BYK

byko-cup M

Manual Cupping Tester

Operating Manual

A member of ALTANA

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1 Overview

Cat. No.: 5415

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https://www.byk-instruments.com

2 Safety Information

WARNING

The instrument must be securely positioned and fastened onto a level bench or table capable of supporting its weight.

DO NOT:

- Use the instrument near water.
- Clean the instrument with solvents (apart from the indenter and clamping system).
- Open the case. There are no user serviceable parts inside.
- Attempt to lift the instrument by the handles or panel clamping mechanism.
- Expose to; excessive heat or humidity, aggressive and/or solvent and/or corrosive substances, flammable substances, excessive vibration.

Defects and Extreme Usage

If safe operation can no longer be presumed, shut down the unit and secure it against unintended operation. The unit must be presumed unsafe to operate if:

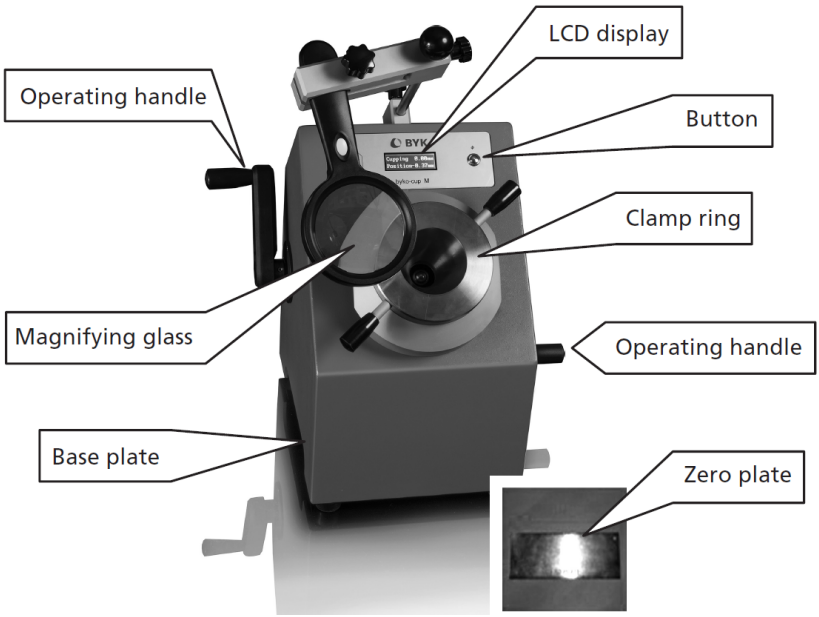
- It shows visible damage.
- It no longer operates.
- It has been stored for long periods under adverse conditions.
- It has received harsh treatment.

* This instrument complies with standard EN 61010-1:2010/A1:2019 Safety requirements for electrical equipment for measurement, control and laboratory use.

3 System Controls

The instrument consists of:

- Zero plate
- Clamp ring
- Operating handle
- Button
- LCD display
- Base plate
- Magnifying glass



4 System Description

The Cupping Tester was originally designed to assess the resistance of coatings of paints varnishes (and related products) to cracking and/or detachment from the substrate under different conditions of controlled deformation. The instrument has since been redesigned and now includes:

- 10:1 gear box for ease of use
- Double-handed operation
- Integral digital readout
- Zero retention at power-off
- Ergonomic design for ease of use and viewing of test
- 10x illuminated magnifier
- 20 mm range with 0.01 mm resolution
- 100 - 240 V AC power adapter with 5 V DC output via USB cable

The BYK-Gardner byko-cup M provides a means of carrying out such a test under precisely controlled conditions, resulting in repeatability of results.

* The machine meets the requirements specified in: BS 3900 E4, BS EN ISO 1520, DIN 53166, DIN 53232, JIS K5600-5-2 and JIS B7729.

5 System Startup

Unpacking

Carefully open the packaging, remove the smaller instruments before removing the instrument itself. Make sure all components in the component list are included.

Installation

* Prior to installation, keep in mind that the instrument must not be exposed to; excessive heat or humidity, aggressive or corrosive substances, .ammable substances, or excessive vibration.

