

# NORLAND PRODUCTS INCORPORATED

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## Norland Optical Adhesive 88

Norland Optical Adhesive 88 ("NOA 88") is an optically clear, liquid adhesive that will cure when exposed to long wavelength ultraviolet light. The adhesive is a one-part, 100% solids material that offers advantages in optical bonding applications. The use of NOA 88 eliminates premixing, drying, or heat curing operations common to other adhesive systems. Curing time can be regulated by the end user by varying the intensity of the curing source.

NOA 88 was formulated as a low outgassing (CVCM) and low Total Mass Loss (TML) adhesive. The ideal applications for this adhesive is for coating of parts destined for space exploration, bonding of high tech computer components, adhering parts in very sensitive instruments and coating sensitive components.

NOA 88 is cured by ultraviolet light (315 nm to 395 nm) with maximum sensitivity at 365 nanometers. The adhesive requires 5 Joules/sq. cm of energy to fully cure a 25 to 50 micron bond. The material has low oxygen inhibition, so adhesive exposed to air will cure tack-free with sufficient exposure to UV light.

Curing of this adhesive can be performed in two steps, a short pre-cure to assure proper alignment of the parts, followed by the full cure. The entire bonding surface must be uniformly exposed to the long wavelength UV light when the material is being cured.

The pre-cure allows the user to align and set precision parts quickly without long holding times and minimizes the total number of fixtures. After the pre-cure any excess adhesive can be removed from the parts using a solvent moistened cloth. Assemblies should be inspected at that time and rejected ones can be separated in Methylene Chloride. The bonded area must be soaked in the solvent and usually required an overnight soak.

When fully cured, NOA 88 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.

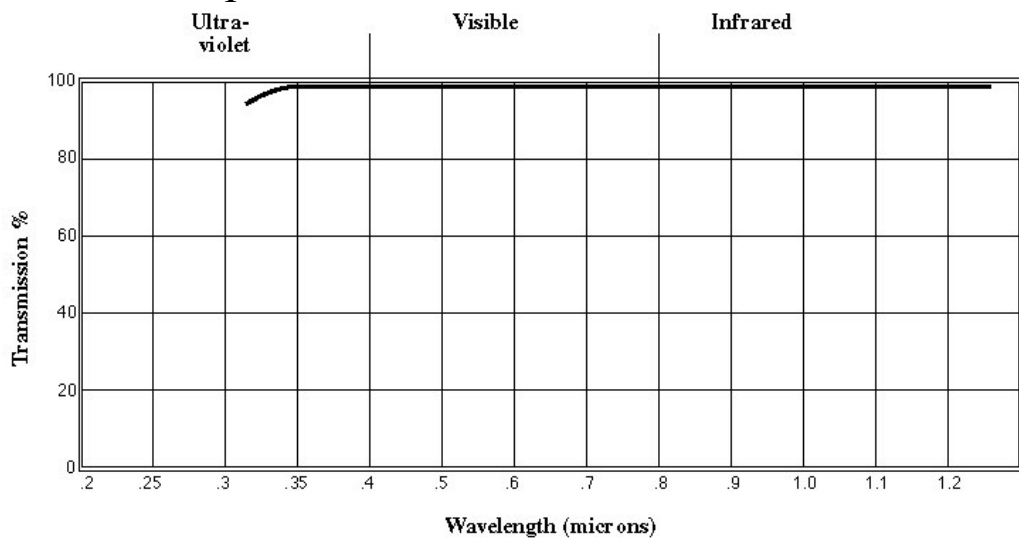
NOA 88 bonds can withstand temperatures of -15°C to 60°C prior to aging and -60°C to 90°C after aging. In some cases the adhesive will withstand temperatures to 125°C when used as a film or coating, depending on the application.

<b>Typical Properties of NOA 88</b>	
Solids	100%
Viscosity at 25° C	250 cps
Refractive Index of Monomer	1.52
Refractive Index of Cured Polymer	1.56
Elongation at Failure	41%
Modulus of Elasticity (psi)	131, 000

<b>Typical Properties of NOA 88 Continued</b>	
Tensile Strength (psi)	2,000
Hardness - Shore D	90
Total Mass Loss (TML)	1.07%
Collected Volatile Condensable Material (CVCM)	<0.01%
Dielectric Constant (1 MHz)	4.06
Dielectric Strength (V/mil)	457
Dissipation Factor (1 MHz)	0.0341
Volume Resistivity (ohm-cm)	6.85 x 10 to the 14 power
Surface Resistivity (MEgohms)	3.71 x 10 to the 12 power

The shelf life of the liquid material is at least four months from the shipment date if kept 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 88



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.

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.