Advancing with technology ElektroPhysik

Cross Hatch Cutters
Models 295

- Standardized cross cutting tests on different coating materials
- Low-priced hand instrument
- High economic efficiency caused by four independent cutting edges

SAFETY INSTRUCTIONS

Proper use

The Model 295 is intended only for adhesion tests by carrying out the cross-cut test in accordance with the international standards.

The Cross Hatch Cutter is a purely mechanical instrument.

Risk of injuries!

The blades of the cross cutters are very sharp edged and therefore may cause injuries, if the instrument is not handled correctly and carefully!

Purpose and Application

The adhesion of a coating on a base material is not only a mechanical property defining the bond between coating and substrate, but it is also of particular importance with regard to the corrosion protection, since areas of poor adhesion can easily be affected by corrosion.

For many years already the cross cutting is the best known and the most frequently used adhesion test method for different coating materials on various substrates!

The standardised cross-cut test provides a very straight forward method of establishing the adhesion quality.

Design and Function

The **Cross Hatch Cutter 295** is a hand operated instrument at an advantageous price that meets the requirements of all cross-cut test standards. Model 295 consists of an ergonomically designed hand grip into which the cutting head is fitted in an adjustable manner to enable the instrument to be operated in a way which is most comfortable to the user. Various versions with different cutting heads are available, which have each **four** cutting edges (except Mod. 295/VI, with two cutting edges). This is a big benefit, also with regard to it's economic efficiency, because there are still three spare cutting edges ready for use, when the first one inevitable sometime will be worn-out.

To the versions **I, II** and **VII** of **Models 295** the cutting head used in each case is mounted in a hand grip in a fixed manner. Because they are, during the test procedure, moved manually over the surface to be tested, the pressure exerted by the hand has to be distributed as evenly as possibly over the cutting head with all its cutters arranged in parallel, in order to obtain a pattern of cuts by which the coating to be tested is cut through uniformly in parallel to the substrate.
This depends on the user and requires a certain "feeling" or experience, respectively.

To facilitate the handling the versions **IX, X** and **XI** have **a free turnable axle between the hand grip and the cutting head.**

The axle supports the uniform distribution of pressure over the total area of the cutting head, and thus the results are less dependent of the user. Herewith many users have made the experience, that the application is considerably more fatigue-free and more comfortable!

However, to comply with the special liking of each user for the performance preferred, **the versions IX, X** and **XI** are additionally equipped with a locking ring. By turning this ring the hand grip and the cutting head are connected rigidly as it is the case of the rigid fixed versions **I, II and VII**, well known as well as often successfully used for many years already.

Most cross-cut instruments from the 295 range are supplied complete, i.e. with cutting head mounted on the plastic handle and are contained in a sturdy plastic carrying case together with polyamide bristle brush and magnifying glass with 2.5 magnification.

In the case of the single cut instruments, Models **295/III**, **XII and XIII** a folding ruler is also included.

There are three versions of folding rulers available:

- for Mod. 295/III: with 10 swivel-mounted folding rulers of 1 mm thickness
- for Mod. 295/XII: with 10 swivel-mounted folding rulers of 1 mm thickness and 1.5 mm thickness each (1.5 mm = acc. to Daimler-Benz)
- for Mod. 295/XIII: with 5 swivel-mounted folding rulers of 1mm/2 mm/3 mm thickness each

These folding rulers provide the ruler thicknesses of 1 mm, 1.5 mm, 2 mm or 3 mm for the required cutting distances “all of a piece” i.e. it is no longer necessary to build them up using several rulers of 1 mm.

The folding ruler for **Model 295/XII** is also equipped with rulers for a cut distance of 1.5 mm, in accordance with the Daimler-Benz standard’s stipulations.

The new innovative design with it’s hand grip in the shape of a helved ball, enables a considerably more comfortable and fatigue-free handling with the folding ruler of **Model 295/XIII** (folding ruler also separately available).

