Design, Supply and Installation of R-Cast™ Acrylic for Pool and other Submersible Applications

EXCLUSIVE AUSTRALIAN DISTRIBUTORS OF R-Cast™ AQUARIUM GRADE STRUCTURAL ACRYLIC

R-Cast™ Acrylic Panel Information & Warranty

Frequently Asked Questions

Chlorine Resistance
Acrylic has a limited resistance to liquid chlorine, however the material has proven long term performance when exposed to the levels normally encountered in natural seawater (approx. 30000 mg/l TDS) and swimming pools (approx 6000 mg/l TDS). Acrylic is the preferred material for commercial seawater aquarium applications worldwide. Acrylic and other plastic materials used in swimming pool construction such as exposed plumbing fittings and skimmer boxes should not be exposed to concentrated chlorine solutions.

Resistance to variable PH levels in Domestic Pools from 6.3 to 8.3
Acrylic is highly resistant to liquids in the pH range of chemicals used in domestic and swimming pool environments. Acrylic panels should not be exposed to solvents such as acetone and benzene.

Abrasion Resistance for Cleaning
R-Cast™ Acrylic should not be exposed to, or cleaned with abrasive materials. Cleaning is generally performed using warm soapy water and soft cleaning cloths or sponges as would normally be used for car care. Occasional polishing with specialized acrylic polishes is also required to maintain premium luster. These polishes are readily available.

Discolouration ?
Many commercial grades of acrylic will suffer from discolouration or yellowing in exposed external conditions. However premium grade R-Cast ™ virgin acrylic sheet manufactured by Reynolds Polymer Technology, Inc. is guaranteed not to show any optical degradation or yellowing due to UV exposure for a period of 10 years. The product will perform without deterioration well in excess of this warranty period.

Thickness of Acrylic
R-Cast™ is available in a range of thicknesses up to 350 mm with most swimming pool applications ranging from 30 mm to 130 mm.

Product Guarantees
Reynolds Polymer was founded and is incorporated in Colorado in the United States. Reynolds operates two manufacturing facilities; Colorado USA, and in Bangkok Thailand. Both facilities manufacture to strict Reynolds quality standards and all R-Cast ™ materials conform to international manufacturing, material, structural and optical standards as listed in the attached documents. Please contact us for a copy of the Product Warranty.

Structural Compliance
All acrylic panels supplied by Clearwater for structural applications are designed to relevant Australian standards using computer analysis. A Certificate of Design Compliance issued by Wirrawonga P/L is provided with each panel, where engineering certification is required under Australian building regulations.

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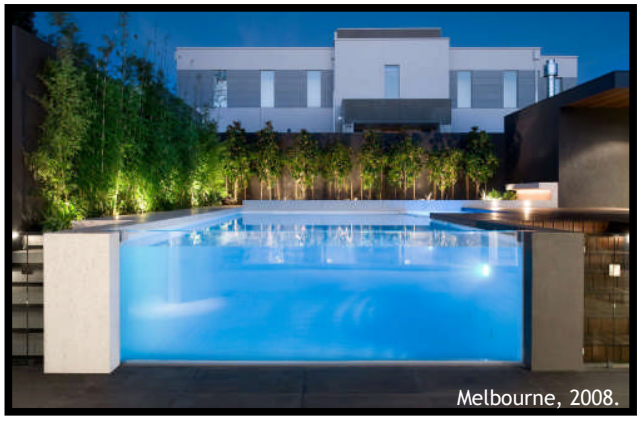
R-Cast™ is a clear plastic material much like glass, however its properties make it a far superior product for many structural applications. **R-Cast Acrylic** is a high quality plastic commonly used in many aquariums, swimming pools and other water related structures.

The advantages of using acrylic over glass are many, including:

- superior optical clarity
- high impact resistance
- UV resistant for long term exposure
- thermal insulating properties
- light weight
- invisible welding of sheets into compound shapes
- surface scratches can be polished out
- can be coloured, and easily routed, shaped, moulded, and cut after casting.

