concrete surface.
- Levelling adhesive HM-180CE: Good thixotropic properties, easy to apply, excellent for filling small holes and chipped-out concrete, and level the surface of the concrete.
- Carbon fiber impregnating adhesive HM-180C3P: low viscosity, good impregnating properties, can well infiltrate the carbon fiber fabrics, and has the thixotropic properties makes it easy to apply.
- Good compatibility with carbon fibers.
- Excellent durable performance, corrosion resistance, humidity and moisture resistance, and chemical corrosion resistance.
- After curing, it has good physical properties, good toughness and elastic properties.

### ▲▲ Application Range

This product is high performance epoxy adhesive, which can be used for the effective penetration bonding to many substrate materials such as concrete, steel material, ceramic, stone, wood component, and many fiber fabrics, e.g. carbon fiber, glass fiber, basalt fiber, and aramid fiber. It is mainly used for the strengthening and reinforcement of structural systems.

### ▲▲ Technical Parameters

#### Physical Properties

Description	HM-180 Carbon Fiber Primer	HM-180CE Levelling Putty Adhesive	HM-180C3P Carbon Fiber Impregnated Adhesive
Performance	Part A: Transparent viscous liquid	Part A: Viscous paste	Part A: Viscous liquid
	Part B: Brown viscous liquid	Part B: Viscous paste	Part B: Viscous liquid
Operable Time (25°C, min)	< 40	< 50	< 70
Touch Dry Time (25°C, h)	1~2	1~2	1~2
Mix Ratio (by Weight)	A:B=2:1	A:B=2:1	A:B=2:1
Viscosity (mPa · s)	≤ 600	-	-
Thixotropy Index	-	≥ 3.0	≥ 3.0
25°C Sag Mobility (mm)	-	≤ 2.0	-
Pot Life (min)	Spring & Autumn (23°C)	≤ 70	≤ 100
	Summer (30°C)	≤ 40	≤ 75
	Winter (10°C)	≤ 190	≤ 250
Shelf Life (month)	12	12	12

#### Properties Performance

##### HM-180 Carbon Fiber Primer Properties Performance

Test Item	Test Conditions	Test Result
Tensile Strength (MPa)	ASTM D638	50
Shear Strength (MPa)	ASTM D732	45
Bonding Strength with Concrete (MPa)	ASTM C882	≥ 20



HM-180C3P Carbon Fiber Impregnated Adhesive Properties Performance

Description	Test Item	Test Conditions	Test Result
Adhesive Performance	Tensile Strength (MPa)	ASTM D638	60
	Tensile Elastic Modulus (MPa)		3100
	Elongation at Break (%)		6
	Flexural Strength (MPa)	ASTM D790	90
	Compressive Strength (MPa)	ASTM D695	95
Bonding Performance	Steel-steel Shear Bonding Strength (MPa)	$(23 \pm 2) ^\circ\text{C}$ , $(50 \pm 5) \% \text{RH}$	Standard Value $\geq 14$
			Average Value $\geq 16$
	Steel-steel Normal Bonding Strength (MPa)	Under $(23 \pm 2) ^\circ\text{C}$ , $(50 \pm 5) \% \text{RH}$ conditions, testing as the inspection standard loading speed	$\geq 40$
	Steel-steel T Impact Stripping Length (mm)		$\leq 20$
Steel-C45 Pulling Bonding Strength (MPa)		$\geq 2.5$ , concrete cohesive failure	
	HDT(Heat Deflection Temperature) ( $^\circ\text{C}$ )	Use 0.45MPa option B of bending stress	$\geq 65$
	Nonvolatile matter Content (%)	$(105 \pm 2) ^\circ\text{C}$ , $(180 \pm 5) \text{ min}$	$\geq 99$



