

Type A package

1.0 Classification:

Packages containing radioactive material is classified as Type A packages provided that the following conditions with respect to the content are met

Type A packages shall not contain activities greater than either of the following:

For special form radioactive material — A1; or

For all other radioactive material — A2.

For mixtures of radionuclides whose identities and respective activities are known, the following condition shall apply to the radioactive contents of a Type A package:

$$\sum_i \{B(i)/A1(i)\} + \sum_j \{C(j)/A2(j)\} \leq 1 \dots\dots\dots(4)$$

where

B(i) is the activity of radionuclide i as special form radioactive material, A1(i) is the A1 value for radionuclide i;

C(j) is the activity of radionuclide j as other than special form radioactive material,

A2(j) is the A2 value for radionuclide j.

2.0 Requirements:

2.1 The consigner has to comply to all the [General requirements](#) of Packaging and Packages

2.2 Specific Requirements for Type A package:

In addition to the general requirements, the following requirements need to be met:

- 1) The smallest overall external dimension of the package shall not be less than 10 cm.

- 2) The outside of the package shall incorporate a feature such as a seal that is not readily breakable and which, while intact, will be evidence that the package has not been opened.

- 3) Any tie-down attachments on the package shall be so designed that, under normal and accident conditions of transport, the forces in those attachments shall not impair the ability of the package to meet the requirements of this safety code.

- 4) The design of the package shall take into account temperatures ranging from – 40°C to +70°C for the components of the packaging. Attention shall be given to freezing temperatures for liquids and to the potential degradation of packaging materials within the given temperature range.

- 5) The design and manufacturing techniques shall be in accordance with national or international standards, or other requirements, acceptable to the Competent Authority.

- 6) The design shall include a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by a pressure that may arise within the package.

- 7) Special form radioactive material may be considered as a component of the containment system.
- 8) If the containment system forms a separate unit of the package, it shall be capable of being securely closed by a positive fastening device that is independent of any other part of the packaging.
- 9) The design of any component of the containment system shall take into account, where applicable, the radiolytic decomposition of liquids and other vulnerable materials and the generation of gas by chemical reaction and radiolysis.
- 10) The containment system shall retain its radioactive contents under a reduction of ambient pressure to 60 kPa.
- 11) All valves, other than pressure relief valves, shall be provided with an enclosure to retain any leakage from the valve.
- 12) A radiation shield that encloses a component of the package specified as a part of the containment system shall be so designed as to prevent the unintentional release of that component from the shield. Where the radiation shield and such component within it form a separate unit, the radiation shield shall be capable of being securely closed by a positive fastening device that is independent of any other packaging structure.
- 13) The package shall be so designed that if it were subjected to the tests for demonstrating ability to withstand normal conditions of transport specified (as 2.3)
 - a) it would prevent loss or dispersal of the radioactive contents;
 - b) or more than a 20% increase in the maximum radiation level at any external surface of the package.

2.3 Tests for Demonstrating Ability to Withstand Normal Conditions of Transport

Specimens of the package shall be subjected to the free drop test, the stacking test and the penetration test, preceded in each case by the water spray test. One specimen may be used for all the tests, provided that the time interval between the conclusion of the water spray test and the succeeding test shall be such that the water has soaked in to the maximum extent, without appreciable drying of the exterior of the specimen. In the absence of any evidence to the contrary, this interval shall be taken to be 2 h if the water spray is applied from four directions simultaneously. No time interval shall elapse, if the water spray is applied from each of the four directions consecutively.

Water Spray Test: The specimen shall be subjected to a water spray test that simulates exposure to rainfall of approximately 5 cm per hour for at least 1 h.

Free Drop Test: The specimen shall drop onto the target so as to suffer maximum damage in respect of the safety features to be tested:

The height of drop measured from the lowest point of the specimen to the upper surface of the target shall be not less than the distance specified in Table-I for the applicable mass. The target shall be as defined in Safety Code.

For rectangular fibreboard or wood packages not exceeding a mass of 50 kg, a separate specimen shall be subjected to a free drop onto each corner from a height of 0.3 m.

For cylindrical fibreboard packages not exceeding a mass of 100 kg, a separate specimen shall be subjected to a free drop onto each of the quarters of each rim from a height of 0.3m.

TABLE-I

FREE DROP DISTANCE FOR TESTING PACKAGES TO NORMAL CONDITIONS OF TRANSPORT

| Package Mass (kg) | Free Drop Distance (m) |
|--------------------------------|-------------------------------|
| Package mass < 5000 | 1.2 |
| 5 000 ≤ Package mass < 10 000 | 0.9 |
| 10 000 ≤ Package mass < 15 000 | 0.6 |
| 15 000 ≤ Package mass | 0.3 |

Stacking Test:

Unless the shape of the packaging effectively prevents stacking, the specimen shall be subjected, for a period of 24 h, to a compressive load equal to the greater of the following:

The equivalent of 5 times the maximum weight of the package. The equivalent of 13 kPa multiplied by the vertically projected area of the package.

The load shall be applied uniformly to two opposite sides of the specimen, one of which shall be the base on which the package would typically rest.

Penetration Test:

The specimen shall be placed on a rigid, flat, horizontal surface that will not move significantly while the test is being carried out.

A bar 3.2 cm in diameter with a hemispherical end and a mass of 6 kg shall be dropped and directed to fall, with its longitudinal axis vertical, onto the centre of the weakest part of the specimen, so that, if it penetrates sufficiently far, it will hit the containment system. The bar shall not be significantly deformed by the test performance.

The height of drop of the bar measured from its lower end to the intended point of impact on the upper surface of the specimen shall be 1 m.

2.3.1 Additional conditions for Type A package with liquids and gases

- 1) The design of a package intended for liquid radioactive material shall make provision for ullage to accommodate variations in the temperature of the contents, dynamic effects and filling dynamics.

- 2) A specimen, or separate specimens, shall be subjected to each of the following tests unless it can be demonstrated that one test is more severe for the specimen in question than the other, in which case one specimen shall be subjected to the more severe test:

Free Drop Test: The specimen shall drop onto the target so as to suffer the maximum damage in respect of containment. The height of the drop measured from the lowest part of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in the Safety Code.

Penetration Test: The specimen shall be subjected to the test specified in clause 5.8.4.5, except that the height of the drop shall be increased to 1.7 m from the 1 m specified earlier.

- 3) The package designed for gases shall prevent loss or dispersal of the radioactive contents if the package were subjected to the additional tests specified in Point no.2. A Type A package designed for tritium gas or for noble gases shall be excepted from this requirement.

- 4) The package shall be adequate to meet the conditions specified in clause 2.3 (13)(a) if the package is subjected to the tests specified in Point no.2 and

either:

be provided with sufficient absorbent material to absorb twice the volume of the liquid contents. Such absorbent material must be suitably positioned so as to contact the liquid in the event of leakage;

or

be provided with a containment system composed of primary inner and secondary outer containment components designed to enclose the liquid contents completely and to ensure their retention within the secondary outer containment components, even if the primary inner components leak.
