

MBrace[®] Resin Systems

Composite (FRP) Strengthening Systems

Description of products

The MBrace[®] Composite Strengthening Resin System consists of:

MBrace[®] Primer

MBrace[®] Primer is the concrete bonding adhesive for use with the MBrace[®] Composite Strengthening System. It is a 100% solids low viscosity epoxy resin able to cure in the presence of moisture and at temperatures as low as 2°C. When applied to sound concrete MBrace[®] Primer gives a high tensile bond strength to the MBrace[®] Composite Strengthening System.

MBrace[®] Putty

MBrace[®] Putty is the concrete smoothing material for use with the MBrace[®] Composite Strengthening System. It is a 100% solids, nonsag paste epoxy resin material. Recommended uses include sealing surfaces prior to epoxy injection, bonding of rigid materials, and leveling uneven surfaces prior to application of the MBrace[®] Composite Strengthening System.

MBrace[®] Saturant

MBrace[®] Saturant resin is the easy to apply, 100% solids material that permits adhesion of a lightweight sheet, within the MBrace[®] Composite Strengthening System. When cured with the tow sheet, MBrace[®] Saturant resin produces a high performance composite system for use in external structural repair or upgrade applications.

MBrace[®] Topcoat

MBrace[®] Topcoat coating is a high solids, high gloss, corrosion resistant polyurethane Topcoat that is developed for use within MBrace[®]

Composite Strengthening System. MBrace[®] Topcoat is especially beneficial for service conditions that require a low VOC to meet air pollution regulations.

Features and benefits

- Increased flexural strength
- Increased shear strength
- Increased impact resistance
- Confinement
- Blast resistance
- Fatigue enhancement
- Lightweight
- Durable
- Control of crack propagation
- Excellent strength to thickness ratio

MBrace[®] Topcoat

- Minimal VOC emissions
- Resistant to chemical splash, spillage and fumes
- Long lasting attractive finish, UV resistant
- Abrasion resistant
- Long maintenance free service
- Reduces dusting

Available in Light Grey and Medium Grey

Technical data/typical properties

MBrace [®] Primer	
Bonding to concrete, pr EN 1542 (direct) > tc (c. failure)	
Tensile strength:	
- Direct, ASTM D638	>12 Mpa
- By flexing, ASTM D790	>24Mpa
Modulus of elasticity:	
- Tensile, ASTM D638	>700Mpa
- Flexural, ASTM D790	>580Mpa

MBrace[®] Resin Systems

Specific characteristics of MBrace Primer	
Composition	Two parts (A & B)
Type of resin (A)	Epoxy (BisphenolA)
Type of hardener (B)	Polyamine
Solids by volume	100%
Mixing ratio A : B	By weight 2:1
Specific gravity of components A and B	A : 1.135 ± 0.024kgp/L B : 1.06 ± 0.024kgp/L
Specific gravity	1.10 ± 0.024kgp/L
Colour	Transparent, Amber
Overall thickness	90µm
Recommended layers	1
Theoretical consumption	0.2 L/m ²
Theoretical coverage	5m ² /L
Pot life	1°C; 8 hours 7°C; 2 hours 21°C; 45 min 32°C; 25 min
Tack free	1°C; 20 hours 7°C; 9 hours 21°C; 7 hours 32°C; 3 hours
Overcoating time	
- With MBrace Putty	Fresh (30 mins)
- With MBrace Adhesive	
a) Recommended	Tack free
b) Max.	48 hours
Optimal storage 1824°C	

MBrace Putty	
Composition	Two parts (A & B)
Type of resin (A)	Epoxy (BisphenolA)
Type of hardener (B)	Polyamine
Solids by volume	100%
Mixing ratio A : B	By weight 2:1
Specific gravity of components A and B	A : 1.6 ± 0.024kgp/L B : 1.6 ± 0.024kgp/L
Specific gravity	1.6 ± 0.024kgp/L
Colour	Comp. A off white Comp. B black
Theoretical consumption	1.7 L/m ² rough sup. 0.8 L/m ² smooth sup
Theoretical coverage	0.6 L/m ² rough sup. 1.25 L/m ² smooth sup.

