

## MATERIAL SPECIFICATION

Unless otherwise shown on Engineering Drawings, a rapid hardening cementitious repair mortar containing corrosion inhibitor and with an extended working time shall be used for:

- Fast setting horizontal concrete repairs
- Vertical and overhead form and pour concrete repairs
- Concrete Repairs that need to be over-coated with moisture sensitive coatings on fast turn-around projects

The concrete repair material shall be a blended, pre-packaged cement-based mortar requiring only the addition of potable water

The concrete repair material shall meet all the following typical performance criteria when tested at 21°C:

TYPICAL PHYSICAL PROPERTIES			
PROPERTY		STANDARD	VALUES
Compressive Strength	3 Hours	ASTM C109	20 MPa
	1 Day		40 MPa
	7 Days		55 MPa
	28 Days		<65 MPa
Flexural Strength	1 Day	ASTM C348	3.7 MPa
	7 Days		6.9 MPa
	28 Days		7.6 MPa
Split Tensile Strength	7 Days	ASTM C496	2.1 MPa
	28 Days		3.3 MPa
Slant Shear Bond Strength	1 Day	ASTM C882	10.3 MPa
	7 Days		14.5 MPa
	28 Days		19.3 MPa
Modulus of Elasticity		ASTM C469 (28 Days)	5.28 x 10 <sup>6</sup> psi
Volumetric Resistivity		FM 5-578 (28 Days)	31,300 ohm-cm
Abrasion Resistance		ASTM C779 (28 Days)	0.019 inches of wear @ 1 hour
Length Change*	Air Cure	ASTM C157 (28 Days)	-0.03%
	Wet Cure		0.013%
Setting Time	Initial Set	Gillmore Needles	30 - 60 Minutes
	Final Set		60 - 90 Minutes

\*Based on initial length @ 24 hours; 7.6 cm x 27.9 cm beams

### A repair material that meets the requirements is:

- VERSASPEED LS100 – Available from: TREMCO CPG – [www.tremco.com.au](http://www.tremco.com.au)

### Ancillary products from Tremco Include:

- Eucocrete Zincrich Primer – Primer for steel reinforcing
- Eucoweld 2.0 - Latex bonding agent
- Dural 452 MV - Wet to dry epoxy adhesive
- Evencure XDS-NXGEN – Curing compound
- Evencure AC – Curing compound
- Formrelease WB – Form release agent
- Dymonic 100 – One part polyurethane sealant

## SURFACE PREPARATION

### Concrete Surfaces

- All areas to be repaired are to be clearly marked out by the client's representative in rectangular, or square shapes.
- Saw-cut concrete around the outlines of the marked-up areas to a minimum depth of 6mm, ensuring all cuts are perpendicular to the surface, to avoiding feather-edging.
- Side edges of the saw cuts must be mechanically roughened to create adequate mechanical bond.
- The perimeter of the repair shall be kept to a simple shape and sharp angles avoided.

- Long narrow repair areas shall be avoided.
- Completely remove all loose, delaminated and weak concrete to a minimum depth of 6mm up to the saw cut edge for light traffic areas. A minimum depth of 25mm is required for heavy traffic areas.
- Avoid abrupt changes in depth.
- Clean the surface and remove any dust, oil, grease, paint and / or other contaminants.
- Prepare concrete using acceptable mechanical means and concrete cleaners and degreasers as necessary to obtain clean, sound and rough surfaces. Coarse aggregate shall be exposed.
- All cracks shall be brought to the attention of the engineer and a determination made of whether the cracks are subject to movement.
- The cracks shall be repaired as directed by the engineer prior to application of the repair material.
- All existing joints in the substrate are to be honored. Any new joints required shall be cut/prepared as outlined on the engineering drawings.
- Soak concrete thoroughly with potable water for a minimum of 2 hours prior to placement.
- Concrete shall be saturated and free of standing water at time of placement (surface saturated dry). Any free-standing water should be drained from formwork or vacuumed up immediately before application of the repair mortar takes place.
- When required for horizontal repairs, prime the clean, dry substrate with Euroweld 2.0. For areas where superior bonding is required DURAL 452 MV epoxy adhesive may also be considered. Alternatively, a scrub coat of the repair material can be applied to the saturated surface dry (SSD) substrate to enhance bonding as per the manufacturer's guidelines.

