Learn More

**Manufacturer:**
ÅngströmLink™

**Product Name:**
ÅngströmLink™ AL-2233 Optical Coating (1.33), 1% - 480cc

**Manufacturer Part Number:**
AL1-2233-480CC

Click here for more details on the ÅngströmLink™ AL-2233 Optical Coating (1.33), 1% - 480cc

*ÅngströmLink™ Optical Polymers*
*AL-2233 Optical Coating for photonic and fiber optics*

## ÅngströmLink™ Key Features

- 1.33 refactive index
- Transparent from UV to NIR
- Non-toxic, non-flammable carrier solvent

ÅngstromLink AL-2233 is a high purity, transparent polymer coating designed specifically for coating of optical and photonic components. It may be applied by spin coating, or dip coating, or may be used to form a thin sheet of coating material by casting on a flat substrate or in a mold. The low refractive index of AL-2233 makes it ideal for enhancement of total internal reflection at grazing incidence optical interfaces where unintentionally applied layers of organic hydrocarbons might otherwise cause ray leakage from the lightpath.

Suitable applications for AL-2233 are as a lightguide cladding, an anti-reflection (AR) coating on lenses, a planar polymer waveguide cladding and overcoat, a mold release for precision plastic optics, and an optically clear low surface energy barrier film for preventing migration of adhesives on optical substrates.

The product is available in several standard concentrations, allowing a choice of a range of coating thicknesses per coat. AL-2233 offers a service temperature range up to +110°C (up to +300°C for transient soldering operations).

## Applications

**Lens coating**
Dust & water repellent; Protects lens during handling

**Mold coating for precision plastic optics**
Good release, low risk of part contamination

**Optically clear barrier film for masking**
Can be applied with ink printing processes

**Cladding and overcoat for polymer waveguides**
Protects and reduces optical losses

**Anti-reflection (AR) coating for prisms, faceplates**
Improves optical performance

**Cladding for liquid lightguides, especially at UV wavelengths**
Improves TIR; Reduces losses

## Benefits

**Choice of ready-to-use solvent solutions**
Aids variation of coating thickness applications

**Slow solvent evaporation rate**
Eliminates cratering and pinholes in finished coating

**Low surface energy coating**
Repels water, uncured adhesives, hydrocarbon solvents

**Low refractive index of 1.33**
Aids total internal reflection in waveguides, fiber runs, etc.

**Optically clear**
Low optical losses as lens coating, AR coating or cladding

**Wide temperature service**
Suitable for outside plant telecom; Permits solderability



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| Property (at 25°C unless noted) | Test Method | Typical Value |
|---|---|---|
| **Deposition Processing Characteristics** | | |
| Coating Concentration by Weight | | 1%, 2%, 5%, 10% |
| Carrier Solvent Specific Gravity | | 1.73 |
| Carrier Solvent Boiling Point | | 135 °C |
| Coating Concentration at Saturated Solution | | 20-30% by wt. |
| **Mechanical Properties** | | |
| Tensile Modulus | ASTM D-1708 | 1400 MPa |
| Yield Stress | ASTM D-1708 | 30 MPa |
| Yield Strain | ASTM D-1708 | 3 - 4 % |
| Specific Gravity | ASTM D-1217 | 1.9 |
| Surface Energy | | 15 dyne/cm, est. |
| **Cured Thermal Properties** | | |
| Glass Transition | DSC | 120-125°C |
| Thermal Expansion by Volume | TMA | 2 x 10-4 cc/cc/°C, est. |
| **Cured Electro-optical Properties** | | |
| Appearance | visual | clear |
| Ionics (K, Na, P, Ag, Cu, Sn) | ICP | < 10 ppm, est. |
| Volume Resistivity | | $> 10^{15}$ ohm-cm, est. |
| Dielectric Constant (1 kHz) | | 2 |
| Dissipation Factor (1 kHz) | | $5 \times 10^{-4}$ |
| Refractive Index, 589 nm | ASTM D-1218 | 1.33 (chart) |
| Refractive Index vs. Temperature | ASTM D-1218 | $1 \times 10^{-4}$ /°C |
| Refractive Index vs. Wavelength | prism coupler | (chart) |
| Optical Absorption | spectrophotometer | (chart) |



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## Deposition Processing

AL-2233 may be applied to a substrate by casting, spin-coating, dip-coating, spray-coating, or various ink-printing processes. Several standard coating concentrations are available in order to permit convenient lay-down of a desired coating thickness with a minimum number of coats, as shown in the table below. For thin coats, the coating will be dry to the touch and physically firm within fifteen minutes at room temperature. Complete removal of the carrier solvent at room temperature may require several days. This process can be accelerated by heating the dried coating in order to evaporate off the residual solvent.

Higher temperatures increase the rate of solvent evaporation. Temperatures up to +100°C are suitable for acceleration of the solvent evaporation; higher temperatures may create pinholes in the coating if a significant fraction of solvent is still present and the solvent is raised above its boiling point. For deposition processes using multiple coats, it may be desirable to use a post processing annealing step, cycling the temperature slowly above 135°C and then back down, in order to remove intralayer stresses and prevent the formation of fracture lines.

| Product | Concentration by Weight | Viscosity | Typical Coating Thickness Single Dip Process* |
|---|---|---|---|
| AL-2233-1% | 1% | 3.58 cP | 200 nm |
| AL-2233-2 % | 2% | 6.91 cP | 650 nm |
| AL-2233-5 % | 5% | 19.33 cP | 2.5 µ |
| AL-2233-10 % | 10% | 640 cP | 10 µ |

* These figures are nominal values for dip coating only. Thickness will vary with coating method.



