

# **Elcometer 1800**

## **Specific Gravity Cup (Densimeter) (Picnometer or Pyknometer)**

### **Operating Instructions**

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Thank you for your purchase of this Elcometer 1800 Specific Gravity Cup. Welcome to Elcometer.

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

This Elcometer 1800 Specific Gravity Cup 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](http://www.elcometer.com)

## **1 ABOUT THIS INSTRUMENT**

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The Elcometer 1800 Specific Gravity Cup is a simple but effective instrument used to determine the density of paints and similar low or medium viscosity fluids. The instrument is sometimes known as a Densimeter, Picnometer or Pyknometer.

The instrument consists of a cylindrical container and a lid. The lid has a small hole at its centre through which excess air and liquid can escape.

The instrument allows the mass of a known volume of liquid to be measured and its density (or specific gravity) to be calculated.

## 1.1 FEATURES

- Simple to use.
- Stainless steel construction.
- Available in 2 sizes

## 1.2 STANDARDS

Your Elcometer 1800 Specific Gravity Cup can be used in accordance with the following National and International Standards.

ASTM D 1475 supersedes: FTMS 141 4184; ISO 2811-1 supersedes; NF T30-020; NBN T22-110; DIN 53217-2; ASTM D891-B supersedes: FTMS 141 4183; JIS K 5600-2-4.

## 1.3 WHAT THE BOX CONTAINS

- Elcometer 1800 Specific Gravity Cup
- Storage case
- Operating instructions

The Elcometer 1800 Specific Gravity Cup 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.



## 2 MEASURING THE DENSITY OF A LIQUID

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Take care to avoid damaging your Elcometer 1800 Specific Gravity Cup. Deformation or other damage to the cup or lid will affect the calibration

### 2.1 BEFORE YOU START

- Ensure that your Elcometer 1800 Specific Gravity Cup is calibrated<sup>a</sup>, clean and dry.

### 2.2 PROCEDURE

1. Place the cup and the lid on the weighing machine and record the total mass ( $m_1$ ).
2. Place the cup on a level surface and fill with the liquid. Stop when the liquid is 1 mm to 2 mm (1/16") from the rim of the cup.



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a. A calibrated certificate is available at the time of ordering. Calibration can be checked at any time by measuring the density of distilled water - see '4 Maintenance' on page 7.

3. Lower the lid slowly and very gently onto the cup.



4. Use a tissue to remove liquid which escapes from the hole in the lid.

5. Place the cup in a constant temperature bath ASTM: 25°C; ISO: 23°C for approximately 30 minutes to allow the temperature of the liquid inside to stabilise.

6. Use a tissue to remove any additional liquid which has escaped from the hole in the lid. Do not touch the cup with fingers.

7. Take the cup out of the bath and dry it, taking care not to spill any liquid.

8. Quickly place the cup on the weighing machine and record the total mass of the cup, the lid and the liquid ( $m_2$ ).

9. Calculate the density of the liquid using the test method ISO 2811-1

$$D = (m_2 - m_1) / \text{volume}$$

Where  $D$  = Density in  $\text{mg}/\text{cm}^3(\text{cc})$ ;  $m_1$   $m_2$  = mass in g; volume = cup volume in  $\text{cm}^3(\text{cc})$  (see section 3 **CALIBRATION** on page 6).

10. Calculate the density of the liquid using the test method ASTM D1475

$$D = (m_2 - m_1) 8.3454 / \text{volume}$$

Where  $D$  = Density in  $\text{lb}/\text{gal}$ ;  $m_1$   $m_2$  = mass in g; volume = cup volume in ml



## 2.3 SPECIFIC GRAVITY

If the specific gravity (relative density) of the liquid is required, divide the density of the liquid obtained in page 5 by the density of distilled water at 23 or 25°C.

## 2.4 AFTER THE TEST

Always clean the instrument thoroughly after a test.



Do not use wire brushes, metal scrapers, metal files or other metallic tools for cleaning.



Clean the cup and lid using a suitable solvent only.

After cleaning, ensure that all materials are removed and that the instrument is dry.

## 3 CALIBRATION

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Follow the instructions given in “Measuring the density of a liquid” on page 4 to determine the mass of grade 2 purity (ISO 3696) or Type II (ASTM D 1193) water.

Calculate the volume<sup>b</sup> of the cup using the following equation:

$$V \text{ (ASTM)} = (m_2 - m_1)/0.9970, \text{ OR}$$

$$V \text{ (ISO)} = (m_2 - m_1) \times 1.00356$$

See Standards for details.

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- b. The value for density is not corrected for air buoyancy because the correction value is negligible in relation to the precision of the test method.



## 4 MAINTENANCE

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The Elcometer 1800 Specific Gravity Cup is designed to give many years reliable service under normal operating and storage conditions.

Regular calibration checks over the life of the instrument are a requirement of quality management procedures e.g. ISO 9000 and other standards.

To check for accuracy, use the instructions given in sections 2 and 3 to measure the density of distilled water at 23°C (or 25°C). If the cup is accurate, the measured density should be equal to density of water which at 23°C = 0.9975 g/ml and at 25°C = 0.9970 g/ml.

## 5 TECHNICAL SPECIFICATION

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Material:	Stainless Steel
Operating temperature:	ASTM = 25°C; ISO = 23°C
Accuracy:	± 0.005 ml

## 6 ELCOMETER 1800 RANGE

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<b>Model</b>	<b>Type/Material</b>	<b>Capacity</b>	<b>Unit</b>	<b>Part Number</b>
Elcometer 1800/1	Stainless steel	50 ml	Metric	K0001800M001
Elcometer 1800/2	Stainless steel <sup>a</sup>	50 ml	Metric	K0001800M002
Elcometer 1800/5	Stainless steel	100 ml	Metric	K0001800M005
Elcometer 1800/6	Stainless steel <sup>a</sup>	100 ml	Metric	K0001800M006

a. Includes Test Certificate

## 7 RELATED EQUIPMENT

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In addition to the Elcometer 1800 Specific Gravity Cup, Elcometer produces a wide range of other coating testing equipment.

Users of the Elcometer 1800 Specific Gravity Cup may also benefit from the following Elcometer products:

- Elcometer Digital Thermometers
- Elcometer Laboratory Scales
- Elcometer Fineness of Grind Gauges
- Elcometer Viscosity Meters
- Elcometer Flash Point Testers
- Elcometer Film Applicators

For further information contact Elcometer or your local supplier.

Details of Elcometer offices around the world are given on the outside cover of these operating instructions. Alternatively visit the Elcometer website, [www.elcometer.com](http://www.elcometer.com).