

How to measure viscosity using Elcometer Dip Cups

When measuring the viscosity of a liquid, it is a common misconception that you are measuring how thick or thin a liquid is. What you are really measuring is the resistance a fluid has to flow.

You could be testing paint viscosity, to ensure it will work in a spray gun or stick properly to a substrate. Or testing oils at different temperatures to ensure they will perform properly in a vehicle. You could even be testing food items such as chocolate or sauces, to ensure they are the right consistency.

There are a number of ways to measure the viscosity of a liquid, one of which is dip cups.

A dip cup is a cup of a specified size and volume, with a hole of a defined size in the bottom. And they are available in a wide range of industry standard designs, and orifice diameters to suit different viscosities.

To test, you will require a dip cup, a stopwatch, a thermometer with a liquid probe, and a container of your sample liquid - ensuring there is enough of a sample to be able to submerge the dip cup entirely.

But with many different designs available, which dip cup should you choose?

Well, if a preferred dip cup isn't listed on the technical data sheet of the liquid you are testing, then typically you should select a cup that will give an estimated flow time of between 30 to 100 seconds. However this is dependent on the range of the dip cup you are testing with, or the test method or standard you are working to.

You can click on the pop-out link in the top right of the screen, to view Elcometer's Dip Cups, along with their ranges.

Using a suitable solvent, ensure the handle, cup, and orifice are clean; as dirty equipment will affect the accuracy of the test. Do not use any abrasive cleaning tools, such as wire brushes or metal scrapers, as this will damage the cup, again resulting in inaccurate results.

Immerse the dip cup completely into the liquid and twist several times to dislodge any air bubbles in the cup. Then stir the liquid gently to ensure uniform temperature and density in the sample.

To ensure uniform temperature at the time of testing, the cup is now left in the liquid for 1 to 5 minutes, depending on the cup being used. For example, for cups with a low mass, like a Zahn cup, 1 minute should be sufficient; while cups with a higher mass would be better left for 5 minutes. After this time, you should measure and record the temperature of the sample, as its temperature during the test will have an impact on the result.

The temperature you test at will be dependent either on the test method or standard you are working to, the liquid you are testing, or on an agreed temperature by any interested parties.

Now, hold the cup by the handle in one hand, and have the stopwatch at the ready in the other.

Lift the cup vertically out of the liquid and start the stopwatch the moment the top of the cup breaks the surface of the liquid.

You then carefully watch the flow of liquid from the orifice, and stop the stopwatch the first moment the flow breaks.

Alternatively, if you are using the Elcometer 2215 Lory Viscosity Cup, instead watch the surface of the liquid, and the moment the spindle inside the cup appears, stop the stopwatch.

The measured kinematic viscosity is expressed in seconds, which can be converted into Centistokes using a simple formula – where “t” is the flow time in seconds, “K” and “c” are constants which are given in tables relating to the dip cup you used, and the resulting “V” is your kinematic viscosity in Centistokes.

The Elcometer 2400 Viscosity Disc provides a quick way to work out your kinematic viscosity in Centistokes. Simply find the cup you used on the wheel, move the hand to the flow time of your liquid, and the disc will tell you the result in Centistokes.

Alternatively you could use ElcoCalc, Elcometer’s free app available from the Android or Apple App stores. Click the pop-out link in the top right to find out how to download.

ElcoCalc works out the viscosity in Centistokes for you. Again, just choose your cup type, enter the flow time, and ElcoCalc does the rest.

It’s important to note, not all dip cups provide results that can be converted into Centistokes – so in these cases, you’d record the kinematic viscosity in seconds flow time.

Once the test is complete, clean the dip cup and all equipment using a suitable solvent, ready for next use.

For more information on the Elcometer dip cups, click the pop-out in the top right of the screen, or simply visit Elcometer.com.

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