Paul N. Gardner Company

FORD STANDARD & STANDARD DIP CUPS **VISCOMETERS**

Instructions for using and caring for the Ford Standard and Standard Dip Viscosity Cups.



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Ford Standard & Standard Dip Cups

GARDCO Ford Standard and Standard Dip Viscosity Cups measure the efflux time of liquids for viscosity evaluation. Both versions use precision, removable orifices and have the same sample capacity. The Standard Cup is used with a level support stand, while the Standard Dip Cup features a red anodized aluminum handle for immersion in the test material.

Efflux time can be used directly as a process-control value or converted to kinematic viscosity in centistokes using the applicable conversion formula, conversion table, or GARDCO Viscosity Calculator. Select the cup type and number corresponding to the cup being used.

The Standard series includes Cup Nos. 0–5. The Standard Dip series includes Cup Nos. 3–5. Use the appropriate operating procedure and production tolerance for each version.

Available Versions



Ford Standard Viscosity Cups

Stand-mounted viscosity cups with an overflow well surrounding the top opening. Available with No. 0–5 orifices.

Buy at gardco.com



Ford Standard Dip Viscosity Cups

Full-capacity dip cups with red anodized aluminum handles for laboratory and field use. The top overflow ring is omitted. Available with No. 3, 4, and 5 orifices.

Buy at gardco.com

Select the Correct Cup

Select a cup that provides an efflux time well within its recommended range. Avoid selecting a cup solely because a reading falls near the minimum or maximum limit.

Ford Standard Cups

Cup No.	Efflux-Time Range	Nominal Viscosity Range	Recommended Calibration Oil
0	57–120 seconds	2–14 cSt	G6
1	60–120 seconds	12–40 cSt	G10
2	37–120 seconds	25–120 cSt	G35
3	23–120 seconds	29–273 cSt	G60
4	16–120 seconds	34–441 cSt	G60
5	10–120 seconds	77–1,413 cSt	G200

Select the Correct Cup (continued)

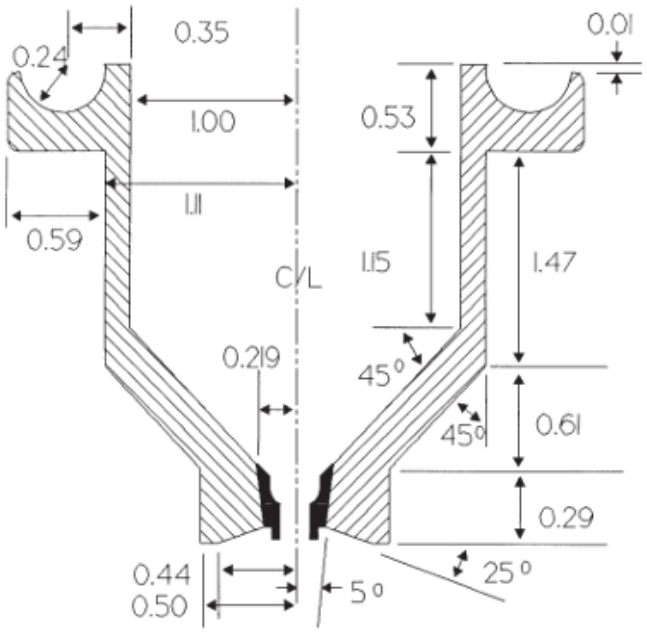
Ford Standard Dip Cups

Cup No.	Efflux-Time Range	Nominal Viscosity Range	Recommended Calibration Oil
3	56 seconds	29–251 cSt	G60
4	35 seconds	34–441 cSt	G60
5	39 seconds	77–1,413 cSt	G200

Cup Construction

Both versions use removable Ford cup orifices with tapered exteriors that fit matching sections in the cup body. This close fitting design helps eliminate gaps and difficult-to-clean areas between the cup and orifice.

The upper interior of the orifice is shaped to produce a cleaner break in the stream as the cup empties. The longer No. 0 orifice uses a different internal profile.



Ford Standard Cup

The Standard Cup has an overflow well surrounding the top opening to collect excess material during filling. The cup is supported in a bracket or tripod stand and leveled before testing. Its lower body helps protect the orifice from damage.

