mClad™ Ceramic Metal
Product Technical Data

MCOR™ 3330

MCOR™ 3330 (mClad™ Ceramic Metal) is two component ceramic reinforced acrylic-modified epoxy compound. Thixotropic with high molecular weighing reactive polymers and oligomers; the molecular ceramic is utilized as a trowel grade paste-like polymer to restore, repair and reclaim metal components of engineering grade machinery, equipment, and other mechanical components.

The MCOR™ 3330 provides advanced wear resistance cladding and sealed corrosion protection with neutral conductivity and inert fillers. It may be drilled, tooled, tapped, filed or machined for repair of equipment and parts that may require precision finishing and dressing. Once cured, the material replaces worn or lost metal and restores metallic profile with polymechanical bonding and reinforcing as a cold-weld alternative.

Applications Include

The MCOR™ 3330 is versatile, often utilized as cladding epoxy, metal reclaimer, and/or mechanical filler.

- Scored or worn shafts
- Oversized bearing / bush housings
- Cavitated impellers / propellers
- Fractured and holed casings / blocks
- Corrosion cells and tank leaks
- Scored hydraulic rams
- Sloppy keyways
- Scored machine beds
- Flange faces
- Fractured pipes
- Undersized / scored shafts
- Pitted and warped valves

Features

- Machinable
- 100% solid
- Ease of application
- Inert fillers, great electrical insulation
- Minimize cathodic disbondment
- For all metals
- Extended working time
- Convenient 1:1 ratio by volume

Volume Capacity / Theoretical Coverage

The volume capacity of 1 kg. of mixed MCOR™ 3330 is 660 cm^3 (40 in^3). Approximate coverage per 1 kilogram covers 660 cm^2 at 1 cm. thickness (1 kg covers 80 in^2 at 0.5 in. thickness).

Film Thickness

MCOR™ 3330 is a thixotropic material intended to be applied in various controlled applications for specific needs, and can be further controlled by sanding/machining for precision dressing. Intended as a cladding epoxy or filler at various thicknesses, the MCOR™ 3330 can be applied at any thickness up to 1.25 cm (1/2 inch) per pass without sagging, without mechanical support; and thicker if applied in multiple passes or with mechanical support (reinforcement mesh, weld rods, metal and fabric scrim).

Surface Preparation

The success of any coating application is directly proportional to the completeness of the substrate preparation and the care the application crew puts into the application. Surface must be clean and sound. Verify that the temperature of the surface is at least 3 degrees C (5 degrees F) higher than the dew point temperature to preclude condensation.

Metal: Before preparing steel, please inspect and remove oil, grease, or other contaminants - "Solvent Cleaning" (SSPC-SP1) may be required. Grind any weld spatter or steel weld inconsistencies. Abrasive blasting (or other approved mechanical methods) to SSPC SP-6/NACE No. 3 "Commercial Blast Cleaning" must be used in order to achieve a clean surface with a minimum profile of 75 microns (3 mils); remove dust and debris by high compressive air or solvent cleaning (SSPC-SP1) may be require again. MCOR™ 9521 | Primecoat™ MTe is advised as a primer should the substrate be susceptible to flash-rusting, to stripe coat any edges or bends in the metal for enhancing peak retention, or should the metal not possess the characteristics to achieve optimal profiling capability.

Application Method

Material is supplied in two (2) containers (base+cure) as a unit. If possible, always mix a complete unit in the proportions supplied, if not, use a calibrated scale to weigh out each component or use measuring cups to measure by volume. Adding more or less hardener will adversely affect the cured physical properties. Measure the material temperature prior to mixing. If the material is cooler than 16 °C (60 °F), raise its temperature slowly to above 22 °C (72 °F). For published working time to remain manageable, do not exceed 32 °C (90 °F).

After the components have been measured, place equal volume of Part A and Part B on a clean, flat mixing board, mix thoroughly with a trowel/spatula/putty-knife until the mixture becomes a uniform in color and viscosity with no visible streaks or lumps (2 - 3 minutes). Incomplete mixing will result in loss of physical properties and unmixed/malcured patches.

Apply the mixture immediately with a trowel/spatula/putty-knife.

Cover large holes or cracks with mechanical support (mesh, weld rods, metal and fabric scrim) and apply MCOR™ 3330 or other 3000 (mClad™) series product over the patch and onto an adjacent solid area. Pipes can be repaired by coating a cloth "bandage" with MCOR™ 3330 or other 3000 (mClad™) series product and wrapping the bandage around the pipe. An additional layer of MCOR™ 3330 should be applied over the bandage.

Apply quickly- designed for quick return-to-service; hence, shortened pot life.

MCOR™
Advanced Mechanical Polymers
3000 N 29 CT, Hollywood, FL 33020
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Packaging & Color

A unit is a two-component (base+cure)

mClad™ Ceramic Metal is available in:

- Bronze (BZ)

Thinning

Thin with MCOR™ 9001 | #1 Reduction not to exceed 2% by volume.

