

How to measure dispersion using Elcometer Fineness of Grind Gauges

Whether you're developing coatings, inks, or cosmetics in a laboratory...

Or testing during the production process...

...measuring the particle size of the material (also known as dispersion) is an essential part of ensuring reliable and repeatable formulations.

Typically, to measure dispersion, fineness of grind gauges are used.

Elcometer's fineness of grind gauges consist of a stainless steel block with a precision ground scraper. Each block has either one or two channels, precision ground in a uniformly increasing depth from zero at one end, to a specified depth at the other, identified by the scale on the gauge.

Elcometer precision manufacture and supply three different types of fineness of grind gauges.

Dual channel gauges, such as the Elcometer 2020, which are available in various scale ranges, and are ideal for testing the dispersion of many materials including paints, coatings, cosmetics, chocolates, and other similar products. The Elcometer 2020 gauges are available with either mil or micron scales; and include two other scales as standard - the PCU (North) scale where your material is compared with a known sample, and the NS (Hegman) scale which reports the distance from the deepest end of the channel.

Dual channel gauges also allow you to test different material formulations side-by-side, so you can instantly compare the results.

Alternatively there are high precision single channel grindometers, such as the Elcometer 2050, available in either mils or microns. The combination of the same depth, that's precision ground across a longer channel, means the Elcometer 2050 allows you to measure to a greater accuracy, of $\pm 1\mu\text{m}$ ($\pm 0.04\text{mil}$).

And the NPIRI Fineness of Grind gauge, the Elcometer 2070, precision made for determining dispersion in printing inks according to the National Printing Inks Research Institute scale, as well as either mils or microns.

Before you start, ensure the surface of the gauge and the scraper are clean from previous test materials, dust or oil; and ensure the surfaces are not damaged – as dents and scratches will affect the accuracy of the result.

Place the gauge on a flat, horizontal and non-slip surface, with the zero mark on the scale closest to you. Then place a suitable amount of the material you're testing in the deep end of the channel or channels. You should slightly overfill the channels to ensure you have enough of a sample.

Holding the scraper in both hands, place it behind the material.

Depending on the test method or standard you're working to, you should hold the scraper either perpendicularly to the surface of the gauge, or with the scraper slightly angled towards you.

Now pull the scraper along the length of the gauge at a constant speed, applying downward pressure as you do, to push any excess material to the edges of the gauge. Stop the pull at a point beyond the zero depth on the gauge, ensuring your sample has been scraped over the entire length of the channel or channels.

You could even place a sacrificial piece of paper or cover at the end of the gauge, and scrape the excess material straight onto it, making it easier to clean later. This whole action should take around 1 to 2 seconds in total.

Within seconds of completing the pull, turn the gauge sideways so it is perpendicular to you, and view the surface of the material at a 20° to 30° angle to read the result.

If you're using the Elcometer 2020 or Elcometer 2050, look at the deep end of the gauge and move to the zero, and find a band across the channel or channels that is 3mm (1/8") wide, which contains 5 to 10 particles of the material. Once located, read the position of the upper limit of this band on the scale, and record the value. When using a dual channel gauge, you should read each channel as an individual result.

Alternatively, if you're using the Elcometer 2070 NPIRI gauge for printing inks, then once again looking from the deep end to zero, find the first position in the material where a predefined number of scratches can be seen. A recommended method is to record two values: position one where there are four scratches, and position two where there are ten scratches.

Depending on your test method or standard, you may be required to test the material multiple times and calculate the average, so make sure you use a suitable solvent to clean both the gauge and scraper before retesting.

Once all tests are complete, ensure the scraper and gauge are both clean and dry, and store in the case provided for protection.

For more information on Elcometer's Fineness of Grind gauges, click the pop-out in the top right of the screen, or simply visit Elcometer.com.

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