1. Place the instrument on a firm, hard and level surface, strong enough to support its weight without significant vibration with adequate access to the front and sides.
2. The power adapter is supplied with plugs for various country requirements. Select the plug suitable for your requirements. Insert the power adapter into a suitable receptacle. power adapter requirements are 100 - 240 V AC. Use the provided cable. Plug the Micro USB connector into the receptacle on the rear panel.
3. Position the instrument with the LCD towards the operator, leaving sufficient room to operate the two handles without obstruction.
4. Unfold the two operating handles so they snap in place.
5. Slide off the battery cover on the magnifying glass. Insert the four AAA cells into the body (see battery orientation indicated on the cover).
6. The magnifier assembly is supplied separately. Slide the circular shaft through the clamp plate and tighten the clamping knob. Slide the shaft of the assembly into the receptacle on the instrument and tighten the clamp knob. Adjust to a position for optimum viewing of the sample.
7. Carefully install the two handles into the clamping ring. Turn the handles on the clamping ring counterclockwise to raise the clamping ring from the clamping surface. Rotate the operating handles counter-clockwise (as viewed from the right hand side of the instrument) to lower the hemispherical Indenter below the clamping surface.
8. The byko-cup M is now ready for use.

6 Operation

1. Power on the instrument with the switch located on the rear panel. Switch on the magnifier, if required.
2. Rotate the operating handles counter-clockwise (as viewed from the right-hand side of the instrument) to lower the hemispherical indenter just below the level of the bottom clamping ring.
3. Insert the zero plate and rotate the clamping ring clockwise to securely retain the plate.
4. Press and hold the button to zero the instrument's measurement system (zero position). The display will show:

Touch Zero Plate!
Then Press Button

Lightly hold one of the operating handles with two fingers and slowly turn the handle counterclockwise (as viewed from the right-hand side of the instrument) to raise the hemispherical indenter until a slight resistance is encountered. When this position is reached, stop turning; the indenter is now in contact with the underside of the test panel. Press the button once more to zero the instrument. The display will now show:

Cupping 0.00
Position 0.00

Cupping

The cupping display indicates indentation depth in millimeters.

Position

The position display indicates the indenter's position relative to the zero position.

Loosen the clamping ring by turning counterclockwise and remove the zero plate.

1. Carefully pass the prepared test panel (coated side facing upwards) through the slot (at 90° to the operator) so that the center of the indenter is at least 35 mm from the edge of the test panel.
2. Clamp the test panel in position by turning the handles on the clamping clockwise - hand force is sufficient.
3. There are two test methods. Choose one of the two procedures below.

Method A – Pass/Fail

A pre-determined depth of deformation is applied to the test panel in order to test for compliance to a specification. The test panel may or may not fail at the applied depth of deformation. Having set the zero position, turn both the handles (clockwise as viewed from the right-hand side of the instrument) to raise the indenter to the depth required as shown on the LCD.

Method B – Failure Point

The depth of test panel deformation is increased until the first moment cracking and/or detachment of the coating is observed; this marks the failure point, and no further deformation is required.

Observe the deformation with standard corrected vision or, by agreement, with the use of the magnifying lens. The turn rate may be reduced slightly (in order to assist observation) at the first sign of coating failure. Take the LCD cupping reading at the first failure point.

* For both methods turn the handle at a constant rate of 0.2 ±0.1 mm per second - i.e. at one revolution per second.

1. After completion, unclamp the sample (it will be necessary to allow the clamp-ring sufficient room for the indented dome to be removed).
2. Check for any detached coating on the instrument and remove these before starting another test.
3. Turn the handles in a counter-clockwise direction (as viewed from the right-hand side of the instrument) to lower the hemispherical indenter until 0.00 or less is shown on the LCD and then reverse direction until 0.00 is shown. The byko-cup M is now set at the zero position and is ready for the next test.
4. To conform to the standard, repeat the test on a new coated test panel, to confi rm the previous result. If the results differ significantly, further testing is required in order to obtain consistent readings.
5. Record the values, stating whether the results were obtained using standard corrected eyesight or by use of the magnifying glass.
6. Continue testing or switch off the instrument as required. Unplug the power supply if the instrument is not to be used for long periods.

Operation Notes

The instrument will accommodate panels with a maximum width of 100 mm.

Reference to the test method recommends the use of burnished steel panels with a width and length of at least 70 mm and a thickness range of 0.3 mm to 1.25 mm (maximum).

