

# Pressure, Vacuum, and Cryogenic Systems: Testing Requirements

Department: Chemical and General Safety

Program: Pressure, Vacuum, and Cryogenic Systems

Owner: Program Manager

Authority: ES&H Manual, Chapter 14, Pressure, Vacuum, and Cryogenic Systems<sup>1</sup>

This exhibit summarizes testing requirements and lists regulations, codes, and standards that are applicable to the testing of pressure, vacuum, and cryogenic systems.

## Testing Requirements

All pressure and cryogenic systems must be tested to verify integrity of workmanship and functionality prior to being put into use. Testing methods may include pneumatic or hydraulic test media or vacuum leak testing. Leak detection methods may include visual inspection, testing with leak solution, observation for pressure decay, or helium leak testing (under pressure or vacuum).

Particular methods of leak testing and alternatives are specified in the listed codes or regulations (see below). In addition:

- Pressure testing of pressure vessels must be in accordance with the applicable ASME code documents for these vessels.
- Vacuum systems that may be connected to a pressurized system must be tested in accordance with the information listed in Pressure, Vacuum, and Cryogenic Systems: Vacuum System Requirements.<sup>2</sup>
- Pressure testing of components that are not pressure vessels must be accomplished in accordance with the following regulations, codes, or standards

## Regulations, Codes, and Standards

Title 10, *Code of Federal Regulations*, Part 851, “Worker Safety and Health Program” (10 CFR 851)<sup>3</sup> requires compliance with selected ASME standards in addition to federal OSHA regulations, applicable California state and local regulations and codes, and certain NFPA standards to all pressure systems and hardware.

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1 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 14, “Pressure, Vacuum, and Cryogenic Systems”, [http://www-group.slac.stanford.edu/esh/hazardous\\_activities/pressure/policies.htm](http://www-group.slac.stanford.edu/esh/hazardous_activities/pressure/policies.htm)

2 Pressure, Vacuum, and Cryogenic Systems: Vacuum System Requirements (SLAC-I-730-0A21S-037), <http://www-group.slac.stanford.edu/esh/eshmanual/references/pressureReqVacuumSafety.pdf>

3 “Code of Federal Regulations: Main Page”, <http://www.gpoaccess.gov/cfr/>

Additional information on 10 CFR 851 and its implementation is available from the following site: “Worker Safety and Health Program Final Rule - 10 CFR 851”, <http://www.hss.energy.gov/healthsafety/WSHP/rule851/851final.html>

*Note Use the most current edition unless otherwise indicated.*<sup>4</sup>

### **ASME Standards and Publications**

- ASME B31.3 “Process Piping”

### **California Fire Code**

- Chapter 34, “Flammable and Combustible Liquids”
- Chapter 27, “Hazardous Materials – General Provisions”

### **California Mechanical Code**

- Chapter 14, “Process Piping”

### **California Plumbing Code**

- Chapters 7, “Sanitary Wastes”
- Chapter 8, “Indirect Wastes”

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4 See the “SLAC Research Library Community Pages”, <http://www-group.slac.stanford.edu/library/CommunityPages.asp>, for available standards.