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NORLAND OPTICAL ADHESIVE 60

Norland Optical Adhesive 60 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 elements where the bonding surface can be activated with light. The use of NOA 60 eliminates premixing, drying, or heat curing operations common to other optical adhesive systems. Curing time is a matter of minutes and is dependent upon the thickness applied and the energy of ultraviolet light available.

Typical applications would be for use as a mounting cement for lenses, for the assembly of doublets or prisms, or for mounting components between a sandwich of glass. It can also be used as a protective overcoat on electrical components because of its excellent insulating properties.

NOA 60 like all Norland Optical Adhesives is cured by ultraviolet light with maximum absorption between 350 and 380 nanometers. The recommended energy required for full cure is 3 Joules/cm² of long wavelength u.v. light. The cure is not inhibited by oxygen, hence any areas in contact with air will cure to a non-tacky state.

In most optical applications, curing is done in two steps. A short precure with ultraviolet light of sufficient duration to set the bond allows it to be moved without disturbing alignment. This is followed by a longer cure under u.v. light to obtain the optimum properties of the adhesive. The precure enables the user to inspect his product when it is still possible to separate it if necessary. It also allows him to easily clean up any excess of adhesive with a solvent moistened cloth. Various solvents can be used for cleanup including methylene chloride, acetone, and ethylene dichloride. These same solvents can be used to separate assemblies. The bonded area must be soaked in the solvent and normally will separate overnight. The time required to break the bond depends upon the extent of cure and area of bond. This is accomplished most easily before the final cure.

Glass optics can withstand temperatures of -15 to 60°C when bonded together with NOA 60, and in some cases temperatures to 90°C when the adhesive is used as a film or coating. The latter would depend upon the application.

Some of the various light sources that can be used to cure the adhesive are sunlight, mercury light, fluorescent black light, pulsed xenon and carbon arc. Any light that contains some of the near ultraviolet light above 340 nanometers can be used. Time for full cure can be stated generally by first finding the time of precure or initial set and multiply by a factor of 20. For example, a 100 watt mercury lamp giving a 15 second precure would take (15 sec. x 20) 5 minutes for full cure. This is for thicknesses up to 10 mils. For thicker coatings a longer exposure is desirable.

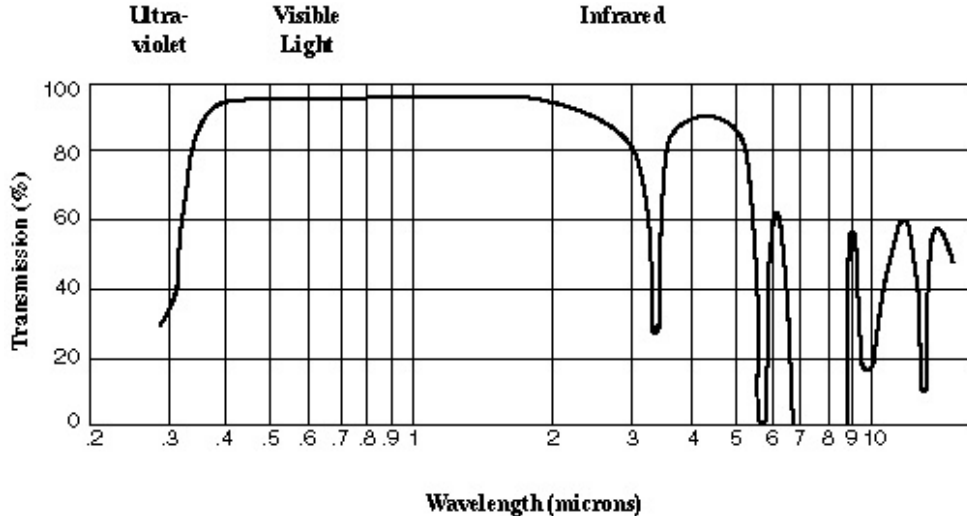
Typical Properties of Norland Optical Adhesive 60:

Solids	100%
Viscosity	300 cps
Refractive Index	1.56
Elongation at Failure	35%
Modulus of elasticity (psi)	135,000
Tensile Strength (psi)	2,800
Hardness Shore D	81
Water Absorption	0.15%

Shelf life of the liquid is at least 6 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.

Care should be taken in handling this material. Prolonged skin contact should be avoided and affected areas should be thoroughly washed with copious amounts of soap and water. If the 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 60



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.