relative humidity without significant
improvement of test reproducibility;
(2) At 65 percent ±2 percent relative
humidity, and at a temperature of 20
°C±2 °C (68 ±3°F), or 27 °C±2 °C (81
°F±3°F). Average values should fall
within these limits. Short-term fluctua-
tions and measurement limitations
may cause individual measurements to
vary by up to ±5 percent relative hu-
midity without significant impair-
ment of test reproducibility; or
(3) For testing at periodic intervals
only (i.e., other than initial design
qualification testing), at ambient con-
ditions.
(e) Except as otherwise provided,
each packaging must be closed in prep-
paration for testing in the same manner
as if prepared for actual shipment. All
closures must be installed using proper
techniques and torques.

<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,</td>
<td>Six—(three for each</td>
<td>First drop (using three samples): The package must strike the</td>
</tr>
<tr>
<td>Metal drums (other than steel</td>
<td>drop)</td>
<td>target diagonally on the chime or, if the packaging has no</td>
</tr>
<tr>
<td>or aluminum), Steel Jerricans,</td>
<td></td>
<td>chime, on a circumferential seam or an edge. Second drop (using</td>
</tr>
<tr>
<td>Plywood drums, Wooden barrels,</td>
<td></td>
<td>the other three samples): The package must strike the</td>
</tr>
<tr>
<td>Fiber drums, Plastic drums and</td>
<td></td>
<td>target on the weakest part not tested by the first drop,</td>
</tr>
<tr>
<td>Jerricans, Composite packagings</td>
<td></td>
<td>for example a closure or, for some 7 cylindrical drums, the</td>
</tr>
<tr>
<td>which are in the shape of a</td>
<td></td>
<td>welded longitudinal seam of the drum body.</td>
</tr>
<tr>
<td>drum.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boxes of natural wood, Plywood</td>
<td>Five—(one for each</td>
<td>First drop: Flat on the bottom (using the first sample). Second</td>
</tr>
<tr>
<td>boxes, Reconstituted wood boxes,</td>
<td>drop)</td>
<td>drop: Flat on the top (using the second sample). Third drop:</td>
</tr>
<tr>
<td>Fiberboard boxes, Plastic boxes,</td>
<td></td>
<td>Flat on the long side (using the third sample). Fourth drop:</td>
</tr>
<tr>
<td>Steel, aluminum or other metal</td>
<td></td>
<td>Flat on the short side (using the fourth sample). Fifth drop:</td>
</tr>
<tr>
<td>boxes, Composite packagings that</td>
<td></td>
<td>On a corner (using the fifth sample).</td>
</tr>
<tr>
<td>are in the shape of a box.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bags—single-ply with a side</td>
<td>Three—(three drops</td>
<td>First drop: Flat on a wide face (using all three samples). Sec-</td>
</tr>
<tr>
<td>seam ...</td>
<td>per bag)...</td>
<td>ond drop: Flat on a narrow face (using all three samples). Third</td>
</tr>
<tr>
<td>Bags—single-ply without a side</td>
<td>Three—(two drops per</td>
<td>first drop: On an end of the bag (using all three samples).</td>
</tr>
<tr>
<td>seam, or multi-ply.</td>
<td>bag)...</td>
<td>First drop: Flat on a wide face (using all three samples).</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 sam-
pies, one sample each for the two drop
orientations. These samples may have
been previously used for the hydro-
static pressure or stacking test. Excep-
tions for the number of steel, alu-
imium and other metal 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,
composites packagings (plastic mate-
rial), 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 °C
(0 °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 °C (0 °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).
§ 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.

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

(e) Drop height. Drop heights, measured as the vertical distance from the target to the lowest point on the package, must be equal to or greater than the drop height determined as follows:

(1) For solids and liquids, if the test is performed with the solid or liquid to be transported or with a non-hazardous material having essentially the same physical characteristic, the drop height must be determined according to packing group, as follows:

(A) Packing Group I: 1.8 m (5.9 feet).

(B) Packing Group II: 1.2 m (3.9 feet).

(C) Packing Group III: 0.8 m (2.6 feet).

(2) For liquids in single packagings and for inner packagings of combination packagings, if the test is performed with water:

(A) Packing Group I: 1.8 m (5.9 feet).

(B) Packing Group II: 1.2 m (3.9 feet).

(C) Packing Group III: 0.8 m (2.6 feet).

(3) For a bag, neither the outermost ply nor an outer packaging exhibits any damage likely to adversely affect safety during transport;

(f) Criteria for passing the test. A package is considered to successfully pass the drop tests if for each sample tested—

(1) For packagings containing liquid, each packaging does not leak when equilibrium has been reached between the internal and external pressures, except for inner packagings of combination packagings when it is not necessary that the pressures be equalized;

(2) For removable head drums for solids, the entire contents are retained by an inner packaging (e.g., a plastic bag) even if the closure on the top head of the drum is no longer silt-proof;

(3) The packaging or outer packaging of a composite or combination packaging must not exhibit any damage likely to affect safety during transport. Inner receptacles, inner packagings, or articles must remain completely within the outer packaging and there must be no leakage of the filling substance from the inner receptacles or inner packagings;

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

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