

4.6.2 Coated Windowpane Structural Integrity

Windowpane coatings shall be located on surfaces to minimize structural degradation of the panes.

4.6.3 Windowpane Coatings for Infrared and Ultraviolet Photography or Sensing

In the event that a vehicle/element window is to be used for infrared (IR) and ultraviolet (UV) photography or sensing, the location of the window coatings shall provide for IR and UV viewing through windowpanes without degrading the structural integrity.

4.7 Structural Analysis Requirements

The primary critical loading condition in windowpanes is typically the bending stress resulting from applied pressures. All polished glass or ceramic windows contain invisible micro cracks critical to the strength and life of the finished product. Fracture mechanics and static fatigue analyses, which are valid for most spacecraft windows, are based on the assumption that the critical flaws are much smaller than the thickness of the glass.

4.7.1 Structural Analysis Requirements for Windowpanes, Glass, and Ceramic Structure

- a. Fracture mechanics technology and the related flaw growth methodology as detailed herein shall be used to assure adequate life of any glass structure.
- b. All static fatigue assessments on the structural glass life shall consider all load events to which the component has been and will be exposed.
- c. The glass/ceramic component predicted life shall be greater than the design life with the appropriate life factor applied (section 4.5.2 of this Standard).

4.7.2 Analysis Methods for Annealed Glass

- a. One of the methods in sections 4.7.3 or 4.7.4 of this Standard shall be used to verify the life requirement.
- b. Other analytical techniques may be used, but NASA Technical Authority approval shall be obtained before implementation.

4.7.3 Use of NASGRO®

The analysis method provided in the NASGRO® computer program is an acceptable method for analysis of vehicle/element glass structure with the following constraints and assumptions:

- a. The exponential equation model of flaw growth shall be selected.