

ZCC 2087

Cross-cut Tester

Instruction manual



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Exclusion of liability

Illustrations, descriptions as well as the technical specifications conform to the instruction manual on hand at the time of publishing or printing. However, Zehntner GmbH Testing Instruments policy is one of continuous product development. All changes resulting from technical progress, modified construction or similar are reserved without obligation for Zehntner to update.

Some of the images shown in this instruction manual may be of a preproduction model and/or are computer generated; therefore the design / features of the delivered product may differ in various aspects.

The instruction manual has been drafted with the utmost care. Nevertheless, errors cannot be entirely excluded. The manufacturer will not be liable for errors in this instruction manual or for damages resulting from any errors.

The manufacturer will be grateful at any time for suggestions, proposals for improvement and indications of errors.

1 Description of device

The ZCC 2087 is an ergonomically designed cross-cut tester with a special flexible cutting head with exchangeable cutting tool for evaluation of adhesion of single- or multi-coat systems.

2 Safety information

2.1 Symbols used



This note comprises instructions needed to follow directions, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.



This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

2.2 Safety notes and hints



The ZCC 2087 is exclusively intended for the evaluation of adhesion of single- or multi-coat systems. Any other use is considered as being not in accordance with the intentions of the manufacturer and is conducted at the user's own risk. The manufacturer is not liable for any resulting damages.



Unauthorized modifications and changes of the ZCC 2087 are not permitted.



Reproduction of the ZCC 2087 without permission is not allowed.



Zehntner GmbH Testing Instruments refuses all warranty and liability claims for damages caused by usage of the ZCC 2087 in combination with **non-original accessories**, or accessories from 3rd party suppliers.



All local safety regulations apply for the operation of the ZCC 2087.

3 Delivery of device

3.1 Damages during carriage

On the receipt of the goods, check for any visible damages on the packaging. If it is undamaged you may sign the receipt of the goods. If you do suspect by your visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier service must be held responsible for the damage in writing.

If a hidden damage is discovered while unpacking, you have to inform and hold the courier liable immediately in the following way: "When opening the parcel we had to notice that ... etc." This superficial checking of the goods has to be done within the time limit set by the carrier, which is normally 7 days. However, the period could vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.








If there are any damages also inform your authorized Zehntner agent or **Zehntner GmbH Testing Instruments** immediately.

3.2 Shipment

Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally use filling material in the package to protect the device from any shock during carriage.

3.3 Standard delivery

The following parts are included in the delivery:

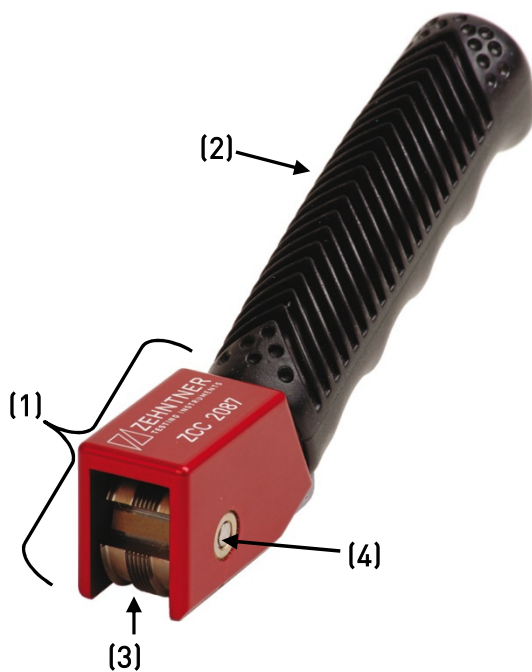
Cross-cut tester with flexible cutting head (to guarantee reproducible cross-cuts) and multiblade cutting tool according to version (see technical specifications)	
Allen key	
Brush (for versions ZCC 2087.1 to ZCC 2087.4)	
Roll of adhesive tape ACC753 (length: 50 m, width: 25 mm)	
Magnifier	
Certificate of manufacturer	
Carrying case	

