

RPT quotation | ROM



This Rough Order of Magnitude (ROM) quotation is a broad estimate for the purposes of budgetary consideration only. **This is not a final price.**

DATE	1/11/2018		
TO	PAOLO MICOZI Dr. ENEA		
PHONE	+39-338-6902803	FAX	
E-MAIL	paolo.micozzi@enea.it		
PROJECT LOCATION	Italy		

Project Assumptions

Pricing is for budgetary purposes only and is not a final price.
Please see Proposal Summary and Panel Schedule for project assumptions.

Specifications

Please reference Attachment C, Revision B for detailed RPT acrylic specifications.

Quotation ☒ Acrylic Only ☐ Acrylic and Installation

QUANTITY	DESCRIPTION	FLAT OR CURVED	PRICE
1 Lot	Glazing Panels (See Panel Schedule)	Cylinder	\$ 109,301.00
1	Shipping, Handling and Packaging	Misc.	\$ 6,273.00
	TOTAL		\$ 115,574.00

Acrylic Only | Does not include installation design, performance, materials, or services.

Installation Services | RPT offers professional installation services and installation warranty under separate RPT agreement only.

All price quotations are based upon quality and warranty standards along with terms and conditions defined on this document and the referenced attachments. Any changes to these conditions invalidate the price quotation. This quote is valid for 30 days and does not incorporate any cost increase beyond this time frame. **Sales/Usage/Earnings taxes are not included in our pricing.**

Design & Engineering Services | D & E assistance are available only upon execution of Letter of Intent.

Delivery Estimate* | RPT begins casting only when all three (3) of the following conditions are satisfied:

- 1) Executed agreement
- 2) Approval of drawings
- 3) Receipt of deposit for project

LEAD TIME**	ESTIMATED SHIP DATE†	SHIPPING TERMS
TBD	TBD	CIF

*Delivery is TBD at time of purchase order, approved customer drawings, and the receipt of down payment. A firm delivery date will be established based on the production load and panel stock when the above criteria are met. For panels 14' and wider, we recommend performing a route survey to ensure proper access to the job site. **Any lead times given are only valid for two (2) weeks from date of quote. After two (2) weeks, the lead time will need to be recalculated. Lead time starts at the day of approved customer drawings along with a down payment. †Any shipping cost is purely an estimate and could increase or decrease at the time of final delivery. All Shipping, Handling, and Packaging prices are Good Faith estimates. Pricing subject to change. Transportation pricing will be finalized 30 days prior to ship date.

Quality | All items in the order meet or exceed the strict standards set forth by RPT as indicated in Attachment C. See attachment at end of quote.

Terms of Payment | 30% down payment, monthly progress payments, and full balance paid before shipment.

Warranty | 10 years for workmanship, bonds, sheet, and yellowing. For details, please contact your representative listed below.

Supply Only | This is a material supply quote only. RPT will not engage in any outside subcontractor agreements for material supply-only transactions.

Your Representative

NAME	TITLE	PHONE	SKYPE	E-MAIL
George Papoutsoglou	Account Representative	+30 210 9340227	g.papoutsoglou	gpapoutsoglou@reynoldspolymer.com



ENEA Cylinder
Proposal Summary

Customer Name: ENEA
Project Location: Italy
Sales Rep: GP

Revision #: 3.00
Bid Type: High Level ROM
Proposal Date: 1/11/2018

Option 2

1	Glazing Panels (see panel schedule)	\$109,301
2	Shipping, Handling, and Packaging: Door RPT CIF to Port of Civitavecchia, Italy	\$6,273
Total		\$115,574

Project Notes:

This pricing is for budgetary purposes only.
Not engineered for any specific purpose.

This quote is valid for 30 days.
Shipping terms based on 2010 Incoterms

Customer Name: Paolo Micozi Dr.
Project Owner: ENEA
Project Location: Italy

ENEA Cylinder
Product Schedule
BUDGETARY PRICING

Customer Panel Designation	QTY	Type	Shape	Bond H/V	Support	Water Height DSS	View Width or A.L.	View Height
							OD	
Cylinder	1		CYLINDER	V	2SS	0.000 m 0.00 in	2.100 m 82.68 in	1.700 m 66.93 in
Cylinder with 20mm groove around outside 20mm from top and bottom.								
Cylinder walls have twelve 120mm thru holes with 152mm countersunk faces on inside and outside.								
RPT requires soft material inside holes. Cylinder walls have Eight 96mm thru holes with 128mm countersunk faces on inside and 152mm countersunk faces on outside. RPT requires soft material inside holes.								
Shipping dims = 2.1M x 2.1m x 1.7m tall								
Holes and vacuum device has not been engineered or approved by RPT.								

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A. Design Criteria:

Base design on latest state-of-the-art criteria for acrylic aquarium windows.

