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Norland Optical Adhesive 68TH

Norland Optical Adhesive 68TH (NOA 68TH) is a clear, colorless, liquid photopolymer that will cure when exposed to ultraviolet light and/or heat. Since it is a one part system and 100% solids, it offers many advantages in bonding where the adhesive can be exposed to UV light. The use of NOA 68TH eliminates premixing, drying, or heat curing operations common to other optical adhesive systems. Curing time is remarkably fast and is dependent upon the thickness applied and the amount of ultraviolet light energy available.

NOA 68TH is designed to give improved adhesion to many plastics such as acrylic, polycarbonate and cellulose acetate butyrate. In addition to plastics, NOA 68TH has good adhesion to glass and metals and can be used to bond combinations of the three. Suggested uses for NOA 68TH include bonding compound plastic lenses, laminating polarized film between glass or plastic, mounting plastic lenses in metal or plastic mounts and bonding cover glasses. NOA 68TH has a high viscosity which allows the user to screen print onto substrates.

The recommended energy to fully cure the NOA 68TH is 4.5 Joules/cm² of long wave UV light with maximum absorption between 350 to 380 nanometers. Most glasses and many clear plastics will transmit light in this range, although some clear plastics contain UV absorbers. The absorbers will reduce or eliminate the UV light to slow down or prevent curing. Systems must be designed with at least one substrate transparent to the UV light in order to cure the adhesive.

In addition to the UV cure, NOA 68TH contains a latent heat catalyst that can quickly cure areas that do not see the UV light. The catalyst allows the adhesive to cure in 10 minutes at 125°C in a convection oven, or 3 hours at 80°C. Faster cure times are possible with infrared ovens. Areas in contact with air will cure tacky unless exposed to UV light or given the 125°C cure. Temperatures less than 80°C will not cure the adhesive. The advantage of the heat cure is to bring partially cured adhesive to full cure to get the maximum physical properties of the adhesive. The heat cure is not required if all of the adhesive receives proper exposure to UV light.

Some of the light sources that can be used to cure the adhesive are sunlight, mercury lamps, and fluorescent black lights.

TYPICAL CURE TIMES

LIGHT SOURCE	FILM THICKNESS	PRECURE	FULL CURE
100 Watt Mercury Spot Lamp at 6 Inches	1-10 mil	15 seconds	5 minutes
2 15-watt Fluorescent Black Lights at 3 Inches	1-10 mil	60 seconds	20 minutes
Opticure LED 200 @ ½ inch	1-10 mil	n/a	5 to 10 seconds
Opticure UV/Vis Wand @ ½ inch	1-10 mil	n/a	10 to 15 seconds

When fully cured, NOA 68TH has very good adhesion and solvent resistance, but has not reached its optimum adhesion to glass. This will come with aging over a period of about 1 week, in which a chemical bond will form between the glass and adhesive. This optimum adhesion can be obtained by aging at 50°C for 12 hours. After aging, glass bonds can withstand temperatures of -125° to 125°C while non-aged glass and plastic bonds will withstand temperatures from -15° to 60°C. In some cases, the adhesive will withstand temperatures to 125° C when used as a film or a coating depending upon application.

The NOA bonds can be separated in chlorinated solvent such as methylene chloride. The bonded area must be soaked in the solvent and normally will separate overnight if only precured. Longer times may be necessary depending upon the extent of the cure and the size of the bond area. Caution is warranted because methylene chloride will attack many plastics.

Typical Properties of NOA 68TH

Solids	100%
Viscosity at 25° C	20,000 to 25,000 CPS
Refractive Index Liquid	1.51
Refractive Index Cured	1.54
Elongation at Failure	59%
Modulus of Elasticity (psi)	12,400
Tensile Strength (psi)	714
Hardness – Shore D	50

Shelf life of the liquid is 8 months from date of manufacture if stored in cool (5° to 25° C) dark place in the original container. If refrigerated, allow the adhesive to come to room temperature prior to use.

Care should be taken in handling this material. The Safety Data Sheet should be read for this product as well as for any associated products such as alcohol, acetone, or methylene chloride. Prolonged contact with skin should be avoided and affected areas should be washed thoroughly with copious amounts of soap and water. If adhesive gets into eyes, flush with water for 15 minutes and seek medical attention. Use the material in a well-ventilated area, otherwise a NIOSH approved organic vapor mask is recommended.

Spectral Transmission of NOA 68TH