



DRIZORO[®]

CARBOROD

CARBON FIBRE ROD FOR REPAIR AND STRUCTURAL STRENGTHENING OF CONCRETE AND MASONRY

DESCRIPTION

DRIZORO[®] CARBOROD is a circular rod composed of unidirectional carbon fibres, embedded in an epoxy resin matrix and conformed by pultrusion process. Its high tensile strength, lightness and easy of use, provides an efficient system for strengthening concrete, timber and masonry structures.

DRIZORO[®] CARBOROD is inserted into the drilled holes or grooves using the near surface mounted technique and bonded on the structure with **MAXEPOX[®] CARBOFIX** (Technical Bulletin n° 290) as the epoxy-based structural adhesive.

APPLICATION FIELDS

- Strengthening bearing elements due to requirements for increasing live loads, installation of heavy machinery, and improvement of service capacity or change of final use
- Restoration of bearing elements, changes in structural systems or rehabilitation of historical buildings.
- Repair of concrete elements due to damage on structural parts, pathologies, project design defects, construction faults, etc.
- Construction of slender and low weight reinforced concrete structures with reduced protection cover.
- Adaptation to updated regulations.
- Rehabilitation of bridges, chimneys and singular structures.
- Replacement of steel rebar affected by corrosion process, fire, impacts, etc.

ADVANTAGES

- High tensile load, tensile strength and fatigue resistance. Very high elasticity modulus, it is 10 and 3 times stronger than steel and fibreglass systems, respectively.
- Long lasting, it is not affected by corrosion, withstands ground salts and marine environment, and avoids anticorrosion protective solutions.

- Electromagnetic neutral: contains no metal, and does not interfere with operation of sensitive electronic devices such as medical MRI units or electronics testing devices.
- Lightweight: about 5 times less than steel rebar with equivalent diameter, allowing cost savings in transport, handling and installation.
- Improved mechanical properties compared to fibre carbon rods with same diameter obtained by torsion methods.
- Roughness surface with indentations, to facilitate stress transfer and improve adhesion with the epoxy adhesive.
- Faster installation at low cost with a minimum substrate preparation. Very easy to place on masonry joints or concrete substrates using the near surface mounted technique.

APPLICATION INSTRUCTIONS

Substrate preparation

Remove all damaged and unsound concrete to expose a structurally resistant substrate. Open a groove or drill hole into the concrete or masonry by suitable means and provide an open roughened texture. Size should be about 1,5 times the diameter of the carbon fibre rod to be set. Care must be taken not to cut any other existing embedded element; bars, tendons, ducts, etc.

Repair adjacent damaged areas with a suitable structural repair mortar such as **MAXREST[®]** (Technical Bulletin 2) or **MAXRITE[®] 500/700** (Technical Bulletins 50 and 51, respectively).

Finally, thoroughly clean the inner surface at the hole or groove using a vacuum and/or compressed air. Surface must be free of paints, coatings, efflorescence, greases, oils, demoulding agents, dust, gypsum, etc.

Application

Cut **DRIZORO[®] CARBOROD** to an appropriate length with a suitable grinder, using a duct tape in the cutting zone.

Apply **MAXEPOX[®] CARBOFIX** into the groove, checking that there is no occluded air at the bottom. Place **DRIZORO[®] CARBOROD** pressing slightly while the structural adhesive is still fresh, i.e. within its open time, and ensuring it is fully saturated by the epoxy adhesive of the groove. Finally, apply additional layers of **MAXEPOX[®] CARBOFIX** to

cover completely all around the rod. Remove excess adhesive before hardening.

Application conditions

The ideal working temperature for surface and ambient is between 10 °C and 35 °C. Do not apply with temperature below 10 °C or if lower temperature is expected within the first 24 hours.

Temperatures above 35 °C increase the reaction speed and production of heat, and reduce greatly the workability time for application. In this case, before applying the system, store products at temperatures between 15 °C to 20 °C and plan previously the works.

Surface and ambient temperature must be at least 3 °C higher than dew point. Do not apply with R.H. higher than 85%. With low temperatures, high humidity levels or both, use dry and warm air in order to get the suitable conditions, such as with an electric powered air blower system.

