



Standard Guide for Design Criteria for Plutonium Gloveboxes¹

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1. Scope

1.1 This guide defines criteria for the design of glovebox systems to be used for the handling of plutonium in any form or isotopic composition or when mixed with other elements or compounds. This guide does not apply to large scale commercial gloveboxes although many of the criteria contained herein are relevant. Not included in the criteria are systems auxiliary to the glovebox systems such as utilities, ventilation, alarm, and waste disposal. Also not addressed is the massively shielded (concrete)-type enclosure or open-face hoods, although the same basic design considerations might apply. The scope of this guide excludes specific license requirements relating to provisions for criticality prevention, hazards control, safeguards, packaging, and material handling. Observance of this guide does not relieve the user of the obligation to conform to all federal, state, and local regulations for design and construction of glovebox systems.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ANSI Standards:

N13.1 Guides to Sampling Airborne Radioactive Materials in Nuclear Facilities²

ANSI/ASME NQA-1 Quality Assurance Requirements for Nuclear Facilities²

2.2 NFPA Pamphlets:

Nos. 71, 72A, 72B, 72C, and 72D³

2.3 U. S. Government Document:

U. S. Govt. Code of Federal Regulations, Title 10 Part 20

“Standards for Protection Against Radiation” (latest edition)⁴

Nuclear Materials Licensing Code of Federal Regulations, Energy, Part 50 (10CFR50) Licensing of Domestic Production and Utilization Facilities⁴

DOE 6430.1A General Design Criteria for Nuclear Facilities⁴

3. Significance and Use

3.1 The purpose of this guide is to establish criteria for the design of gloveboxes used as primary confinement systems to ensure the safety of the workers and the protection of the environment when handling plutonium.

4. Design Considerations

4.1 Design considerations should include mitigating engineered safety features and redundant plant services to achieve confinement reliability. Reliability shall be considered in the light of the risk associated with postulated accidents, the probability of occurrence of the accidents, and the severity of their consequences, as well as in the light of normal processing requirements. The design for the glovebox system shall consider all of the following subjects:

4.1.1 Fire,

4.1.2 Explosions,

4.1.3 Criticality,

4.1.4 Power failure,

4.1.5 Uncontrolled water,

4.1.6 Other services failure,

4.1.7 Pressurization or evacuation, or both,

4.1.8 Health physics, and

4.1.9 Need for glovebox isolation or compartmentalization, or both.

5. Glovebox System Design Features

5.1 The glovebox system is defined as a series of physical barriers provided with glove ports and gloves, through which process and maintenance operations may be performed, together with an operating ventilation system. The glovebox system shall minimize the potential for release of radioactive material to the environment under normal and abnormal conditions, protect the operators from contamination under normal operating conditions, and mitigate the consequences of

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² Available from the American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

³ Available from the National Fire Protection Agency (NFPA), 60 Battery March St., Boston, MA 02110.

⁴ Available from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.