3.4 Options

ACC183 adhesive tape (1 roll with 65 m, width 25 mm)	
ACC204 adhesive tape (1 roll with 66 m, width 50 mm)	
Multi-blade cutting tool with 6 blades according to DIN EN ISO 2409 ACC064 – spacing: 1 mm ACC094 – spacing: 2 mm ACC095 – spacing: 3 mm	
Multi-blade cutting tool according to ASTM D3359 ACC096 – with 11 blades, spacing: 1 mm ACC098 – with 6 blades, spacing: 2 mm	
ACC166 Multi-blade cutting tool with 11 blades, spacing: 1.5 mm	



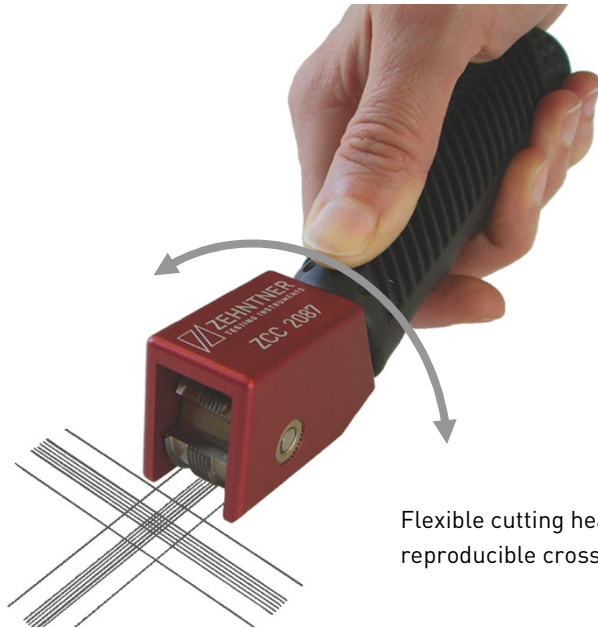
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- (1) Flexible cutting head
- (2) Ergonomic handle
- (3) Multi-blade cutting tool
- (4) Fixing screw

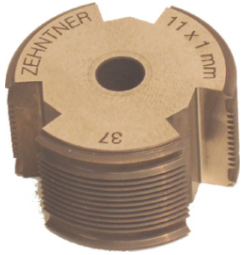
4.1 Flexible cutting head

The ZCC 2087 is equipped with a specially designed flexible cutting head which ensures reproducible cross cuts. It avoids unbalanced pressure by the operator and provides a uniform cutting depth over the complete width. Therefore it is also suitable for untrained users.



Flexible cutting head ensures reproducible cross-cuts.

4.2 Multi-blade cutting tool



Our multi-blade cutting tools (3) are equipped with the amount of blades required by the relevant standard. If one side is worn out, the multi-blade cutting tool (3) can be rotated onto an unused side. We suggest to mark the worn out side, e.g. with a water proof marker and with a black tip.

- Loosen the fixing screw (4) with the Allen key.
- Remove the fixing screw (4) and the multi-blade cutting tool (3).
- Rotate the multi-blade cutting tool (3) to the next unused blade and re-insert it in this position.
- Insert the fixing screw (4) and push the multi-blade cutting tool (3) on the guiding pin.



Correct inserting of the cutting tool

- Refasten the fixing screw (4) with the Allen key.

When all three sides of the blades are worn out, the reverse side of the blade can also be used. Remove the multi-blade cutting tool turn and re-inserted it.

If all six blades are worn out, either a spare multi-blade cutting tool has to be bought at Zehntner GmbH Testing Instruments, respectively by an authorized Zehntner agent or the multi-blade cutting tool has to be sharpened at Zehntner.

5 Choice of the appropriate spacing of cuts acc. to DIN EN ISO 2409

Film thickness in μm	Substrate	Spacing of cuts in mm
0 to 60	hard	1
0 to 60	soft	2
above 60 to 120	hard and soft	2
above 120 to 250	hard and soft	3

The cross-cut test is not suitable for substrates with a film thickness over 250 μm .

6 Choice of the appropriate spacing of cuts acc. to ASTM D3359

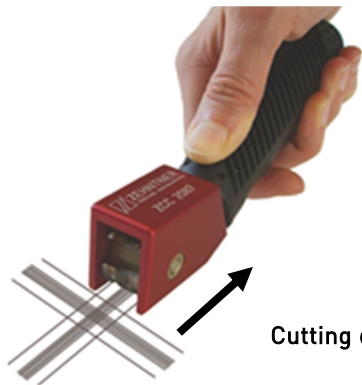
Film thickness in μm	Film thickness in mils	Spacing of cuts in mm
0 to 50	0 to 2.0	1
50 to 125	2.0 to 5	2

To test film thickness over 125 μm use test method A, as described in the standard.

