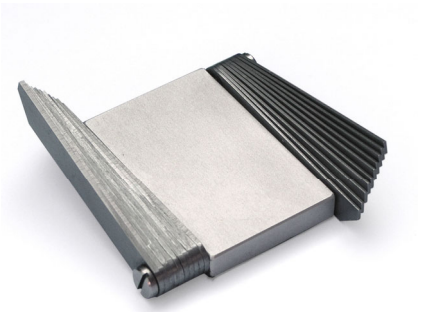
Cross Hatch Cutter with
free turnable axle

SCROLLRULER
adjustable Cross Cut Ruler

Cross Hatch Cutters Models 295



Folding Ruler

Folding Ruler with handle

Models 295/XIV and 295/I with cutting head and folding ruler

testing equipment for quality management

ERICHSEN
since 1910

Technical Description and Operating Instructions

Low-priced
Hand Instrument

High Economic Efficiency caused by four independent Cutting Edges

Standardized
Cross Cutting Tests
on different Coating
Materials

SAFTY 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.

Danger

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

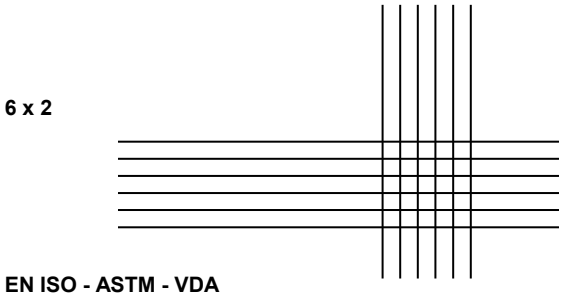
Due to several requests a new and versatile applicable single edge cutting device is now available. With **Model 295/XIV** free cuts on curved surfaces are now possible. It consists of a special hard-coated test tip mounted into an adapter block with holder. A helpful and for many of such applications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

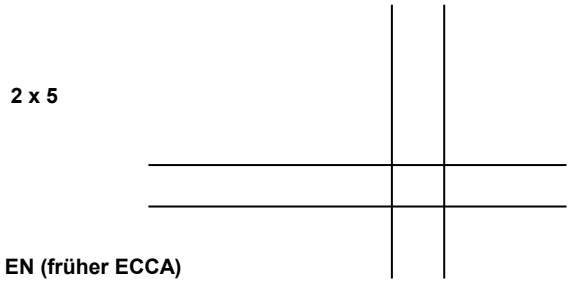
The **SCROLLRULER 295/XV** is a universal ruler for cross hatch cuts, where the desired cutting distances (6 x 1 mm, 6 x 2 mm, 6 x 3 mm, 11 x 1 mm, 11 x 1.5 mm) can be adjusted very easily as well as comfortable, simply by turning a thumb wheel.

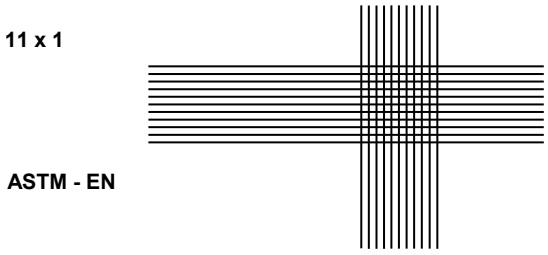
Test Principle

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.

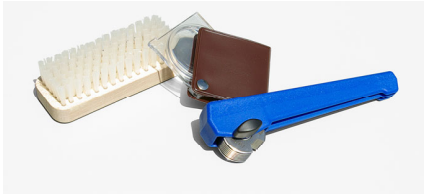
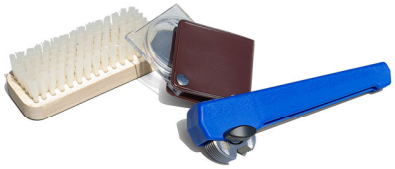
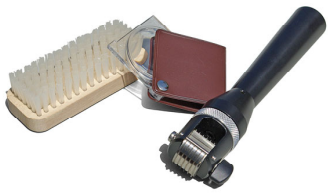
The result will be furnished with a judgement scale’s code (e.g. with the aid of the evaluation table in accordance with EN ISO 2409 on the last page of this technical description).