Open time	20°C : 30 min
Complete setting	48 hours at 20°C
Time for second coat	Immediate

MBrace Saturant	
Composition	Two parts (A & B)
Type of resin (A)	Epoxy (BisphenolA)
Type of hardener (B)	Polyamine
Solids by volume	100%
Mixing ratio A : B	By weight or volume 5:2
Specific gravity of components A and B	A : 1.0 ± 0.024kgp/L B : 1.0 ± 0.024kgp/L
Specific gravity	1.0 ± 0.024kgp/L
Colour	Translucent blue
Viscosity	3100 mPas
Complete setting	7 days at 20°C
Tack range	
- Recommended	Within 48 hours
- Max	7 days

MBrace[®] Resin Systems

Application procedure

Preparation of substrate:

Concrete shot blasting or abrasive blasting to remove laitance and surface contamination. The concrete must be thoroughly cured, free of oils, curing compounds or mould release agents and must be thoroughly dried and free of dust at time of application. The concrete substrate must be repaired using epoxy resin or polymer modified cementitious mortars with tensile strength equal to or greater than the original concrete. Any cracks not caused by steel corrosion should be repaired using epoxy resin crack injection. Surface defects in concrete should be made good using MBrace[®] Putty. Differences in adjacent concrete surface levels must be no more than 1 mm. Concrete surface protrusions such as small projections, grouting lines etc. must be ground flat using concrete planes, disc sanders etc. Depressions in the concrete surface such as a concrete joint must be filled with MBrace[®] Putty. Sharp corners must be rounded with a radius of at least 10mm. The larger the radius the better the preparation. Internal concrete angles must be rounded using an MBrace[®] Putty.

Mixing

MBrace[®] Primer, MBrace[®] Putty and MBrace[®] Saturant Mechanically premix the MBrace[®] Part A resin individually prior to adding Hardener. Mechanically mix Resin Part A and Hardener Part B for 3 minutes or until homogeneous. After initial mixing of MBrace[®] Topcoat Part A (Base) with mechanical mixer, add Part B (Hardener) and continue to mechanically mix for another 5 minutes.

Application

MBrace[®] Primer

Work site must be thoroughly ventilated. Do not apply MBrace[®] Primer if ambient temperature is less than 5°C. Only mix as much primer as can be applied within its pot life. Mixed primer should be applied with roller brush. If necessary a second coat can be applied if needed when surface is very porous. MBrace[®] Primer must be allowed to cure until tack free (overnight curing is common practice).

MBrace[®] Putty

Only mix as much putty as can be applied within its pot life. Apply the MBrace[®] Putty Adhesive to the substrate using a steel trowel or other suitable implement in order to eliminate surface imperfections. Application thickness and coverage rates will be highly dependent on the condition and profile of the concrete substrate. Primed and smoothed surfaces should be top coated within two days to ensure proper adhesion of the MBrace[®] Fibre Reinforcement System to the substrate.

MBrace[®] Saturant

The MBrace[®] Fibre Reinforcement System must be cut before application of MBrace[®] Saturant into prescribed sizes using scissors or cutters. The number of sheets cut shall be limited to those that can be used within a day. Size of any sheet length should be less than 2 metres in length to facilitate flat wrinkle free application and ensure no air is entrapped under the fibre sheet. Apply fully mixed MBrace[®] Saturant resin first coat to the MBrace[®] Fibre Reinforcement surface with a roller brush.

MBrace[®] Resin Systems

Resin saturated MBrace[®] Reinforcement Systems should be placed fibre side down onto the concrete surface onto which the MBrace[®] Primer has been applied.

The Fibre Reinforcement System should be strongly squeezed in the longitudinal direction of the fibres two or three times using a defoaming roller and rubber spatula in order to impregnate the resin into the fibres and to defoam the resin coat.

For joining strips of fibre sheet, a 15cm overlap length is required in the horizontal direction and 2cm overlap length in the vertical direction. Additional resin must be applied at the overlap location on top of the outer layer of fibre sheet to be overlapped. The adhered Fibre Reinforcement System should be allowed to stand for at least 30 minutes. Any lifting or dislocation that occurs during this period must be corrected using the roller and spatula.

The second or overcoat of mixed MBrace[®] Saturant should then be applied onto the surface of the fibre sheet. The coated surface should be strongly squeezed in the fibre longitudinal direction two or three times with the roller and spatula in order to impregnate the fibre sheet in the same manner as above.

In cases where more than one layer of fibre sheet is to be applied, the above application method for MBrace[®] Saturant should be repeated.

The appearance of the MBrace[®] Saturant material should be translucent blue. The colour of the application will be varied due to overlaps and slight thickness variations. Overlap areas should also be translucent.