HM-180C3P Carbon Fiber Adhesive Long Term Application Performance

Test Item		Test Conditions	Qualified Standard (GB50728-2011)
Conditions Resistance	Wet And Heat Ageing Resistance	Under 50℃、95% RH conditions, ageing 90days, testing at ambient temperature by steel-steel tensile shear strength	Compared with the short-term results at roomtemperature, shear strength loss: ≤ 12%
	Heat Aging Resistance	Under (80±2) °C conditions, ageing 30day, testing as the same temperature by steel-steel tensile shear strength	Compared with the short-term results at same temperature 10min, shear strength loss: ≤ 5%
	Freezing And Thawing Resistance	Under -25℃-35℃ freezing circulating temperature, circulate 8h every time, after 50 times, testing at ambient temperature by steel-steel tensile shear strength	Compared with room temperature, short-term results, shear strength loss is not greater than 5%
Stress Resistance	Performance Under Sustained Load	Under (23±2) °C, (50±5) % RH conditions, undertake 4.0MPa shear strength continuous to 210d	Steel - steel tensile shear specimens does not fail, and creep deformation value is less than 0.4 mm
	Fatigue Performance	Under ambient temperature, as frequency 5Hz, stress ratio 5:1.5, max stress 4.0MPa fatigue load testing by steel-steel tensile shear strength	After 2×10 <sup>6</sup> times continuous sine wave fatigue loads, specimen does not fail

▲▲ Package

The A and B components of this product are packed in separate metal containers. Group A is 20kg/container and Group B is 10kg/container.

### ▲▲ Construction Process

Please scan the QR code to watch the video



### ▲▲ Transportation and Storage

- This product should be kept sealed and stored in a dry and clean storage space of ambient temperature between -5 °C and 40 °C. In order to prevent damage, do not store outdoor under direct sunlight or under direct rain.
- A & B components should be kept separately. Shelf life is 12 months at room temperature (25 °C). Product should be tested if exceeded the shelf life. If the physical and mechanical properties after 12 months meet the standard requirements, then it could be used.
- These products are not inflammable, explosive, toxic, or dangerous cargoes. They could be transported with general transportation cargo. The epoxy containers should not be damaged, exposed to direct sunlight or rain, and should not be tilted or stored upside-down during transportation.

### ▲▲ Points for Attention

- Mix proper amount of adhesive at one time, use up within the applicable period, do not use the adhesive if it is beyond the applicable period.
- If components A and B of the adhesive are not used up, they should be covered and sealed. They should not be exposed to air for a long time.

### ▲▲ Safety Measures

- The construction workers should take safety measures (such as wearing masks, gloves, goggles, etc.), and maintain fire prevention measures, as well as keeping the site clean.
- If the adhesive accidentally got in touch the skin and cloths, acetone can be used to wipe it at once, followed by a great deal of clear water.
- If accidentally swallowed or splashed into the eyes, please seek immediate medical service.

# UD Carbon Fiber Plate



Steel plate bonding has been widely used for structural strengthening of concrete buildings, bridges and other structures. However, during the last two decades, carbon fiber reinforced polymer (CFRP) composites have been dominating the rehabilitation and strengthening construction market, particularly, transportation infrastructure.

CFRP systems could be used to improve stiffness, strength, and ductility of existing concrete/steel/masonry/wood structures.

Their application in concrete structures is almost unlimited, as they could be used to strengthen slabs, beams, walls, and columns.

Horse Construction Company offers a complete system of carbon fiber plates and epoxy adhesive system for all types of structural components and systems.

## ▲▲ Advantage of HM UD Carbon Fiber Plate

- HM carbon fiber plates are manufactured under very high quality control, in dust free and environmentally controlled facilities, where temperature and humidity are well controlled. As a result, Horse Construction products easily meet very high standards in both domestic and international markets.
- Use of automatic temperature-controlled heating system during manufacturing results in maintaining a uniform pultrusion process, and therefore producing CFRP plates that have reliable stable pulling strength.
- Autonomous large-ton hydraulic traction system fully guarantees the precise control of tension and line speed, ensuring the flatness and straightness of the carbon fiber plate without any internal residual stress.
- Self-developed carbon fiber constant creel makes each carbon fiber yarn smooth before dipping into the epoxy bath, no scratches after the glue application, and the fibers are distributed evenly, to ensure the integral curing of CFRP plate.