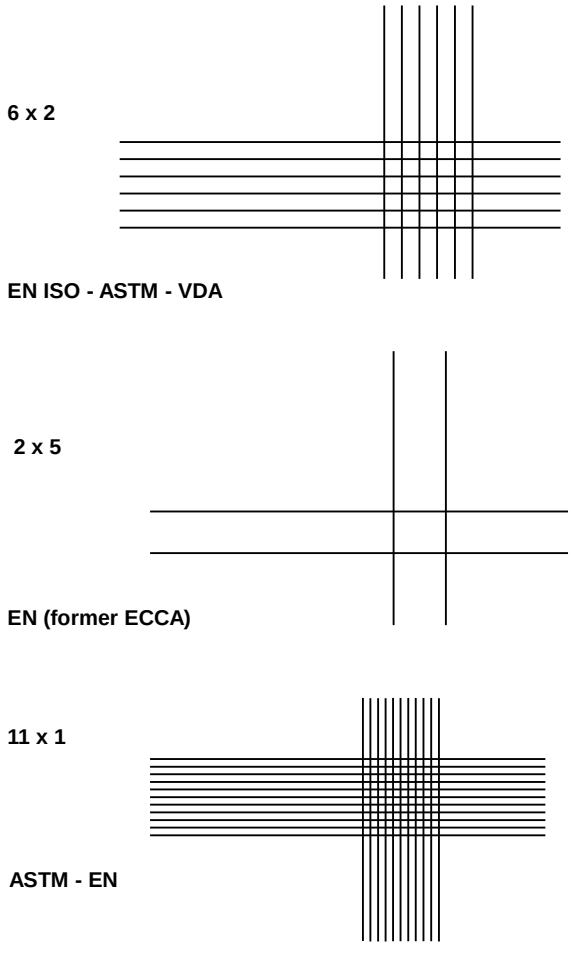
Due to several requests a new and versatile applicable single edge cutting device is now available. With **Model 295/XIV** free cuts on curved surfaces are now possible. It consists of a special hard-coated test tip mounted into an adapter block with holder. A helpful and for many of such applications recommandable flexible steel ruler is already included.

The **SCROLLRULER 295/XV** is a universal ruler for cross hatch cuts, where the desired cutting distances (6 x 1 mm, 6 x 2 mm, 6 x 3 mm, 11 x 1 mm, 11 x 1.5 mm) can be adjusted very easily as well as comfortable, simply by turning a thumb wheel.

Test Principle

The basic principle is to cut through the coating with a series of several cuts at right angles in a defined manner. The square pattern that is obtained can be evaluated visually by examining the way in which the coating has broken away from the base material (along the cutting edges and/or complete squares), and this can be compared with schematic representations in the standard.

The result will be furnished with a judgement scale’s code (e.g. with the aid of the evaluation table in accordance with EN ISO 2409 on the last page of this technical description).

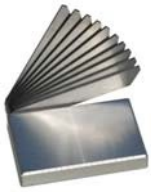
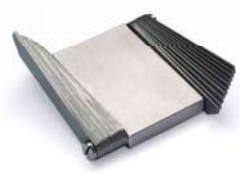
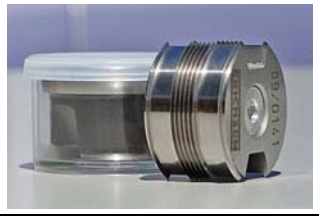


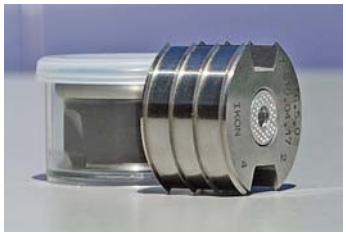
Please note:

The Mod. 295’s cutting heads are made of high class hardened steel, with altogether 4 cutting edge traverses for a maximum of long lasting lifetime. But, depending of the use, a continuously occurring wear of the used cutting blades, is inevitable! Due to this fact, ERICHSEN offers a resharpenservice for worn cutting heads with still suitable blades.
Regardless of this, of course, all cutting head types are also available as spares.

