Paul N. Gardner Company

# EZ™ ZAHN VISCOSITY CUP

# VISCOSITY

Instructions for using GARDCO EZ™ Zahn Viscosity Cups for viscosity and drain-time measurement.

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# EZ™ Zahn Viscosity Cup

The GARDCO EZ™ Zahn Viscosity Cup is a stainless steel dip cup designed for fast, convenient viscosity checks of liquids in production and laboratory settings. It is used to measure efflux time and determine approximate viscosity in centistokes for quality control and process monitoring.

*Calibrated Viscosity Cups Designed, Produced & Sold by Paul N. Gardner*

| SPECIFICATION TABLE | | | | |
|---|---|---|---|---|
| **Cup Number** | **Seconds Range** | **Centistoke Range (*)** | **Midrange Sensitivity (**)** | **Calibration Oil / Centistokes (*)** |
| 1 | 40 to 60 | 10 to 36 | 1.3 | G-10 / 19 |
| 2 | 20 to 60 | 19 to 156 | 3.3 | G-60 / 117 |
| 3 | 12 to 60 | 64 to 596 | 10.5 | G-200 / 458 |
| 4 | 10 to 60 | 79 to 784 | 13.9 | G-200 / 458 |
| 5 | 10 to 60 | 161 to 1401 | 24.2 | G350 / 878 |

(*) Centistoke values are nominal – actual values are printed on labels.
(**) Stated as centistokes per second of efflux time.

## Instructions for Use

1. Select the proper number cup to be used from the specification table above, which is dependent on the expected viscosity range of the material to be measured.
2. Ensure that the cup is clean and that there is no residual dried material in or around the orifice. If necessary, use a length of nylon fishing line to clean the orifice.
3. Adjust the temperature, if necessary, of the test material.
4. Completely immerse the cup into the material to be measured in a location free from bubbles or foam, holding the cup vertically by means of the stainless steel split key ring.
5. Hold the cup vertically by inserting your index finger into the handle ring. In a quick, steady motion, lift the cup out of the sample material, starting the timer when the top edge of the cup breaks the surface. During the flow time, hold the cup no more than 6 in above the level of the sample material.
6. Stop the timer when the first definite break in the efflux stream at the base of the cup is observed.
7. Record the number of seconds of efflux time, the temperature, and the cup number. (Example: No. 2, EZ™ Dip Cup, 35.0 seconds at 25.1°C.)
8. Promptly clean the cup unless it will be used immediately for a rerun of the same material.

Use the QR code to download the **GARDCO Viscosity Calculator Mobile App** to quickly and easily calculate viscosity or drain time and also note/ record your measured temperature.

Download on the App Store

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Desktop Version

## Instructions for Care of Cup

The EZ™ viscosity cup is made primarily of stainless steel and is designed to provide many years of reliable service with proper care. Clean the cup thoroughly after each use to help maintain consistent performance.

Check the cup's calibration periodically, and always recheck it if the cup is dropped or damaged. To verify calibration, use the appropriate standard oil listed in the specification table. The viscosity values for these oils are traceable to the National Institute of Standards and Technology (NIST).

## Conversion Formulas

**Derived by Paul N. Gardner Company research**

### (EZ #1 ONLY)

Use this formula to find viscosity (V) in centistokes when cup efflux time in seconds (T) is known:

$$V = 0.875T - 993 \div T$$

Use this formula to find cup efflux time in seconds (T) when viscosity (V) in centistokes is known:

$$T = (V + \sqrt{V^2 + 3476}) \div 1.75$$

### (EZ #2 ONLY)

Use this formula to find viscosity (V) in centistokes when cup efflux time in seconds (T) is known:

$$V = 2.80T - 747 \div T$$

Use this formula to find cup efflux time in seconds (T) when viscosity (V) in centistokes is known:

$$T = (V + \sqrt{V^2 + 8366}) \div 5.60$$

### (EZ #3 ONLY)

Use this formula to find viscosity (V) in centistokes when cup efflux time in seconds (T) is known:

$$V = 10.09T - 587 \div T$$

Use this formula to find cup efflux time in seconds (T) when viscosity (V) in centistokes is known:

$$T = (V + \sqrt{V^2 + 23691}) \div 20.18$$

### (EZ #4 ONLY)

Use this formula to find viscosity (V) in centistokes when cup efflux time in seconds (T) is known:

$$V = 13.26T - 673 \div T$$

Use this formula to find cup efflux time in seconds (T) when viscosity (V) in centistokes is known:

$$T = (V + \sqrt{V^2 + 35696}) \div 26.52$$

### (EZ #5 ONLY)

Use this formula to find viscosity (V) in centistokes when cup efflux time in seconds (T) is known:

$$V = 23.56T - 744 \div T$$

Use this formula to find cup efflux time in seconds (T) when viscosity (V) in centistokes is known:

$$T = (V + \sqrt{V^2 + 70115}) \div 47.12$$

**Results from the above formulas, solved for each tenth of a second within the cup range**

# EZ™ Zahn Viscosity Cup

## GARDCO Viscosity Calculator App

GARDCO Viscosity Calculator App, formerly known as the Insta-Visc app, is a viscosity and drain-time calculator. It is easy to use, calculates quickly, and supports 52 different viscosity cups.

Use the QR code below to download the free mobile app to quickly calculate kinematic viscosity or drain time for your GARDCO and BYK viscosity cups, or use the desktop version via the link below. To run a calculation, enter either a drain time or a viscosity value into one of the input fields, then select the viscosity cup you are using.

If the selected cup is highlighted in green, your value is within that cup's viscosity range and the result is valid. If the value is outside the cup's range, an error message appears to indicate it is out of tolerance. In that case, select a different cup that is in range for the value you want to test. You can find suitable cups by entering your desired value and scrolling through the list; any cup shown in green can provide a valid measurement for that input.

### Downloads

Viscosity Calculator Mobile App
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**Desktop Version**