## ▲▲ Product Characteristics

- Light weight, easy to use, easy to operate and does not require large construction equipment.
- High strength, when bonding carbon fiber plates, the epoxy adhesive does not flow, can reduce the impact on the site environment during operation.
- Easy to apply in industrial facilities and buildings where service pipes might be running under concrete slabs.
- The shape and weight of structural components are not changed after strengthening.
- The reinforcement effect of 1 layer of carbon fiber plate is equivalent to 4 to 8 layers of carbon fiber sheets, which results in tremendous saving on the labor-cost.
- The visual inspection is easy to be carried-out after construction.

## ▲▲ Application Range

- The remedy repair and strengthening of the slab and beam of concrete structures.
- The strengthening of the opening sides in walls and slabs.
- The strengthening of beams of wooden buildings, etc..
- The strengthening of bridge slab, bridge pier and girder.
- The remedy repair and strengthening of tunnel and cable lines.
- Alteration of structural system.

### ▲▲ Basic Parameters

Specification	Size	
	HM-1.2T	Thickness
Width		50mm/100mm
Length		100m/roll
HM-1.4T	Thickness	1.4mm
	Width	50mm/100mm
	Length	100m/roll

### ▲▲ Technical Parameters

Description	Grade I Technical Properties	Grade II Technical Properties
Tensile Strength (ASTM D3039) (MPa)	2600	2200
Tensile Elastic Modulus (ASTM D3039) (MPa)	$1.6 \times 10^5$	$1.4 \times 10^5$
Elongation at Break (ASTM D3039) (%)	1.6	1.4
Shear Strength (ASTM D732) (MPa)	80	70
FRP With Base Materials Bonding Strength(MPa)	For concrete and masonry: $\geq 2.5$ MPa, concrete cohesion failure	
Fiber Volume Content(%)	$\geq 65$	$\geq 55$

### ▲▲ Operation Process

- Mark location of CFRP plates on concrete surface, as per design drawings.
- Grind concrete surface to remove paint off the surface, blow out or vacuum the concrete dust produced by the grinding operation. Repair the concrete surface, if needed.
- Prepare Epoxy Adhesive: mix components A and B to a uniform consistency in supplied containers, by weight at a ratio A:B=2:1.
- Applying adhesive: apply the above mixed epoxy adhesive onto the surface of carbon fiber plate evenly along the length of the CFRP plate (transversely, more adhesive near the center of the plate), please avoid bubbles.
- Installation: attach the carbon fiber plate to the concrete surface, and hold with steel strip, remove excessive glue compounds around, and fix with steel framework.
- Curing: curing time should not be less than 24 hours at room temperature.

### ▲▲ Transportation and Storage

- This product should be stored in a dry, cool and well-ventilated environment. It should not be stored under direct sunlight and/or rain. It should not be impacted with sharp objects.
- Carbon fiber materials during transport and storage shall not be squeezed/compressed, so as to avoid carbon fiber damage, or stored under direct sunlight and/or rain.

### ▲▲ Package

The length of the product is 100m, the plate width is available in 50mm, and 100mm; and the thickness is available in 1.2mm, and 1.4mm. The 100m plate is rolled in a compact package. Other specifications could be customized.

### ▲▲ Safety Measures

- The construction workers should take all necessary protective measures (such as wearing masks, gloves, goggles, etc.). Safety measures should be taken on site to keep the site clean and prevent fire hazards.
- When unrolling the CFRP plate out of the package, extra attention should be exercised, as it is rolled under pressure.
- Carbon fiber is conductive, safety measures should be taken to prevent electric shocks, particularly near electric equipment.



