English

Elcometer
2350 · 2351
2352 · 2353 · 2354

Viscosity Cup

Operating Instructions

elcometer

English

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Doc.No. TMA-0318 Issue 05
Text with Cover No: 19334

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Thank you for your purchase of this Elcometer Viscosity 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 Viscosity Cup is a world beating product. With the purchase of this Viscosity Cup 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 VISCOSITY CUP

Elcometer Viscosity Cups are easy-to-use gauges for measurement of viscosity of liquids.

The cup is supported in a stand and is filled with the liquid to be measured. The time taken for the liquid to drain through an orifice in the bottom of the cup is measured.

The measured kinematic viscosity is generally expressed in seconds (s) flow time, which can be converted to Centistokes (cSt).

A wide range of cups with different orifices is available for measurements between 5 cSt and 5100 cSt.

1.1 THESE INSTRUCTIONS

These instructions describe the operation of the following Elcometer Viscosity Cups:

Elcometer 2350: DIN

Elcometer 2351: FORD ASTM

Elcometer 2352: AFNOR NFT

Elcometer 2353: ISO, DIN, NF, NBN, ASTM

Elcometer 2354: BS

1.2 STANDARDS

The Elcometer Viscosity Cups can be used in accordance with a wide range of National and International Standards.

For full details of which standards are appropriate see “Elcometer viscosity cups” on page 12.

1.3 WHAT THE BOX CONTAINS

- Elcometer Viscosity Cup
- Operating instructions
- Storage case

The Elcometer Viscosity 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.

1.4 CAUTION

Take care to avoid damaging your viscosity cup. Damage to the orifice, scratches on the internal surface or deformation of the cup will affect the readings and the gauge may have to be replaced.

2 TAKING A READING

2.1 BEFORE YOU START

- Select a cup which gives a flow time of between 30 seconds and 100 seconds.
- Ensure the cup and the orifice are clean and free of debris.
- The liquid being tested must be homogeneous and must not contain any bubbles. Use freshly strained samples only.
- The liquid being tested must be newtonian.

  To determine whether a liquid is newtonian, carry out the following measurements using the instructions given in “Test procedure” on page 5:

  - Fill the cup and measure flow time immediately after filling.
  - Fill the cup, wait one minute, then measure flow time.

  If the difference between the two flow times is greater than 10%, the liquid is considered to be non-newtonian and cannot be tested using the Viscosity Cup.
- Measure and record the temperature of the liquid.

2.2 TEST PROCEDURE

1. Place the cup into the stand and level the cup using the glass plate and bubble level supplied with the stand.

2. Allow the temperature of the cup and the sample to stabilise at the agreed temperature. Check the temperature of the sample before filling[a].

3. Place a finger over the cup orifice to close the orifice.
4. Pour the liquid gently into the cup, avoiding the formation of air bubbles.

a. If the test environment is not temperature stabilised, use a double wall jacket - see “Accessories” on page 9.

5. Slide the glass plate over the rim of the cup to remove excess sample. Avoid the formation of air bubbles between the glass plate and the liquid.

6. Remove finger from cup orifice and wait for a few minutes to allow any air bubbles to rise to the top of the liquid.

7. Remove the glass plate and start the stopwatch.

8. Watch the flow of liquid from the orifice and stop the stopwatch the moment the flow breaks.
9. Repeat the test.
10. If the test results do not differ by more than 5%, calculate the average of the two test results and record the result.

The measured kinematic viscosity is generally expressed in seconds (s) flow time, which can be converted to Centistokes (cSt). To convert, use the Elcometer 2400 Viscosity Disc - see “Related equipment” on page 10.

Viscosity Disc

2.3 AFTER THE TEST

Clean the gauge and all equipment.

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

✔ Clean the gauge and all equipment using a suitable solvent.

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

3 STORAGE

Always store the gauge in its case.

4 TECHNICAL SPECIFICATION

Body: Anodised aluminium

Orifice: Stainless steel

	2350 - DIN4	2351 - ASTM	2353 - ISO	2354 - BS
Accuracy	3%	10%	3%	2.5%

5 MAINTENANCE

Elcometer Viscosity Cups are designed to give many years reliable service under normal operating and storage conditions.

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

To check for wear, use Elcometer 2410 Viscosity Standard Oils[b] in place of your liquid and measure the flow time. If wear is detected, contact Elcometer or your local Elcometer 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

b. See “Viscosity standard oils” on page 11 for ordering information.

