THE COMPLEAT SCULPTOR
90 Vandam Street New York NY 10013
212-243-6074 TCS@SCULPT.com
800-9-SCULPT www.SCULPT.com

TECHNICAL INFORMATION SHEET - POLY-OPTIC® 14 SERIES CASTING RESINS

Low Viscosity, Polyurethane Casting Resins -- Clear Like Water

Description: Poly-Optic® 14 Series clear, liquid plastics are useful for casting decorative objects, production parts, tools, models, patterns, fixtures, duplicate masters and more. Extremely low viscosity provides for easy mixing, excellent detail penetration and the most bubble-free castings.

Poly-Optic® 14 series resins are two-component, water clear, formulated specifically for applications where optical clarity is a must. Their low viscosities and long pot lives allow easy degassing and handling. Selected dyes may be added to each system to obtain clear colored castings.

Poly-Optic® 1410 is virtually unbreakable and is lower in cost than Poly-Optic® 1420. Poly-Optic® 1410 can be cured at room temperature and may be post cured at 65oC (150oF) to improve physical properties.

Poly-Optic® 1420 is a tough, high impact resistant system used where polishing rough surfaces and higher heat resistance is necessary. Poly-Optic® 1420 must be heat cured between 65-80oC (150-180oF).

Poly-Optic® 14-70 is a firm rubber. Blends of Poly-Optic® 1410 and 14-70 allow any hardness between Shore D-85 and Shore A-70.

FEATURES:	Crystal clear	Long working time	Air bubbles rise and break
	Easy to machine	Tough, hard and not brittle	
	Reproduces fine detail	Low shrinkage upon cure	

PHYSICAL PROPERTIES:	Poly-Optic® 1410	Poly-Optic® 1420	Poly-Optic® 14-70
Mix ratio, by weight	3A to 2B (100A:67B)	2A to 1B (100A:50B)	4A to 5B (100A:125B)
Hardness	85 Shore D	85 Shore D	70 Shore A
Pour time, 2 lb. mix	15 min.	15 min.	15 min.
Maximum exotherm, 2 lb. mass (4 x 4 in. cylinder)	129oC (265oF)	155oC (311oF)	88oC (190oF)
Demold time 2 hrs. (1" thick casting)*	8 hrs. @ 65oC (or 30 min@ 80oC)		24-48 hrs.
Specific gravity, g/cc	1.07	1.05	1.06
Color, cured	Water Clear	Water Clear	Water Clear
Viscosity, 2 min. after mixed	700 cps.	250 cps.	336 cps.
Specific volume, cu. inches/lb.	27.5 27.5 27.5		
Shrinkage during cure,	Very low**	Very low**	Very low**

* Demold time for Poly-Optic® 1410 and 14-70 will vary depending on thickness of casting and the amount of Poly-Optic® Part 14X added.
**Shrinkage is primarily caused by gelling while hot then cooling. Parts that cure with minimal temperature rise will exhibit minimal shrinkage.

Long term exterior use of unfilled, unpigmented systems is not recommended. Poly UV Additive can be used to improve exterior durability. See "Additives" below for more information. Casting thick sections over 1/2 to 1 inch thick may result in exothermic heating causing distortion, waviness and significant shrinkage unless Poly-Optic® 14R Retarder is used. See "Additives" below for more information.

mold preparation: These products will reproduce minute detail from a mold or pattern but may stick or foam when poured on improperly prepared surfaces. A trial casting on a surface finish similar to the final mold should be made to avoid damaging a valuable mold. Polyethylene and silicone rubber molds, such as PlatSil® 71 Series products, do not require a release agent. Condensation-cure silicones (such as the TinSil® 70 Series) are generally not recommended for casting Poly-Optic® since residual alcohol by-products may inhibit the cure or produce a hazy casting. If tin silicone molds are used, baking the mold for four hours at 100oC (212oF) prior to use will aid removal of alcohol from the mold. Latex, polyurethane rubber or metal molds must be dry and require a coat of a suitable release agent, such as Pol-Ease® 2300. For optical clarity, highly polished molds are necessary, such as shiny polyethylene or polypropylene.

