KAYSONS

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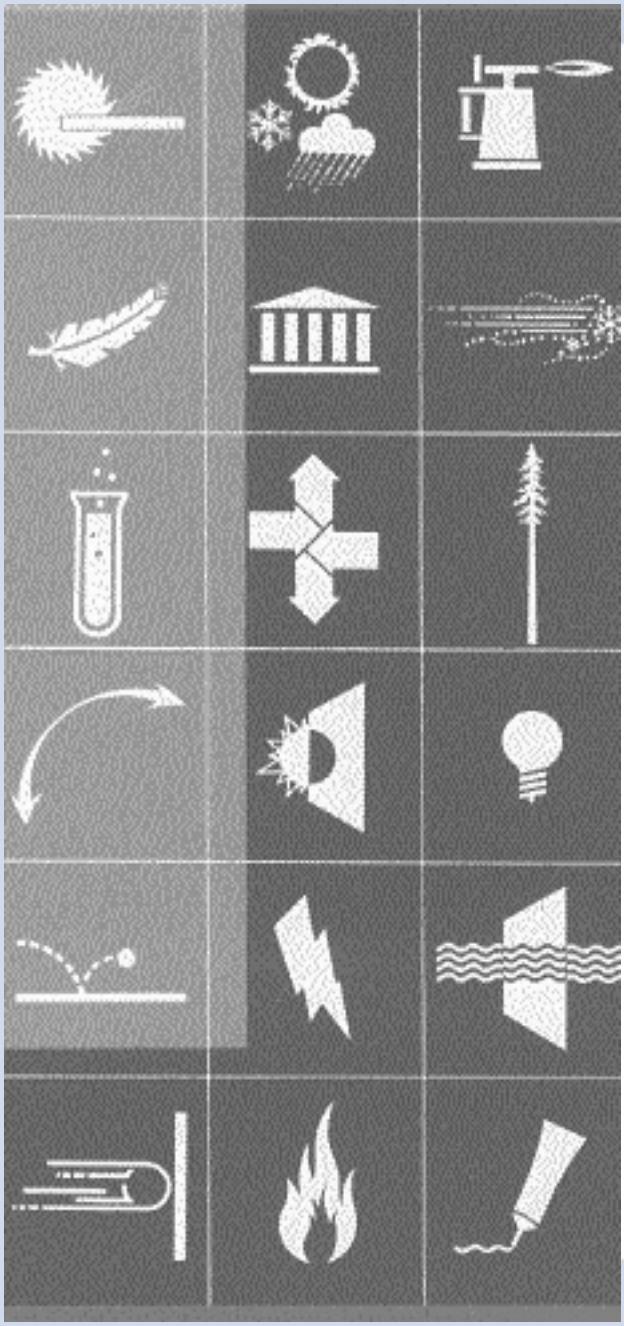