# CFRP Pre-stressing System

The CFRP pre-stressing system includes carbon fiber plate, rigid anchorages and adhesive.

The anchorage system includes fixed-end (dead-end) and stressing-end (live-end) anchorages, which are fixed (bolted) to the surface of the concrete structure.

The CFRP plate is held at each anchorage with clamping jaws, tensioned with hydraulic jacks, and then bonded to the concrete surface.

This system is effective in carrying portion of the load that exists on the structure during the installation of the CFRP system.

## ▲▲ Advantage of Pre-stressed Carbon Fiber Plate

- Patent Technology, a full mechanical clamping system. Anchorage does not need adhesive, no fatigue damage of the adhesive under long term strain. Minimize strain loss, eliminate potential safety problems.
- Wide application scopes, e.g. bridges, commercial buildings, steel structures etc.
- Unique design, comparing with other prestressing systems, 75% less cutting length, 53% less cutting depth on the concrete surface, shorter application time, easier application, 4.5 times higher efficiency.
- High strain, carbon fiber plate tensile force can reach 40 tons. The ultimate tensile force of the anchor can reach 96T.
- Anchorage has slot fixing holes. Such slot holes make application easier, faster, and more exactly, leading to increase efficiency.
- The system has been successful used on 17 expressways of 57 national projects, and on 14 international projects in 5 countries. Proven quality, advanced technology, and guaranteed high performance.

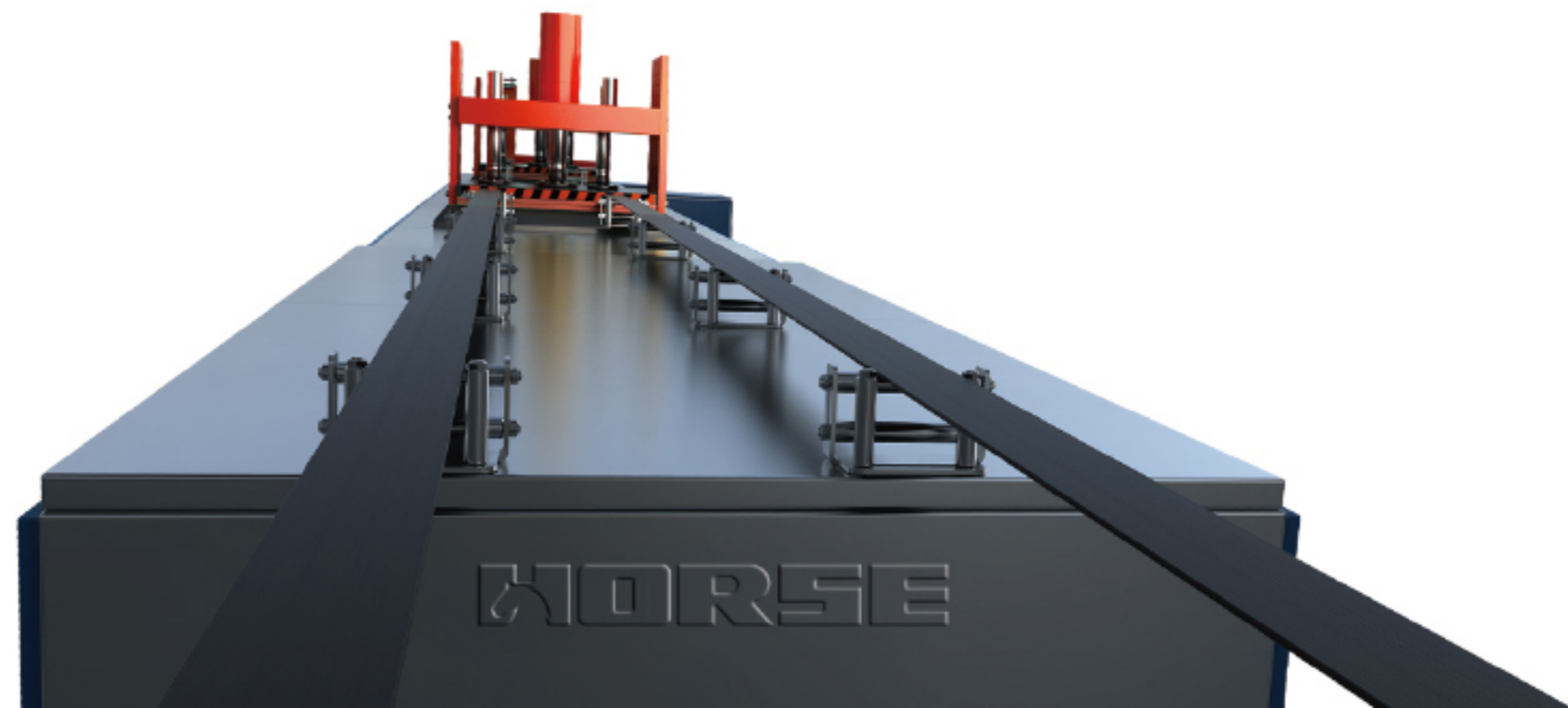
## ▲▲ Characteristics of the Pre-stressed Carbon Fiber Plate Reinforcement System