Property	Acrylic	Glass
Impact Resistance	✓ Will not shatter	✗ Can shatter spontaneously
Thermal Insulation	✓ limits heat loss	✗ 20% more heat loss
Clarity / Colour	✓ Colourless 92% light transmission	✗ Green colour 80% light transmission
Density	✓ 50% lighter than glass	✗ Handling issues
Flexibility	✓ Can be curved, machined	✗ Cannot be altered after toughening


Melbourne, 2008.

Versatility
Acrylic panel can be thermoformed into any curve or shape. Fabricated sheet can be machined and welded to produce monolithic compound shapes and features. Sheet can be altered after fabrication, and drilled or trimmed on site with conventional tools when required.

All of these make acrylic an ideal material for use in swimming pools, aquariums, and water features.


Queensland, 2009.

Acrylic Sheet and Block
Acrylic can come in a variety of different shapes, sizes, colours, textures and finishes.

Thickness
Acrylic sheets can be cast in large block form up to 350mm thickness. There is no need to laminate sheets to obtain required structural performance.

Invisible Joins
When creating very large acrylic panels, the sheets are molecularly welded, creating a permanent and invisible join. Panels up to 12m long can be readily provided, with longer panels being available on request.

Optical Clarity
Acrylic provides a clear optical view for any viewer with minimal colouring or distortion. Acrylic has a transparency rating of 92% making it one of the clearest materials available, and much superior to glass. Acrylic is the preferred material for aquarium and viewing window applications.

Thermal Conductivity
Heat transfer in acrylic is approximately 8 times less than glass. This allows acrylic to better conserve heat in retained fluids.

Surface Maintenance
Unlike glass, surface scratches may be polished out. Notches may also be filled where damage has occurred

Thermoforming
Acrylic can be shaped and curved to any required shape. Acrylic can be cut, sawn, routed, drilled, sanded and polished after it has been fabricated.

Long Term Performance
High quality cast acrylic is highly resistant to weathering, optical and mechanical degradation under long term exposure. There are no laminates to break down, which is a significant issue with laminated glass sheet.

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Product Data Sheet

Attachment A

R-Cast™ sheet

Applications
- Aquariums
- Displays
- Fountains
- Projection screens
- Furniture
- Optical lenses
- Port hole windows
- Sight glass
- Scientific applications
- Point of purchase
- Hyperbaric chambers
- Vacuum chambers
- Bio-safety chambers
- and more...

Benefits
- Outstanding optical clarity
- Excellent UV properties
- High impact resistance - 17x greater than glass &
  - 4x greater than concrete
- Superb weatherability - won't yellow or show signs of aging
- Structural & can be engineered to support weight
- UVT available

Color Availability
- Clear
- Standard colors stocked (thin gauge only)
- Custom colors available