1. Acrylic panel material shall be commercial grade polymethyl methacrylate as approved by the manufacturer.
2. Acrylic panel material shall have a flame spread of 200 or less (class III) in accordance with ASTM E-84.
3. Minimum Safety factor of 11.2 for acrylic panels shall be based on the minimum allowable physical properties as defined per the latest revision of ASME PVHO-1 standards for monolithic castings.
4. For panels with an unsupported edge, the initial deflection shall not exceed $1/400$ the length of the unsupported edge.

B. Acceptance of Material:

1. Material specification - windows shall be monolithically cast from polymethyl methacrylate resin, hereinafter referred to as "acrylic". The acrylic used for fabrication of windows must satisfy two general requirements:
 - 1.1 The casting process used in the production shall be capable of producing material with the minimum physical properties shown in ASME PVHO-1 Table 2-3.4-1. The manufacturer of the material shall maintain on file certifications showing that the physical properties of typical material meet or exceed these values.
 - 1.2 Each acrylic window casting must be free of inclusions which either significantly decrease its structural performance or mar its optical appearance.
 - 1.2.1 An inclusion may take the form of a round or elongated bubble, grain of sand, hair, fibers, pieces of gasket material, paint chips / flakes or any other non-acrylic material.
 - 1.2.2 Only inclusions that would be in the viewing area of the finished panel and whose diameter, or length exceeds the significant dimension of 0.125 inches (3.2 mm) shall be considered. Inclusions in excess of 0.250 inches (6 mm) in two dimensions or that exceed 0.5 inches (13 mm) in overall length, i.e. a hair or string, shall be unacceptable.
 - 1.2.3 Inclusions acceptable to the criteria in paragraph 1.2.2 and that are in the viewing area are limited to one per 2 sq. yds. (1.67 sq. m.).
2. Dimensional Tolerances - The acrylic windows, in order to maximize their structural strength, provide acceptable optical performance, and minimize difficulties during installation shall meet the following dimensional tolerances or as otherwise specified on project drawings:
 - 2.1 The actual thickness of each window measured at any location on the window shall be to a tolerance of $+0.50, -0.00$ inch ($+13, -0$ mm) from T, where "T" is the calculated minimum engineered thickness of the window that provides a minimum safety factor of 11.2. Any subsequent adjustments to the panel thickness must always maintain a safety factor of 11.2 or greater.
 - 2.2 Each viewing surface on a plane, rectangular, shall have a flatness tolerance of $0.002 \times L$, where "L" is the length of the window.

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- 2.3 The length and width of each plane window shall be within ± 0.250 inch (6 mm) of specified nominal dimensions, based on design air and water temperatures.
- 2.4 The sharp corners on the edges of all windows shall be chamfered to prevent chipping during shipping and installation. The width of the 45 degree chamfer shall not exceed 0.125 inch (3 mm) T or 0.75 inch (19 mm) maximum, where "T" is the nominal thickness of the window.
3. Optical Performance Requirements - The air or "dry" side optical performance demanded of the windows in an aquarium is similar to that of picture windows in stores or residences (except that minor wet side distortions are corrected by the interference with the water). To achieve this performance:
 - 3.1 The material must be colorless, clear, with a minimum of haze. (Greater than 92% total transmission with a 2" [51 mm] cubed sample per ASTM D-1003).
 - 3.2 Standing 24 -36 inches (610 mm-915 mm) from the "dry" side of the panel, the air surface shall be polished, smooth, without obvious surface irregularities in the form of waviness, ridges, distortions, pits, dimples, bumps, and scratches or scuffs.
 - 3.3 Optical Verification:
 - 3.3.1 Equipment

One grid board consisting of 1 x 1 inch (25 x 25 mm) squares formed by white coated wire approx 0.06 inch (2 mm) diameter, with a dark background. The grid board minimum height is to be the same height as the top of the viewing area of the panel (height minus rebate). There shall be sufficient lighting to produce even, shadowless illumination over the entire viewing surface of the grid board.
 - 3.3.2 Procedure
 - 3.3.2.1 Panel to be located with the shortest edge in a vertical position.
 - 3.3.2.2 Position grid board 24-36 inches (610 mm - 915 mm) from designated wet side of the panel.
 - 3.3.2.3 Panel and grid board should be parallel to each other; however, angles up to 15 degrees are acceptable.
 - 3.3.2.4 Position grid lights on each side of grid board between panel and board, outside viewing area. Set each lamp or assembly at an equal distance from center of grid. Adjust height and angle of lamp or assembly to produce even, shadowless illumination of area to be viewed.
 - 3.3.2.5 Rebate areas on the edges of the panel may be covered during the optical inspection process. Covering this area minimizes edge / corner distortions. Rebate areas are defined on the panel drawings.

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- 3.3.2.6 For Flat panels, Curved panels and Tunnel sections the inspector shall stand 24-36 inches (610 mm - 915 mm) from the viewing surface (dry side). The allowable angle for viewing of the panel shall not exceed (from perpendicular) 45° (dry side) or 90° ± 15° (wet side and tunnels) from the grid board. The view point shall not extend past the boundaries of the grid board. A portable grid board and lighting will be moved with the inspector for curved panels and tunnel sections as necessary.
- 3.3.2.7 The inspection, if required, is to be conducted by the purchaser or a designated representative prior to shipment of panels to the job site.