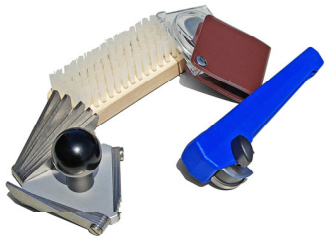


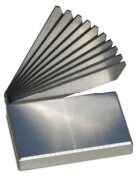
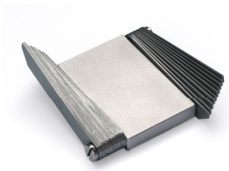




Please note:
All cutting head types are available as spares.

Order Informations		
Figure	**Ord.-No.**	**Description**
	0019.01.31	**Multi-Cross Cutter 295/I** with **6 edges**, **cutting distance 1 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.02.31	**Multi-Cross Cutter 295/II** with **6 edges**, **cutting distance 2 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.07.31	**Multi-Cross Cutter 295/VII** with **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
	0019.03.31	**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	**Ord.-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
	0019.05.31	**Multi-Cross Cutter 295/V,** with **11 edges**, **cutting distance 1 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.06.31	**Multi-Cross Cutter 295/VI,** with **11 edges**, **cutting distance 2 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.04.31	**Multi-Cross Cutter 295/IV,** with **2 edges**, **cutting distance 5 mm**, incl. magnifying glass, polyamide bristle brush and plastic case
	0019.14.31	**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	**Ord.-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 swivel-mounted folding rulers of 1 mm, 2 mm and 3 mm thickness each**, without Manufacturer's Test Certificate M
	0433.01.32	**Cutter (Spare Part)** for models 295/I and 295/IX
	0433.02.32	**Cutter (Spare Part)** for models 295/II and 295/X

Order Information		
Figure	**Ord.-No.**	**Description**
	0433.03.32	**Cutter (Spare Part)** for models 295/III, 295/XII and 295/XIII
	0433.04.32	**Cutter (Spare Part)** for model 295/IV
	0433.05.32	**Cutter (Spare Part)** for model 295/V
	0433.06.32	**Cutter (Spare Part)** for model 295/VI
	0433.07.32	**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.

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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/XIV 295/II, 295/X, 295/III, 295/XII, 295/XIII, 295/XIV
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/XIV 295/VII, 295/XI, 295/XII, 295/XIII, 295/XIV
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/XIV 295/IV, 295/III, 295/XII, 295/XIII, 295/XIV
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/XIV 295/II, 295/X, 295/III, 295/XII, 295/XIII, 295/XIV
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/XIV 295/II, 295/X, 295/III, 295/XII, 295/XIII, 295/XIV 295/VII, 295/XI, 295/XII, 295/XIII, 295/XIV
DBL 5416	not dependent on film thicknesses	6 x 1.5	295/XII, 295/XIV
ISO 2409-1972 BS 3900:E6 NF T 30-038 (all withdrawn)	to be specified by agreement	11 x 2	295/VI, 295/XIV

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 EM.

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; chipped surface not more than 5 % of the cross hatch cut's area.	1
	Loss of small coating material's flakes along the cuts' blades and/or at their intersections; chipped surface more than 5 % but not more than 15 % of the cross hatch cut's area.	2
	Loss of coating material's flakes along the cuts' blades and/or of squares (partly or wholly); chipped surface more than 15 % but not more than 35 % of the cross hatch cut's area.	3
	Loss of coating material's flakes along the cuts' blades and/or of squares (partly or wholly). chipped surface more than 35 % but not more than 65 % of the cross hatch cut's area.	4
	Coating material's loss of distinctly more than 65%, which cannot even be classified by classification "4".	5

Please also request our literature for the **CrossScan 295 XVI**. The Automatic Cross Hatch Cut Rating System with evaluation software determines the percentage (coating) material loss in the defined area of the cross hatch pattern and automatically assigns the corresponding cross hatch characteristic according to the standard.