

# Application Guide

Epoxy Repair Systems

MasterStrength



## Table of Contents

<b>GENERAL.....</b>	<b>2</b>
Products Info .....	2
Concrete Cracking.....	3
Application Requirements.....	4
<b>APPLICATION- MASTERSTRENGTH EPOXY REPAIR PRODUCTS.....</b>	<b>5</b>
MasterStrength 2525- High Performance, Versatile Epoxy Binder .....	5
MasterStrength 1444- Thixotropic Epoxy Structural Adhesive and Binder .....	8
MasterStrength 1446 - Two-Component Solvent-Free Thixotropic Epoxy Paste .....	9
MasterStrength 1475- Solvent-Free Epoxy Paste.....	10
<b>OVERVIEW .....</b>	<b>II</b>
Other products application guide.....	II

## GENERAL

This application guide applies to the MB Solutions Australia Pty Ltd, Epoxy crack systems, known as MasterStrength brand family brands formerly known as MasterBrace. This application guide shall be read in conjunction with all project specifications (including drawings) -by others- and the current material Technical Data Sheets (TDS) and Safety Data Sheets (SDS).

## Products Info

Renamed Brand	Formerly as	Size	Resin base	Component/ Mixing ratio	Thickness range (mm)
MasterStrength 2525	MasterEmaco 2525	2&20L	Epoxy	2C-1PTA:3PTB	N/A
MasterStrength 1444	MasterBrace 1444	1L	Epoxy	2C-1PTA:3PTB	0-5mm
MasterStrength 1446	MasterBrace 1446	10kg	Epoxy	2C-1PTA:3PTB	5-25mm
MasterStrength 1475	BluRez 575	4L	Epoxy	2C-1PTA:1PTB	Max 40mm

### Note:

- There are further solvent free Epoxy products under the brand name of MasterStrength such as MasterStrength PRI 3500, 4000 and 4500. These range are part of Structural Strengthening systems.
- These products being used as primer, adhesive or saturant with MasterStrength composite product ranges such as laminates, fibres, anchors and bars.
- For more details, please refer to: "Structural Strengthening Systems- MasterStrength ".

## Concrete Cracking

- Concrete provides structures with strength, rigidity, and resistance to deformation. However, these characteristics also make concrete structures less flexible, limiting their ability to accommodate external forces, environmental changes, or volumetric variations.
- Cracking occurs when tensile stress exceeds the tensile strength of the concrete substrate. Common causes include premature removal / disturbance to forms, weak structure, temperature changes, settlement, corrosion of rebar, AAR / sulphate attack, movement or vibration E.g. earthquakes.

### Pre-Inspection of Crack

- The cause of crack, size (dept and width), type and nature of cracks to be determined prior material selection or injection method selection.
- Once the cause of a crack is identified, the appropriate course of action can be determined—whether to leave it as is, inject it with a suitable material, or apply other repair methods.

### Cause of Cracks

- Cracks can be categorised based on the time of occurrence:
  - **Before Hardening:** Caused by moisture movement (e.g., plastic shrinkage, plastic settlement) or structural movement (e.g., formwork instability, subgrade settlement).
  - **After Hardening:** Classified into five categories: Physical (Dry shrinkage, Cracking); Chemical (Corrosion, AAR); Thermal (Ambient temperature change, Thermal shock) and Mechanical (Overloading).

### Nature of Cracks

- Cracks can be categorised as superficial, structural, or water leakage defects.
  - **Superficial cracks:** Caused by plastic shrinkage, drying shrinkage, thermal stresses, chemical reactions, or weathering.
  - **Structural cracks:** Result from corrosion of reinforcement, construction overloads, design errors, detailing flaws, external loads, or excessive drying shrinkage.
  - **Water leakage defects:** Typically occur in underground constructions such as basements, tunnels with preformed segments, caused by water pressure, weight loading, or segment settling in newly bored tunnels.

### Crack Size (Width)

- Cracks can be categorised based on the width of cracks:
  - **Fine crack:** cracks with less than 1mm width
  - **Wide crack:** cracks with 1 to 6 mm width
  - **Fractures:** cracks exceeding 6mm width

### Crack Activity Classification

- Cracks can be categorised based on whether a crack is active or stabilised:
  - **Dormant/Dead/Non-moving cracks:** No change in width or length (except thermal expansion/contraction).
  - **Active/Live/Moving cracks:** Change in either width or length over time.
  - To determine, the following methods can be used: Glass strip test or Avongard crack monitor.