Order Information		
Figure	**Order-Nr.**	**Desciption**
	85-802-0012	**Multi-Cross Cutter 295/I** with **6 edges, cutting distance 1 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	85-802-0006	**Multi-Cross Cutter 295/II** with **6 edges, cutting distance 2 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	85-802-0002	**Multi-Cross Cutter 295/VII** **w**ith **6 edges, cutting distance 3 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.09.31	**Multi-Cross Cutter 295/IX** with free turnable axle between hand grip and cutting head, **6 edges, cutting distance 1 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.10.31	**Multi-Cross Cutter 295/X** with free turnable axle between hand grip and cutting head, **6 edges, cutting distance 2 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.11.31	**Multi-Cross Cutter 295/XI** with free turnable axle between hand grip and cutting head, **6 edges, cutting distance 3 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	85-802-0013	**Single Edge Cutting Device 295/III** **with folding ruler** with **10 swivel-mounted folding rulers of 1 mm thickness each**, incl. magnifying glass, polyamide bristle brush and plastic case

Order Information		
Figure	**Order-No.**	**Description**
	0019.12.31	**Single Edge Cutting Device 295/XII** **with folding ruler** with **10 swivel-mounted folding rulers of 1 mm and 1,5 mm thickness each**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.13.31	**Single Edge Cutting Device 295/XIII** **with folding ruler** egonomically optimized, triangular version with handle and **5 swivel-mounted folding rulers of 1 mm, 2 mm and 3 mm thickness each**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.15.31	**SCROLLRULER 295/XV** universal cross cut ruler, scaled cutting distances (6 x 1 mm, 6 x 2 mm, 6 x 3 mm, 11 x 1 mm and 11 x 1,5 mm) adjusted by turning a thumb wheel
	85-802-0034	**Multi-Cross Cutter 295/V** with **11 edges, cutting distance 1 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	85-802-0001	**Multi-Cross Cutter 295/VI** with **6 edges, cutting distance 2 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	85-802-0014	**Multi-Cross Cutter 295/IV** with **6 edges, cutting distance 5 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.014.31	**Single Edge Cutting Device 295/XIV** hard-coated test tip mounted into an adapter block with holder, for cuts on curved sufaces, incl. felxible ruler and plastic case, without Manufacturer's Test Certificate M

Order Information		
Figure	**Order-No.**	**Description**
	0239.01.31	**Cutter 295/I and holder** with **6 edges, cutting distance 1 mm**, incl. tubular plastic case, without Manufacturer's Test Certificate M
	0239.02.31	**Cutter 295/II and holder** with **6 edges**, **cutting distance 2 mm**, incl. tubular plastic case, without Manufacturer's Test Certificate M
	0239.05.31	**Cutter 295/V and holder** with **11 edges**, **cutting distance 1 mm**, incl. tubular plastic case, without Manufacturer's Test Certificate M
	0239.07.31	**Folding Ruler** with **10 swivel-mounted folding rulers of 1 mm each** as supplied with model 295/III, without Manufacturer's Test Certificate M
	0239.08.31	**Folding Ruler** with **10 swivel-mounted folding rulers of 1 mm and 1.5 mm thickness each** as supplied with model 295/XII, without Manufacturer's Test Certificate M
	0239.06.31	**Folding Ruler** egonomically optimized, triangular version as supplied with model 295/XIII, with **5 swivelmounted folding rulers of 1 mm, 2 mm and 3 mm thickness each**, without Manufacturer's Test Certificate M
	85-808-0087	**Cutter (Spare Part)** for models 295/I and 295/IX
	85-808-0088	**Cutter (Spare Part)** for models 295/II and 295/X

Order Information		
Figure	**Order-No.**	**Description**
	85-808-0106	**Cutter (Spare Part)** for models 295/III, 295/XII and 295/XIII
	85-808-0094	**Cutter (Spare Part)** for model 295/IV
	85-808-0095	**Cutter (Spare Part)** for model 295/V
	85-808-0001	**Cutter (Spare Part)** for model 295/VI
	85-808-0093	**Cutter (Spare Part)** for models 295/VII and 295/XI
	0564.01.32	**Test Tip (Spare Part)** for model 295/XIV

