

CHAPTER 14 VACUUM WINDOWS

14.1 INTRODUCTION

Vacuum windows are a potential hazard to personnel. If a window fails, there may be flying debris. If the opening is large enough, an individual may be drawn to, or into, the opening, potentially causing injury.

14.2 SCOPE

This section provides guidelines for the safe use of vacuum windows. Proper design, installation, and safeguards shall be considered when a vacuum window must be used.

14.3 RESPONSIBILITIES

- A. Department Heads, Division Heads, and Supervisors are responsible for approving the need for vacuum windows and to ensure their safe installation/use within their administrative areas.
- B. Project Engineers or Vacuum Engineers are responsible for implementing this section when designing and considering the necessity of a vacuum window. They are also responsible for ensuring that adequate acceptance tests are performed on the vacuum windows.
- C. Environmental, Safety, and Health (ES&H) Division is responsible for assisting in implementing this section.

14.4 PRACTICES/PROCEDURES

- A. Supervisors in charge of devices that have vacuum windows shall train their employees on the potential hazards and safe work practices related to their equipment.
- B. Acceptance of vacuum window designs and installations shall be, at a minimum, in accordance with TFTR Procedure PTP-VAC-004.
- C. Design reviews of vacuum systems must also include the review of the window design. The review will consider the structural integrity in addition to the physics applications. At these design reviews, safety professionals and vacuum engineers shall evaluate window utilization, structural integrity, and testing.

- D. The design philosophy should be that a vacuum vessel will contain windows only when it is necessary, thereby keeping the hazard to a minimum.
- E. The designed margin of safety of a simply supported window is to be +10 (a diameter to thickness ratio of about 13).
- F. Any window that is not needed for routine visual inspection, and exists in a location where it could be damaged, should be provided with a protective barrier. Lexan™ 0.5-0.75 inch thick is preferred. If a window is installed that is constructed of material other than Lexan™, i.e., a toxic material such as beryllium, then special precautions are required and the ES&H Division shall be contacted.
- G. Any window that is used for viewing on a regular basis should be provided with a protective barrier. A polycarbonate (e.g., Lexan™) sheet 0.500.75 inch thick is preferred. This is a requirement for any window with a 4 inch or greater aperture (unless paragraph H or I applies) and recommended for windows less than a 4 inch aperture.
- H. Windows intended for instrumentation should have a protective shroud between the window and personnel to provide additional protection. A protective barrier, as described in F and G, above, should be installed whenever the instrument is removed.
- I. Any window of a 4 inch or greater aperture that cannot have a protective barrier installed, due to spectral transmission requirements for diagnostics, shall have a sign posted stating:

CAUTION: WINDOW DOES NOT HAVE A PROTECTIVE BARRIER USE EXTREME CARE WHEN WORKING IN HIS AREA

Any personnel working in this area while the vacuum vessel is not at atmospheric pressure must wear safety glasses, have the permission of a supervisor, understand the potential hazards and safe practices for vacuum windows, and not work alone (see ES&H Manual, Chapter 13).

- j. Window protection hardware should be installed only when the vacuum vessel is at atmospheric pressure, or windows must be designed such that protection hardware can be mounted under a vacuum with no risk to personnel.