MBrace[®] Topcoat

MBrace[®] Topcoat coating should be used over a completed installed impregnated MBrace[®] System whenever the system is directly exposed to sunlight or weathering or chemicals in the environment. Note that the carbon fibres are capable of preventing deterioration of the resin system by interruption of ultraviolet rays. Spray application is preferred for best finish. However, MBrace[®] Topcoat coating can be applied by brush or roller for small areas. Generally, application at 3.55.0 wet mils yields 23 mils dry.

Coverage

MBrace[®] Putty

Estimated coverage rates are as follows for 3 mm application thickness:

Smooth surfaces	0.29 m ² / litre
Rough surfaces	0.15 m ² / litre

MBrace[®] Primer

First Coat:	3.9 to 5.25 m ² / litre.
Second Coat:	6.5 to 8.5 m ² / litre.
(when required)	

MBrace[®] Saturant

Estimated coverage is 1.45 1.70 litre per m based on presaturation of tow sheet and 1st & 2nd coat of tow sheet installation.

MBrace[®] Topcoat

8.2 to 12.4 m²/ litre @ 3.5 to 5.0 wet mils.

Cleaning

Use Cleaning Solvent No.2, Methyl Ethyl Ketone or Acetone. Observe fire and health precautions with solvents.



The Chemical Company

MBrace[®] Resin Systems

Storage

Store in cool, dry area (10 to 32°C) away from direct sunlight, flame or other hazards. MBrace[®]Fibre reinforcement materials contain carbon fibres. During application of MBrace[®]Fibre materials, wear appropriate work clothing to minimize contact. Use caution when handling flammable liquids and eliminate all sources of ignition from work area. Product Material Safety Data Sheets (MSDS) are available and should be consulted and on hand during application and/or whenever handling these products. These products are for professional and industrial use only; application directions must be followed.

Shelf life

MBrace[®]Primer / Putty / Saturant

Twenty four months when properly stored in unopened containers.

Packaging

MBrace[®]Primer Part A 1.85kg unit

MBrace[®]Primer Part B 0.945kg unit

DMBrace[®]Saturant Part A 3.57 litre unit

MBrace[®]Saturant Part B 1.45 litre unit

Watchpoints

MBrace[®]Primer / Putty / Saturant contain reactive resins and diluents. Observe the following health and physical precautionary measures before using this product: Wear gloves, eye protection, and appropriate work clothing to avoid contact with components. Ventilation is required with special consideration for enclosed or confined areas. Air movement must be designed to ensure turnover at all locations in work adjacent areas to avoid buildup of heavy vapours. Do not apply the MBrace[®]Fibre Reinforcement Systems when ambient temperature is less than 5°C.

MBrace[®]Topcoat should be recoated within 1 week when exposed to sunlight; otherwise must be recoated within 4 weeks to assure proper adhesion of MBrace[®]Topcoat to itself. If recoat times are exceeded surface must be grit blasted or mechanically abraded to provide a non-glossy, roughened surface. Surfaces should be top coated within two days when exposed to direct sunlight, or in other cases within one week to assure proper adhesion of topcoat to saturant.

Maintenance

Periodically inspect the applied material and repair localised areas needed. Consult BASF Construction Chemicals SA Technical Services for additional information.

Health and Safety

For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted.

The following general comments apply to all products. As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs, (which may also be tainted with vapour until the product is fully cured and dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek medical attention. Keep away from children and animals. Reseal containers after use.



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MBrace[®] Resin Systems

Solvent Based Products

Use in well ventilated areas; avoid inhaling. Suitable respiratory equipment may be needed, e.g. when spraying. Can cause skin, eye irritation. Wear protective eye shields and gloves during use. Do not smoke or allow sparks or naked lights when stored or in use.

Powder Products

Should be handled to minimise dust formation; use light mask if excessive dust unavoidable. Cement powders when wet or moistened can cause burns to skin and eyes which should be protected during use.

Resin Products

Can cause irritation, dermatitis or allergic reaction. Use protective equipment particularly for skin and eyes. Use only in well ventilated areas.

Spillage

Chemical products can cause damage; clean spillage immediately.

Disclaimer

The information given here is true, represents our best knowledge and is based not only on laboratory work, but also on field experience.

However, because of numerous factors affecting results we offer this information without any guarantee and no patent liability is assumed.

All products should be used in accordance with the Manufacturer's instructions. No responsibility can be taken by the manufacturer where conditions of use are beyond our control.

It is the responsibility of the user to obtain the most up-to-date datasheet which supersedes all previous literature.

For additional information or questions, contact your local BASF Construction Chemicals SA representative.

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Revised : January 2010