Reference Class:
Most versions of Model 295 (without 295/XIV, 295/XV) are supplied with a Manufacturer's Certificate M in accordance with DIN 55 350-18 that includes among others the following information:
Spacing between the outer cutting edges (at Multi-Cross Cutter), angle of cutting edge, cutting edge, deviation between the cutting edges (at Multi-Cross Cutter), product identification, test equipments used and their calibration results, date, name of inspector.
When checking the cross cutting knife-edges, a contour measuring instrument is used to determine, across the cutting direction, the profile line from which all values relevant to the quality are then deduced.

Standard	Layer thickness	No. of cuts x distance (mm)	Model
ISO 2409	up to 60 µm	6 x 1 [2)] 6 x 2 [3)]	295/I, 295/IX, 295/III, 295/XII, 295/XIII 295/II, 295/X, 295/III, 295/XII, 295/XIII
EN ISO 2409[1)] JIS K 5600-5-6	60 µm up to 120 µm 120 µm up to 250 µm	6 x 2 6 x 3	295/II, 295/X, 295/III, 295/XII, 295/XIII 295/VII, 295/XI, 295/XII, 295/XIII
EN 13523-6[4)] (formerly ECCA T6)	up to 60 µm above 60 µm	6 x 1 2 x 5	295/I, 295/IX, 295/III, 295/XII, 295/XIII 295/IV, 295/III, 295/XII, 295/XIII
ASTM D 3359	up to 50 µm 50 µm up to 125 µm	11 x 1 6 x 2	295/V, 295/III, 295/XII, 295/XIII 295/II, 295/X, 295/III, 295/XII, 295/XIII
VDA 621-411	up to 60 µm 60 µm up to 120 µm above 120 µm	6 x 1 6 x 2 6 x 3	295/I, 295/IX, 295/III, 295/XII, 295/XIII 295/II, 295/X, 295/III, 295/XII, 295/XIII 295/VII, 295/XI, 295/XII, 295/XIII
DBL 5416	not dependent on film thickness	6 x 1,5	295/XII
ISO 2409-1972 BS 3900:E6 NF T 30-038 (all withdrawn)	to be specified by Agreement	11 x 2	295/VI

1) Since 1994, the European standard EN ISO 2409 replaces the national standards DIN 53151, BS 3900:E6, NF T 30-38, NEN 5337 and SIS 184172.
2) for hard substrates
3) for soft substrates
4) The cross hatch test is intensified by a subsequent deep drawing test acc. to EN ISO 1520, which can be performed using the ERICHSEN Cupping Test Machines, Models 200 and 202 C.

Determination of Cross Hatch Cut Classifications

Cuts' appearance	Description	Classification
	Completely smooth blades of the cuts, without any loss of coating material.	0
	Loss of small coating material's particles, detached from the cuts' intersections.The loss of coating material is just a little bit more than 5% of the complete Cross Hatch Cut's area.	1
	Loss of small coating material's flakes along the cuts' blades and/or at their intersections. The loss of coating material is distinctly greater than 5% up to just a little bit more than 15% of the complete Cross Hatch Cut's area.	2
	Loss of coating material's flakes along the cuts' blades and/or of squares (partly or wholly). The loss of coating material is distinctly greater than 15% up to just a little bit more than 35% of the complete Cross Hatch Cut's area.	3
	Loss of coating material's flakes along the cuts' blades and/or of squares (partly or wholly). The loss of coating material is distinctly greater than 35% up to just a little bit more than 65% of the complete Cross Hatch Cut's area.	4
	Coating material's loss of distinctly more than 65%, which cannot even be classified by classification "4".	5

The right of technical modifications is reserved.
Group 12 – TBE/BAE 295 – VII/2010

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