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Instruction manual

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ZCO 2410 Conical mandrel tester



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Exclusion of liability

The figures and descriptions as well as the technical data correspond to the present operating instructions at the time of printing. Changes of any type, resulting from technical progress, modified design or similar, are reserved. The operating instructions have been prepared with the greatest care. Nevertheless, errors cannot be completely excluded. The manufacturer cannot be made liable for any errors in these operating instructions and possible damage resulting from these.

The manufacturer is always grateful for suggestions, proposals for improvement and indications of errors.

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1. Description of device

1.1 Summary

The ZCO 2410 Conical mandrel tester is used for the determination of the flexibility, adhesion and elongation of a coating of paint, varnish or related product and its resistance to cracking and or detachment from a substrate at bending stress.

Test panels will be bend over a cone through 180° and examined afterwards.

Application / application areas:

- Laboratory test apparatus for the paint industry as well as the manufacturing industry
- practically applicable to all single and multi-coat systems on test panels
- for quality control and experimental purposes

In particular, this apparatus has the following **features**:

- Safe and easy clamping of the test panels with only one screw for fastening
- Big clamping range for test panels with thicknesses up to 4 mm
- Robust design, no corrosion
- No maintenance necessary
- Easy to handle

2. Safety notes

2.1 Dangers




Attention!

This note is included in this instruction manual wherever it is warned about dangers which will arise to life and limb of persons 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 these instruction manual the generally applicable safety instructions and regulations for prevention of accidents have to be taken into account.

Caution

This note comprises instructions to be observed in order to comply with guidelines, instructions, notes and the proper procedure of the work, and to avoid damaging or destruction of the apparatus.

2.2 Safety notes

-  The conical mandrel tester ZCO 2410 is exclusively intended for the determination of flexibility, adhesion and elongation of paint applied to test panels. Any other use is considered as being not in accordance with the intentions of the manufacturer. For damages resulting thereof the manufacturer is not liable; the risk for this is taken by the user alone.
-  Reconstruction without permission and modifications of the ZCO 2410 are not permitted. Please use only the accessories available together with the apparatus. For damages resulting from the non-observance of the safety notes the manufacturer is not liable; the risk for this is taken by the user alone.
-  All maintenance and repair work which is not explicitly permitted and described in the present instruction manual shall only be carried out by **Zehntner GmbH Testing Instruments** or your authorized ZEHNTNER trader, otherwise all the guarantee and liability claims will expire.

3. Delivery of device

3.1 Damages during carriage

During carriage the ZCO 2410 is to be handled with the usual care. To ensure carriage without damages the device is to be transported in the original packaging and under normal freight conditions. Pushes during carriage are to be avoided.

At the destination take out the device of the packaging and check immediately for any damages from the transport; if there are any damages your authorized ZEHNTNER trader or **Zehntner GmbH Testing Instruments** directly should be informed immediately.

3.2 Extent of delivery

The following parts are included in the delivery:

- 1 ZCO 2410 Conical mandrel tester
- 1 certificate of manufacturer

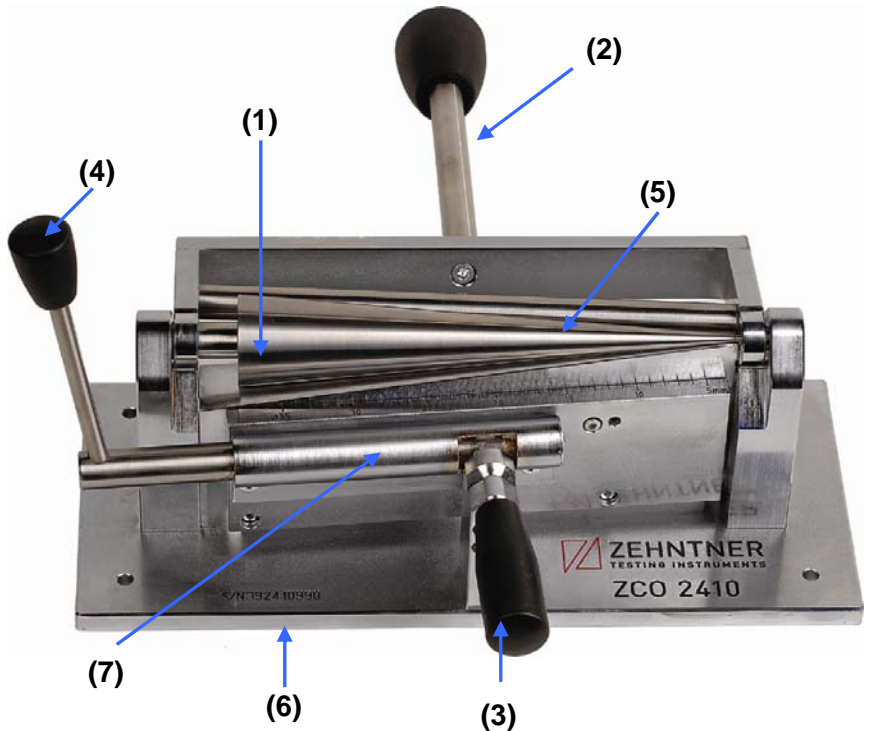
3.3 Optional accessories

- Zehntner applicators
- ZCO 2410 Conical mandrel tester with scale graduated in inches

! **Zehntner GmbH Testing Instruments** refuses all warranty and liability claims for damages caused by usage of the ZCO 2410 in combination with **non-original accessories**, or accessories from 3rd party suppliers.