# Physical Properties of Acrylic Sheets

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# Physical Properties

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| Property[a] | | ASTM Method | Typical Value (0.236 Thickness) [b] |
|---|---|---|---|
| Mechanical | Specific Gravity | D 792 | 1.19 |
| | Tensile Strength | D 638 | 10,000 psi (69 M Pa) |
| | Elongation | | 4.2% |
| | Modulus Of Elasticity | | 400,000 psi (2800 M Pa) |
| | Flexural Strength (Rupture) | D 790 | 16,500 psi (114 M Pa) |
| | Modulus Of Elasticity | | 475,000 psi (3300 M Pa) |
| | Compressive Strength (Yield) | D 695 | 18,000 psi (124 M Pa) |
| | Modulus Of Elasticity | | 430,000 psi (2960 M Pa) |
| | Shear Strength | D 732 | 9000 psi (62 M Pa) |
| | Impact Strength | | 0.4 ft. lbs/in of notch |
| | Izod Milled Notch | D 256 | (21.6 J/m of notch) |
| | Rockwell Hardness | D 785 | M-94 |
| | Barcol Hardness | D 2583 | 49 |
| | Residual Shrinkage[c] (Internal Strain) | D 702 | 2% |
| Optical (Clear Material) | Refractive Index | D 542 | 149 |
| | Light Transmission, Total | D 1003 | 92% |
| | UV Transmission | | 0 at 320 nanometers |
| | Haze | | Less than 1% |
| Thermal | Forming Temperature | - | 340 - 380°F (170-190°C) |
| | Deflection Temperature under Load, 264 psi | D 648 | 210°F (99°C) |
| | Vicat Softening Point | D 1525 | 239°F (115°C) |
| | Maximum Recommended Continuous Service Temperature | - | 180°F [d] (82°C) |
| | Coefficient of Linear Thermal Expansion | D 696 | 0.000040 in/in-°F (0.000072 m/m-°C) |
| | Coefficient of Thermal Conductivity (k-factor) | Cenco-Fitch | 1.3 BTU/(Hr) (Sq. Ft) (°F/in) (0.19 w/m·K) |
| | Flammability (Burning Rate 3mm thickness) | D 635 | 1.2 in/min. (30.5 mm/min.) |
| | Specific Heat @ 77°F | - | 0.35 BTU/(lb.)( °F) (1470 J/Kg·k) |
| | Smoke Density Rating (3mm Thickness) | D 2843 | 11.4% |
| Electrical | Dielectric Strength | | |
| | Short Time (0.1 25" Thcikness) | D 149 | 430 volts/mil (17 KV/mm) |
| | Dielectric Constant | | |
| | 60 Hertz | D 150 | 3.5 |
| | 1,000 Hertz | | 3.2 |
| | 1,000,000 Hertz | | 2.7 |
| | Dissipation Factor | | |
| | 60 Hertz | D 150 | 0.06 |
| | 1,000 Hertz | | 0.04 |
| | 1,000,000 Hertz | | 0.02 |
| | Volume Resistivity | D 257 | 1.6 x $10^{16}$ ohm-cm |
| | Surface Resistivity | D 257 | 1.9 x $10^{15}$ ohm-cm |
| Water Absorption | 24 hrs @ 73°F | | |
| | Weight Gain during Immersion | D 570 | 0.2% |
| | Soluble Matter Lost | | 0.2% |
| | Water Absorbed | | 0.2% |
| | Dimensional Change during Immersion | | 0.2% |
| Long Term Water Absorption | Weight Gain During Immersion | | |
| | 7 Days | D 570 | 0.5% |
| | 14 Days | | 0.6% |
| | 35 Days | | 1.0% |
| | 48 Days | | 1.1% |
| Odor | | - | None |
| Taste | | - | None |

NOTES:
(a) Typical values: should not be used for specification purposes.
(b) Values shown are for 6mm thickness unless noted otherwise. Some values will change with thickness.
(c) Difference in length and width, as measured at room temperature, before and after heating above 300°F.
(d) It is recommended that temperatures not exceed 180°F for continuous service, or 200°F for short, intermittent use.

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AKRYLIK is cell-cast acrylic sheets made to exacting standards of furniture and accessories. The physical properties referenced here are that of the acrylic sheet such as Plexiglass, Acrylite, Lucite, Shinkolite, Polycast, etc.


AKRYLIK is made up of lightweight, rigid thermoplastic material that has many times the breakage resistance of standard window pane glass. It is highly resistant to weather conditions. It is suitable for most utilitarian applications and is ultraviolet light absorbing up to approximately 360 nanometers.

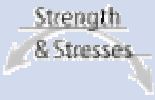

AKRYLIK is more impact-resistant than glass. If subjected to impact beyond the limit of its resistance, it does not shatter into small slivers but breaks into comparatively large pieces.


AKRYLIK offers better weather resistance than other types of transparent plastics. AKRYLIK will withstand exposure to blazing sun, extreme cold, sudden temperature changes, salt water spray and other harsh conditions. It will not deteriorate after many years of service because of the inherent stability of acrylic.


