Castable Mounting

PACE TECHNOLOGIES

Castable Mounting Resins

- **Epoxies**
- **Acrylics**
- **Polyesters**

CASTABLE MOUNTING

Castable mounting or cold mounting resins are typically used for encapsulating specimens which are either very brittle or highly sensitive to standard compression mounting temperatures (e.g. heat treated metals and low temperature solders). Castable mounting resins are also used when a large number of samples need to be mounted or when mounting time is critical (acrylics and fast curing epoxies).

- Thermal mass of specimen (larger specimens require longer curing time)
- Specimen material
- Initial resin temperature (higher temperatures cure faster)
- Ambient temperature (higher temperatures cure faster)
- Relative humidity and shelf life (absorption of water)

As a general rule, curing is on the order of 30-45 minutes to 24 hours for ready to grind

Property	Epoxy	Acrylics	Polyesters
Type	Epoxy resin and hardener	Acrylic resin and powder	Polyester resin and hardener
Peak Temperature	100-375°F	150°F	100°F
Shore D Hardness	82	80	76
Cure Time	30 minutes to 8 hours	5-8 minutes	6-8 hours

Castable resin systems consist of a monomer resin which is catalyzed or polymerized with a hardener. Polymerization results in cross-linking of the polymer to form a relatively hard mount.

There are three main categories of castable mounting resins:

- Epoxy Resins
- Acrylics (Castable)
- Polyesters (clear)

EPOXY RESINS

Epoxy resins are typically two part systems consisting of a resin and a catalyst (hardener). Mixing ratio's vary from 10-parts resin to 1-part hardener to 5-parts by weight of resin to 2-parts by weight of hardener and it is important that the recommended ratio of resin to hardener be maintained.

Curing time is dependent upon a number of variables including:

- Volume of mount (larger mounts cure faster)

epoxy resins (Shore D hardness approximately 80). Note that these epoxy resins typically will continue to harden over a longer period of time.

The curing time can be altered by modifying or controlling the resin temperature. For example, an 8-hour resin system can be cured in 30-45 minutes by pre-heating the resin to approximately 120°F (50°C) prior to mixing and then curing at room temperature. This

procedure initiates the catalytic reaction sooner; however, this may also increase the maximum exotherm temperature.

The resin curing cycle can be slowed or reduced by decreasing curing temperature by forcing air over the curing mounts, placing the mounts into a water bath, or curing in a refrigerator. In this case, care must be taken not to kill the reaction, however if this does occur or the resin is too soft after curing, heating it to 100-120°F for several hours should push the reaction to completion and the mount should be hard after cooling to room temperature.

Advantages of Epoxy Resins:

- Low shrinkage
- Relatively clear
- Relatively low exotherms
- Excellent adhesion
- Excellent chemical resistance
- Good hardness

Epoxy System	EPOXY-Standard	QUICKMOUNT 2	ULTRATHIN 2
Characteristic	Lower cost	Fsst cure	Low viscosity, clearer, lower exother, low shrinkage
Cure time	1-2 hours	30-45 minutes	2 hours
Mixing ratio (weight) (resin:hardener)	5:1	10:1	10:1
Peak Exotherm -20 grams -30 grams	 300° F 350° F	 350° F 375° F	 120° F 150° F
Color	Clear to slight yellow tint	Slight yellow tint	Clear
Viscosity Resin Hardener	 1000 cps 350 cps	 1000 cps 350 cps	 500 cps 250 cps
Shrinkage	Moderate	High	Low
Specific gravity (mixed)	1.10	1.10	1.09
Pot life	1 hour	30 minutes	12-20 minutes
Cure time to 75-80 Shore D hardness	45 minutes up to 8 hours	30-45 minutes	4-6 hours
Full Hardness (Shore D)	85	84	85
Tensile strength	8500 psi	8000 psi	8000 psi

ACRYLICS (Castable) - are fast curing resin systems which are useful for rapid specimen mounting. Typical acrylic mounts are ready for use within 8-15 minutes. Fillers are added to increase hardness and to reduce shrinkage.

Acrylic resins are also less sensitive to mixing ratio's and therefore tend to produce more consistent repeatable results as compared to epoxy resin.

Characteristics of Acrylics
- Rapid mounting
- Very repeatable and consistent
- Moderate shrinkage
- Good hardness
- Opaque
- High odor
- Can be submerged in water during curing to reduce exotherm heat and shrinkage

POLYESTERS - are typically used when a very clear mount is required.

Characteristics of Polyesters
- Very clear (water clear)
- High odor
- Can be submerged in water during curing to reduce exotherm heat and shrinkage

Polyester resins are also very useful for large casting and for decorative casting for demonstration purposes.