Ford Standard Dip Cup

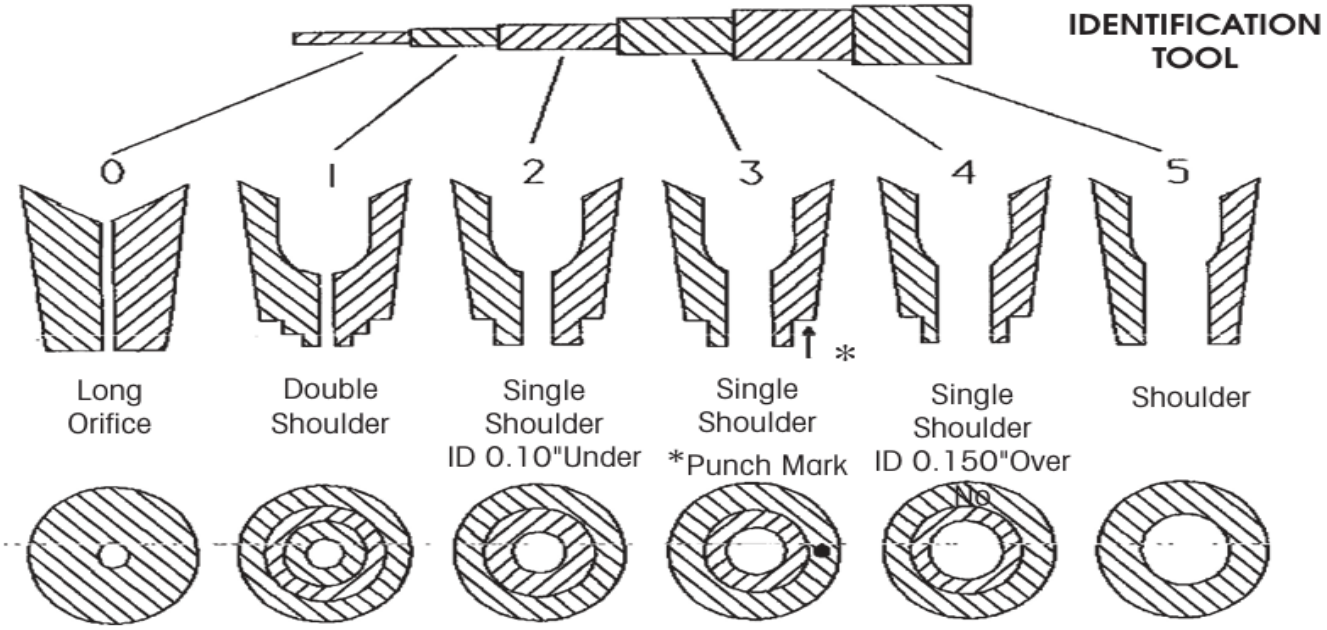
The Standard Dip Cup has the same capacity as the Standard Cup but is fitted with a red anodized aluminum handle. The overflow ring is omitted so the cup can be immersed in the test material and raised for measurement.

Ford Standard & Standard Dip Cups

Understanding Centistokes

Efflux time is the time required for a liquid to flow through the cup orifice and is recorded in seconds. The corresponding Ford cup formula or conversion table converts the measured time to viscosity in centistokes, abbreviated cSt.

Ford Standard and Standard Dip Cups use the same conversion constants for corresponding cup numbers. Their production tolerances may differ, so identify both the version and cup number when recording results.



Instructions for Use - Standard Cup

1. Adjust the sample to the specified measuring temperature, usually 25°C (77°F).
2. Select the cup that will provide readings well within its recommended range.
3. Make sure the cup is clean and place it in its support stand.
4. Level the cup.
5. Cover the orifice with a finger and fill the cup with bubble-free test material. The cup is full when the meniscus disappears where the liquid meets the sidewall.
6. If the cup is overfilled, remove excess material into the overflow well with a spatula or by passing the cover plate across the cup opening.
7. With the cover plate in place, remove your finger from the orifice.
8. Remove the cover plate and start the timer simultaneously.
9. Measure the temperature of the efflux stream. Repeat the test if a significant temperature change occurs.
10. Stop the timer at the first break in the stream, approximately 1–2 inches below the orifice.
11. Record the cup type and number, measured temperature, and efflux time. For best accuracy, average three or more readings.
12. Promptly clean the cup, paying particular attention to the orifice.