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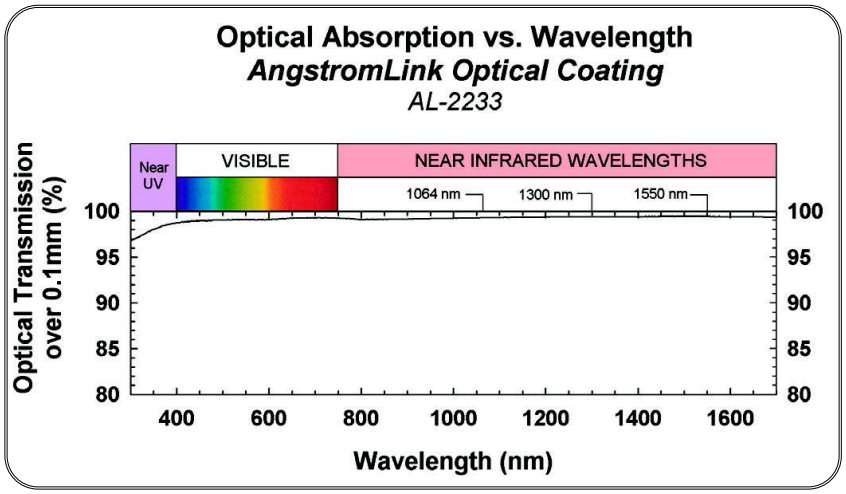


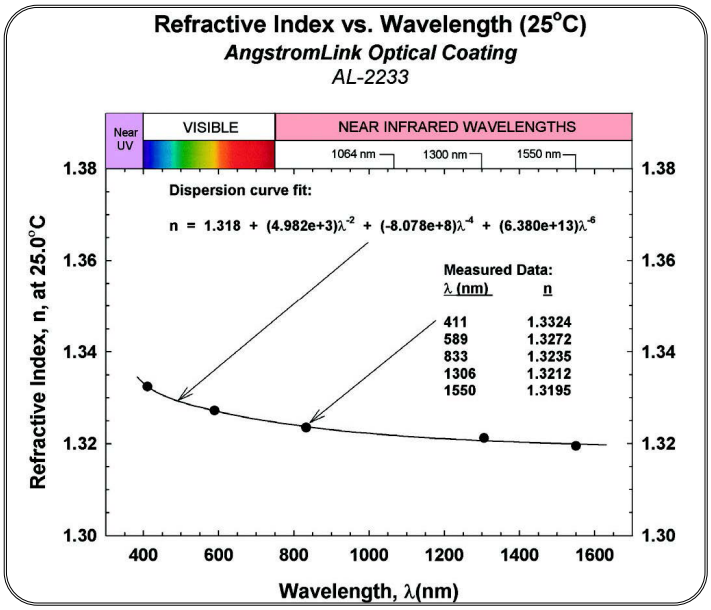


## Solvent Dilution or Concentration

In the event that the user requires a more dilute concentration than one of the standard concentrations, Fiber Optic Center offers a standard dilution solvent, ALS-2233. Intermediate concentrations may be obtained by mixing two standard concentrations together.Concentrations up to approximately 15% by weight may be obtained by partially evaporating off the solvent in a standard concentration version. Alternatively, Fiber Optic Center will quote a non-standard concentration percentage customized for specific applications.



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## Substrate Preparation

Substrates should be free of dust, oil, and fingerprint soils. Clean substrates using suitable techniques for cleaning optics. If hydrocarbon solvent cleaning is used, a final rinse with reagent grade isopropanol is recommended. If aqueous detergent cleaning is used, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol is recommended.

## Cleanup

Wet or partially dried portions of AL-2233 may be removed from surfaces by first wiping off excess material with a suitable lint-free paper or cloth wipe and then using a suitable wipe soaked with a reagent grade fluorinated solvent. Dried AL-2233 coatings can be removed using a suitable reagent grade fluorinated solvent. Fiber Optic Center offers AngstromLink ALS-2233 for this purpose. The user is responsible for compliance with all applicable local, state, and federal regulations governing disposal of waste materials as indicated in the SDS.

## Packaging

| Application Volume | Size |
|---|---|
| For prototyping and small batch sizes in production<br>For larger volume production usage | 30cc (1 fl.oz.) bottle with pipette applicator<br>480cc (16 fl.oz.) bottle |

Other container options are also available for use with automated dispensing equipment. Contact Fiber Optic Center for assistance with special packaging or private labeling requirements.

## Specifications

The typical properties quoted on this product data sheet should not be used as a basis for preparation of product specifications. Consult Fiber Optic Center for assistance.



For Special Quotes and Technical Consultations Please Contact:
**Kelly Barker, Fiber Optic Center: kbarker@focenter.com**

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## Shelf Life

AL-2233 is an inert composition with no intrinsic shelf life limitations. The dried AL-2233 coating will, however, suffer changes in properties if subjected to extreme environmental conditions, as indicated in the typical properties table on page 2, which tend to cause volatilization or thermo-oxidative breakdown, or alternatively through contamination with particles of dust or dirt.

## Warranty

AL-2233 is sold without warranty, express or implied. Fiber Optic Center expressly disclaims any liability for incidental or consequential damages resulting from use of this product.

## Safety

Consult the Safety Data Sheet (SDS) for AL-2233 before use. AL-2233 is an industrial product, designed for use only by qualified laboratory or production personnel.

## For Special Quotes and Technical Consultations

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