7 Handling ZCC 2087.1 to ZCC 2087.4 acc. to DIN EN ISO 2409

- ! Hold the cross-cut tester only at the handle.
- ! The flexible cutting head should always move freely.
- ! Never use your other hand or finger of the leading hand to add additional pressure to the cutting head during testing.
- ! Always pull the cross-cut tester, never push it.
- ! If the panel is made of wood or a similar material, apply the cuts with an angle of 45° to the direction of the grain.

- Place the conditioned test panels on a rigid, flat surface to prevent any deformation of the panel during the test.
- Carry out the test at a temperature 23 ± 2 °C and relative humidity of 50 ± 5 %.



- Hold the ZCC 2087 with the blade vertical to the test panel surface.
- Make two successive cuts, the second cut crossing the original one at 90°, generating a lattice pattern. All cuts shall penetrate the coating completely down to the substrate surface. The indentation depth into the substrate should be as low as possible.

- Remove any loose particles from the area of cutting. For suitable methods refer to chapter 7.1 on page 14.
- Carefully examine the cross-cut area and compare it with the classification table in order to determine the cross-cut value.
- Test at least on three areas on the panel.
- Issue a test report.

7.1 Removing loose particles

According to the informative Annex A of the DIN EN ISO 2409 the following three methods are suitable for removing loose particles:

Brushing

- Brush the panel lightly using a soft brush several times backwards and forwards along the diagonals of the lattice pattern.

Adhesive tape

- Remove two complete laps of tape and discard.
- Remove an additional length at a steady (that is not jerked) rate and cut a piece of about 75 mm long. Place the center of the tape over the lattice in a direction parallel to one set of cuts and smooth into place over the area of the lattice.
- To ensure good contact with the coating, rub the tape firmly with a fingertip or the nail.
- Remove the tape within 5 minutes after applying. Grasp the free end of the tape and pull it off steadily in 0.5 s to 1.0 s at an angle which is as close as possible to 60°.



Since using an adhesive tape is no longer a normative reference, it is possible to use any adhesive tape. However, we suggest to use a tape with an adhesive strength on steel between 6N and 10 N. The adhesive strength of coatings can differ significantly from the manufacturer's specifications on steel. Therefore it is important to always use the same adhesive tape in order to get reproducible results.

Compressed air or Nitrogen

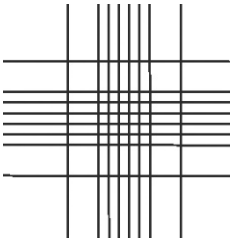
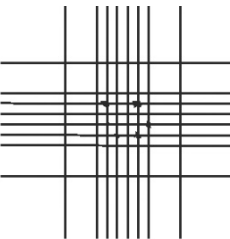
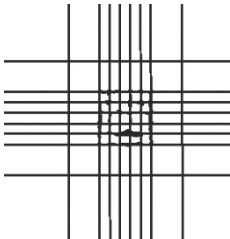
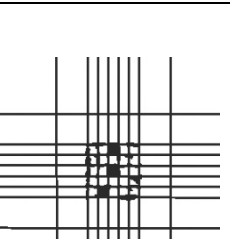
- Remove all loose particles with compressed air or nitrogen.

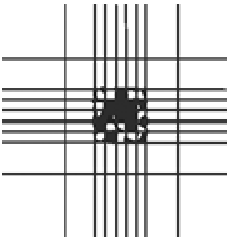
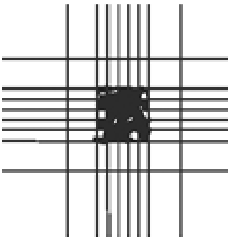
8 Handling ZCC 2087.5 and ZCC 2087.6 acc. to ASTM D3359