## Application Requirements

- **Training:** All work shall be carried out by adequately trained and skilled applicators/installers, under appropriate supervision.
- **Safety:** Always ensure the appropriate use of adequate PPE (gloves, goggles, long sleeves etc) and comply with all other safety related requirements when applying Master Builders Solutions materials.
- **Quality Systems:** The applicator shall operate under a fully compliant quality system, to ensure the on-site quality of applied material. The applicator shall keep fully documented work records for all works undertaken.
- **Quality Control:** If after application and/or testing, any applied material is deemed as unsatisfactory by the specifying consulting engineer and/or MB Solutions Australia Ltd, it may need to be rectified at the applicator's cost.
- **Useful documents:** MasterStrength resin Products are used for a variety of crack repair applications and share some common attributes and often some installation techniques.
- For detailed explanations of the mechanisms of concrete deterioration, inspection and interpretation of inspections and repair technologies, several documents should be referred to. Some of these include:
  - Standards Australia HB 84:2018 "Guide to concrete repair and protection"
  - European Norm EN 1504 part 5. BS EN 1504-5:2017
  - International Concrete Repair Institute, ICRI 310.2R-2013 "Concrete Surface Profile Chips (CSP 1-10)"

## APPLICATION- MASTERSTRENGTH EPOXY REPAIR PRODUCTS

### MasterStrength 2525- High Performance, Versatile Epoxy Binder

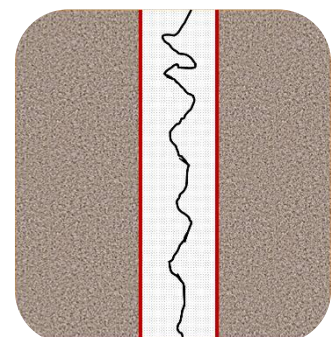
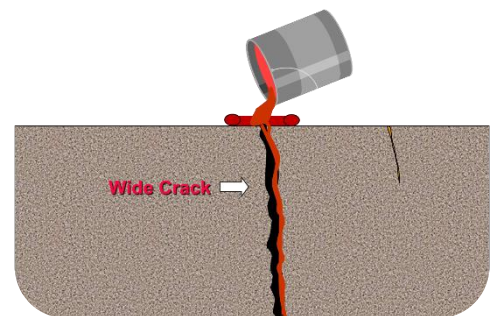
- MasterStrength 2525 can be used to produce a range of epoxy resin-based mortars, structural adhesives or for crack repairs and injection.
- MasterStrength 2525 can be applied to both dry and damp surfaces and adheres to most substrates after proper preparation.

#### Mixing

- Proportion part kits accurately mixing only what can be used in less than 30 minutes.
- Thoroughly stir Part A, add Part B (3:1 parts by volume respectively) and blend thoroughly using a slow speed mixer fitted with a suitable paddle.
- When being used as a grout or mortar, only clean kiln dried sand may be mixed in. The maximum aggregate size should approximate to 1/3 of the minimum required depth.

#### Repair of horizontal cracks- Gravity Fill Method:

- All potential barriers to penetration must be removed.
- Remove all dirt, grease, oil, paints, and curing compounds from the crack.
- Use a wire brush, handheld grinder, or sandblasting method to remove loose particles from the crack, followed by oil-free compressed air to remove dust.
- Cracks must be free of dirt and dust. While the sides of the cracks may be damp or wet, they must be clean and free of mud.
- For low-strength or very weak concrete, saw-cut the cracks to create a V-shaped groove at the crack opening.
- Fine cracks: Clean and profile surface using a grinding wheel
- Wide cracks: Cut open Cracks in a V-Groove, clean thoroughly, and remove any contaminants.
- Create a temporary reservoir along the crack.
- Fill the Reservoir with MasterStrength 2525.



- Allow the grout to seep in, then remove any excess grout after the gel time.
- Note: Only low-viscosity and long pot-life grouts should be used. Alternatively, grout can be applied to the entire area using a squeegee.