Although AKRYLIK will expand and contract due to changes in temperature and humidity, it will not shrink with age. Some shrinkage occurs when ACRYLITE GP sheet is heated to forming temperature.


Acrylic Sheets used to make AKRYLIK are less than half the weight of glass, and 43% the weight of aluminum. One square foot of 1/8” (3.0 mm) thick Acrylic sheet weighs less than ¾ pound (1/3 kilogram).


Acrylic Sheets used are not as rigid as glass or metals. However, it is more rigid than many other plastics such as acetates, polycarbonates, or vinyls.




Although the tensile strength of Acrylic sheets used is 10,000 psi (69 MPa) at room temperature (ASTM D638), stress crazing can be caused by continuous loads below this value. For most applications, continuously imposed design loads should not exceed 1,500 psi (10.4 MPa). Localized, concentrated stresses must be avoided. All thermoplastic materials-including ACRYLIK will gradually lose tensile strength as the temperature approaches the maximum recommended for continuous service. For ACRYLIK, the maximum is 180°F (82°C).


A 48” panel will expand and contract approximately .002” for each degree fahrenheit change in temperature. In outdoor use, where summer and winter temperatures differ as much as 100°F, a 48” sheet will expand and contract approximately 3/16”.
AKRYLIK also absorbs water when exposed to high relative humidities, resulting in expansion of the sheet. At relative humidities of 100%, 80%, and 60%, the dimensional changes are 0.6%, 0.4% and 0.2%, respectively.


ACRYLIK can be used at temperatures from -40°F (-40°C) up to +200°F (93°C), depending on the application. It is recommended that temperatures not exceed 180°F for continuous service, or 200°F for short, intermittent use.
AKRYLIK should not be exposed to high heat sources such as high wattage incandescent lamps, unless the finished product is ventilated to permit the dissipation of heat.


AKRYLIK has excellent resistance to many chemicals including:
• solutions of inorganic alkalies such as ammonia
• dilute acids such as sulfuric acid up to a concentration of 30%
• aliphatic hydrocarbons such as hexane
AKRYLIK is not attacked by most foods, and foods are not affected by it.
It is attacked, in varying degrees, by:

- aromatic solvents such as benzene and toluene
- chlorinated hydrocarbons such as methylene chloride and carbon tetrachloride
- ethyl and methyl alcohols
- some organic acids such as acetic acid
- lacquer thinners, esters, ketones and ethers

For a listing of the resistance of ACRYLITE GP sheet to more than 70 chemicals, refer to the table on page 5.


AKRYLIK is a combustible thermoplastic. Precautions should be taken to protect the material from flames and high heat sources. AKRYLIK usually burns rapidly to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires sufficient air will not be available and toxic carbon monoxide will be formed, as it is from other combustible materials.
Other properties related to flammability:

- Burning rate is 1.2 inches per minute (for 3 mm thickness) according to ASTM D 635.
- Smoke density: Measured by ASTM D 2843 is 11.4%.
- Self-ignition temperature is 910°F (488°C) when measured in accordance with ASTM D 1929.

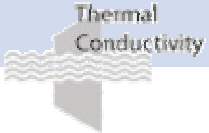
While these test data are based on small scale laboratory tests frequently referenced in various building codes, they do not duplicate actual fire conditions.


Clear, colorless ACRYLITE GP sheet has a light transmittance of 92%.
It is warranted not to lose more than 3% of its light-transmitting ability in a 10-year period.


ACRYLIK is more resistant than glass to thermal shock and to stresses caused by substantial temperature differences between a sunlit and a shaded area of a window, or by temperature differences between opposite surfaces of a window.


The surface of plastic is not as hard as that of glass. Therefore, reasonable care should be exercised in handling and cleaning ACRYLIK.