Do not apply if rain, condensation, dew or water contact is expected 24 hours after application and protect the application against contact with water until the total curing of the material.

Curing

Complete cure of **MAXEPOX[®] CARBOFIX** is achieved at 7 days at 20 °C and 50% R.H. Minimum temperature during the full curing time must be higher than 10°C. Applications carried out at lower temperatures, with high humidity or with poor ventilation require longer drying and curing time. Do not allow to bear loads before full curing time.

Cleaning

All tools and equipments can be cleaned with **MAXEPOX[®] SOLVENT** immediately after use. Once the product cures, it can only be removed by mechanical methods.

CONSUMPTION

Estimated consumption of **MAXEPOX[®] CARBOFIX** is 1,8 kg/m² per mm thickness, i.e. 0,55 kg per litre of volume to be filled. These figures may vary depending on the roughness, surface conditions and the application method. A preliminary test on-site will determine the consumption exactly.

PACKAGING

DRIZORO[®] CARBOROD is supplied in rods of 3 lineal meter length and with the following diameters:

DRIZORO[®] CARBOROD 308: 8 mm diameter.
DRIZORO[®] CARBOROD 310: 10 mm diameter.
DRIZORO[®] CARBOROD 312: 12 mm diameter.

Others lengths available under request.

STORAGE

DRIZORO[®] CARBOROD has an indefinitely shelf life when is stored in its original packaging in a dry and covered place, with temperatures between 5 °C and 40 °C, protected against direct sunlight, heat and frost.

SAFETY AND HEALTH

DRIZORO[®] CARBOROD is not a toxic product but skin and eye contact must be avoided. When mixing and applying the structural adhesive, do not work without the protection of rubber gloves and safety goggles. In case of eye contact, rinse immediately with clean water but do not rub. In case of skin contact, wash affected area with abundant water and soap. If irritation persists, seek medical assistance.

Observe the usual precautions for the handling and the application of this type of products.

DRIZORO[®] CARBOROD is a conductive material so it must be kept away from electrical cables and devices in order to avoid risk of electric shocks or short-circuiting.

For further information, Safety Data Sheet of **DRIZORO[®] CARBOROD** is available by request.

Disposal of the product and its empty containers must be made by the final user and according to official regulations.

IMPORTANT INDICATIONS

- **DRIZORO[®] CARBOROD** is used to increase the concrete bearing capacity according to a determinate mechanical stress request; hence it is not suitable for related structural durability problems.
- **DRIZORO[®] CARBOROD** must be completely embedded in the structural adhesive.
- Design and specifications must be made and certified by a professional engineer.
- Design and specifications must be made by qualified engineer.
- Workers on job-site must be skilled for this type of structural strengthening.
- For further information and other uses not specified in this Technical Bulletin consult our Technical Department.

TECHNICAL DATA

Characteristics of the product	DRIZORO [®] CARBOROD		
Appearance and colour	Black colour rod with rough finish surface		
Length (m)	3,00		
Tensile strength (MPa)	2.000		
Elongation at break (%)	>1,33		
Elasticity Modulus (MPa)	150.000		
Diameter (mm)	8	10	12
Cross-sectional area (mm ²)	50	78	110
Guaranteed tensile load (kN)	100	156	220
Recommended design tensile strength (MPa)	1.400		
Recommended design load (kN)	70	109	154
Equivalent diameter to B-500 steel	φ14	φ16	φ20

GUARANTEE

The information contained in this leaflet is based on our experience and technical knowledge, obtained through laboratory testing and from bibliographic material. **DRIZORO[®], S.A.U.** reserves the right to introduce changes without prior notice. Any use of this data beyond the purposes expressly specified in the leaflet will not be the Company's responsibility unless authorised by us. We shall not accept responsibility exceeding the value of the purchased product. The data shown on consumptions, measurement and yields are for guidance only and based on our experience. The data is subject to variation due to the specific atmospheric and jobsite conditions so reasonable variations from the data may be experienced. In order to know the real data, a test on the jobsite must be done, and to be carried out under the client responsibility. We shall not accept responsibility exceeding the value of the purchased product. For any other doubt, consult our Technical Department. This version of bulletin replaces the previous one.



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