Instructions for Use - Standard Dip Cup

1. Select the cup appropriate for the expected viscosity range.
2. Make sure the cup and orifice are clean and free of obstruction or damage.
3. Adjust the material to the specified measuring temperature, if necessary.
4. Lower the cup into the material until the cup rim is submerged.
5. Place a thermometer into the immersed cup and measure the sample temperature. Remove the thermometer.
6. Quickly raise the cup high enough to observe the efflux stream and start the timer at the same time.
7. Stop the timer at the first break in the stream, approximately 1–2 inches below the orifice.
8. Record the cup type and number, sample temperature, and efflux time.
9. Promptly clean the cup, paying particular attention to the orifice.

Temperature Control

Viscosity changes with temperature. A change in material temperature can change the measured efflux time, even when the material itself has not changed. For consistent results, bring the cup and test material to the specified measuring temperature and record the temperature with each result.

Work in a room free from drafts and quick temperature changes. When measuring at 25°C (77°F), keep the room within ±3 °C (±5 °F) of the measuring temperature. This helps keep conditions stable, but you still need to control the sample temperature.

Temperature control matters most during calibration checks. Standard oils can change in viscosity by about 3–8% for every 1 °C change near 25°C, so even a small temperature difference can affect how measured and expected efflux times compare.

Good Temperature Control Practices

- Use the measuring temperature specified by the test method or product specification.
- Let the cup and test material reach the same temperature before testing.
- **Standard Cup:** Measure the temperature of the efflux stream during the test. If the temperature changes noticeably, repeat the test.
- **Standard Dip Cup:** Measure the sample temperature with the cup immersed, then remove the thermometer before raising the cup.
- Record the cup version, cup number, temperature, and efflux time together.
- For calibration checks at 25.0°C (77.0°F), use a thermometer readable to the nearest 0.1°C (0.2°F). Compare measured and expected times only when the test temperature is within ±0.2°C (±0.4°F) of 25.0°C.

Ford Standard & Standard Dip Cups

Temperature Scale Conversion Between Celsius and Fahrenheit

DEGREES CELSIUS	DEGREES FAHRENHEIT
20.0	68.0
20.1	68.2
20.2	68.4
20.3	68.5
20.4	68.7
20.5	68.9
20.6	69.1
20.7	69.3
20.8	69.4
20.9	69.6
21.0	69.8
21.1	70.0
21.2	70.2
21.3	70.3
21.4	70.5
21.5	70.7
21.6	70.9
21.7	71.1
21.8	71.2
21.9	71.4
22.0	71.6
22.1	71.8
22.2	72.0
22.3	72.1
22.4	72.3
22.5	72.5
22.6	72.7
22.7	72.9
22.8	73.0
22.9	73.2
23.0	73.4
23.1	73.6
23.2	73.8
23.3	73.9
23.4	74.1
23.5	74.3
23.6	74.5
23.7	74.7
23.8	74.8
23.9	75.0
24.0	75.2
24.1	75.4
24.2	75.6
24.3	75.7
24.4	75.9
24.5	76.1
24.6	76.3
24.7	76.5
24.8	76.6
24.9	76.8
25.0	77.0
25.1	77.2
25.2	77.4
25.3	77.5
25.4	77.7
25.5	77.9
25.6	78.1
25.7	78.3
25.8	78.4
25.9	78.6
26.0	78.8
26.1	79.0
26.2	79.2
26.3	79.3
26.4	79.5
26.5	79.7
26.6	79.9
26.7	80.1
26.8	80.2
26.9	80.4
27.0	80.6

F° = (C° x 1.8) + 32
C° = (F° - 32°) ÷ 1.8

Care of Cup

GARDCO Ford viscosity cups are precision instruments. Careful handling and prompt cleaning help protect the cup and orifice and support consistent measurements.