- ! Hold the cross-cut tester only at the handle.
 - ! The flexible cutting head should always move freely.
 - ! Never use your other hand or finger of the leading hand to add additional pressure to the cutting head during testing.
 - ! Always pull the cross-cut tester, never push it.
-
- Place the test panel on a firm base.
 - Successively make two cuts about 20 mm (0.79 in.) long, the second cut crossing the first one at 90°, generating a lattice pattern. Cut through the film to the substrate in one steady motion using just sufficient pressure on the cutting tool to have the cutting edge reach the substrate. (For coatings having a dry film thickness up to and including 50 µm (2 mils) – eleven cuts, for coatings having a dry film thickness between 50 µm (2 mils) and 125 µm (5 mils) – six cuts).
 - Brush the film lightly with a soft brush or tissue to remove any detached flakes or ribbons of coatings.
 - Remove two complete laps of tape and discard.
 - Remove an additional length at a steady (that is not jerked) rate and cut a piece about 75 mm (2.95 in.) long.
 - Place the center of the tape over the grid and in the area of grid smooth into place by a finger.
 - To ensure good contact with the film rub the tape firmly with the eraser on the end of a pencil.
 - Within 90 ± 30 s of application, remove the tape by seizing the free end and rapidly (not jerked) back upon itself at as close to an angle of 180° as possible.
 - Inspect the grid area for removal of coating using a magnifier and rate the adhesion in accordance with the cross-cut scale.
 - Repeat the test in two other locations on each test panel.
 - Issue a test report.

9 Overview – Cross-cut classification

Classification of test results

Cross-cut	According to DIN EN ISO 2409	According to ASTM D3359
	0: The edges of the cuts are completely smooth; none of the squares of the lattice is detached.	5B The edges of the cuts are completely smooth, none of the squares of the lattice is detached. Percent area removed: 0 % - none
	1: Detachment of small flakes of the coating at the intersections of the cuts. A cross-cut area not greater than 5 % is affected.	4B Small flakes of the coating are detached at intersections, less than 5 % of the area is affected.
	2: The coating has flaked along the edges and/or at the intersections of the cuts. A cross-cut area greater than 5 %, but not greater than 15 % is affected.	3B Small flakes of the coating are detached along edges and at intersections of cuts. The area affected is 5 to 15 % of the lattice.
	3: The coating has flaked along the edges of the cuts partly or wholly in large ribbons, and/or it has flaked partly or wholly on different parts of the squares. A cross-cut area greater than 15 % but not greater than 35 % is affected.	2B The coating has flaked along the edges and on parts of the squares. The area affected is 15 to 35 % of the lattice.

Cross-cut	According to DIN EN ISO 2409	According to ASTM D3359
	4: The coating has flaked along the edges of the cuts in large ribbons and/or some squares have detached partly or wholly. A cross-cut area greater than 65 % is affected.	1B The coating has flaked along the edges of cuts in large ribbons and whole squares have detached. The area affected is 35 to 65 % of the lattice.
	5: Any degree of flaking that cannot even be classified by classification 4.	0B Flaking and detachment worse than classification 1B.

10 Maintenance and cleaning

10.1 Maintenance which can be carried out by the user

The user is only allowed to carry out the following maintenance and cleaning work:

- Outer cleaning of the device as described below

! All other maintenance and repair work shall only be carried out by **Zehntner GmbH Testing Instruments** or your authorized Zehntner agent, otherwise all the guarantee and liability claims will be void.

10.2 Cleaning of the device

For cleaning of the aluminium housing use a proper, soft cloth. Only use soft cleaning agents.

- !** Do not use aggressive solvents or cleaning agents.
- !** If the device has to be disinfected, do not use disinfectants that contain sodium hydroxide.

11 Technical specifications

Version	Number of blades	Spacing of blades	Standard
ZCC 2087.1	6	1 mm (0.04")	DIN EN ISO 2409
ZCC 2087.15	11	1.5 mm (0.06")	
ZCC 2087.2	6	2 mm (0.08")	DIN EN ISO 2409
ZCC 2087.3	6	3 mm (0.12")	DIN EN ISO 2409
ZCC 2087.4	6	1 mm (0.04"), 2 mm (0.08") and 3 mm (0.12"), exchangeable	DIN EN ISO 2409
ZCC 2087.5	11	1 mm (0.04")	ASTM D3359
ZCC 2087.6	6	2 mm (0.08")	ASTM D3359

Material head: red anodised aluminium

Material multi-blade cutting tool: hardened steel

Dimensions (LxWxH): 160 x 26 x 80 mm (6.30 x 1.02 x 3.15")

Weight: 245 g (0.54 lbs)

Warranty: 2 years

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