



# Makrolon® AL sheet

## Automotive lamination

Makrolon® AL sheet is a one side hard coated polycarbonate product designed to meet the high optical quality requirements of automotive laminates. State-of-the-art manufacturing and inspection processes ensure minimal inclusions and surface defects. The advanced hard coat technology significantly enhances the abrasion resistance, chemical resistance, and weathering properties of the product while maintaining the excellent impact performance of Makrolon polycarbonate.

## Applications

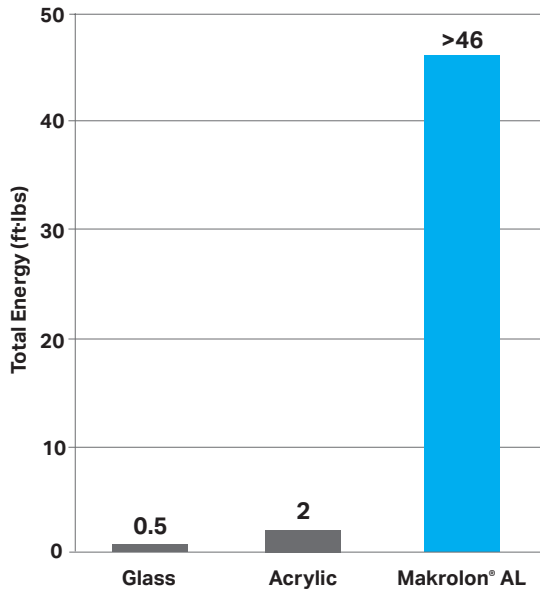
Automotive laminates

| Typical Properties*                      |             |                               |                         |
|--|-------------|-------------------------------|-------------------------|
| Property                                 | Test Method | Units                         | Values                  |
| <b>PHYSICAL</b>                          |             |                               |                         |
| Specific Gravity                         | ASTM D 792  | –                             | 1.2                     |
| Refractive Index                         | ASTM D 542  | –                             | 1.586                   |
| Light Transmission, Clear @ 0.125"       | ASTM D 1003 | %                             | 86                      |
| Water Absorption, 24 hours @ 73°F        | ASTM D 570  | %                             | 0.15                    |
| Poisson's Ratio                          | ASTM E 132  | –                             | 0.38                    |
| <b>MECHANICAL</b>                        |             |                               |                         |
| Tensile Strength, Break                  | ASTM D 638  | psi                           | 9,500                   |
| Tensile Strength, Yield                  | ASTM D 638  | psi                           | 9,000                   |
| Tensile Modulus                          | ASTM D 638  | psi                           | 340,000                 |
| Elongation                               | ASTM D 638  | %                             | 110                     |
| Flexural Strength                        | ASTM D 790  | psi                           | 13,500                  |
| Flexural Modulus                         | ASTM D 790  | psi                           | 345,000                 |
| Compressive Strength                     | ASTM D 695  | psi                           | 12,500                  |
| Compressive Modulus                      | ASTM D 695  | psi                           | 345,000                 |
| Izod Impact Strength, Notched @ 0.125"   | ASTM D 256  | ft-lbs/in                     | 18                      |
| Izod Impact Strength, Unnotched @ 0.125" | ASTM D 256  | ft-lbs/in                     | 60 (no failure)         |
| Instrumented Impact @ 0.125"             | ASTM D 3763 | ft-lbs                        | >46                     |
| Shear Strength, Break                    | ASTM D 732  | psi                           | 10,000                  |
| Shear Strength, Yield                    | ASTM D 732  | psi                           | 6,000                   |
| Shear Modulus                            | ASTM D 732  | psi                           | 114,000                 |
| Rockwell Hardness                        | ASTM D 785  | –                             | M70 / R118              |
| <b>THERMAL</b>                           |             |                               |                         |
| Coefficient of Thermal Expansion         | ASTM D 696  | in/in/°F                      | 3.75 x 10 <sup>-5</sup> |
| Coefficient of Thermal Conductivity      | ASTM C 177  | BTU-in/hr-ft <sup>2</sup> -°F | 1.35                    |
| Heat Deflection Temperature @ 264 psi    | ASTM D 648  | °F                            | 270                     |
| Heat Deflection Temperature @ 66 psi     | ASTM D 648  | °F                            | 280                     |
| Brittleness Temperature                  | ASTM D 746  | °F                            | -200                    |

\*Typical properties are not intended for specification purposes

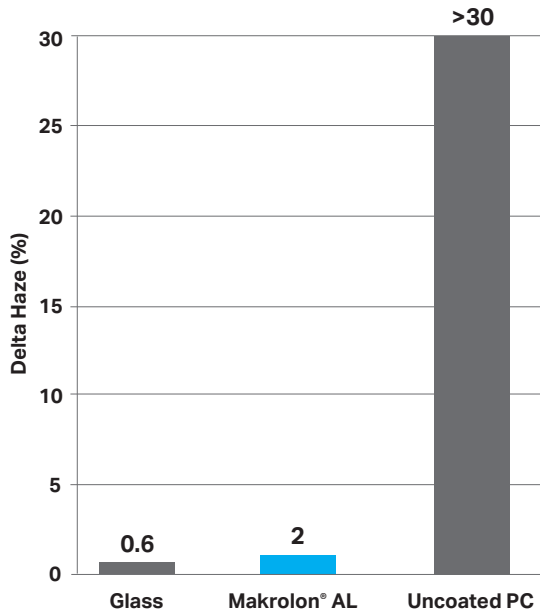
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## Impact Resistance\*



\*Instrumented Impact per ASTM D 3763, sample thickness 0.125" nominal

## Abrasion Resistance\*



\*Taber Abrasion per ASTM D 1044, 100 cycles, CS-10F wheel

## Chemical Resistance\*

| Chemical Tested                 | Resistance Time |
|---------------------------------|-----------------|
| Acetone                         | >24 hrs         |
| Ammonia (10% concentration)     | >24 hrs         |
| Antifreeze (50/50)              | >24 hrs         |
| Benzene                         | >24 hrs         |
| Bleach (Clorox concentrated)    | >24 hrs         |
| Chloroform                      | >24 hrs         |
| Denatured Alcohol               | >24 hrs         |
| Di (2-ethylhexyl) phthalate     | >24 hrs         |
| Diesel Oil                      | >24 hrs         |
| Isopropyl Alcohol (IPA)         | >24 hrs         |
| Kerosene                        | >24 hrs         |
| Methyl Alcohol                  | >24 hrs         |
| Methyl Butyl Ketone             | >24 hrs         |
| Methyl Ethyl Ketone             | >24 hrs         |
| Methylene Chloride              | >24 hrs         |
| Naphthalene, 1-bromo-           | >24 hrs         |
| Potassium Hydroxide - Lye (10%) | >24 hrs         |
| Sodium Hydroxide (10%)          | >24 hrs         |
| Toluene                         | >24 hrs         |
| Turpentine                      | >24 hrs         |
| Unleaded Gasoline (87 Octane)   | >24 hrs         |
| Vinegar                         | >24 hrs         |
| Xylene                          | >24 hrs         |
| <b>Acids:</b>                   |                 |
| Hydrochloric Acid (20%)         | >24 hrs         |
| Nitric Acid (20%)               | >24 hrs         |
| Sulfuric Acid (20%)             | >24 hrs         |

\*Tested in accordance to ASTM D 1308-02

Always keep hazardous chemicals away from uncoated edge of Makrolon Polycarbonate

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