4. Outline of the instrument

4.1 Abridged survey



Key:

- (1) Cone
- (2) Bending lever
- (3) Set screw for fastening
- (4) Clamping lever
- (5) Bending roll
- (6) Base plate
- (7) Scale

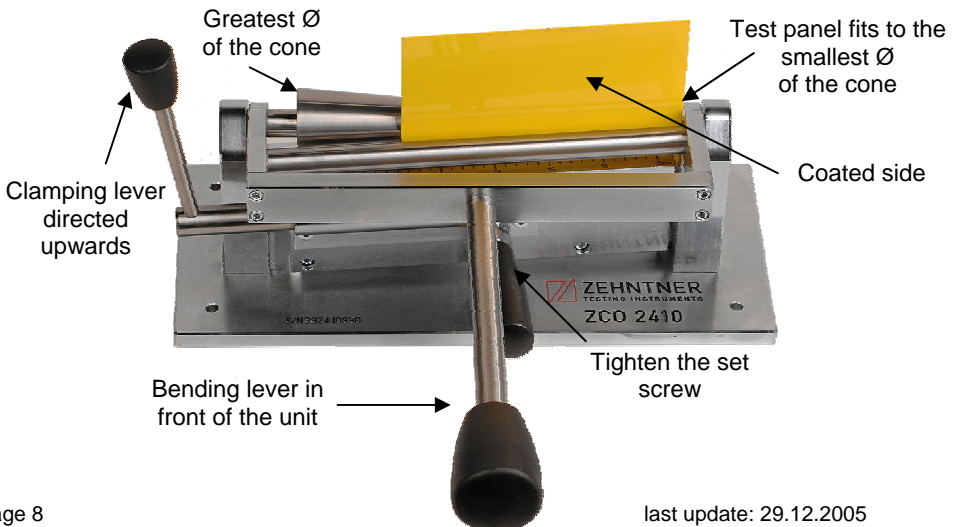
5. Handling

5.1 Assembly

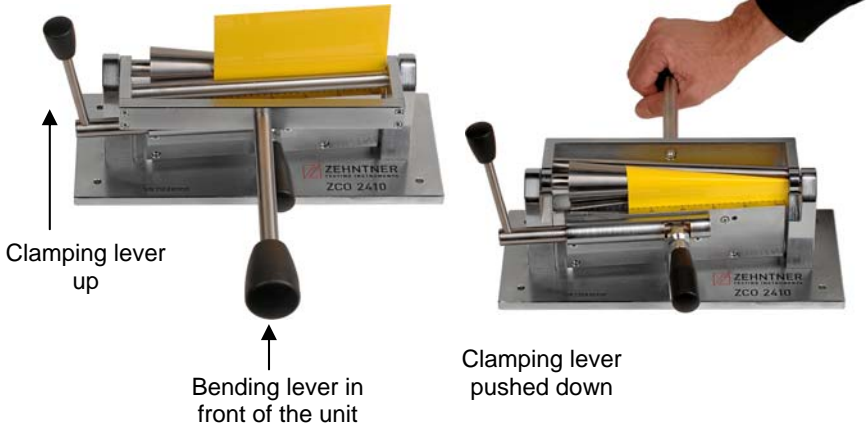
Fasten the ZCO 2410 Conical mandrel tester with 4 screws M6 (\varnothing 6 mm) onto the bench.

5.2 Bending procedure

- Unless otherwise specified, prepare the test panels in accordance with DIN EN ISO 6860
- Carry out the determination at least in triplicate:
 - for the bending test the ZCO 2410 Conical mandrel tester is to be mounted onto a bench.
- Insert the test panel into the ZCO 2410 Conical mandrel tester:
 - for this, the bending lever shall lie before the ZCO 2410 Conical mandrel tester, the clamping lever shall be directed upwards;
 - a sheet of paper may be inserted over the coated surface between the test panel and the bending roll to prevent the coating being damaged by the bending roll during the bending operation
 - the coated side shall be towards the bending roll;
 - the rolling direction of test panels made of aluminium shall be at an angle of 90° to the axis of the cone;
 - if applied by brushing, any brush marks shall be at an angle of 90° to the axis of the cone
 - the test panel shall fit at the end of the smaller diameter of the cone



- Clamp the test panel tightly:
 - tighten the set screw;
 - push the clamping lever downward;
 - check if the test panel is clamped tightly.



- Bend the test panel evenly and without jerking over the cone through 180° in a period of 2 to 3 seconds.
- Mark the end of the crack that is furthest from the small end of the cone;
- Read off the cone diameter at the end of the crack.
- Release the test panel from the ZCO 2410 Conical mandrel tester and examine it.



5.3 Examination of the test plates

- Immediately examine the coating for cracking and/or detachment from the substrate, using a lens of x10 magnification and sufficient light or, if agreed between the interested parties, examine the coating visually.
- Measure the length of the crack along the panel from the small end of the cone to the marked end of the crack in centimetres.
- Calculate the mean value of the three determinations and report the result to the nearest centimetre.
- Calculate the elongation of the coating by using the cone diameter
- Prepare a test report.

6. Maintenance and cleaning

6.1 Cleaning of the device

Clean the ZCO 2410 Conical mandrel tester by a clean, soft and dry towel.
Do not use cleaning agents for glass, benzine, acetone, diluent for cellulose lacquers and strongly acidic or alkaline liquids.

7. Technical data

Material	Cone: stainless steel Remaing parts: chromium-plated steel
Dimensions (LxHxW):	324 mm x 140 mm x 10 mm Cone: length 203 mm, greatest Ø 38 mm, smallest Ø 3,1 mm
Test panel:	Length: 200 mm at maximum Width: 130 mm at maximum Thickness: max 1 mm at steel, max 2 mm at aluminium, max 4 mm at materials with less bending stress than aluminium
Weight:	10,7 kg
Standards:	ASTM D 522, DIN EN ISO 6860:2004-12, FTMS 141a Method 6222, Method 6223
Warranty:	2 years

Glossary

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