6 ACCESSORIES

Stand (with bubble level and glass): KT002400N001

Stand, double wall jacket (with bubble level and glass): KT002400N002

Double wall jacket

Bubble level: KT002400P001

Glass plate: KT002400P999

7 CERTIFICATION

Elcometer Viscosity Cups are supplied with a Batch Calibration Certificate as standard. Individual Calibration Certificates are available but must be requested at the time of order as they can not be issued retrospectively.

8 RELATED EQUIPMENT

In addition to Viscosity Cups, Elcometer produces a wide range of other equipment for measuring the physical characteristics of surface coatings. Users of the Elcometer Viscosity Cups may also benefit from the following Elcometer products:

- Elcometer 2410 Viscosity Standard Oils for Calibration
- Elcometer 2400 Viscosity Disc
- Elcometer 7300 Digital Stopwatch
- Elcometer 212/213 Digital Thermometer

For further information contact Elcometer, your local supplier, or visit our website at www.elcometer.com

9 VISCOSITY STANDARD OILS

Part Number	Range at 25° C (77°F)	Cup Type	Cup No.	Model	Orifice Diameter
K0002410M022	60 - 120cSt	DIN Flow Cup	4	Elcometer 2350/2	4mm
K0002410M023	100 - 230cSt	DIN Flow Cup	4	Elcometer 2350/2	4mm
K0002410M024	200 - 460cSt	DIN Flow Cup	4	Elcometer 2350/2	4mm
K0002410M021	20 - 34cSt	ASTM/Ford Flow Cup	2	Elcometer 2351/2	2.53mm
K0002410M022	60 - 120cSt	ASTM/Ford Flow Cup	3	Elcometer 2351/3	3.4mm
K0002410M023	100 - 230cSt	ASTM/Ford Flow Cup	4	Elcometer 2351/4	4.12mm
K0002410M021	20 - 34cSt	ISO Flow Cup	3	Elcometer 2353/1	3mm
K0002410M022	60 - 120cSt	ISO Flow Cup	4	Elcometer 2353/2	4mm
K0002410M023	100 - 230cSt	ISO Flow Cup	6	Elcometer 2353/4	6mm
K0002410M024	200 - 460cSt	ISO Flow Cup	6	Elcometer 2353/4	6mm

10 ELCOMETER VISCOSITY CUPS

Elcometer model	Cup number	Applicable standards	Range (cSt)	Part Number	
				Without Calibration Certificate	With Calibration Certificate
2350/1	2	-	-	K0002350M001	K0002350M001C‡‡
2350/2	4	DIN 53211	96 - 683	K0002350M002	K0002350M002C‡
2350/3	6	-	-	K0002350M003	K0002350M003C‡‡
2350/4	8	-	-	K0002350M004	K0002350M004C‡‡
2351/1	1	ASTM D1200	10 - 35	K0002351M001	K0002351M001C‡
2351/2	2		25 - 120	K0002351M002	K0002351M002C‡
2351/3	3		49 - 220	K0002351M003	K0002351M003C‡
2351/4	4		70 - 370	K0002351M004	K0002351M004C‡
2351/5	5		200 - 1200	K0002351M005	K0002351M005C‡
2352/1	2.5	NF T30-014	5 - 140	K0002352M001	K0002352M001C‡‡
2352/2	4		50 - 1100	K0002352M002	K0002352M002C‡‡
2352/3	6		510 - 5100	K0002352M003	K0002352M003C‡‡
2353/1	3	ISO 2431[a]	7 - 42	K0002353M001	K0002353M001C‡
2353/2	4	ASTM D 5125	34 - 135	K0002353M002	K0002353M002C‡
2353/3	5		91 - 326	K0002353M003	K0002353M003C‡
2353/4	6		188 - 684	K0002353M004	K0002353M004C‡
2353/5	8	-	-	K0002353M005	K0002353M005C‡‡
2354/1	2	BS 3900 A6:1971	-	K0002354M001	K0002354M001C‡‡
2354/2	3	AS/NZS 1580.214.2	-	K0002354M002	K0002354M002C‡‡
2354/3	4	(Cup 4 only)	-	K0002354M003	K0002354M003C‡‡
2354/4	5		-	K0002354M004	K0002354M004C‡‡
2354/5	6		-	K0002354M005	K0002354M005C‡‡

a. ISO 2431 supersedes DIN 53224 NF T30-070, EN 535, NBN T22-108 ‡ Efflux Time Certificate ‡‡ Dimensional Certificate