Cross-cut test

ISO 2409

Cross-cut test ISO 2409:

"This International Standard specifies a test method for assessing the resistance of paint coatings to separation from substrates when a right-angle lattice pattern is cut into the coating, penetrating through to the substrate. The property determined by this empirical test procedure depends, among other factors, on the adhesion of the coating to either the preceding coat or the substrate. This procedure is not to be regarded, however, as a means of measuring adhesion."

The latest (2013) version states:

"*the description of suitable methods for removal of loose paint have been transferred to an informative annex***** as examples and, for the method using adhesive tape, *the adhesive strength of the tape is no longer specified**"

In the past, the norm stated (ISO 2409-2007):

"**Unless otherwise agreed*, adhesive tape with an *adhesive strength between 6 N per 25 mm width and 10 N per 25 mm width* (determined in accordance with IEC 640454-2) shall be used. The tape shall be at least *50 mm* wide*"
Remark: *Transparent* tape is recommended.

CONFIDENTIAL INFORMATION

Adhesion according to 60454-2 results in values 5-10 % higher compared to tesa adhesion values, these therefore needed to be between 2.2 and 3.8 N/cm

***** see next slide

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ISO 2409

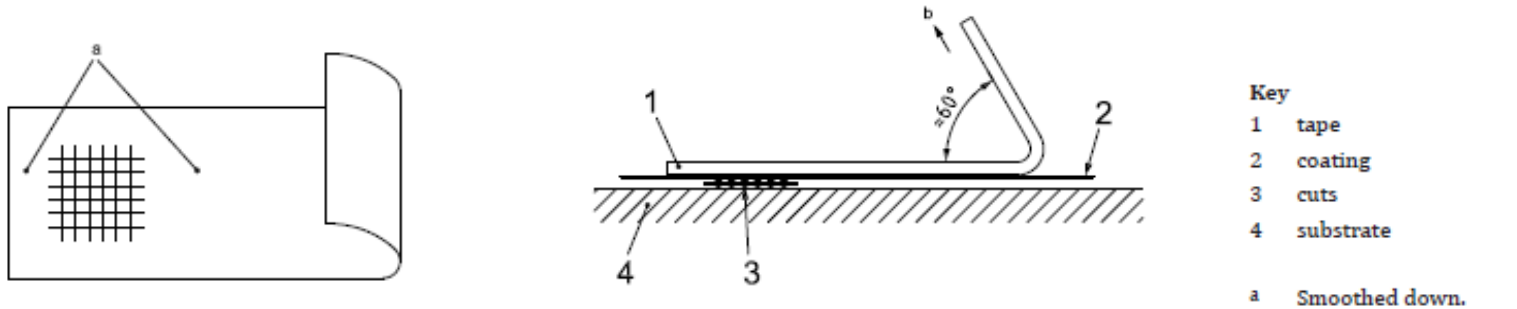
ISO 2409-2013 annex A.2 Using pressure-sensitive adhesive tape

Place the centre of the tape over the lattice in a direction parallel to one set of cuts as shown in Figure A.1 and smooth the tape into place over the area of the lattice.

To ensure good contact with the coating, rub the tape firmly with a fingertip or fingernail.

Within 5 min after applying the tape, remove the tape by grasping the free end and pulling it off steadily in 0.5 s to 1.0 s at an angle which is as close as possible to 60° (see Figure A.1).

NOTE The operation of applying and removing the tape can be carried out more than once, depending on the kind of coating and cutting direction.



a) Position of adhesive tape with respect to grid

b) Position immediately prior to removal from grid

Figure A.1 — Positioning of adhesive tape

Cross-cut test

Tape to use

In all cases, *tests* should be made to chose the correct product for a specific customer, because all substrates and inks are different, as well as customer test methods and requirements

"ASTM 3359" is very similar to ISO 2409, and it doesn't specify adhesion levels either – the wording shows nicely how the choice of the adhesive tape should always be made individually:

> 5.3 *Tape*—25-mm (1.0-in.) wide semitransparent pressure-sensitive tape[5] with an adhesion strength agreed upon by the supplier and the user is needed.

Transparency of the tape is *recommended* (but not mandatory) in order to be able to see all transferred ink particles – including the white ones

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Tape to use

Here are some tesa recommendations for tapes that can be used:

	Adhesive	Backing	Adhesion/Steel (tesa) [N/cm]
tesa® 4024 transparent	Acrylic	PP	3
tesa® 4104 / 4124 transparent	Natural Rubber	PVC	2.3
tesa® 4104 colored	Natural Rubber	PVC	3.6 [1)]
tesa® 4124 colored	Natural Rubber	PVC	3.2 [1)]
tesa® 4122 transparent	Natural Rubber	PVC	2 [2)]
tesa® 4280 transparent	Synthetic Rubber	PP	4.8 [3)]
tesa® 4287 transparent	Natural Rubber	PP	4 / 5.4 [3)] [4)]

[1)] Can be used, but transparency is recommended
[2)] Adhesion value *too low* according to 2409-2007, but there now is no more adhesion recommendation in the ISO 2409
[3)] Adhesion value *too high* according to 2409-2007, but there now is no more adhesion recommendation in the ISO 2409
[4)] Two different versions internationally, two different tesa plants

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Further information

"DIN53151" is sometimes mentioned, this is old, ISO 2409-2013 to be applied!

Other tesa anchorage tests:

Printing ink anchorage on film substrates (without cross-cutting):
J0PMI031 tesa® 4124

Cross-cut test laser label (anchorage between varnish layers):
J0PM0127 tesa® 4124

Cross-cut test paint (varnish) on mdf wood:
J0PMX024 tesa® 4122