Guidelines for Polyester Castings

SINGLE LAYER CASTING
The addition of catalyst to resin starts a chemical reaction, creating heat which cures (hardens) the resin. For best results, measure resin into a graduated unwaxed mixing cup and add the appropriate amount of catalyst (see chart below). DO NOT add excessive catalyst, as castings may fracture. MIX THOROUGHLY for approximately 60 seconds, scraping sides and bottom of mixing container. Pour into mold and allow to harden completely before removing from mold. Curing (hardening) time is dependent upon amount of catalyst used, thickness of the casting, room temperature and resin temperature, humidity, and amount of colorant used. DO NOT RETURN CATAYZED RESIN TO

Acrylic System	CASTAMOUNT	SUPERMOUNT
Characteristic	Fast, clear, low shrinkage	Fast, hard, opaque
Cure time	8-10 minutes	10-12 minutes
Mixing ratio (volume) Powder:liquid	3:2 or 2:1 for lower viscosity	5:2
Color	Semi-clear	Gray

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MULTIPLE LAYER CASTING (EMBEDDING)
Embedding objects in plastic resin involves making a casting of 2 or more layers with embedments sandwiched between layers. Generally, you work in reverse when embedding objects. The first layer you pour becomes the top or face of your casting. Pour first layer of catalyzed resin into mold. Allow to gel until firm enough to support the embedments (20-30 minutes). Catalyze second batch of resin and stir. To avoid trapping air, dip embedments into catalyzed resin; set in place face down on the first gelled layer. Pour balance of catalyzed resin over embedments. If embedments are not yet covered or if you want a colored background, pour a third clear or colored layer after the second layer has gelled. Embedments can be placed in several levels to create a "floating" appearance. After final layer has been poured, allow casting to harden completely before removing from the mold.

Vacuum/Pressure Mounting

For porous or cracked specimens, the epoxy resin can aid in supporting these features. Filling these voids can be difficult depending upon their size, with smaller voids being much more difficult to impregnate than larger voids. This arises mainly from the compressibility and volume of air within the void. By applying a vacuum to the specimen and pouring while under vacuum the total pressure of this air can be reduced significantly. Subsequent curing at increased pressures will force or push the resin into the voids. Note that the vacuum time on both the resin and specimen should be kept to a minimum in order to reduce degassing of the resin.

Additionally, slight preheating of the epoxy will reduce the viscosity of the resin, however this will also expedite the curing cycle and maximum exotherm.

Miscellaneous Mounting Accessories

Product Name	Quantity	Catalog Number
1.25" reusable two piece plastic molds 1.5" reusable two piece plastic molds	12/pkg	METPREP-0125 METPREP-0150
Disposable plastic mounting cups 1-inch molds 1.25-inch molds 1.5-inch molds	50/pkg	 MOUNT-0100 MOUNT-0125 MOUNT-0150
Phenolic Ring forms 1-inch 1.25-inch 1.5-inch	100/pkg	 RF-0100 RF-0125 RF-0150
Mold release	8 oz (0.24 l) 16 oz (0.47 l)	MR-1000-08 MR-1000-16
Stirring sticks (6" tongue depressors)	100	SS-1000-100
Mixing cups (100/pkg) (3 oz graduated cups)	100	MCUPS-1000
Plastic specimen mounting clips (100/pkg)	100	KLIP-0100
Metal specimen mounting clips (100/pkg)	100	MKLIP-0100
1.25" specimen storage containers (25/pkg)	25	STORE-0125

Product Descriptions

Epoxy

Product Name	Size	Catalog Number
EPOXY resin	32 oz (0.95 l) 1 gallon (3.8 l)	EP-3000-32 EP-3000-128
EPOXY Hardener	8 oz (0.95 l) 32 oz (0.95 l)	EH-3000-08 EH-3000-32

QUICKMOUNT 2 Fast Epoxy

Product Name	Size	Catalog Number
QUICKMOUNT Epoxy resin	1 gallon (3.8 l)	EPF-3000-128
QUICKMOUNT Hardener	32 oz (0.95 l)	EHF-3000-32

ULTRATHIN 2 Low Viscosity Epoxy

Product Name	Size	Catalog Number
ULTRATHIN 2 Epoxy resin	1 gallon (3.8 l)	ULTRA-3000-128
ULTRATHIN 2 Hardener	32 oz (0.95 l)	ULTRA-3000H-32

Acrylics (castable)

Product Name	Size	Catalog Number
CASTAMOUNT Acrylic resin kit (1 lb)	1 lb resin with 12 oz hardener	AK-5000
CASTAMOUNT Acrylic resin powder	1 lb (454 grams) 5 lbs (2.2 kg)	AR-5000-P1 AR-5000-P5
CASTAMOUNT Acrylic hardener (clear blue liquid)	12 oz (0.36 l) 64 oz (1.9 l)	AH-5000-H12 AH-5000-H64

SUPERMOUNT Acrylics (castable)

Product Name	Size	Catalog Number
SUPERMOUNT Acrylic resin kit (1 lb)	1 lb resin with 12 oz hardener	GKAR-3000
SUPERMOUNT Acrylic resin powder (gray)	5 lbs (2.2 kg)	GRAR-3000-P5
SUPERMOUNT Acrylic hardener (clear liquid)	64 oz (1.9 l)	GRAH-3000-64

POLYCAST Clear Polyester Resin

Product Name	Size	Catalog Number
POLYCAST Polyester Resin	32 oz (0.95 l) 1 gallon (3.8 l)	POLYCAST-32 POLYCAST-128
POLYCAST Hardener	1 oz	POLYHARD-01
POLYCAST Dye Kit	1 oz	DYE-1000

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