

Elcometer 106 Scale 6

**Coatings on Concrete
Adhesion Tester
and
Concrete Tensile Strength Tester
Operating Instructions**

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A Material Safety Data Sheet for the araldite epoxy adhesive supplied with the Elcometer 106 Scale 6 and available as an accessory is available to download via our website:

www.elcometer.com/images/MSDS/araldite_epoxy_adhesive.pdf

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A copy of this Instruction Manual is available for download on our Website via www.elcometer.com.

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Thank you for your purchase of this Elcometer 106 Scale 6 Adhesion Tester. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of inspection equipment for concrete and coatings. Our concrete inspection products include a comprehensive range of concrete, and civil engineering inspection equipment. Our coatings products cover all aspects of coating inspection, from development through application to post application inspection.

This Elcometer 106 Scale 6 Adhesion Tester is a world beating product. With the purchase of this product you now have access to the worldwide service and support network of Elcometer. For more information visit our website at www.elcometer.com

1 ABOUT YOUR GAUGE

The Elcometer 106 Scale 6 Adhesion Tester is designed to determine the bond strength of coatings applied to concrete surfaces. It will also test the tensile strength of hardened concrete on site.

The Adhesion Tester employs a pull-off method to determine the force required to pull a test dolly of fixed area of coating away from the concrete.

The surface under examination is prepared and then a test dolly with a diameter of 50.8 mm (2") is attached by adhesive. When the adhesive is cured the Adhesion Tester claw is engaged onto the dolly and a force is applied. The resulting stress is recorded by means of a dragging indicator on an engraved scale.

There are five other models of the Elcometer 106 Adhesion Tester and these are designed for measuring the bond strength of coatings applied to a wide range of materials using a 20 mm diameter dolly.

Users of this Adhesion Tester may also benefit from other Elcometer Concrete Inspection Equipment - see "Related equipment" on page 11.

1.1 STANDARDS

The Elcometer 106-6 can be used in accordance with the following National and International Standards : ASTM D 7234, BS 1881-207, EN1542, EN 12636.

1.2 CHECKING THE CONTENTS OF THE BOX

- Elcometer 106 Scale 6 Adhesion Tester
- Dollies, 50.8mm (2"), 5x
- Base Support Ring
- Pack of Adhesive
- Ratchet Spanner
- Carrying Case
- Operating Instructions

The Elcometer 106 Scale 6 Adhesion Tester is packed in a cardboard and foam package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

To maximise the benefits of this instrument please take some time to read these Operating Instructions. Do not hesitate to contact Elcometer or your Elcometer supplier if you have any questions.

2 TEST PROCEDURE

2.1 SCORE THE COATING

Scoring of the coating down to, or just into, the surface of the concrete may be required by standard test methods.

To score coatings thicker than 0.5 mm (20 mils) use a diamond tipped core bit with an internal diameter of 50.8 mm (2") mounted in a drill press or hand drill. Ensure that the scoring is normal (perpendicular) to the coating and that the test area is not subjected to twisting or torque. To minimise heat and suppress dust, water lubrication may be required.

To score coatings thinner than 0.5 mm (20 mils), a sharp knife may be sufficient to score around the dolly once it has been secured in place by adhesive.

2.2 SECURE THE DOLLY

The surface of the dolly and the test area should be abraded and be free from oil, moisture and dust to ensure a good bond between the dolly face and the coating.

1. Prepare the surface of the dolly and the coating where the dolly is to be applied by roughening with an abrasive paper. Then de-grease these areas by using a suitable solvent to clean both surfaces.
2. Mix a small quantity of adhesive and apply an even film to the prepared surface of the dolly.
3. Place the dolly onto the prepared test surface and apply pressure to squeeze out excess adhesive which should then be removed. Allow the adhesive to cure for the recommended time - see "Adhesives" on page 6.

Dollies can be re-used after cleaning. Additional dollies are available from your local Elcometer supplier or direct from Elcometer - see "Spares" on page 10.

2.3 APPLY LOAD TO DOLLY

1. Place the base support ring over the dolly ensuring that it lies flat on the surface.
2. Slacken the nut on the Adhesion Tester. Set the dragging indicator to zero (0) on the scale and carefully engage the claw with the dolly.
3. Hold the Adhesion Tester steady with one hand to prevent rotation and tighten the nut with the wrench slowly and evenly to apply an increasing force to the dolly and hence stress to the coating. Continue until the dolly is removed from the surface, or until the specified stress is reached. The value is read from the position of the dragging indicator after the test is complete.

According to Standards, the load should be applied uniformly. The wrench should be rotated without stopping. Calculate the time the stress should be increased over and practice before testing. This table shows how many seconds each turn should take. Some Standards allow a slower rate (more seconds) up to a maximum time.

Elcometer 106			Stress Rate, s/turn (See Standard)			
Scale	Max MPa	MPa/turn	1MPa/s	0.2MPa/s	0.05MPa/s	0.035MPa/s
6	3.5	0.40	0.4	2.0	8	11.4



There will be a loud bang and the Adhesion Tester may jump up a few centimetres as the dolly and coating detach and the energy in the tester is released. For personal safety it is recommended that the operator does not lean over the Adhesion Tester during use.