### Low Pressure Injection Method

- For stabilized cracks between 0.05 mm to 7 mm in width, low-viscosity epoxy injection can be used.
- Prepare the surface and fix near-surface injection ports at the centre of the crack, spacing them equal to the thickness of the member, with a maximum spacing of 500 mm.
- Seal the crack line and the interface between the concrete and ports using MasterStrength 1444.
- Mix the Epoxy product and fill it into the injection reservoir.
- Fix the injection system onto the surface-mounted port.
- Apply pressure to the plunger using rubber bands.
- Vertical cracks: Start from the bottom and work upwards.
- Horizontal cracks: Work from one end to the other.
- Work from larger cracks to smaller cracks.
- Allow the grout to seep in naturally.
- Remove pressure once the grout starts gelling.
- Leave the syringe in place until the material starts gelling.
- Once set, remove the injection port and finish the surface by grinding or cutting.
- Master Builders Solutions recommends vacuuming or flushing with water or cleaning solutions. If the injection material requires a dry environment for application, it is important to consider this prior to cleaning.
- If the crack runs through the full length of the structure and is visible from the underside MasterStrength 1444/1446 must be used to seal both sides of crack to prevent loss of the injected product.
- For injection by pump:
  - Commence from the widest part of the crack and proceed injecting outwards along the crack in each direction.
  - Turn on pump and slowly increase pressure to a maximum of 10 - 15 bar.
  - Stop pumping for every litre injected and allow 1 - 2 minutes for reaction.



- Start and stop injection until the packer will no longer accept material or if the specified pressure has been reached.
- Move to the next packer and repeat injection process. Continue injection until crack is full and has been adequately sealed.
- Monitor the effectiveness of the work and allow to settle for 2 - 3 days before returning to site and completing additional injection if required.

### Hand applied techniques

- The MasterStrength 2525 mortar or grout may be placed on to the surface using standard grouting or trowelling techniques.
- The surface needs to be primed when using "dry" mortars. Use MasterStrength 2525 binder only to prime and apply wet on wet, when aggregate ratio is over 1-3, resin to aggregate.

Mixed with added MasterCoat FIL I		Total Yield
Grout	2L	2.25L
Flowable Mortar	3L	3L
Mortar	4L	4L

## MasterStrength I444- Thixotropic Epoxy Structural Adhesive and Binder

- MasterStrength I444 supplied as a solvent-free, smooth, non-sag paste.
- MasterStrength I444 is 4 in a 1L kit size, to cover approximately 1m<sup>2</sup> at 1mm of thickness.

### Mixing

- MasterStrength I444 Proportion part kits accurately, mix only what can be used in less than 30 minutes.
- Thoroughly stir Part A, add Part B (3:1 parts by volume respectively) and blend thoroughly using a slow speed mixer fitted with a suitable paddle, until a streak free uniform grey colour is achieved.

### Application

- **As an adhesive** - immediately spread the mixture over the surface and promptly place other surface to be adhered into tight contact. Use clamps where necessary until hardened.
- **As a patching mortar** – wipe trowel frequently with a cloth dampened with Thinners to aid finishing.
- Kiln dried sand or MasterCoat FIL 5 aggregate may be added to repair mortar at a thickness greater than 5mm, or where a stiffer mix is required.
- The maximum aggregate size should approximate to 1/3 of the depth.
- **As a wet to dry bond coat** – on vertical or sloping surfaces, trowel mixed MasterStrength I444 over prepared surface at 3-4m<sup>2</sup> per litre depending on surface profile.
- Mix and apply cementitious material before MasterStrength I444 “tacks off”.
- Apply mortar or concrete to MasterStrength I444 after 40 – 80 minutes, depending on ambient conditions.
- Applied mortar or concrete should be cured as per manufacturer’s instructions.
- **As a primer** – on vertical or sloping surfaces apply at a rate of 3-6m<sup>2</sup> per litre depending on surface profile (a CSP 2-3 maybe suitable for this application) and apply in an even coat.

## MasterStrength 1446 - Two-Component Solvent-Free Thixotropic Epoxy Paste

- MasterStrength 1446 is designed as a structural adhesive and may be used to bond precast elements and segments. It can also be used as a polymer repair mortar and will bond to a wide variety of building and construction materials including concrete, masonry, timber and metals.
- MasterStrength 1446 is a two-component system available in a 15kg kit size, Part A 10kg & Part B 5kg. Estimated yield of a 15 kg kit is 9.5L.

