

Case 13/2017

Issue: Use of proprietary R-CAST® monolithic acrylic panel for construction of a cylindrical indoor aquarium tank

Recommendation: To accept the use of proprietary R-CAST® monolithic acrylic panel for construction of a cylindrical indoor aquarium tank with the following conditions:

- (i) Maximum permissible tensile stress of the acrylic panel adopted as 4.826N/mm^2 (700psi) with a factor of safety (FOS) of 12.89;
- (ii) Provision of an extra 15mm thick acrylic material to allow for the need of removal of weathered layer (7.5mm for dry-side and 7.5mm for wet-side) in future;
- (iii) Destructive tensile tests to ASTM D638 carried out on the bonded samples prepared on site in this particular case after the completion of the on-site bonding of the acrylic curved panels to the acrylic cylinder, with results satisfying the acceptance criteria;
- (iv) Proper maintenance of the acrylic tank throughout its design life with a maintenance manual compiled by the RSE. To ensure the owner of the indoor acrylic aquarium tank aware of the maintenance requirements of the acrylic panel and follow the maintenance requirements as specified in the maintenance manual properly, RSE undertakes to ensure the maintenance requirements will form part of the maintenance manuals attached to the owner's manual.
- (v) On-site bonding with a bonding adhesive LUC6751-RT developed by Reynolds Polymer Technology, Inc.

Decision: Having noted the background information, the clarifications made by the RSE and his consultant team, members endorsed the recommendations on a case-by-case basis subject to the following conditions:

- (i) Upon completion of the works, RSE should submit the Maintenance and Inspection Manual to the satisfactory of the Buildings Department. The Maintenance and Inspection Manual should include information of (i) those harmful substances that would cause severe damage to acrylic panels; and (ii) acceptable cleaners/biocides/polishes. Reference should be made to the Mandatory Appendix V of ASME PVHO-2-2012 – Safety Standard for Pressure Vessels for Human Occupancy: In-Service Guidelines. Approval drawings should also be included in the Manual for the owner's reference.
- (ii) The maximum thickness of weathered layer of acrylic

material removed within any 10 years period should not exceed 1.5mm on either face of the panel.