§ 178.603 Drop test.

(a) General. The drop test must be conducted for the qualification of all packaging design types and performed periodically as specified in §178.601(e). For other than flat drops, the center of gravity of the test packaging must be vertically over the point of impact. Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the packaging must be used. The number of drops required and the packaging orientations are as follows:

<table>
<thead>
<tr>
<th>Packaging</th>
<th>No. of tests (samples)</th>
<th>Drop orientation of samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel drums, Aluminum drums, Metal drums</td>
<td>Six—(three for each drop).</td>
<td>First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on a circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some 7 cylindrical drums, the welded longitudinal seam of the drum body.</td>
</tr>
<tr>
<td>(other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and Jerricans, Composite packagings which are in the shape of a drum.</td>
<td>Five—(one for each drop).</td>
<td>First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).</td>
</tr>
<tr>
<td>Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box.</td>
<td>Three—(three drops per bag).</td>
<td>First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples). First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).</td>
</tr>
<tr>
<td>Bags—single-ply with a side seam ...</td>
<td>Three—(two drops per bag).</td>
<td>First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).</td>
</tr>
<tr>
<td>Bags—single-ply without a side seam, or multi-ply.</td>
<td>First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).</td>
<td></td>
</tr>
</tbody>
</table>

(b) Exceptions. For testing of single or composite packagings constructed of stainless steel, nickel, or monel at periodic intervals only (i.e., other than design qualification testing), the drop test may be conducted with two samples, one sample each for the two drop orientations. These samples may have been previously used for the hydrostatic pressure or stacking test. Exceptions for the number of steel and aluminum packaging samples used for conducting the drop test are subject to the approval of the Associate Administrator.

(c) Special preparation of test samples for the drop test. (1) Testing of plastic drums, plastic jerricans, plastic boxes other than expanded polystyrene boxes, composite packagings (plastic material), and combination packagings with plastic inner packagings other than plastic bags intended to contain solids or articles must be carried out when the temperature of the test sample and its contents has been reduced to \(-18^\circ C\) (\(0^\circ F\)) or lower. Test liquids must be kept in the liquid state, if necessary, by the addition of anti-freeze. Water/anti-freeze solutions with a minimum specific gravity of 0.95 for testing at \(-18^\circ C\) (\(0^\circ F\)) or lower are considered acceptable test liquids. Test samples prepared in this way are not required to be conditioned in accordance with §178.602(d).

(d) Target. The target must be a rigid, non-resilient, flat and horizontal surface.
§ 178.604 Leakproofness test.

(a) General. The leakproofness test must be performed with compressed air or other suitable gases on all packagings intended to contain liquids, except that:

(1) The inner receptacle of a composite packaging may be tested without the outer packaging provided the test results are not affected; and

(2) This test is not required for inner packagings of combination packagings.

(b) Number of packagings to be tested—

(1) Production testing. All packagings subject to the provisions of this section must be tested and must pass the leakproofness test:

(i) Before they are first used in transportation; and

(ii) Prior to reuse, when authorized for reuse by §173.28 of this subchapter.

(2) Design qualification and periodic testing. Three samples of each different packaging must be tested and must pass the leakproofness test. Exceptions for the number of samples used in conducting the leakproofness test are subject to the approval of the Associate Administrator.

(c) Special preparation—(1) For design qualification and periodic testing, packagings need not be tested with closures in place. For production testing, packagings must be tested with closures in place. Removable heads need any damage likely to adversely affect safety during transport;

(4) For a composite or combination packaging, there is no damage to the outer packaging likely to adversely affect safety during transport, and there is no leakage of the filling substance from the inner packaging;

(5) Any discharge from a closure is slight and ceases immediately after impact with no further leakage; and

(6) No rupture is permitted in packagings for materials in Class 1 which would permit spillage of loose explosive substances or articles from the outer packaging.