- Inspect the cup and orifice before use.
- Remove residue or obstruction before testing.
- Protect the orifice from scratches and impact.
- Use the supplied wooden dowel for orifice removal and installation.
- Do not substitute a metal punch or another hard object.
- Keep orifice changes to a minimum.
- Replacing the original orifice in a certified cup/orifice combination voids its certification.

Cleaning Procedure

Clean the cup promptly after use, paying particular attention to the orifice. The following procedure describes the removal of G Series calibration oil.

1. Flush the cup and orifice with a suitable solvent to remove remaining material. For G Series calibration oils, suitable petroleum-derived hydrocarbon solvents include heptane and light naphtha.
2. Wipe the cup dry with a soft, lint-free cloth.
3. If necessary, rinse with a compatible, highly volatile solvent to remove traces of the first cleaning solvent.
4. If residue remains on the orifice sidewall, carefully clean it with a piece of nylon fishing line.
5. Allow the cup to dry completely. A low-velocity stream of clean air may be used to evaporate remaining traces of volatile solvent.
6. Avoid rapid solvent evaporation that excessively cools the cup surface, as this may cause moisture to condense on the cup.

G Series Viscosity Standards

GARDCO Ford Standard and Standard Dip Viscosity Cups are calibrated using G Series Viscosity Standards. The centistoke viscosity of these standard oils is traceable to the National Institute of Standards and Technology (NIST). Use the recommended standard oil to periodically check the performance of the cup.

Select the Correct Standard Oil

Select the oil recommended for the Ford cup version and number being checked. The values in the table on the next page are nominal. Use the actual viscosity printed on the bottle label when determining the expected efflux time.

Ford Standard & Standard Dip Cups

G Series Viscosity Standards (continued)

Cup No.	Standard Cup Oil	Standard Dip Cup Oil
0	G6	–
1	G10	–
2	G35	–
3	G60	
4	G60	
5	G200	

Viscosity standards must be protected from contamination to preserve their labeled values.

- Use clean cups, containers, thermometers, and stirring devices.
- Protect the oil from water, solvents, dust, and test-material contamination.
- Keep the standard in its labeled container with the cap secured when not in use.
- Replace the standard if contamination is suspected or its expiration date has passed.

Caution: Do not use silicone fluids to calibrate viscosity cups intended for other materials. Silicone fluids can change the interaction between the cup surface and the test material, affecting calibration. Solvent washings from equipment used with silicone fluids should not be used to clean other viscosity equipment.

Available Accessories



Ford Standard Cup Bracket Stand

Supports the cup in a level position during testing. The bracket stand may be used with a glass cover plate, bubble level, and receiving beaker to support repeatable measurements.

Buy at gardco.com

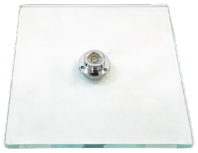


Ford Standard Cup Tripod Stand

Portable tripod stand for supporting the cup during testing. Use with a cover plate and bubble level to verify proper leveling before starting the efflux measurement.

Buy at gardco.com

Available Accessories (continued)



Glass Scraper Plate & Level

Helps remove excess material from the cup surface and confirms that the cup is level before the test begins. Only for the Ford Standard Cup.

Buy at gardco.com



Stainless Steel Griffin Beakers

Collect test material during the efflux measurement.

Buy at gardco.com



Certified Pro Ultimate Stopwatch

Measures efflux time to the required resolution for accurate testing and conversion.

Buy at gardco.com



Stem Precision Thermometer

Measures test material temperature during viscosity cup testing. Avaliable with 8-in and 12-in stems.

Buy at gardco.com

Ford Standard & Standard Dip Cups

Available Accessories (continued)



Orifice Gage

Helps identify removable orifices in the Ford Series viscosity cups. Use the gage to distinguish orifice sizes when selecting or replacing an orifice.

Buy at gardco.com



Ford Cup Orifice

Replacement snap-in orifice, available for cups: #0, #1, #2, #3, #4, and #5.

Buy at gardco.com



G Series Viscosity Standards

G6, G10, G35, G60, G200 viscosity standards are available for periodic cup verification.