### Steel Reinforcement

- All reinforcing steel that has lost bond with the concrete must be fully exposed by a minimum of two times the maximum aggregate size.
- Continue to remove concrete along all exposed reinforcing bars to at least 50mm beyond the point of corrosion.
- All steel reinforcing bars must be securely anchored with an appropriate lap length as directed by the engineer.
- If more than 10% of the diameter of a reinforcing bar has been deteriorated, the bar will require replacement or will need to be spliced as directed by the engineer.
- Corroded steel should be mechanically cleaned to remove all signs of oxidation and thoroughly high pressure washed with clean water to ensure removal of debris and residual contamination.
- All exposed steel reinforcing bars shall be free of all loose scale, rust and other contaminants around the entire perimeter of the bar to achieve a surface preparation at least equivalent to Class SA 2.5 "near white metal" as per AS 1627.4
- Particular attention is to be paid to the back of the exposed steel reinforcing bars.
- Prepared steel is to be coated with an approved Zincrich Primer as per the manufacturer's guidelines.
- The minimum cover over reinforcement shall be in accordance with job specifications.

### FORMWORK

- Formwork shall be constructed of rigid and non-absorbent materials to ensure that no water is absorbed from the repair material.
- Formwork must be securely anchored, watertight and strong enough to resist forces created when placing the repair material.
- Vents / Air relief holes are to be included as required.
- Formwork shall be coated with a suitable form release agent.

### ENVIRONMENTAL CONDITIONS

- Substrate & equipment should be pre-conditioned to between 2°C and 32°C.
- For optimum performance, material should be pre-conditioned to between 15°C & 24°C
- Shade the material from direct sunlight as necessary.
- Store material in an area that is clean, dry & protected from the elements.

### MIXING

#### Drill and Paddle Mixer (Single Bag Mixes)

- Place the minimum amount of premeasured potable water into a clean mixing bucket.
- While mixing at a slow speed, slowly add repair material and mix to a uniform consistency.
- Add remaining water to achieve desired workability.
- Do not exceed maximum water content as printed on product packaging or an amount that will cause segregation.
- Total mixing time should not exceed 4 minutes.
- Do not mix more material than can be placed within the working time of the repair material.
- Do not re-activate the mix by adding additional water.

#### Pan Mixer (Stationary Barrel with Moving Paddles for multiple unit mixes and/or where repair material is being extended with aggregate)

- Do not mix more material than can be placed within the working time of the repair material.
- Provide an adequate number of mixers in good operating condition for uninterrupted placement.
- Do not exceed one-half the maximum capacity of the mixer.

- ❑ Pre-wet mixer ahead of mixing and then empty excess water.
- ❑ Start by adding the minimum amount of premeasured clean water to mixer.
- ❑ While mixing, gradually add the repair material and mix to a uniform consistency.
- ❑ Add remaining water as necessary to achieve desired workability.
- ❑ Total mixing time should not exceed 4 minutes.
- ❑ Do not exceed maximum water content as printed on product packaging or an amount that will cause segregation.
- ❑ Do not re-activate the mix by adding additional water.
- ❑ Avoid splitting kits of repair material i.e., only mix full units.
- ❑ Aggregate Extension:
  - For repairs deeper than 50mm the concrete repair material may be extended by the addition of coarse aggregate.
  - For pours requiring aggregate extension, add aggregate before final water adjustment.
  - Contact manufacturer for detailed aggregate extension guidelines.

### PLACEMENT

- ❑ Prepared substrate must be damp & puddle free prior to placement.
- ❑ When primer is not being used on horizontal repairs, then firmly work a scrub coat of repair material into the saturated surface dry (SSD) concrete surface to enhance bonding.
- ❑ Wheelbarrows, buckets, tremies, bird-mouth formwork or similar equipment may be required for material placement.
- ❑ For vertical repairs, repair material must be poured in formwork in a manner to avoid segregation and not allowed to fall freely over reinforcement. Air vents / ports should be used to monitor placement & ensure complete filling of the void.
- ❑ For horizontal repairs, repair material must be placed continuously from one side of repair area to the other and onto the damp scrub coat. Repair material must be compacted into the repair area before finishing as required and not simply poured into the void.
- ❑ Placement must be continuous to prevent cold joints.
- ❑ Continue placement until repair area is completely filled taking care to not over-finish the repair.
- ❑ A stiff bristle broom can be used to create a non-slip texture just prior to final set if required on horizontal surfaces.

### CURING

- ❑ Correct curing is essential to ensure optimum performance.
- ❑ Where repairs are to be overcoated with moisture sensitive coating after +/- 5 hours: Cure with water / wet rags as soon as the material has reached final set (+/- 40 minutes) and continue to wet cure for 2 to 3 hours. Curing can be further enhanced by covering wet cured repairs with plastic.
- ❑ For other form & pour concrete repairs: Wet cure exposed repair mortar as soon as the repair mortar has reached its final set. Formwork may be removed as soon as the repair mortar has stiffened or set sufficiently to prevent sagging. Note: Formwork facilitates curing when left in place for as long as possible. Apply an approved curing compound such as Evencure XDS-NXGEN, or EVENCURE AC immediately after formwork is removed.
- ❑ In extreme weather conditions, supplementary curing with plastic sheeting should be considered.

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