Additives: 14X Accelerator is a powerful catalyst to increase the speed of curing for Poly-Optic® Resins. Recommended for castings less than 1/2" thick. For best results, mix Parts A and B, degas if required, then add Part 14X and degas again if necessary. One half of one percent speeds the cure significantly. For example, one half of one percent of Part 14X in a 100 gram mix of Poly-Optic® 1410 reduces the pour and curing time by half. Exotherm (heat of reaction) and thus shrinkage on cooling is also increased. Experiment to determine the right amount of Part 14X to use but do not use more than 1% Part 14X of the total weight of the mix or final physical properties will be affected. 14R Retarder can be used to extend the pot-life of any Poly-Optic® product. An addition of 1.5% 14R to the total mix weight of Poly-Optic® 1410 will increase pot-life from 15 minutes to 70 minutes. Depending on the size and mass of the part, post curing Poly-Optic® 14-70 and 1410 parts in the mold at a minimum of 140oF for 12 to 16 hours may be necessary. The extended pot-life creates a lower exotherm upon curing, allowing larger castings to be made without distortion. Poly UV Additive should be used with Poly-Optic® 1410 to obtain the best long term results in exterior applications. A 1% addition to the total mixed weight of Poly-Optic® will improve exterior durability, reducing the onset of chalking and pitting of the outside surface for ~2 years. Addition of 3% Poly UV Additive has shown good exterior stability beyond 5 years.

MIXING: Prior to mixing Parts A and B, be sure that all molds and equipment are prepared. Parts A and B should be above 60°F. Use metal or plastic mixing vessels and spatulas to avoid introducing moisture (e.g., with paper or wood tools). Shake or stir Part B before use. Carefully weigh proper ratios of A and B into a mixing container (e.g., polyethylene pail). Mix immediately, thoroughly scraping sides and bottom. Vacuum degas mix if desired. Pour mix into mold as quickly as possible. Pressure casting helps produce clear castings. A light spray of Pol-Ease® 2300 or quickly passing the flame of a torch over the back of the casting will help break any bubbles on the back of the pour.

For best results, degas Part B separately. Degas again after mixing A and B.

If additives are to be used, premix with Part B, prior to mixing with Part A.

To determine the proper amounts of Parts A and B for Poly-Optic® 1410 the following formula has been developed. Total weight of resin required divided by 5 equals one fifth of the total mix. One fifth part of total mix times 3 equals the amount of Part A required, and one fifth of the total mix times 2 equals the amount of Part B required.

Once the containers of Parts A and B are opened, they should be used completely or resealed tightly as atmospheric moisture contamination may cause foaming of the plastic.

CURING: Castings should be allowed to remain in the mold until thoroughly cured. Parts demolded too soon may be subject to deformation. Use of pre-warmed molds will hasten curing. Low temperatures will slow the curing and extend demold time. Poly-Optic® 1410 and 14-70 cure at room temperature. For castings less than 1/2" in thickness, use Part 14X or for best results cure 8 hours or more at 140-150oF. Failure to follow these instructions may result in tacky and/or soft parts. Castings greater than 1/2" thick do not require heat or 14X but the addition or use of either will speed up the curing process considerably. Recommended cure for Poly-Optic® 1420 is 8 hours at 65oC (150oF) and for optimum physical properties 16 hours at 65oC (150oF). Poly-Optic® 1420 may be demolded sooner when cured at a higher temperature such as 30 minutes at 80oC (180oF) depending on size of casting and mold. Mold release must be removed from surfaces prior to painting or bonding.

CLEAN UP: Tools should be scraped clean before the plastic is hard. Solvents such as alcohols (shellac thinner), acetone or MEK are good cleaning solvents, but are highly flammable and must be handled with extreme caution. Work surfaces can be waxed or coated with Pol-Ease® 2300 Release Agent so hardened resin can be removed.

SAFETY: Before use, read product labels and Material Safety Data Sheets. Follow safety precautions and directions. Contact with uncured products may cause eye, skin and respiratory irritation and dermal and/or respiratory sensitization. Avoid contact with skin and eyes. If skin contact occurs, remove with waterless hand cleaner or alcohol then soap and water. In case of eye contact, flush with water for 15 minutes and call physician. Use only with adequate ventilation. Poly Plastics are not to be used where food or body contact may occur. Poly Plastics burn readily when ignited. Care should be taken with sanding dust and other easily ignitable forms of these products.

STORAGE LIFE: At least six months in unopened containers stored at room temperature (60-90°F). Poly-Optic® 14 Series Part A's may crystallize slightly or become highly viscous during storage. If crystallization occurs warm the container to 40-50oC (100-120oF) until crystals dissipate. Cool to room temperature before use.