

§ 173.412 Additional design requirements for Type A packages.

In addition to meeting the general design requirements prescribed in §173.410, each Type A packaging must be designed so that—

- (a) The outside of the packaging incorporates a feature, such as a seal, that is not readily breakable, and that, while intact, is evidence that the package has not been opened. In the case of packages shipped in closed transport vehicles in exclusive use, the cargo compartment, instead of the individual packages, may be sealed.
- (b) The smallest external dimension of the package is not less than 10 cm (4 inches).
- (c) Containment and shielding is maintained during transportation and storage in a temperature range of $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$) to $70\text{ }^{\circ}\text{C}$ ($158\text{ }^{\circ}\text{F}$). Special attention shall be given to liquid contents and to the potential degradation of the packaging materials within the temperature range.
- (d) The packaging must include a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by pressure that may arise within the package during normal transport. Special form Class 7 (radioactive) material, as demonstrated in accordance with §173.469, may be considered as a component of the containment system. If the containment system forms a separate unit of the package, it must be securely closed by a positive fastening device that is independent of any other part of the package.
- (e) For each component of the containment system account is taken, where applicable, of radiolytic decomposition of materials and the generation of gas by chemical reaction and radiolysis.
- (f) The containment system will retain its radioactive contents under the reduction of ambient pressure to 25 kPa (3.6 psi).
- (g) Each valve, other than a pressure relief device, is provided with an enclosure to retain any leakage.
- (h) Any radiation shield that encloses a component of the packaging specified as part of the containment system will prevent the unintentional escape of that component from the shield.
- (i) Failure of any tie-down attachment that is a structural part of the packaging, under both normal and accident conditions, must not impair the ability of the package to meet other requirements of this subpart.
- (j) When evaluated against the performance requirements of this section and the tests specified in §173.465 or using any of the methods authorized by §173.461(a), the packaging will prevent—
 - (1) Loss or dispersal of the radioactive contents; and
 - (2) A significant increase in the radiation levels recorded or calculated at the external surfaces for the condition before the test.
- (k) Each packaging designed for liquids will—
 - (1) Be designed to provide for ullage to accommodate variations in temperature of the contents, dynamic effects and filling dynamics;
 - (2) Meet the conditions prescribed in paragraph (j) of this section when subjected to the tests specified in §173.466 or evaluated against these tests by any of the methods authorized by §173.461(a); and
 - (3) Either—
 - (i) Have sufficient suitable absorbent material to absorb twice the volume of the liquid contents. The absorbent material must be compatible with the package contents and suitably positioned to contact the liquid in the event of leakage; or

(ii) Have a containment system composed of primary inner and secondary outer containment components designed to assure retention of the liquid contents within the secondary outer component in the event that the primary inner component leaks.

(l) Each package designed for gases, other than tritium not exceeding 40 TBq (1080Ci) or noble gases not exceeding the A_2 value appropriate for the noble gas, will be able to prevent loss or dispersal of contents when the package is subjected to the tests prescribed in §173.466 or evaluated against these tests by any of the methods authorized by §173.461(a).

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