Storage & Handling

Shelf life: 36 months, sealed.

Store in a dry area away from direct sunlight.

The material should be conditioned to between 24 °C (75 °F) and 35 °C (95 °F) before use.

Clean tools with MCOR™ 9015 | #5 Cut & Clean.

Safety

Consult Safety Data Sheet (SDS) for all material safety information.

Technical Properties

General

Type:	Thixotropic Ceramic Epoxy Compound	**Mixing ratio (by weight):**	1:1
Base component (consistency):	Paste	**Mixing ratio (by volume):**	1:1
Base component (color):	Bronze	**Solids by volume:** ASTM D2697	100%
Solidified component (consistency):	Paste	**Solvents (VOC) by volume:** ASTM D2697	0%
Solidified component (color):	Black	**Pot life (200g mass @ 20 °C):**	30 min.
Finish:	Matte		

Curing Table

TEMPERATURE	**41 °F** (5 °C)	**50 °F** (10 °C)	**59°F** (15°C)	**68 °F** (20 °C)	**77°F** (25°C)	**86 °F** (30 °C)	**150 °F** (65 °C)
Use involving no loading (min.)	24 hrs	22 hrs	20 hrs	14 hrs	10 hrs	7 hrs	1 hrs
Machining and/or light loading (min.)	36 hrs	28 hrs	24 hrs	18 hrs	14 hrs	12 hrs	1.5 hrs
Full electrical, mechanical or thermal loading (min.)	72 hrs	72 hrs	60 hrs	48 hrs	44 hrs	36 hrs	6 hrs
Immersion in chemicals (min.)	72 hrs	72 hrs	60 hrs	48 hrs	44 hrs	36 hrs	6 hrs

Adhesion

Tensile adhesion (pull-off bond strength)

In accordance with ASTM D4541/ISO 4624, the pull off strength from abrasive blasted steel yields on average:

20 MPa (2,890 psi)

Hardness

Shore D

In accordance with ASTM D2240, typical values will yield:
83

Barcol

In accordance with ASTM D2583, typical values will yield:
88

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Abrasion

Abrasion Resistance (Taber)

In accordance with ASTM D4060 and ASTM G195 with 1kg load, typical abrasion resistance values will yield:

CS-17 Wheel (Dry)	0.094 g (490 mm^3) @1000 cycles
H-10 Wheel (Wet)	0.119 g (429 mm^3) @1000 cycles

Impact Resistance

Izod Impact Strength

In accordance with ASTM D256, typical impact resistance values will yield:

0.241 [12.80]	ft-lbf/in [J/m]
0.602 [1,259.7]	ft-lbf/in^2 [J/m^2]

Electrical Properties

Dielectric Constant & Dissipation Factor

When tested to ASTM D150 typical value when tested at 5V & 10 kHz will yield:

0.029 (Corrected Dissipation Factor, D)

3.93 (Dielectric Constant, k')

Dielectric Strength

When tested to ASTM D149 typical value when tested at 2000V/s will yield:

416 V/mil

Surface & Volume Resistivity

When tested to ASTM D257 typical value when tested at 500V for 60 seconds will yield:

0.89 x 10^{15} (Surface Resistivity)

0.94 x 10^{14} (Volume Resistivity)

Temperature Tolerance

Wet Heat Resistance

When exposed or in contact with high temperature immersion the product performance was acceptable. Wet heat resistance testing was performed by immersion of a 1" x 3" x 0.2" thick free film into a beaker of water and cutting oil maintaining both at 120 C for 24 hours. Resulting in no blistering, no softening, no other effects nor loss of adhesion.

Dry Heat Resistance

In accordance with ISO 11357, using differential scanning calorimetry (DSC) typical heat resistance tolerance yielded:

314.3 C (598 F)

Cold Temperature Tolerance

For most applications, the product is suitable in temperature as low as:

- 40 C (- 40 F)

Elongation & Tensile Properties

In accordance with ASTM D638, typical values will yield:

Tensile strength:	33.6 MPa (4,868 psi)
Tensile elongation:	1.5 %
Young's Modulus:	4,867.7 MPa (6.41 x 10^5 psi)

Flexural Properties

In accordance with ASTM D790, typical values will yield:

Flexural strength:	52.7 MPa (7,646 psi)
Flexural Strain at Yield:	2.3%
Flexural modulus:	3,061.2 MPa (4.44 x 10^5 psi)

Compressive Properties

In accordance with ASTM D695, test pieces on various sizes, with no backing and with steel backing, at both ambient cure and at heated cure yield:

Compressive strength (average)

54.1 MPa (7,841 psi)	@ ambient cure
58.9 MPa (8,543 psi)	@ 100 °C cure

Compressive yield (average)

53.9 MPa (7,811 psi)	@ ambient cure
46.6 MPa (6,763 psi)	@ 100 °C cure

Compressive modulus (average)

4,867.7 MPa (7.06 x10^5 psi)	@ ambient cure
1,276 MPa (1.85 x10^5 psi)	@ 100 °C cure

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