- High strength carbon fiber plate, increase loading carrying capacity significantly.
- Achieve high forces in carbon fiber plates, by prestressing.
- Active loading by prestressing, no strain lagging.
- Achieve reverse bending moment, offset part of existing loading, increase stiffness, reduce deformation and deflection of members.
- Reduce cracks, close and stop cracking.

## ▲▲ Application Range

Long span structures on highways, expressways, railways bridges, commercial buildings etc.

Ideal for structures where portion of the dead load needs be carried by the CFRP strengthened members.



### ▲▲ Technical Parameters

Self Lock Pre-stress Strengthening System (Patent Number:ZL.2014.2.0115709.1)

Product Description	Specification	Size	
Pre-stress Carbon Fiber Plate	HM-1.4P	Thickness	1.4mm
		Width	50mm/100mm
		Length	100m/roll
	HM-2.0P	Thickness	2.0mm
		Width	50mm/100mm
		Length	100m/roll
	HM-3.0P	Thickness	3.0mm
		Width	20mm/50mm
		Length	100m/roll
Self Lock Anchorage	HM-MJ100		
	HM-MJ50		
	HM-MJ20		
	HM-MJ-G50		

Description	Test Items	Test Result
Carbon Fiber Plate	Standard Tensile Strength (ASTM D3039) (MPa)	2800
	Tensile Modulus (ASTM D3039) (MPa)	$1.6 \times 10^5$
	Elongation at Break (ASTM D3039) (%)	1.6
	Shear Strength (ASTM D2344) (MPa)	80
	Flexural Strength (ASTM D7264) (MPa)	1600
	Carbon Fiber Content(%)	$\geq 65$
Anchorage	Steel Tensile Strength(MPa)	$\geq 345$
	Stress Amplitude Difference(MPa)	160
	2 million cycles fatigue testing $F_{min}$ (MPa)	1120
	2 million cycles fatigue testing $F_{max}$ (MPa)	1280

