

# MasterBrace<sup>®</sup> Laminate

The MasterBrace<sup>®</sup> Laminate System is a Carbon Fibre Reinforced Polymer (CFRP) system for structural strengthening of concrete and timber structures. The system comprises of a heavy-duty MasterBrace Laminate Adhesive which is used to bond the ready to use MasterBrace Laminates.

## DESCRIPTION

**MasterBrace Laminate** is a ready to use pultruded, carbon fibre laminate, normally externally bonded to structures, to provide additional load bearing capacity. It provides a lightweight, high tensile strength material (higher than steel reinforcement used in the concrete industry) and is largely utilised for additional flexural reinforcement (ie plate bonding) of concrete and timber members, as part of the **MasterBrace Laminate** system.

## RECOMMENDED USES

To add strength and reinforce structures with material that has a high tensile capacity, **MasterBrace Laminate** enables the traditional technique of plating (with steel plates) to be replaced with extremely light materials, that are far easier to install, and to:

- Increase the flexural capacity of beams and slabs
- Increase the general load-bearing capacity (e.g. structural conversion following an increase in loading conditions)
- Help reduce deflection of the overall structural element (increase in rigidity)
- Help increase the fatigue strength (reduced maintenance)
- Help to increase the crack resistance of a structure (increase in durability)

## FEATURES AND BENEFITS

- **Fast and easy installation** - reducing overall installation cost of strengthening.
- **Durable** - non-corroding even if in contact with moisture.
- **Thin section compared to traditional** methods - Low profile (thickness) does not impact on architectural aesthetics or reduce useable space.
- **Simple design** - enables the amount of reinforcement to be calculated in relation to the performance required or the flow of stress.
- **Customisable** - a range of sizes and grades available to optimize design requirements and suitable for near surface mounting in grooves.
- **All laminates are supplied with a protective peel-ply to both faces** - reducing preparation costs, whilst delivering better adhesion to the substrate and to any subsequent coatings.

## PROPERTIES

MasterBrace Laminate (Grade)	170/3100	210/3300
Mean Tensile strength $\sigma$ (MPa)	3100	3300
Mean Tensile modulus <b>E</b> (GPa)	170	210
Laminate Width (mm)	50, 80, 100 typical (120, 150 on request) * Note: Other widths maybe manufactured to order	
Laminate Thickness (mm)	1.4 * Note: Other thicknesses maybe manufactured to order	
Ultimate Elongation (at break)	1.6%	1.4%
Fibre content %	70	70
Density g/cm <sup>3</sup>	1.6	1.6
Inter Laminar Shear Strength	80 MPa	80 MPa
Thermal Expansion m/m/°C	0.6 x10 <sup>-6</sup>	0.6 x10 <sup>-6</sup>

**Note:** Values given in the Performance Data table are mean values obtained from regular, quality assurance testing. Some variation may occur dependent on batch, size, and test method sensitivity. Allowance should be made for this in the design process. The structural designer is advised to satisfy themselves, by prior testing if necessary, that the grade chosen will conform to the performance criteria for their specific design requirements.

## APPLICATION

### Preparation of Substrate

The surfaces of elements that are still in good condition or restored with a leveling material from the BASF range, should be sanded down and left clean and dry. With degraded structures, the whole damaged area should be removed by scarifying, hydro-demolition or similar, and then structural restoration carried out with mortar from the **MasterEmaco** or **MasterBrace** range of products (**eg MasterEmaco S 5400CI or MasterBrace 1444**).

Remove oils, grease, dust or any other loose material from the surface and leave dry.



We create chemistry

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## Application

To ensure maximum adhesion, apply one coat of **MasterBrace P 3500** by roller or brush.

If necessary, apply a coat of **MasterBrace 4000** or **MasterBrace 1444** using a putty knife, to fill any blow holes or imperfections to the concrete or timber surfaces.

Remove the protective peel-ply film from one surface of MasterBrace Laminate to be adhered. If the type of Laminate being used does not have a peel-ply surface, then wipe clean the Laminate surface with a suitable solvent (MEK or Acetone).

Apply one layer of **MasterBrace 4000** 1 – 1.5 mm thick on both the surfaces (concrete and Laminate). Apply Adhesive on the Laminate so that it is a minimum of 1 mm thick at each side, and 2 mm thick at the centre by using an appropriately shaped spatula.

Apply **MasterBrace Laminate** and using the correct hard roller, exert a constant pressure by moving the tool backward and forward, in the direction of the fibres, along the centre-line of the laminate. Expel any excess **MasterBrace 4000** (and air) from under the Laminate, leaving a nominal 1-3 mm layer of adhesive.

Clean up the surfaces of the Laminate, taking care not to move the bonded material.

For detailed information about application, please obtain a copy of the BASF "Application Guide for MasterBrace" from your local representative.

## PACKAGING

Available in rolls, typically 100 m long. (Approx 30kg in weight, depending on size).

## SHELF LIFE

**MasterBrace Laminate** has a shelf life of 36 months. Store out of direct sunlight, clear of the ground on pallets protected from rainfall.

## WATCHPOINTS – DESIGN & INSTALLATION

Design and detailed specification should be carried out by appropriately qualified and competent person(s).

Professional consulting engineers and designers may make use of a special design programme for the MasterBrace Laminate system. Please contact your local BASF Construction Chemicals office for further details.

Installation should only be carried out by trained and experienced specialist contractors. Site quality control (including tensile bond testing), should be the responsibility of an independent organisation appointed by the client or his representatives.

Surfaces exposed to U.V. rays should be protected within two days (maximum seven days) with a selected product from the **MasterProtect** range (eg **MasterProtect 160**), in order to ensure perfect bonding between the protective layer and CFRP. Remove the outer layer of peel-ply prior to application of protective coating.

Technical details of adhesives, primers and coatings can be found on the technical data sheets of the respective products.

## PRECAUTIONS

For the full health and safety hazard information and how to safely handle and use this product, please make sure that you obtain a copy of the BASF Material Safety Data Sheet (MSDS) from our office or our website.

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## STATEMENT OF RESPONSIBILITY

The technical information and application advice given in this BASF publication are based on the present state of our best scientific and practical knowledge. As the information herein is of a general nature, no assumption can be made as to a product's suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by law. The user is responsible for checking the suitability of products for their intended use.

## NOTE

Field service where provided does not constitute supervisory responsibility. Suggestions made by BASF either orally or in writing may be followed, modified or rejected by the owner, engineer or contractor since they, and not BASF, are responsible for carrying out procedures appropriate to a specific application.

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