MasterBrace Laminate

Carbon Fibre Reinforced Polymer (CFRP) system for structural strengthening of concrete and timber structures as part of MasterBrace System; CLS (1&2), CLM (1&2) Carbon Laminates according to AS 5100.8

Material 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. MasterBrace Laminate system is in compliance with AS 5100.8: 2017 .

Areas of Application

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)

Characteristics 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

Performance Properties	AS5100.8 Table A2.2.1 Type CLS (1/2)	MasterBrace LAM [width] /1.4 CLS
Tensile Strength MPa	2200/2800	3000
Tensile Modulus GPa	150/160	170
Ultimate Elongation (at break)	1.3/1.6%	1.60
Volumetric fibre fraction %	68%	68%±3
Glass transition Temperature °C	70	>80°C

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.

Dimensions

Type	Width (mm)	Thickness (mm)
MasterBrace LAM width/ thickness CLS *e.g MasterBrace LAM 120/1.4 CLS*	80,100,120,150	1.4
MasterBrace LAM 120/2.8 CLS (Surface Mounted) *	120	2.8*

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MasterBrace LAM 15/2.5 CLS (Near Surface Mounted)**	15	2.5
MasterBrace LAM width/ thickness CLM *** *e.g MasterBrace LAM 120/1.4 CLM*	80,100, 120,150	1.4

Note:
Other widths and thicknesses are available as made to order and subject to minimum order quantity.
* Surface Mounted system at denser thickness offering reduced installation time and labour costs.
** Near Surface Mounted installation in saw cuts.
***High Modulus laminates type CLM (1&2) are available in various widths subject to minimum order quantity, and made to order.

Application

Preparation of Substrate

The surfaces of elements that are still in good condition or restored with a leveling material from the Master Builders Solutions 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.

Application

To ensure maximum adhesion, apply one coat of MasterBrace P 3500 at a coverage of 6m^2/L 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 Master Builders Solutions "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 Master Builders Solutions office for further details.

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Engineered Specification Clause

Utilise peel ply pultruded carbon fiber reinforced polymer (CFRP) laminates, complying in accordance to AS 5100.8: 2017 table A2.2.1, characterised as follows:

Type CLS (1&2) where tensile strength is the dominant required property;
Type CML (1&2) where tensile modulus is the dominant required property;
These CFRP laminates are to be strategically integrated to augment load-bearing capacity and confer supplementary flexural reinforcement unto concrete and timber constituents.

For Exter applications and Surfaces exposed to U.V. rays should be protected within two days (maximum seven days) with a selected UV resistance product, in order to ensure perfect bonding between the protective layer and CFRP.

Illustrative Annotations on Engineering Drawings:
To facilitate clear communication and correct execution on engineering drawings. For example:

MasterBrace LAM 120/1.4 CLS
@ intervals of 300 centers every 6 meters
UV resistance coating for external areas : MasterProtect 150/160

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

Disclaimer

MB Solutions Australia Pty Ltd	MB Solutions New Zealand Ltd	Emergency Advice:
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