Buy at gardco.com

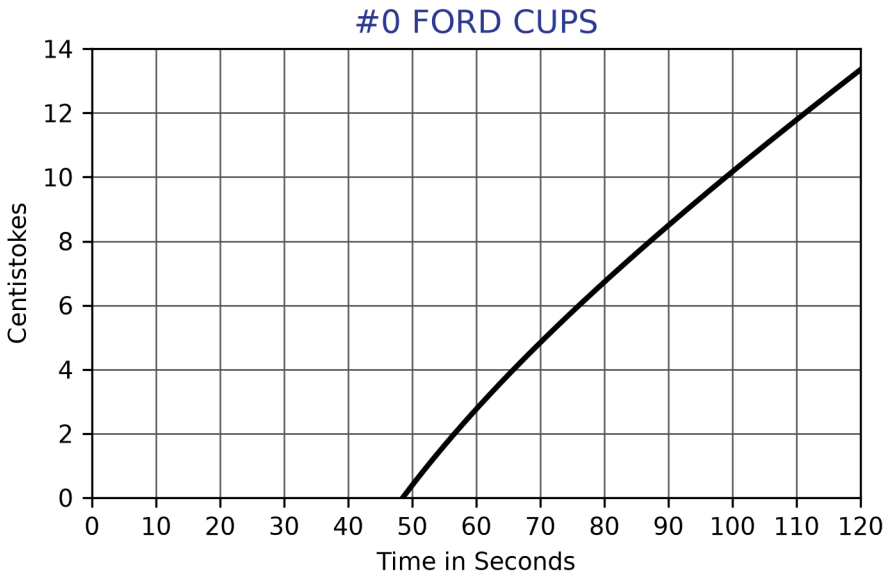
Efflux Time and Viscosity Conversion

The following charts show the relationship between efflux time in seconds and viscosity in centistokes (cSt) for GARDCO Ford cups. Each chart includes the cup specific formulas for calculating viscosity from a measured efflux time or determining the expected efflux time from a known viscosity.

For convenient conversion, use the GARDCO Viscosity Calculator. Select the appropriate cup type and number, then enter the measured efflux time to calculate viscosity in centistokes.

Use the chart or conversion information corresponding to the cup being tested. Cup Nos. 0–2 apply to Ford Standard Cups. Cup Nos. 3–5 use the same conversion constants for both Ford Standard and Standard Dip Cups.

Efflux Time and Viscosity Conversion (continued)



