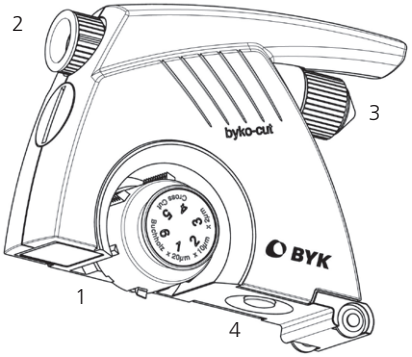
ENGLISH

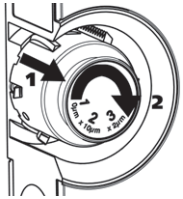
byko-cut universal

Instrument Description



1. Revolving head with cutters
2. Upper eyepiece to adjust the sharpness of the scale
3. Lower object lens to focus on the surface
4. Illumination switch

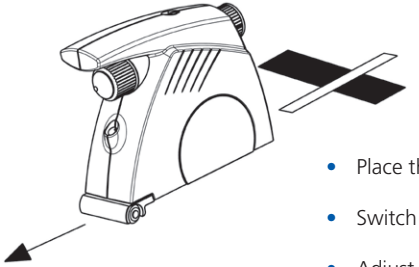
How to adjust the revolving head



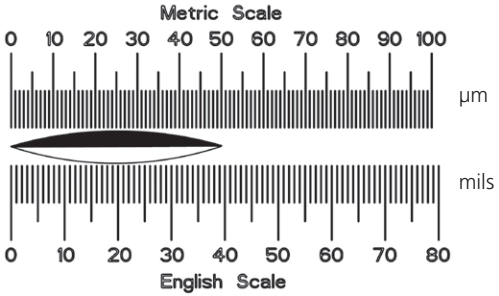
- Pull the revolving head out
- Turn the head to select appropriate cutter
- Release head to lock it

How to make the cut for Film Thickness

- Mark the surface and cut at a 90° angle to the marking



- Place the byko-cut on the cut
- Switch on illuminantion
- Adjust the microscope



Detailed operating manual for download from www.byk-instruments.com

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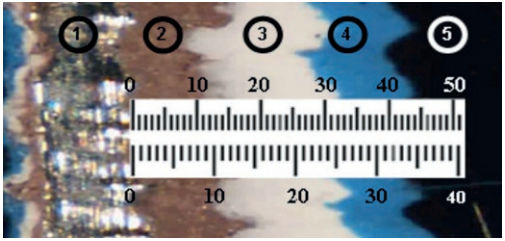
How to determine the total Film Thickness

- Align the 0-marking with the beginning of the 1st coating layer
- Count the line markings (see example)
- Multiply the number of line markings with the appropriate film thickness which equals one line marking (see tables below)

Example:

Multi-layer automotive coating system tested with cutter #3



		Metric Scale	
Cutter	**Cutting angle**	**Range**	**1 line marking**
1	45°	0 – 2000 µm	20 µm
2	26.5°	0 – 1000 µm	10 µm
3	5.8°	0 – 200 µm	2 µm

		Metric Scale
1	Substrate	0
2	E-Coat	~ 12 line x 2 µm = 24 µm
3	Primer	~ 20 line x 2 µm = 40 µm
4	Basecoat	~ 10 line x 2 µm = 20 µm
5	Black marker	
	Total Film Build	~ 84 µm

		English Scale	
Cutter	**Cutting angle**	**Range**	**1 line marking**
1	45°	0 – 80 mils	1 mils
2	26.5°	0 – 40 mils	0.5 mils
3	5.8°	0 – 8 mils	0.1 mils

		English Scale
1	Substrate	0
2	E-Coat	~ 10 line x 0.1 mils = 1 mils
3	Primer	~ 15 line x 0.1 mils = 1.5 mils
4	Basecoat	~ 8 line x 0.1 mils = 0.8 mils
5	Black marker	
	Total Film Build	~ 3.3 mils

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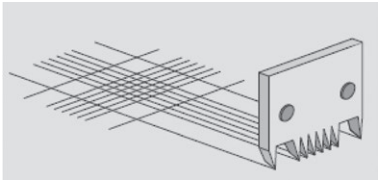
How to perform the Cross-Cut Test

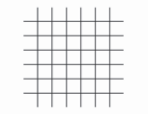
- Select the appropriate cross-cut tool based on the coating film thickness (see table)

Film Thickness	Cutter Spacing
0 – 60 µm	1 mm
60 – 120 µm	2 mm
> 120 µm	3 mm

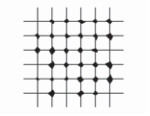


- Make a lattice pattern in the film with appropriate tool, cutting to the substrate
- Brush in diagonal direction 5 times each, using a brush pen or tape and remove with tape
- Examine the grid area using an illuminated magnifier

How to analyze the Cross-Cut Test



ISO Class: 0 / ASTM Class: 5B
- Edges of cut are completely smooth
- None of the squares of the lattice is detached



ISO Class: 1 / ASTM Class: 4B
- Detachment of small flakes at the intersection of the cuts
- Max. 5 % of the cross cut area is affected

ISO Class: 2 / ASTM Class: 3B
- Flaked along the edges and /or intersection of the cuts
- Affected cross-cut area: 5% - 15%

ISO Class: 3 / ASTM Class: 2B
- Squares are partly / wholly damaged
- Affected cross-cut area: 15% - 35 %

ISO Class: 4 / ASTM Class: 1B
- Squares partly / wholly detached
- Affected cross-cut area: 35% - 65 %

ISO Class: 5 / ASTM Class: 0B
- Any flaking worse than ISO 4 or ASTM 1B
- Affected cross-cut area > 65%

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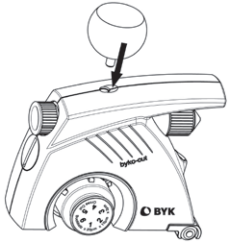
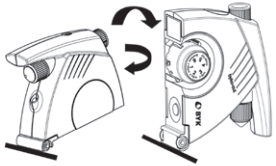
How to perform the Buchholz Indentation Test

- Select indentation tool on revolving head
- Place the slip-on weight on top of the instrument
- Place the byko-cut with slip-on weight on the surface for 30 sec.



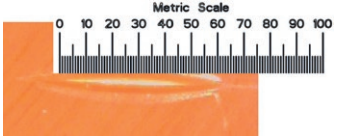
How to find the indentation mark

- Before lifting the byko-cut, mark the sample at the instrument wheels
- Set upright and turn it by 180° (see picture)



How to determine the Buchholz Indentation

- Adjust the microscope and count the markings



1 line marking = 0.02 mm
e.g. 50 line marks = 1 mm

INDENTATION LENGTH (mm)	INDENTATION RESISTANCE a_B	INDENTATION DEPTH (µm)	min. COATING THICKNESS (µm)
0,4	250,0	1	3
0,5	200,0	2	6
0,6	166,7	3	9
0,7	142,9	4	12
0,8	125,0	5	15
0,9	111,1	7	20
1,0	100,0	8	20
1,1	90,9	10	20
1,2	83,3	12	25
1,3	76,9	14	25
1,4	71,4	16	30
1,5	66,7	19	30
1,6	62,5	21	35
1,7	58,8	24	35
1,8	55,6	27	40
1,9	52,6	30	40
2,0	50,0	33	45

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