VPA 7 Status: July 2005

Varnish on packaging made of sheet steel (thickness ≥ 0.5 mm)

Sources

- DIN ISO 2859-1 of January 2004 – Sampling procedures for inspection by attributes
- DIN EN ISO 3231 of February 1998 – Paints and varnishes determination of resistance to humide atmospheres containing sulfur dioxide.
- DIN EN ISO 3882 of October 2003 - Metallic and other inorganic coatings
- DIN EN ISO 2409 of October 1994 – Paints and varnishes cross-cut test
- DIN 67530 of January 1982 - Reflectometer as a means for gloss assessment of plane surfaces of paint coatings and plastics
- DIN EN ISO 6272-1 of August 2004 - Paints and varnishes – Rapid-deformation (impact resistance tests)
- DIN EN ISO 7253 of April 2002 - Paints and varnishes - determination of resistance to neutral salt spray (fog)
- DIN EN ISO 6988 of March1997 - Metallic and other non-organic coatings - sulfur dioxide test with general condensation of moisture

A General

1. Sampling

For examination in the following separate tests random samples are taken out of different delivery/production lots. This sampling can be done according to the regularities of statistical quality control in DIN ISO 2859 part 1.

2. Coat thickness

Examinations with magnetic measurement methods according to DIN EN ISO 3882.
Rated value: according to advice of varnish producer for each varnish type.

3. Adhesive strength

Adhesive strength is tested by cross cut adhesion tests on surfaces of body not deformed, bottom or lid. The curve of thebody sheet is not regarded as deformation.

Cross cut adhesion test:
Test done with single cutting edge device „A“ or with multiple cutting edge device „B“ according to DIN EN ISO 2409. Cut interval 1 mm. Adhesion has to correspond with characteristic values Gt 0 or Gt 1.

4. Elasticity

Ball-impact test:
Elasticity is determined with ball-impact tests.
Based on DIN EN ISO 6272 test is done on outer side of container sheet.
Different from DIN EN ISO 6272 ball diameter is 5/8 inch = 15.9 mm, diameter of die = 16.3 mm and drop weight = 904 g.

The deformation distance was set to 2.0 mm. From this yield the following impact energies (reference values):

Sheet thickness	Impact energy
0.5 mm	25 inch pounds
0.6 mm	30 inch pounds
0.7 mm	35 inch pounds
1.0 mm	40 inch pounds
1.2 mm	60 inch pounds
1.5 mm	80 inch pounds

After deformation varnish may not show any visible damage. For certain inner varnish systems (e.g. modified or pure phenolic resin systems) requirements are to be agreed with varnish producer.

B Outer varnish

1. Shade of colour

Verification of prescribed shade of colour by visual comparison with colour charts or limit samples at daylight.

2. Gloss evaluation

Verification with help of limit samples shaded off according to gloss grades or with reflectometers according to DIN 67530.
Rated value: ≥ 70 units
60° - reflectometer value according to DIN 67530.

3. Corrosion resistance

3.1 Determination of varnish resistance against moist atmosphere containing sulfur dioxide according to DIN EN ISO 3231
Test is carried out with atmosphere containing SO_2 at 40° C and 100 % humidity.

Test cycle: 8 hours with stress inside and 16 hours without stress outside test equipment.
Test duration: 2 cycles

There must not appear any signs of corrosion (rust stains, blisters).

Acceptance of inevitable minimal rust stains should have the agreement of both contractants. Signs of corrosion on the closure are very critical.

3.2 Salt spray test according to DIN EN ISO 7253
Test is carried out with a 5 % NaCl-solution at 35° C. The unscratched test sheets are sprayed under a position angle of 15-30°.
Test duration: 90 h
To obtain an information concerning subversion of a varnish film the salt spray test can by appointment be done with scratched test sheets.

4. Solvent resistance of varnish

If solvent resistance is required those solvents against which a varnish has to be resistant are named by the individual works. A wad of cotton wool is soaked with the respective solvent, put on the container to be tested and covered with a cup or a watch-glass. Action time 10 minutes; regeneration time after removing wad of cotton wool is 5 minutes.
Standard test: aceton as solvent.
A varnish may be rejected, if
a) peel off, heap up or blistering of varnish occurs
b) varnish can be wiped off with a patch after regeneration time.

C Inner varnish

1. Shade of colour

Verification of prescribed shade of colour with help of sample plates or reserve specimen.

2. Filling good resistance of varnish

The examination of filling good resistance lies within the responsibility of the filler. Contents resistance can be determined using different methods. One possibility is described in the following. A zero specimen also is to be stored.

2.1 Short-time test:
Test is carried out for 7 days at a temperature of 50° C. This test is carried out as a preselection test for the long-term test. Rendering a positive result the test is proceeded in a long-term test.

2.2 Long-time test:
a) 112 days at 40° C in laboratory test or
b) 112 days at 50° C in laboratory test (for higher duties) or
c) 6 months at room temperature (20-25° C) with original containers

2.3 Evaluation criteria
In all tests the inner varnish has to stay resistant against the contents both in the vapour as well as in the liquid zone. No blistering, beginning dissolution of varnish or contamination of contents may occur.