▲▲ Construction Process

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setting out



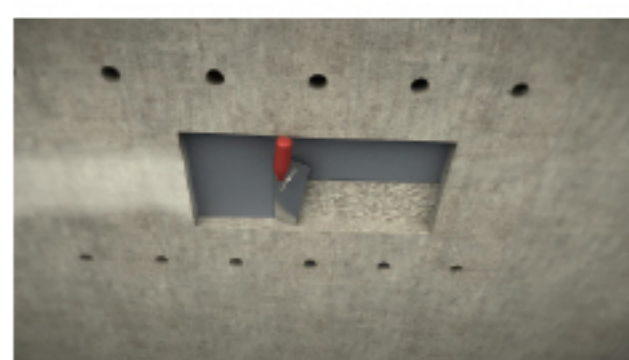
polishing



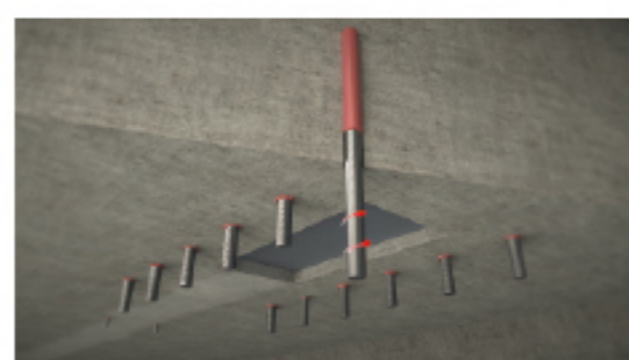
drilling hole



grooving



repairing and levelling



planting



installing anchor box



installing anchor block



fixing carbon fiber laminate



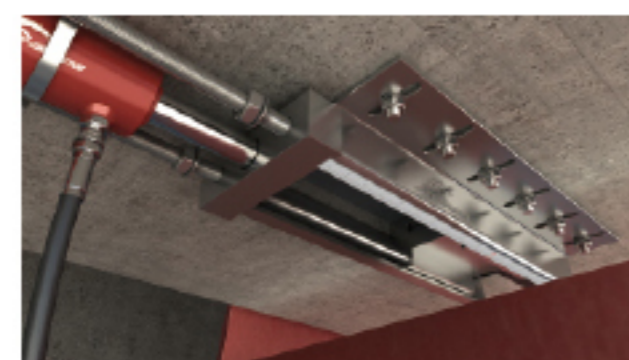
fixing jack and anchor bolt



prestretching



applying epoxy resin adhesive



formal stretching



removing the rod

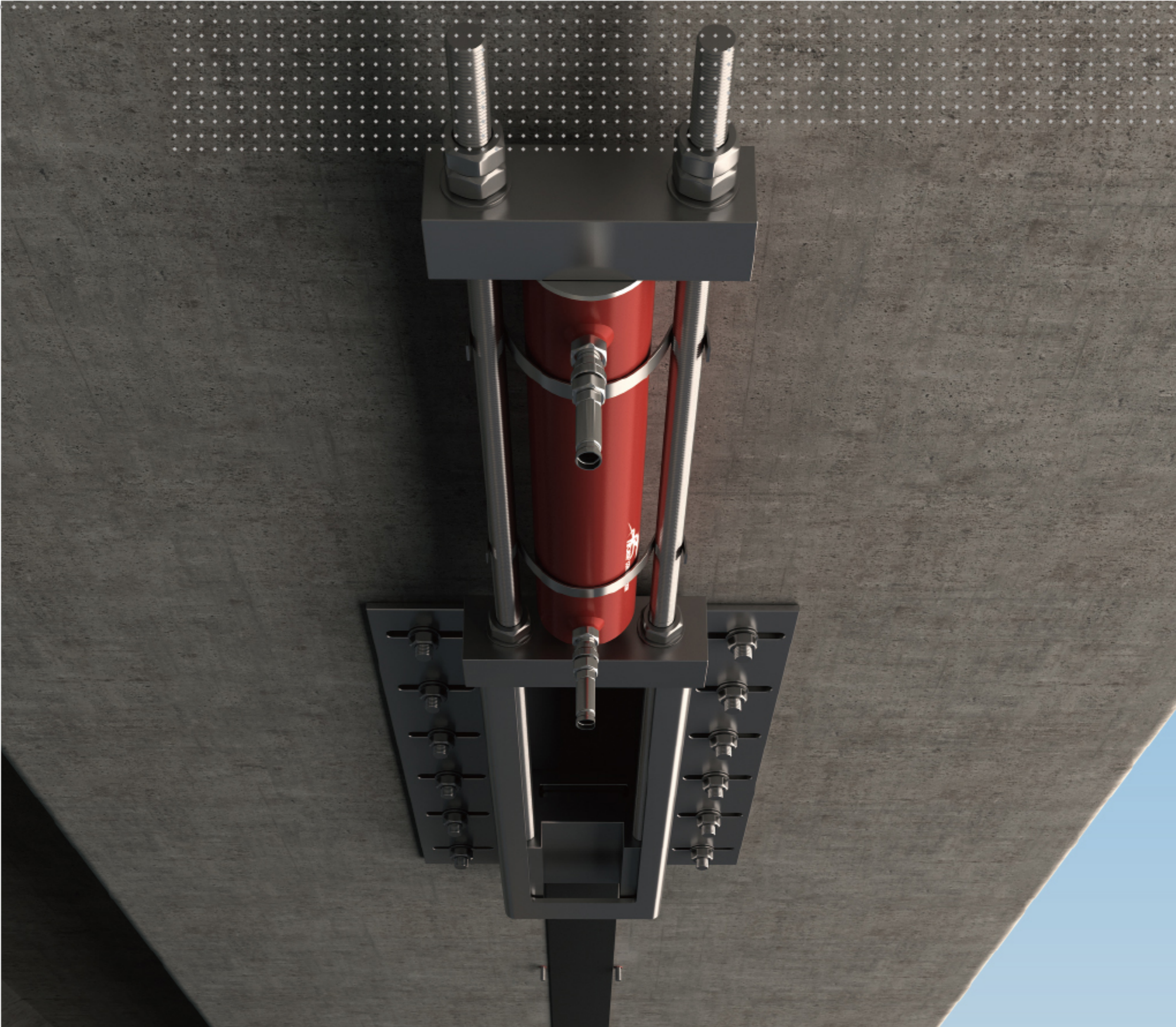


tablet fixing



protecting





### ▲▲ Storage and Transportation

- This product should be stored in a cool, dry and well-ventilated environment. It should not be stored under direct sunlight and/or rain. It also should not be hit with sharp objects.
- This product should not be squeezed or compressed during storage, handling, and transportation.

### ▲▲ Package

100 meters carbon fiber plate roll per carton.

### ▲▲ Points of Attention

- High safety measures should be taken during the prestressing operation.
- Keep site clean, and well-ventilated.
- Keep concrete surface dry, clean and sound prior and during the prestressing operation.
- Working temperature should be above  $-5^{\circ}\text{C}$ , and relative humidity should be less than 85%.
- Outdoor prestressing operation under direct rain is not permitted.