Edge Finishes
- Saw Cut
- Polished edge
- Radius
- Chamfer
- Beveled

Surface Finishes
- Frosted finish
- Gloss finish
- Etched finish

Images & information courtesy of Reynolds Polymer Technology Inc. ©

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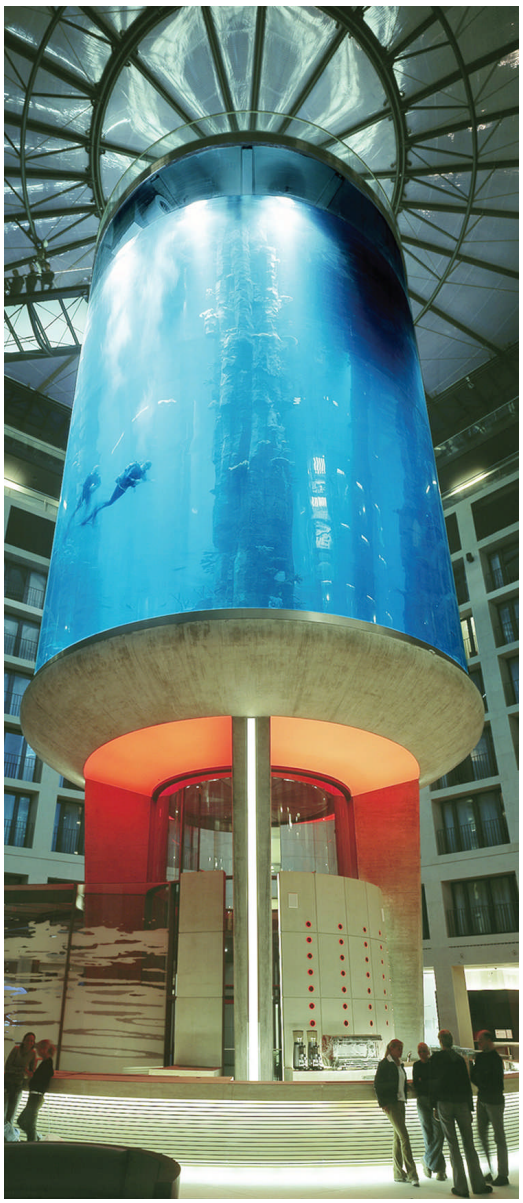
Product Data Sheet

Attachment A

R-Cast™ sheet



Fabrication Options
- Formable
- Bondable
- Drillable
- Paintable
- Various surface finishes

Warranty
10 years

Care & Cleaning
To polish out scratches and restore original lustre, we recommend our R-Cast™ Care Kit to maintain your acrylic panels. Avoid using alcohol-based solvents to clean the acrylic. We recommend using standard soap and water.
Please contact us with any questions regarding cleaners.

Manufacturing
R-Cast™ sheet is monolithically cast from polymethyl methacrylate (PMMA) resin to strict internationally accepted structural standards.

Short Term Loading
Impact, live, and seismic loading conditions are short term and infrequent loading conditions. However, all R-Cast™ sheet panels can be designed to handle these conditions.

Safety Glazing
Meets ANSI Z 97.1 for safety glazing material used in buildings. Approved for safety glazing according to model building codes. Suitable for use in Consumer Products Safety Commission, Safety Standard for Architectural Glazing Material under 16 CFR 1201, Categories 1 & 11.

Images & information courtesy of Reynolds Polymer Technology Inc. ©

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R-Cast™ Acrylic Maintenance & Cleaning Recommendations

Attachment B

Reynolds POLYMER TECHNOLOGY, INC.

To clean acrylic we recommended using R-Clean™ acrylic cleaner from Reynolds Polymer Technology, Inc or Reynolds Polymer Technology Asia Limited. Use a non-abrasive flannel cloth or sponge and follow instructions for cleaning included on the R-Clean bottle.

To clean the wet side(s) of acrylic panels designed for water retaining applications, a loose-knit knotted nylon material is suggested.

Never use abrasive cleaners, household cleaners, scouring compound, window cleaning fluid, abrasive cloths or any strong solvents such as acetone, carbon tetrachloride, methyl ethyl ketone, paint thinner or alcohol solutions containing more that 5% alcohol.

To maintain the luster of acrylics, it is recommended that a good grade of commercial acrylic polish, such as R-Clear™ acrylic polish, be used. Such polish is used to improve the appearance of the acrylic by filling in minor surface scratches. Do not use household spray waxes or automotive waxes.

To remove minor scratches from the surface of acrylics, hand polishing is recommended. Use a very fine grit polishing paste recommended for acrylics. Apply with a moist cloth rubbing in a straight up and down motion parallel with the light scratches. Several applications may be necessary before the scratches are removed or reduced. Excessive hand rubbing in a localized spot will cause optical distortion and should be avoided. When the scratches are removed, clean the repaired acrylic windows with R-Clean™ acrylic cleaner. A final coat of R-Clear™ polish is also recommended.

Never leave the protective covering on the acrylic window panels, in direct sunlight, during hydro testing, or for a prolonged period of time (in excess of 3 months). This may result in the adhesive solidifying, making the removal difficult. Efforts to remove the adhesive coverings might include scraping with plastic or acrylic wedges, thumbnail peeling, alcohol or other chemicals, which will damage the window surface. It is recommended that the protective paper covering be removed as soon as possible.

