

Oceanarium Acrylic Windows & Tunnels

LARGE PMMA STRUCTURES / US & EUROPEAN SPECIFICATION

Define a project design basis for large viewing windows, tunnel segments and bonded assemblies. Geometry, long-term properties, joints, supports and installation must be evaluated together.

01 Specify the destination-market route

Market / purpose	Standard reference	How to apply it
United States	ASTM D4802 + project-specific qualification	Use the acrylic material specification within its scope, with grade-specific tests and a separate design basis for thick blocks and assembled structures.
European / ISO route	ISO 7823-1 scope; ISO 899-1 creep testing	ISO 7823-1 covers 1.5-25 mm flat cast sheet; it does not certify thick oceanarium blocks or tunnels. Obtain a project-specific material and fabrication specification.
Structural approval	Engineer + owner / authority requirements	A laboratory material test is not approval of a public aquarium structure. Confirm applicable local requirements, independent review and commissioning responsibilities.

02 Product and performance parameters

Parameter	Unit / status	Technical requirement
Geometry / joints	mm; radii mm	Model individual panels, bonded joints and supports; distinguish monolithic dimensions from assembled viewing dimensions.
Loading / environment	m; kPa; deg C	Record normal / maximum water levels, density, temperature, transient loads and installation conditions.
Optics / material data	%; MPa; GPa	Require data for the actual grade, thickness and processing history. No verified RP full-thickness property set supplied.
Long-term design basis	Years; creep data	Engineer selects design life, allowable deformation, safety factors and joint qualification. No generic lifetime or parent-material bond-strength guarantee.

Evidence status: no product-specific third-party reports were supplied. Referenced standards are procurement / test routes, not a declaration that RP products are tested, listed, CE marked or certified. Numeric limits must be agreed for the identified product and application.

Property and test method matrix

03 Record values with their test conditions

For each row, the approved schedule must state the measured value, required limit, unit, standard edition and report ID. US and ISO / EN routes below address related properties; they are not presented as equivalent tests.

Property	Unit	US / ISO / EN reference	Required test record / acceptance basis
Optical transmission / haze	% / %	ASTM D1003; alternatively ISO 13468-1 / ISO 14782	State thickness, colour, surface, test procedure and instrument. Methods are not automatic equivalents.
Tensile / flexural behaviour	MPa; GPa; %	ASTM D638 / D790; alternatively ISO 527 / ISO 178	Report strength, modulus and elongation with specimen, orientation, speed and conditioning. Short-term values are not allowable design stress.
Creep / long-term stiffness	MPa; strain %; h	ASTM D2990; alternatively ISO 899-1 (tension)	Provide stress-time-temperature data for the actual grade and environment; agree extrapolation and safety factors with the engineer.
Block / segment geometry	mm; radius; alignment	Approved fabrication drawings + inspection plan	Inspect thickness variation, curvature, joint fit-up, edge support and clear viewing geometry.
Bond / fabrication qualification	Strength; defects; records	Project-approved qualification procedure	Trace resin / adhesive batches, surface preparation, bonding conditions and heat treatment; define witness samples and defect limits.
Installed assembly	Leakage; deflection mm	Approved staged commissioning plan	Agree water levels, hold durations, instruments, stop limits and inspection points. No arbitrary overload proof factor.

Measured value is not the same as a catalogue typical value, guaranteed minimum or structural design allowable. Match the report to the grade, thickness, colour, coating, batch and fabrication route. Where no report is available, the result remains unverified.

Inspection schedule to agree before production

Identify sampling frequency, test specimens, numeric limits, drawing tolerances, inspection conditions and handling of nonconforming results. Use a qualified laboratory whose scope covers the selected method. Record buyer approval before release.

Design review and delivery acceptance

04 Engineering and release requirements

01 Freeze the design basis: full geometry, water conditions, public occupancy, load combinations, service life, maintenance and acceptance responsibility.

02 Use grade-specific long-term properties and model joints, stress concentrations and support interaction. Confirm the analysis method and independent checking scope.

03 Control procurement and fabrication with material traceability, qualified joint procedures, inspection hold points and signed dimensional / optical acceptance records.

04 Coordinate lifting, transport restraints, temporary supports and installation sequence. Establish baseline measurements during staged filling for future inspections.

Calculation illustration only: at $h = 5.0 \text{ m}$, $\rho = 1025 \text{ kg/m}^3$ and $g = 9.81 \text{ m/s}^2$, bottom gauge pressure is 50.28 kPa. Pressure increases with depth. This does not establish wall thickness, joint strength or structural approval.

05 Source register and edition control

Public publisher / authority scope information checked 18 Oct 2026. These notes do not reproduce the standards or replace licensed full texts. Agree contract editions, amendments, required classifications and local authority acceptance before testing or purchase.

ASTM D4802 - general-purpose acrylic material scope

ISO 7823-1:2003 - flat-sheet scope

ASTM D2990 - creep / creep rupture

ISO 899-1:2017 - tensile creep

ISO 178:2019 - short-term flexural test limitations

RP product / application range (catalogue information)

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Send drawings and the required market standard