# Carbon Fiber Plate Adhesive

HM-120CP is a two-component epoxy based adhesive. It has high bond strength, shear strength, and very durable. It is designed for use with carbon fiber plate reinforcement system.



## ▲▲ Product Advantage

- Good thixotropic properties, the static stack height can reach 2-3 cm, non-sagging, easy to apply, lower hollow area, minimal to no waste and need for reapplication.
- Unique structural toughness properties, superior bonding strength, good fatigue resistance. No stripping or tearing damage.
- Moderate curing time, allows for longer application time, no rush application.
- Advanced high speed dual planetary power mixing equipment. The raw material is mixed evenly. With vacuum treatment, there are no bubbles introduced. More stable property, longer shelf life.
- High percentage of effective ingredient, low density, saves at least 30% of glue usage needed.
- HM-120CP has passed safety tests, non-toxic test, horizontal flame test, non-ethane diamine test, acute oral toxicity test, etc..

## ▲▲ Product Characteristics

- Dual Component bisphenol - A modified epoxy resin based adhesive, high bonding strength.
- Application in wide temperature range.
- Good performance, easy application on construction site.
- Excellent acid/alkali resistance and durability, excellent long-term performance.
- Low moisture sensitivity.

## ▲▲ Application Range

Use together with HM carbon fiber plate, HM pre-stress carbon fiber plate, used as reinforcement for existing structures.

