

## Sources

- DIN EN ISO 11126-7 of October 1999 – Specifications for non-metallic blast-cleaning abrasives
- DIN EN ISO 15750-2 - Steel drums

## 1. Presuppositions

- In packaging development residual emptying has to be taken into account in the construction of each packaging design.
- Examination of residual emptying can only be done with neutral filling good substitutes, like e.g. water, soft soap, shotblast corundum.
- For each test a brandnew packaging has to be taken.

## 2. Test criteria for packaging of watery or viscous products

Test agent: tap water. For standard containers with nominal volumes of 10 l to  $\leq 60$  l: admissible residual volume  $\leq 0.2$  % of nominal volume. For standard containers with nominal volumes  $> 60$  l: admissible residual volume  $\leq 0.05$  % of nominal volume.

### 2.1 Residual emptying

(steel and plastic containers with bung-hole, composite IBC, containers with removable lid, cans and canisters made of steel, aluminium and plastic) based on DIN EN ISO 15750-2, appendix B, procedure B

#### 2.1.1 Principle

The method to determine absolute and relative drainability is based upon measuring the weight of water remaining inside the container after draining by gravity.

#### 2.1.2 Equipment

A balance with an accuracy of at least  $\pm 2$  grams is required.

#### 2.1.3 Determination of drainability based on procedure B DIN EN ISO 15750-2 with a complete container:

- Weigh empty container including closure (closures) as exactly as possible and note down weight  $m_1$  in grams.
- Fill container with a limited quantity of tap water, appr. 10 % of nominal volume (max. appr. 40 l). Close container.
- Move container to ensure that the inner surfaces become wet.
- Open container and bring it into horizontal position with the assigned draining opening in lowest position and leave it like this until no liquid emerges any more (position 1). Composite-IBC will just be opened.

**Residual emptying**

- Tilt container slowly to the angle recommended by manufacturer, that guarantees for an optimal emptying (preferably 0 - 20°), and leave container in that position (position 2) for 5 minutes without moving or shaking.
- Close and secure assigned draining opening and remove all surplus water from outside surface of container.
- Weigh drained container as exactly as possible and note down weight  $m_2$  in grams.

**2.1.4 Results**

The difference between weighings ( $m_2 - m_1$ ) yields the residue inside the container and is indicated as absolute residual draining quantity of the container. Relative drainability of a container is calculated as percentage of absolute residual draining quantity, converted into volume, to total volume.

**2.2 Test report**

Test conditions and determined values have to be documented in a test report.

**3. Test criteria for packaging of pasty products**

Test agent: soft soap usual in the trade (viscosity  $> 3000 \text{ mPa} \cdot \text{s}$ )

For standard containers with nominal volumes  $\leq 220 \text{ l}$ : admissible rest volumes  $\leq 0.5 \%$  of nominal volumes.

**3.1 Residual emptying**

(Packaging like: container with removable lid, boxes made of corrugated or full cardboard with inliner)

**3.1.1 Test preparation:**

Weigh packaging without closures  $\rightarrow$  mass A in g (state weighing accuracy of balance).

**3.1.2 Test method**

- Bring a partial quantity soft soap of 5 % of the assigned net mass into the packaging and spread it out about evenly.
- Empty after max. 5 minutes in a type specific way using spatula or a scraper (see sketch).
- Weigh packaging again (without closure)  $\rightarrow$  mass B in g.
- Rest quantity = mass B - mass A in g.
- Admissible rest quantity  $\leq 0.5 \%$  of assigned net mass.

**3.2 Test report**

Test conditions and determined values have to be documented in a test report.

#### **4. Test criteria for packaging of solid free-flowing products (bulk-goods)**

Test agent: shot-blast corundum according to DIN EN ISO 11126-7, grain size 0.5 mm to 1 mm

nominal volume  $\leq$  450 l: admissible rest quantity  $\leq$  0.1 % of net mass

nominal volume  $>$  450 l: admissible rest quantity  $\leq$  0.05 % of net mass

##### 4.1 Residual emptying

(Bulk goods packaging like: sacks, box with inliner, FIBC, removable lid container)

##### 4.1.1 Test preparation:

Weigh packaging without closure / mass A in g (state weighing accuracy of balance).

##### 4.1.2 Test method:

- Bring a partial quantity shot-blast corundum of 5 % of the assigned net mass into the packaging.
- Flexible packaging, e.g. sacks, before testing have to be erected by inflating.
- Close packaging and move several times in both axes.
- Cut open or open closure in typical way for discharge.
- Run-out time for  $\leq$  450 l 1 minute,  
for  $>$  450 l 5 minutes.  
In the end beat or shake 3 times in usual working manner.
- Weigh packaging again (without closure) / mass B in g.
- Rest quantity = mass B - mass A in g.
- Admissible rest quantity for  $\leq$  450 l:  $\leq$  0.1 % of assigned net mass,  
for  $>$  450 l:  $\leq$  0.05 % of assigned net mass.

##### 4.2 Test report

Test conditions and determined values have to be documented in a test report.