### Mixing

- MasterStrength 1446 is supplied in precisely proportioned packaging ready for mixing.
- The individual product components A and B have been pigmented to provide a visual aid to mixing.
- Mix Part A thoroughly, add Part B and blend thoroughly using a slow speed (max. 600 rpm) mixer fitted with a helical (e.g. jiffy) paddle.
- Mix for at least 3 minutes until the blend is a uniform grey colour and streak free.

### Application

- MasterStrength 1446 as a patching mortar to be packed tightly into cracks, spalls, etc. with a clean trowel or putty knife.
- Wipe the trowel with a damp cloth saturated with thinners frequently to aid finishing.
- MasterStrength 1446 can be ground after cure.
- MasterCoat Fil5 may be added for thicknesses greater than 25mm, or where a stiffer mix is required at a rate of 2 parts MasterCoat Fil5 to 1 part MasterStrength 1446.
- Primer (such as MasterStrength 2525) is required with this fill ratio of the MasterStrength 1446 and the filled MasterStrength 1446 should be applied into the wet MasterStrength 2525.
- The thickness range is 5-25mm.

## MasterStrength I475- Solvent-Free Epoxy Paste

- MasterStrength I475 is a high-performance resin specifically designed for bonding, grouting and general repair of concrete.
- MasterStrength I475 will bond well to prepared steel, concrete and other compatible surface.

### Mixing

- MasterStrength I475 is supplied in precisely proportioned packaging ready for mixing.
- Add the two components together
- Thoroughly stir Part A, add Part B (1:1 parts by volume respectively) using a slow speed mixer (400rpm) for at least 3 minutes or until a uniform mixture is achieved.

### Application

- MasterStrength I475 may be trowelled onto prepared surfaces.
- Trowel adequate amounts of MasterStrength I475 onto each surface for bonding to create full contact.
- Bring both surfaces into contact and apply positive pressure until full cure is reached.
- The max thickness range is 40mm.
- Where multiple layers of MasterStrength I475 are being applied to a single surface, roughen between each layer and wait until initial set or all latent heat has dissolved prior to application of next layer.

## OVERVIEW

Master Builders Solutions provides comprehensive construction solutions designed to enhance the performance, durability, and longevity of infrastructure projects. Our innovative range of products ensures that projects meet the highest standards of quality and reliability.

Along with innovative products, customers also receive on-site and technical support from the Master Builders Solutions team of experts. By diagnosing the underlying cause of deterioration, our specialists develop the most suitable repair strategy to prevent further damage and deliver lasting protection. Our civil infrastructure solutions are tailored to meet the specific needs of the construction industry in ANZ, delivering consistent results for a wide range of applications.

### Other products application guide

- **MasterCrete: “Cementitious Concrete Repair”** Application Guide
- **MasterFlux: “Cementitious Grouts”** Application Guide
- **MasterFlux ER: “Epoxy grouts”** Application Guide
- **MasterFill: “Injection Systems”** Application Guide
- **MasterStrength LAM/FIB/BAR/ANC: “CFRP structural strengthening”** Application Guide
- **MasterJoint CHR: “Joint sealants”** Application Guide
- **MasterJoint 910: “Hydro-swelling waterbars for construction joints”** Application Guide
- **MasterJoint 930: “FPO tape for joint waterproofing”** Application Guide
- **MasterShield AKS: “Chemical resistant HDPE liner”** Application Guide
- **MasterShield CHR: “Chemical resistant Novalac coating”** Application Guide
- **MasterShield AC: “Anti-carbonation coatings”** Application Guide
- **MasterShield CI: “Impregnants and corrosion inhibitors”** Application Guide
- **MasterShield CP: “Galvanic cathodic protection systems”** Application Guide
- **MasterGeo: “Geotechnical Soil nails and anchors”** Application Guide

**Disclaimer**

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**STATEMENT OF RESPONSIBILITY**

The technical information and application advice given in this MB Solutions Australia Pty Ltd 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 and for ensuring that the application and use of the product is in accordance with the manufacturer's guidelines and recommendations.

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