Excessive heat and high-temperature lighting must be avoided at all times. Acrylic is a thermoplastic material and can easily be distorted or burned if the surface temperature of the acrylic is in excess of 230 degrees F (110 degree C).

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R-Cast™ Acrylic Maintenance & Cleaning Recommendations

Attachment B

R-Cast™ sheet

R = Resistant
R-Cast™ acrylic withstands this substance for long periods and at temperatures up to 120 degrees F (49 degrees C).

LR = Limited Resistance
R-Cast™ acrylic only resists the action of this substance for short periods at room temperature. The resistance for a particular application must be determined.

N = Non Resistant
R-Cast™ acrylic is not resistant to this substance. It is either swelled, attached, 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 R-Cast™ acrylic as well as the manner in which the chemicals are applied, can influence 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.

Chemical	Code	Chemical	Code
Acetic Acid (5%)	R	Ammonium Hydroxide (Conc.)	R
Acetic Acid (Glacial)	N	Aniline	N
Acetic Anhydride	LR	Battery Acid	R
Acetone	N	Benzaldehyde	N
Acrylic Paints & Lacquers	LR	Benzene	N
Ammonia (aqueous solution)	R	Bituminous Emulsion	N
Ammonium chloride (Saturated)	R	Bromine	N
Ammonium Hydroxide (10%)	R	Butanol	LR
Butyl Acetate	N	Glycol	R
Calcium Chloride (Saturated)	R	Heptane	R
Calcium Hypochlorite	R	Hexane	R
Carbon Tetrachloride	N	Hot Bitumen	LR
Cement	R	Hydrochloric Acid	R
Chlorine Water	LR	Hydrofluoric Acid (40%)	N
Chloroform	N	Hydrogen Peroxide (3%)	R
Chromic Acid (40%)	N	Hydrogen Peroxide (28%)	N
Citric Acid (10%)	R	Isooctane	R
Cottonseed Oil (Edible)	R	Isopropyl Alcohol	LR
Detergent Solution	R	Kerosene	R
Diesel Oil R Lacquer	R	Lacquer Thinner	N
Diethyl Ether	N	Lactic Acid (80%)	LR
Dimethyl Formamide	N	Methane	R
Dioctyl Phthalate	N	Methyl Alcohol (50%)	LR
Ethyl Acetate	N	Methyl Alcohol (100%)	N
Ethyl Alcohol (50%)	LR	Methyl Ethyl Ketone (MEK)	N
Ethyl Alcohol (95%)	N	Methylene Chloride	N
Ethylene Dichloride	N	Mineral Oil	R
Ethylene Glycol	R	Mortar	R
2-Ethylhexyl Sebacate	R	Motor Fuel (benzene-free)	R
Formaldehyde (40%)	R	Motor Fuel (with benzene)	N
Formic Acid (2%)	R	Muriatic Acid (20%)	R
Formic Acid (40%)	LR	Nitric Acid (10%)	R
Gasoline (Regular, Leaded)	LR	Nitric Acid (40%)	LR
Glycerine	R	Nitric Acid (Conc.)	N
Glycerol	R	Oil Paints (pure)	R
Olive Oil	R	Sodium Hydroxide (60%)	R
Oxygen	R	Stearic Acid	R
Ozone	R	Sulfuric Acid (3%)	R
Phenol Solution (5%)	N	Sulfuric Acid (30%)	R
Phosphoric Acid (10%)	R	Sulfuric Acid (Conc.)	N
Plaster of Paris	R	Thinners (general)	N
Soap Solution (Ivory)	R	Toluene	N
Sodium Carbonate (2%)	R	Trichloroethylene	N
Sodium Carbonate (20%)	R	Turpentine	LR
Sodium Chloride (10%)	R	Urine	R
Sodium Hydroxide (1%)	R	Water (Distilled)	R
Sodium Hydroxide (10%)	R	Xylene	N

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