



CRYSTAL CLEAR Series

Rigid Urethane Casting Compounds – FOR INDUSTRIAL USE ONLY.

PRODUCT OVERVIEW

Crystal Clear 200, 202, 204 and 206 are water white clear and made specifically for applications that require absolute clarity. These rigid urethane casting resins differ only in working and demold times.

Low viscosity ensures easy mixing and pouring. Crystal Clear products cure at room temperature* with negligible shrinkage. Cured castings are *UV Resistant* and are not brittle. Vibrant colors and color effects are achieved by adding pigment dispersions. Applications include encapsulation, making prototype models, lenses, sculpture reproductions, decorative cast pieces, jewelry, prototype models, special effects and props. **CAUTION: NOT FOR HOME USE. THIS PRODUCT IS FOR INDUSTRIAL USE ONLY.** Proper ventilation, a NIOSH Approved Respirator and Protective Clothing are required to minimize the risk of inhalation and dermal sensitization. If breathing is affected or a dermal rash develops, immediately cease using this product and seek medical attention. Read MSDS before using.

TECHNICAL OVERVIEW

Key Values:		~Mixing Ratio: 100A: 90B by weight		~Shore D Hardness: 80D*			
	Pot Life	Full Cure	Casting Thickness Min./Max*				
Crystal Clear 200	20 minutes	16 hours	1/2" - 3" ((1.27cm - 7.62cm)				
Crystal Clear 202	9 minutes	90 minutes	1/16" - 1/2" (0.16cm - 1.27cm)				
Crystal Clear 204	120 minutes	48 hours	3" - 6" (7.62 cm – 15.24 cm)				
Crystal Clear 206	180 minutes	48 hours	Greater Than 6" (15.24 cm)				
<i>Crystal Clear 220</i> is a harder product intended for prototyping applications.							
A separate technical bulletin is available for CC220 from Smooth-On or at www.smooth-on.com							
Properties	Viscosity	G/CC	Cu. In./Lb.	Tensile Strength	Compressive Modulus	Shrinkage	Mix Ratio
Part A	300 cps	1.04	-	-	-	-	100 pbw
Part B	800 cps	1.03	-	-	-	-	90 pbw
Mixed	600 cps	1.036	26.7	2,500 psi	40,000 psi	Variable (depending on mass)	
Elongation/Break: 10%		Tensile Modulus: 110,000 psi		Flex. Strength: 11,000 psi			
Dielectric Strength - 260 mls. thick vpm . . . 260				Volume Resistivity @ (ohms/cm) . . . 1.4 X 10 ¹⁵			
Dielectric Constant @ 25C at 1 Khz 3.34				Dissipation Factor @ 25C at 1Khz 0.01			
*Cure time depends on casting thickness and configuration. See "Curing" section on reverse side of this bulletin.							

Preparation Selecting A Mold Rubber Pre-Heat The Mold Measuring

Ventilation . . . good ventilation is essential. You must wear a NIOSH approved respirator to minimize inhalation of residual fumes. Wearing disposable gloves and long sleeve garments will help minimize skin contact. (Refer to safety information on reverse side of this technical bulletin & MSDS). Make sure mixing tools & containers are dry. Product has a limited shelf life. Use as soon as possible.

Selecting A Mold Rubber . . . Crystal Clear Plastics should be cast into Smooth-On Mold Max™ Silicones or Smooth-On urethane mold rubbers. Do not use other silicone or urethane rubber products. If you are unsure about surface compatibility, a trial casting should be made. To prevent cure inhibition, post-cure newly made Mold Max™ silicones for 8 hours at 150° F / 60° C and let cool prior to casting resin. **Polyurethane rubber molds** should be dry and require a coat of a suitable release agent (Universal Mold Release available from Smooth-On) before casting.

For Best Results . . . **Pre-heat the rubber mold** at 212°F / 100°C for 4 hours before mixing & pouring Crystal Clear. This will minimize the chances that cured castings will exhibit casting phenomenon such as fish-eyeing, suck back, corner rounding, large bubbles, etc.

Measuring . . . Crystal Clear plastics should be stored and used in a warm environment (72° F / 22° C). These products have a limited shelf life and should be used as soon as possible. The proper mixing ratio is 100A:90B by weight. You must use an accurate scale (gram scale) to weigh these components properly. Dispense the required amount of Part A into a mixing container. Weigh out the appropriate amount of Part B and combine with Part A. **Important:** Shelf life of product is drastically reduced after opening. Immediately replace container lids after dispensing. Use remaining product as soon as possible.

