



Sonite W-1100 & W-2100

Epoxy Casting Compounds

Description: Sonite W-1100 and W-2100 are non-metallic filled epoxy resins. The same inert inorganic filler which is used in both compounds improves certain properties of the unfilled resin: reduced shrinkage during cure, lower moisture absorption, lower coefficient of thermal expansion and increased thermal conductivity.

W-1100 is a medium viscosity compound, which can be used with a hardener like Sonite 19 for castings requiring high impact resistance or with Sonite 41 for heat resistance up to 145°C.

W-2100 has lower viscosity and lends itself to applications requiring room temperature cure. The overall excellent electrical properties of these formulations make them particularly well suited for the encapsulation of electronic components.

Properties with Various Hardeners

| Casting Compound Sonite Hardener | W-2100/01 | W-2100/03 | W-1100/03 | W-1100/19 |
|--|-----------|------------|-----------|-----------|
| Mixing Ratio by Weight | 100/5.0 | 100/6.5 | 100/6.5 | 100/14.5 |
| Viscosity @ 20 rpm (Spindle #) * | 3,000 | 12,000 (3) | 16,000 | 3,000 (2) |
| Maximum Recommended Casting Thickness | ¾" | ¾" | | ¾" |
| Pot Life – 100 Grams: Minutes D2471-71** | 35 | 40 | 40 | 40 |
| Recommended Cure Cycle – Hours / 25° C | 16 | 16 | 16 | 16 |
| Recommended Cure Cycle – Hours / 100° C | 1 | 1 | 1 | 1 |

Physical Properties After Recommended Cure Cycle

| | | | | |
|--|--------------------|----------------------|--------------------|--------------------|
| Hardness (Barcol 935) | 94 | 93 | 91 | 89 |
| Liner Shrinkage, in/in D2566-79 | .003 | .0025 | .002 | .003 |
| Specific Gravity (cu in / lb) | 1.57 (17.6) | 1.59 (17.4) | 1.51 | 1.53 (18.1) |
| Heat Distortion Temperature ° C D648-82 | 75 | 105 | 70 | 60 |
| Tensile Strength, psi @ 2% Off. D638-84 | 7,000 | 5,000 | 8,000 | 7,000 |
| Compressive Strength, psi @ 2% D-695-84 | 11,000 | 12,000 | 16,000 | 9,000 |
| Flexural Strength, psi D790-84 | 10,000 | 10,000 | 14,000 | 13,000 |
| Thermal Conductivity: btus /hr/sq ft/°F/in | 15 | 15 | 10 | 12 |
| Thermal Coefficient of Expansion ° C | 5x10 ⁻⁵ | 3.5x10 ⁻⁵ | 3x10 ⁻⁵ | 6x10 ⁻⁵ |

* Viscosity measurements are made with a Brookfield HBT at 25°C immediately after mixing compound with hardener.

** ASTM Reference: Dxxxx-xx

The first 3 systems shown above develop exothermic heat which can be considerable for thick sections resulting in rapid cure. Smaller masses generate less heat and cure more slowly. The 1 hour post cure at 125°C. Although not essential, insures optimum property development. For the W-1100/Sonite-41 combination, large castings must be allowed to set ("B-Stage") @ 25°C for 16 hours followed by post-curing 2 hours @ 70°C + 2 hours @ 125°C. Small castings can be oven cured without delay @ 70°C + the 2 hours @ 125°C.

Procedure.

Instructions are given for the preparation of molds of various materials (sealing, mold release, etc.) This product has a limited shelf life and should be used as soon as possible. For encapsulation, select the proper base compound and hardener combination based on such factors as heat resistance required, size of casting, viscosity limitations, etc. **Because no two applications are quite the same, a small test application to determine suitability for your project is recommended if performance of this material is in question.**

(a) Simplicity: For production work, multiple molds will be required, the number depending on expected production rate. During an 8-hour period, it is doubtful that more than 4 pieces can be made per mold cavity, even using maximum allowable oven heat.

(b) Accessibility: Properly designed molds must be easy to assemble and disassemble to minimize "down time." Wherever possible, some draft should be used. This will facilitate extraction of the finished component. Since all epoxy resin compounds have SOME shrinkage, this aspect is much more important in places where the resin tends to shrink tight on a certain part of the mold.

(c) Venting: It is impossible to mix resin and hardener and pour into a mold without air bubble inclusion. Molds must be designed so that bubbles can reach the free surface easily. Whenever possible, an "open cup" type of design should be selected to make pouring easy and proper venting a certainty. The use of vacuum will insure removal of air and improve impregnation of the component,

(d) Mold Materials: Metal molds (aluminum, brass or steel) are the most common for encapsulation. Good surface finish on the mold will mean good surface on the cast epoxy and go a long way toward minimizing adhesion. Chrome plating on brass and steel is helpful. The low temperature melting alloys can be used as "one-shot" molds. Dipping a match plate pattern in the molten alloy usually makes these. Non-metallic molds can be made of Teflon, polyethylene, polyvinyl plastisol and various other plastics. Vinyl or styrene sheet may be vacuum-formed to make multiple molds for simple shapes.

(e) Adhesion: To prevent adhesion to metal surfaces, various release agents have proven effective, in particular Universal Mold Release

MIXING:

(a) Stir the base compound thoroughly to make sure that any filler that may have settled out during storage is completely dispersed. Weigh out desired amount.

(b) Degas under a vacuum of 0.1" or less until bubbling ceases. W-2100 *will* degas at room temperature. W-1100 should be preheated to 60°C. A container, **no** more than 50% full by volume, must be used for vacuuming purposes to allow for air bubble expansion.

(c) Stir in the correct amount of hardener and mix thoroughly. When using W-1100 and a room temperature curing agent, be sure to allow the base compound to cool back down to 25°C before mixing.

(d) Some air entrapment during mixing is unavoidable. Complete degassing should be done again either before or after pouring into the mold.

(e) Preheating the molds will help degas the compound after pouring. It will also minimize any surface bubbles for castings made without vacuum.

CAUTION: Epoxy resins are irritating to the eyes and skin. Avoid prolonged or repeated skin contact to prevent possible sensitization. Remove from skin with waterless hand cleaner, then soap and water.

WARNING: Sonite 01, 03 and 19 are primary aliphatic amines. These are corrosive materials which can cause severe eye and skin burns and are sensitizers that may cause dermatitis from skin contact and/or inhalation. Sonite 41 contains methylene dianiline: an aromatic amine that is a known hepatotoxin and suspected carcinogen. Use these products only with adequate ventilation. If contaminated, flush eyes with water for 15 minutes and seek medical attention. Remove contaminated clothing and wash from skin with soap and water.



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