C. Criteria for Acceptance:

1. A tunnel or the wet side of a flat or curved window is considered acceptable when the lines of the grid board are not broken or distorted beyond 0.5 inch (13 mm) of a grid square.
2. The dry side of a flat or curved window is considered acceptable when the lines of the grid board are not broken, or are not distorted beyond 0.25 inch (6 mm) of a grid square.
3. Bonding Specification - construction of large panels by bonding smaller components is permitted provided that the bonded joints are located at approved locations and the quality of the bond meets specified strength values.
 - 3.1 Only inclusions exceeding the significant dimension of 0.125 inch (3 mm) length shall be considered. Inclusions in excess of 0.5 inch (13 mm) in overall length shall be unacceptable. Those that are larger than 0.125 inch (3 mm) and do not exceed 0.5 inch (13 mm) are limited to no more than 1 per linear yard (0.92 m²).
 - 3.2 Bond joint physical properties shall have a minimum safety factor of 11.2 based on ASTM D-638 Tensile strength and ASTM D-790 Flexural Strength standards.

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Table 2-3.4-1

SPECIFIED VALUES OF PHYSICAL PROPERTIES FOR EACH LOT (To be certified by the manufacturer of material) From ASME/ANSI PVHO-1-2007

TEST PROCEDURES	PHYSICAL PROPERTY	SPECIFIED VALUES	
		U.S. CUSTOMARY UNITS	METRIC UNIT
ASTM D 256	Izod notched impact strength	≥0.25 ft-lb/in-min	≥13.3 J/m
ASTM D 542	Refractive index	1.49 + 0.01	1.49 + 0.01
ASTM D 570	Water absorption, 24 hr	≤0.25%	≤0.25%
ASTM D 621	Compressive Deformation at 4000 psi, 122°F, 24 hr	≤1.0%	≤1.0%
ASTM D 638	Tensile:		
	(a) ultimate strength	≥9000 psi	≥62 MPa
	(b) elongation at break	≥2%	≥2%
	(c) modulus	≥400,000 psi	≥2760 MPa
ASTM D 695	Compressive:		
	(a) yield strength	≥15,000 psi	≥103 MPa
	(b) modulus elasticity	≥400,000 psi	≥2760 MPa
ASTM D 732	Shear ultimate strength	≥8000 psi	≥55 MPa
ASTM D 785	Rockwell hardness	≥M scale 90	≥M scale 90
ASTM D 790	Flexural ultimate strength	≥14,000 psi	≥97 MPa
ASTM D 792	Specific Gravity	1.19 ± 0.01	1.19 ± 0.01
ASTM E 308	Ultraviolet (290-330 nm) light transmittance	≤5%	≤5%
ASTM D 702	Clarity, visually rated	Must be readable	Must be readable
ASTM D 696	Coefficient of linear thermal expansion at		
	°F	10 ⁻⁵ (in/in °F)	°C
	-40	2.9	-40
	-20	3.0	-29
	0	3.2	-18
	+20	3.4	-7
	+40	3.7	4
	+60	4.0	16
	+80	4.3	27
	+100	4.7	38
	+120	5.1	49
	+140	5.4	60
ASTM D 648	Deflection temperature of plastics under flexure at 264 psi (1.8 MPa)	≥185 °F	≥85°C
PVHO-1	Total residual monomer:		
Method, para.	(a) Methyl methacrylate	≤1.6%	≤1.6%
2.2.5	(b) Ethyl acrylate		

NOTE: This table is provided for illustrative purposes only. The requirements of the referenced standards have precedence.

RPT warranty | attachment F

Warranty Acrylic Glazing Panels

The Acrylic Glazing Panels manufactured by Reynolds Polymer Technology, Inc. (RPT) are warranted to be free from all defects in materials and workmanship for a period of ten (10) years from the date of installation.

This warranty does not apply to any defects caused by negligence, misuse or accidents by the owner, or climatic variances caused by air conditioning, humidity control or electric power failure, or surface deterioration of the panel viewing surfaces caused by the public, aquatic life or improper maintenance procedures.

The panels shall conform to the standard manufacturing physical property values and specifications as provided to the owner by RPT.

Panels found to be defective during the source inspection at RPT's plant shall be repaired or replaced at no charge to the owner.

RPT shall repair in place any panel found to have latent defects after installation. This warranty is limited to the replacement or repair of the panel. All transportation, removal, installation or consequential expenses shall be borne by the owner.

RPT shall have no obligation or liability for personal injury, property damages, business interruption losses, opening delays or other consequential damages.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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Acrylic Maintenance and Cleaning Recommendations

To clean acrylic we recommended using R-Clean acrylic cleaner. 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 than 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 hi-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).