Mixing

Pouring

Mix thoroughly for 2 -3 minutes making sure that you scrape the sides and bottom of your container several times. If coloring or filling Crystal Clear product, add filler or pigment dispersion to Part B and mix thoroughly before adding Part A. After mixing, empty contents into a new, clean mixing container and mix again thoroughly.

To Minimize Air Bubbles - Vacuum degass prior to pouring.. Subject mixture to 29 h.i.g. mercury in a suitable vacuum chamber for 2 -3 minutes or until mixture rises, breaks and falls. Allow for 3 to 4 times volume expansion in container.

Pouring - pour mixture in a single spot at the lowest point of the mold and let the mixture seek its level.

For Best Results . . . Best results are obtained using a **pressure casting technique**. After pouring the mixed compound, the entire casting assembly (mold, dam structure, etc.) is placed in a pressure chamber and subjected to 60 PSI (4.2 kg/cm²) air pressure for at least one hour for CC-202, two hours for CC-200 and six hours for CC-204. **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.**

Casting Thickness

Curing

Post Curing

Post Curing . . . Castings will achieve maximum physical properties and better heat resistance if Crystal Clear is post cured. Post curing is recommended if castings are thin or of low mass concentration. Castings should be post cured in a mold or support structure. **Post Cure Schedule:** Allow the material to cure for 6-8 hours at room temperature followed by 6 hours at 150 - 160 F (65 - 72 C). Allow casting or part to cool to room temperature before demolding.

Materials should be stored and used in a warm environment (72° F / 22° C). Castings will reach ultimate physical properties at room temperature in 5 - 7 days. Castings removed from mold before recommended cure may exhibit a tacky surface that can be eliminated by exposing casting to 150 F / 65 C for 6 hours.

Casting Thickness & Cure Time - The cure time and ultimate shrinkage of all Crystal Clear products will vary depending on mass concentration, thickness of the casting, mold configuration, etc. For example, a 200 gram mass of CC 200 will cure faster if left to cure in a conical vessel (cup) versus a casting dispersed as a thin sheet measuring 3 centimeters square by 1 mm thick. This is due to the heat generated by the concentration of material in the cup versus heat that is dissipated from the sheet casting. Castings will resist yellowing when exposed to UV, but may darken over time.

Which Crystal Clear Product Should I Use For My Application?

SOME EXPERIMENTATION MAY BE NECESSARY – these products are used for hundreds of applications and we cannot warrant product suitability for any one application. **Shrinkage will vary depending on mass and mold configuration.** If there is a question as to whether or not a Crystal Clear product meets your needs, a test casting is recommended. You can also call our technical help line for assistance.

- **Crystal Clear 200** is intended for a casting thickness ranging from ½” to 3” at a casting weight maximum of 16 lbs. (7.25 kgs.) **CC 200** offers a 20 minute pot life and 16 hour demold time. Castings greater than 3” should be layer cast.
- **Crystal Clear 202** is intended for casting in thin sections. Developed for casting thicknesses of no more than ½”, CC 202 has a 9 minute pot life and 90 minute demold time.
- **Crystal Clear 204** provides a longer working time (120 minutes). Crystal Clear 204 can be cast in thicknesses up to 6” at a casting weight maximum of 35 lbs. (15.88 kgs.). Cure time is 48 hours.
- **Crystal Clear 206** provides the longest working time (180 minutes) and is for castings greater than 6”. Cure time is 48 hours. Contact Smooth-On prior to using this product for technical assistance if required.

Safety First

The Material Safety Data Sheet (MSDS) for this or any Smooth-On product should be read prior to use and is available upon request from Smooth-On. All Smooth-On products are safe to use if directions are read and followed carefully.

Be careful. Crystal Clear Part A is a modified aliphatic diisocyanate. Vapors, which can be significant if heated or sprayed, cause lung damage and sensitization only with adequate ventilation. Contact with skin and eyes may cause severe irritation. Flush eyes with water for 15 minutes and seek immediate medical attention. Remove from skin with waterless hand cleaner followed by soap and water. Refer to MSDS. Part B is irritating to the eyes and skin. Avoid prolonged or repeated skin contact.. Remove from skin with soap and water. If contaminated, flush eyes with water for 15 minutes and seek immediate medical attention. Use only with adequate ventilation

Important: The information contained in this bulletin is considered accurate. However, no warranty is expressed or implied regarding the accuracy of data, the results to be obtained from the use thereof, or that any such use will not infringe upon a patent. User shall determine the suitability of the product for the intended application and assume all risk and liability whatsoever.