AKRYLIK has many desirable electrical properties and continuous outdoor exposure has little effect on these properties. It is a good insulator with surface resistivity higher than that of most plastics.




The thermal conductivity of a material-its ability to conduct heat-is called the k-Factor. The k-Factor is an inherent property of the material and is independent of its thickness and of the surroundings to which it is exposed.
The k-Factor of Acrylic sheets is: 1.3 B.T.U. or 0.19 W (hour) (sq. ft.) (°F /inch) m.K

# Chemical Resistance

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The table below gives an indication of the chemical resistance of clear Acrylic sheets. The code used to describe chemical resistance is as follows:

**R = Resistant**
Acrylic withstands this substance for long periods and at temperatures up to 120°F (49°C).

**LR = Limited Resistance**
Acrylic only resists the action of this substance for short periods at room temperatures. The resistance for a particular application must be determined.

**N = Not Resistant**
Acrylic is not resistant to this substance. It is either swelled, attacked, dissolved or damaged in some manner.

Plastic materials can be attacked by chemicals in several ways. The methods of fabrication and/or conditions of exposure of AKRYLIK, as well as the manner in which the chemicals are applied, can influence the final results even for "R" coded chemicals. Some of these factors are listed below.

**Fabrication-**Stress generated while sawing, sanding, machining, drilling, polishing, and/or forming.

**Exposure-**Length of exposure, stresses induced during the life of the product due to various loads, changes in temperatures, etc.

**Application of Chemicals-**by contact, rubbing, wiping, spraying, etc.

**The table therefore should be used only as a general guide and, in case of doubt, supplemented by tests made under actual working conditions.**

| Chemical | Code | Chemical | Code |
|---|---|---|---|
| Acetic Acid (5%) | R | Hydrogen Peroxide( up to 40%) | R |
| Acetic Acid (Glacial) | N | Hydrogen Peroxide (over 40%) | N |
| Acetone | N | Isopropyl Alcohol | LR |
| Ammonium Chloride (Saturated) | R | Kerosene | R |
| Ammonium Hydroxide (10%) | R | Lacquer Thinner | N |
| Ammonium Hydroxide (Conc.) | R | Methyl Alocohol (up to 15%) | LR |
| Aniline | N | Methyl Alcohol (100%) | N |
| Battery Acid | R | Methyl Ethyl Ketone (MEK) | N |
| Benzene | N | Methylene Chloride | N |
| Butyl Acetate | N | Mineral Oil | R |
| Calcium Chloride (Sat.) | R | Naphtha (VM&P) | R |
| Calcium Hypochlorite | R | Nitric Acid (up to 20%) | R |
| Carbon Tetrachloride | N | Nitric Acid (20% to 70%) | LR |
| Chromic Acid | LR | Nitric Acid (over 70%) | N |
| Citric Acid (20%) | R | Oleic Acid | R |
| Detergent Solution (Heavy Duty) | R | Phenols | N |
| Diesel Oil | R | Soap Solution (Ivory) | R |
| Dimethyl Formamide | N | Sodium Carbonate | R |
| Doictyl Phthalate | N | Sodium Chloride | R |
| Ether | N | Sodium Hydroxide | R |
| Ethyl Acetate | N | Sodium Hypochlorite | R |
| Ethyl Alcohol (30%) | LR | Sulfuric Acid (up to 30%) | R |
| Ethyl Alcohol (95%) | N | Sulfuric Acid (Conc.) | LR |
| Ethylene Dichloride | N | Toluene | N |
| Ethylene Glycol | R | Trichlorethylene | N |
| Formaldehyde (40%) | R | Turpentine | LR |
| Gasoline (Regular, Leaded) | LR | Water (Distilled) | R |
| Glycerine | R | Xylene | N |
| Heptane | R | | |
| Hexane (Commercial Grade) | R | | |
| Hydrochloric Acid | R | | |
| Hydrofluoric Acid (40%) | N | | |