## ▲▲ Technical Parameters

Mechanical Properties

Model	HM-120CP Carbon Fiber Plate Adhesive	
Appearance	Part A : White Paste	
	Part B : Grey Paste	
Operable Time (25°C, min)	< 40	
Density After Curing (g/cm <sup>3</sup> )	1.6	
Mixture Ratio (By Weight)	A:B=2:1	
Thixotropic Index	≥4.0	
25°C Sagging Mobility (mm)	≤2.0	
Application Time (min)	In Spring and Autumn (23°C)	≤60
	In Summer (30°C)	≤50
	In Winter (10°C)	≤190
Shelf Life (month)	12	

## Performance Parameter

Description	Test Item	Test Conditions	Test Result
Adhesive Performance	Tensile Strength (MPa)	ASTM D638	45
	Tensile Elastic Modulus (MPa)		4500
	Elongation at Break (%)		2
	Flexural Strength (MPa)	ASTM D790	70
	Compressive Strength (MPa)	ASTM D695	100
Bonding Performance	Steel-steel Shear Bonding Strength (MPa)	(23±2) °C , (50±5) % RH	≥ 14
	Steel-steel Normal Bonding Strength (MPa)	Under (23±2) °C , (50±5) % RH conditions, testing as the inspection standard loading speed	≥ 40
	Steel-steel T Impact Stripping Length (mm)		≤ 20
	Steel-C45 Pulling Bonding Strength (MPa)		≥ 2.5, concrete cohesive failure
HDT(Heat Deflection Temperature) (°C)	Use 0.45MPa option B of bending stress		≥ 65
	Nonvolatile matter Content (%)	(105±2) °C , (180±5) min	≥ 99

### ▲▲ Transportation and Storage

- This product should be kept sealed and stored in a dry and clean storage space of ambient temperature between -5 °C and 40 °C. In order to prevent damage, do not store outdoor under direct sunlight or under direct rain.
- A & B components should be kept separately. Shelf life is 12 months at room temperature (25 °C). Product should be tested if exceeded the shelf life. If the physical and mechanical properties after 12 months meet the standard requirements, then it could be used.
- These products are not inflammable, explosive, toxic, or dangerous cargoes. They could be transported with general transportation cargo. The epoxy containers should not be damaged, exposed to direct sunlight or rain, and should not be tilted or stored upside-down during transportation.

### ▲▲ Operation Process

- Mark out location of CFRP plates according to design drawings.
- Grind the concrete surface to remove paint off the surface, blow out or vacuum the concrete dust produced by the grinding operation.
- Prepare epoxy adhesive: mix components A and B evenly in supplied containers, by weighting at a ratio of A:B=2:1.
- Applying adhesive: apply the above mixed epoxy adhesive onto the surface of carbon fiber plate evenly along the length of the CFRP plate (transversely, more adhesive near the center of the plate), please avoid bubbles.
- Installation: attach the carbon fiber plate to the concrete surface, and hold with steel strip, remove excessive glue compounds around, and fix with steel framework.
- Curing: curing time should not be less than 24 hours at room temperature.

### ▲▲ Package

The A and B components of this product are all packed in barrels. Group A is 20kg/barrel and Group B is 10kg/barrel.

### ▲▲ Points for Attention

- Mix proper amount of adhesive at one time, use up within the applicable period, do not use the adhesive if it is beyond the applicable period.
- If A, B components are not used up, they should be covered and sealed, do not expose to the air for a long period of time.

### ▲▲ Safety Measures

- The construction workers should take protective measures (such as wearing masks, gloves, goggles, etc.).  
Safety measures should be taken on site to keep the site clean and prevent fire hazards.
- When unrolling the CFRP plate out of the package, extra attention should be exercised, as it is rolled under pressure.
- Carbon fiber is conductive, safety measures should be taken to prevent electric shocks, particularly near electric equipment.