Do not exceed the above figures as this may cause permanent damage to the instrument.

Zero

All measurements are taken from the zero position (where the indenter is level with the base of the clamp area). It is not necessary to re-zero the zero position when power is switched off and on. However, large ambient temperature changes will affect the readings to a small extent, and it is good practice to regularly re-zero the instrument.

Power Off

Turn off the power using the switch on the back panel. The zero position will be stored during power off.

7 Maintenance

The frequency of regular maintenance depends on the degree of use, together with the thickness of the test panels used:

- Heavy use: Every 3 months
- Medium use: Every 6 months
- Low use: Eevery 12 months

1. Conduct a functional check to ensure that the clamp plate is free to rotate, treat the screw threads sparingly with light grease.
2. Turn the operating handles for complete travel of the indenter (nominally 20 mm). Ensure the movement is smooth and even.
3. Inspect the hemispherical indenter for any signs of wear, for example, flats on the surface. Replace if necessary.
4. Check the magnifying glass condition. Clean if necessary.
5. Inspect the batteries physical condition for leakage in the magnifying glass. Remove and replace if necessary.
6. Remove batteries if leakage occurs. Clean the housing and fit new batteries and re-check function.

* Remove the batteries from the magnifier if the byko-cup M is not to be used for prolonged periods.

Maintenance Schedule

Between tests

Clean the indenter and clamp system as necessary.

Daily

Check the zero-datum as required.

Yearly

Have the instrument serviced and calibrated by a trained and qualified service engineer.

Cleaning

Do not use solvent to clean the outer surfaces of the instrument. Use a damp cloth and mild detergent solution.

The clamp and indenter may be carefully clean with solvents if removed before cleaning.

* Do NOT apply a large side-force to the spindle when cleaning it.

8 Declarations

8.1 EU Declaration of Conformity

We,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declare, that the instrument **byko-cup M** complies with the requirements of the following EU directives:

- 2014/30/EU - Electromagnetic Compatibility (EMC)

The following harmonized standards were applied:

- EN 61010-1:2010/A1:2019 - Safety requirements for electrical equipment for measurement, control, and laboratory use
- EN IEC 61326-1:2021 - Electrical equipment for measurement, control, and laboratory use - EMC requirements

Geretsried, March 26, 2025

Dr. Jörg Krames

President • BYK-Gardner GmbH

8.2 UK Declaration of Conformity

Hereby,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declares, that the instrument **byko-cup M** complies with the requirements of the following UK directives:

- S.I. 2014/30/EU - Electromagnetic Compatibility (EMC)

The following harmonized standards were applied:

- EN 61010-1:2010/A1:2019 - Safety requirements
- EN IEC 61326-1:2021 - EMC requirements

Geretsried, March 26, 2025

Dr. Jörg Krames

President • BYK-Gardner GmbH

9 Ordering Information

byko-cup M
Cat. No. 5415

Complies with:
BS 3900, DIN 53166, DIN 53232, ISO 1520, JIS K 5600-5-2, JIS B 7729

Cat. No.	Description
5415	byko-cup M
5416	Zero Plate
5417	Magnifier
5418	Indenter

Service and Spare Parts

For all service and spare parts requirements please contact either:

BYK-Gardner USA
9104 Guilford Rd, Suite H
Columbia, MD 21046 USA
800-343-7721
301-483-6500

Or:

BYK-Gardner GmbH
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82538 Geretsried
Germany
0-800-4273637
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10 Technical Data

byko-cup M	
Weight	27.2 kg (60 lbs)
Height	500 mm (19.7 in)
Width	405 mm (15.9 in)
Depth	280 mm (11.0 in)
Spherical punch	20 mm (0.8 in)
Accuracy	+0.05 mm full range (+0.002 in full range)
Full travel	-0.5 - 20.5 mm (-0.02 - 0.81 in)
Gearing	1 revolution of handle moves punch 0.2 mm under load
Maximum panel thickness	Steel: 1.5 mm (0.06 in) Aluminium: 3.0 mm (0.12 in)
Operating temperature	15 - 35 °C (59 - 95 °F)
Power	5 V DC - 1000 mA

Notes

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Download your manuals from:
https://www.byk-instruments.com/p/5415

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