4. Immediately after the test is complete and the stress has been recorded, slacken the nut by reversing the wrench to remove all the force from the unit.

2.4 ASSESSMENT OF RESULTS

To record the result, first inspect the face of the dolly. In most cases the coating will fully adhere to the dolly and the test can be claimed as 100% valid. In some cases, the coating will cover only part of the area of the dolly and a partial adhesion failure should be recorded.

If no coating is present on the dolly this must be recorded as a failure of the adhesive (or glue). This is normally due to incorrect or insufficient mixing of the component parts of the adhesive, incompatibility of the adhesive and the coating, or incorrect ambient conditions.

When testing coatings on concrete it is common for the adhesive bond between the coating and the concrete to exceed the strength of the concrete itself. In this case concrete will be removed from the surface and will be seen on the coating on the dolly face.

Observing the test area will give additional information about the type of failure; adhesion and cohesion between different layers of the coating or concrete.

3 ADHESIVES

3.1 ARALDITE

The adhesive supplied with the Elcometer 106 Scale 6 is Araldite, a two-pack epoxy paste which is mixed from approximately equal volumes of the two components. Measurement by eye is sufficient. When mixed it should be used within one hour.

Curing Times:

- 24 hours at 25°C
- 3 hours at 60°C

Araldite is suitable for warm and hot environments. Lower temperatures can require extended curing times of up to 3 days or more.

The expiry date of the adhesive should be checked before use. Adhesive which has expired should not be used. Spare packs of Araldite are available from your local Elcometer supplier or direct from Elcometer - see "Spares" on page 10.

3.2 RAPID ARALDITE

Rapid Araldite is a fast setting two-pack epoxy paste. It should be mixed for 30 seconds and used within 2 minutes.

Curing Times:

- 8 hours at 0°C
- 4 hours at 10°C
- 2 hours at 23°C
- 1.5 hours at 40°C

Rapid Araldite is suitable for cold and warm environments.

3.3 OTHER ADHESIVES

Other adhesives include acrylic types with much faster setting times. **Loctite Multibond** is well suited for low temperature and cures fully in 24 hours. **Scotch-weld M2000** will reach a high strength after 30 minutes.

The User should determine the suitability of any adhesive. Some types of adhesive can adversely affect the test area. Coating environments, solvents, etc. can contaminate some adhesives.

3.4 DISPOSAL OF ADHESIVE

The adhesive supplied with this product must be disposed of as special waste unless it has been fully cured. To dispose of excess adhesive at the end of its shelf life simply mix the remaining material and allow it to cure before disposal.

For further guidance on the disposal of adhesives contact your local environmental authority.

4 STORAGE AND TRANSIT

Store the Elcometer 106 Adhesion Tester in its case when it is not being used and during transit.

5 MAINTENANCE

The Elcometer 106 Scale 6 Adhesion Tester is designed to give many years reliable service under normal operating and storage conditions.

REGULAR MAINTENANCE

Lubricate the screw threads with light machine oil on a regular basis.

PULL-OFF FORCE

The pull-off force is provided by the progressive compression of Belleville washers.

After considerable heavy use the washers may age and no longer have their original characteristics. The washers may also become distorted and permanently damaged if the tester is tightened fully, beyond the length of the engraved scale on the barrel.

In this instance the force recorded by the tester should be checked and, if necessary, the tester should be returned to Elcometer for fitting of a new set of Belleville washers and re calibration.

CALIBRATION

Calibration checks to ensure that the correct load is being applied to the dolly will be required periodically. Elcometer can carry this out and a calibration certificate traceable to national standards can be issued, by contacting Elcometer, your local Elcometer supplier, or visit www.elcometer.com.

6 TECHNICAL SPECIFICATION

GAUGE

Range:	0 MPa to 3.5 MPa (0 PSI to 500 PSI)
Accuracy:	±15% of reading
Height:	208 mm (8.2")
Diameter:	103 mm (4.1") including legs
Net Weight:	2 kg (4.4 lb)
Gross Weight:	5 kg (11 lb) (including case and accessories)
Material:	Body and barrel - Anodised aluminium Feet and Belleville washers - Steel

TEST DOLLY

Diameter:	50.8 mm (2")
Material:	High-tensile aluminium
Adhesive:	Araldite, two-pack epoxy resin

CARRYING CASE

Dimensions: 505 mm x 370 mm x 120 mm (19.9" x 14.6" x 4.7")

Material: Polypropylene

7 SPARES

The following spare parts for the gauge are available from your local Elcometer supplier or direct from Elcometer.

Description	Sales Part No.
Dollies (Pack of 5):	T10618570
Pack of Araldite adhesive:	T99912906
Base Support Ring:	T10618973
Ratchet Spanner:	T1061585
Carrying Case:	T10616944

8 RELATED EQUIPMENT

Elcometer produces a wide range of Concrete Inspection Equipment. Users of the Elcometer 106 Scale 6 Adhesion Tester for Concrete may also benefit from the following Elcometer products:

- Elcometer Concrete Crack Microscope
- Elcometer High Voltage DC Holiday Detector
- Elcometer Crack Width Ruler
- Elcometer Rebar Locators
- Elcometer Concrete Covermeters
- Elcometer Salt Detection Systems

For further information contact Elcometer, your Elcometer supplier or visit www.elcometer.com