



# NORLAND PRODUCTS INCORPORATED

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## Norland Optical Adhesive 68

Norland Optical Adhesive 68 ("NOA68") is a clear, colorless, liquid photopolymer that will cure when exposed to ultraviolet light. Since it is a one part system and 100% solids, it offers many advantages in bonding of optical materials where the bonding surface can be exposed to light. The use of NOA 68 eliminates premixing, drying and 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 68 is designed to give improved adhesion to many plastics such as acrylic, polycarbonate and cellulose acetate butyrate. In addition to plastics, NOA 68 has good adhesion to glass and metals and can be used to bond combinations of the three. Suggested uses for NOA 68 include bonding compound plastic lenses, laminating polarized film between glass or plastic, mounting plastic lenses in metal or plastic mounts and bonding cover glasses.

The recommended energy to fully cure the NOA 68 is 4.5 Joules/sq. cm of long wavelength UV light with maximum absorption between 350-380 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.

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	1-5 mils	10 seconds	3 minutes
2-15 Watt Fluorescent* Black Lights at 3 inches	1-5 mils	40 seconds	15 minutes
Conveyorized High Pressure Mercury 200 Watts/in at 4 inches	1-5 mils	1 second	12 seconds

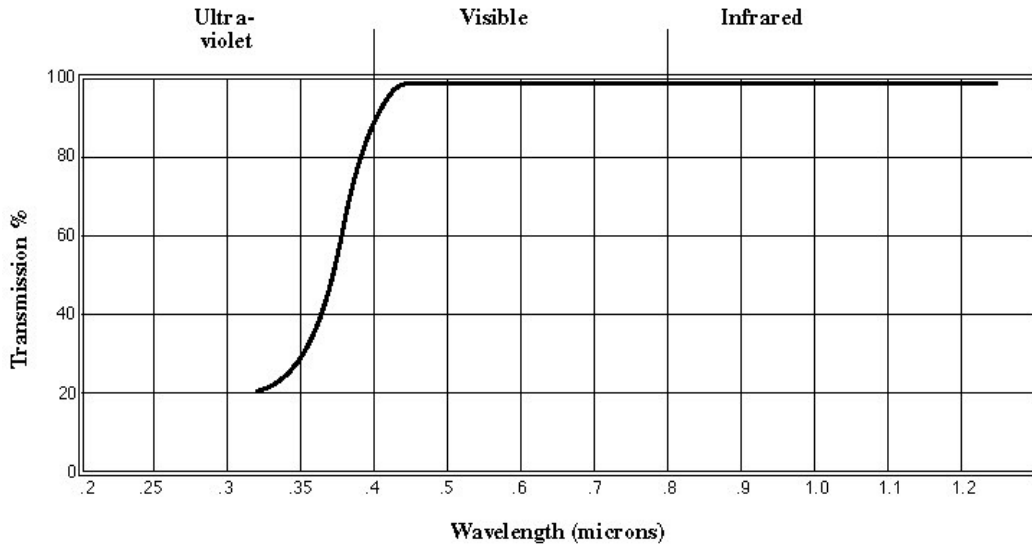
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When fully cured, NOA 68 has very good adhesion and solvent resistance, but has not reached its optimum adhesion to glass. This will come with aging over a period of about 1 week, in which a chemical bond will form between the glass and adhesive. This optimum adhesion can also be obtained by aging at 50° C for 12 hours. After aging, glass bonds can withstand temperatures of -80 to 90° 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 the 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 68	
Solids	100%
Viscosity at 25° C	5,000 cps
Refractive Index of Cured Polymer	1.54
Elongation at Failure	80%
Modulus of Elasticity (psi)	20,000
Tensile Strength (psi)	2,500
Hardness - Shore D	60

Shelf life of the liquid is at least 4 months from the date of shipment if stored in a cool (5-22° C), dark place in the original container. If refrigerated, allow the adhesive to come to room temperature prior to use.

### Spectral Transmission of NOA 68



Care should be taken in handling this material. The Material 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 thoroughly washed with copious amounts of soap and water. If the adhesive gets into the 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

The data contained in this technical data sheet is of a general nature and is based on laboratory test conditions. Norland Products does not warrant the data contained in this data sheet. Norland does not assume responsibility for test or performance results obtained by users. It is the users responsibility to determine the suitability for their product application, purposes and the suitability for use in the user's intended manufacturing apparatus and methods. The user should adopt such precautions and use guidelines as may be reasonably advisable or necessary for the protection of property and persons. Nothing in this technical data sheet shall act as a representation that the product use or application will not infringe a patent owned by someone other than Norland Products or act as a grant of a license under any Norland Products Inc patent. Norland Products recommends that each user test its proposed use and application before putting into production.