GARDCO STANDARD FORD CUP #0

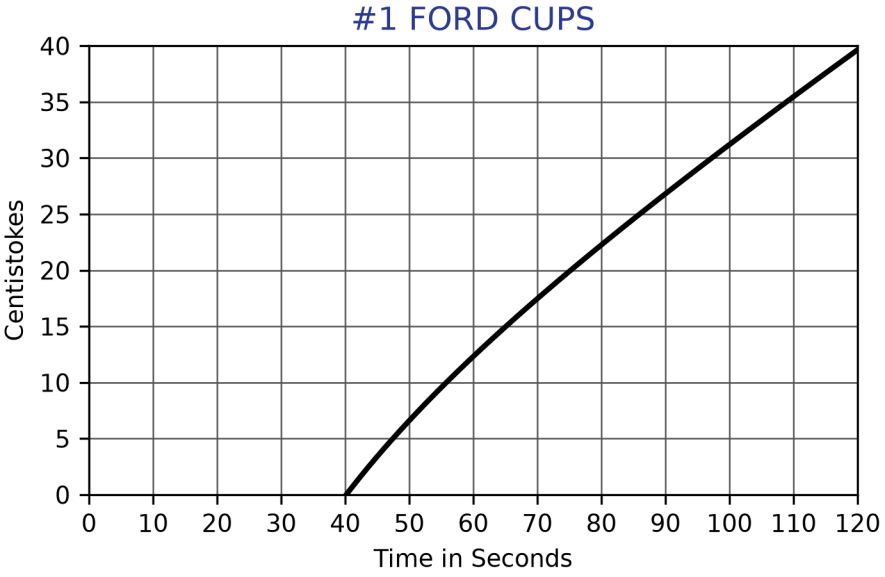
Centistokes, $V = 0.133T - 313 \div T$

Where T is in Seconds

or

Seconds, $T = (V + \sqrt{V^2 + 167}) \div 0.266$

Where V is in Centistokes



GARDCO STANDARD FORD CUP #1

Centistokes, $V = 0.372T - 600 \div T$

Where T is in Seconds

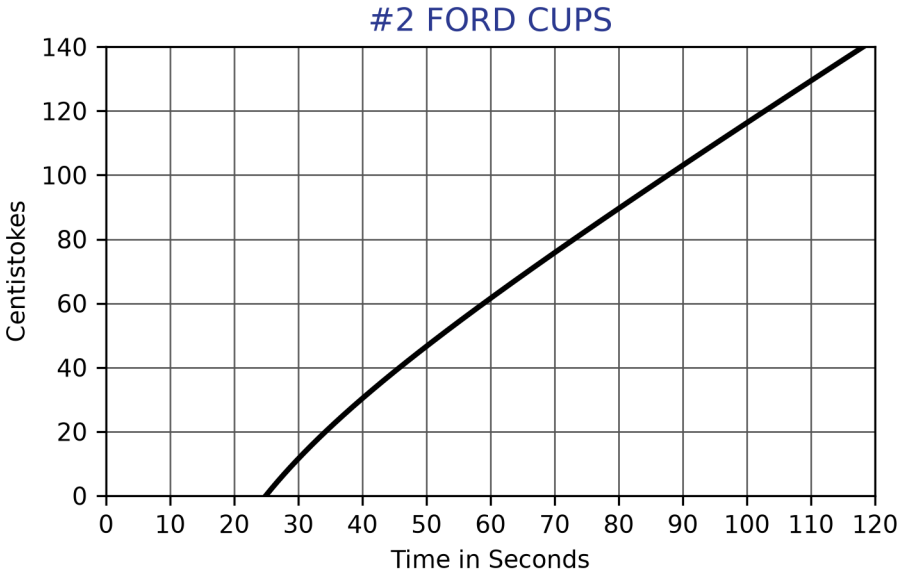
or

Seconds, $T = (V + \sqrt{V^2 + 893}) \div 0.744$

Where V is in Centistokes

Ford Standard & Standard Dip Cups

Efflux Time and Viscosity Conversion (continued)



GARDCO STANDARD FORD CUP #2

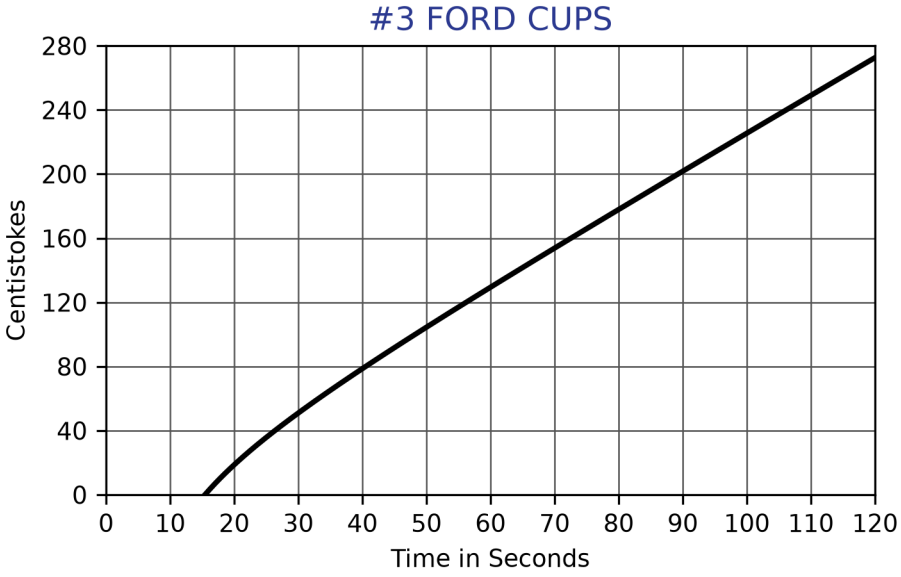
Centistokes, $V = 1.24T - 770 \div T$

Where T is in Seconds

or

Seconds, $T = (V + \sqrt{V^2 + 3819}) \div 2.48$

Where V is in Centistokes



GARDCO STANDARD FORD CUP #3

Centistokes, $V = 2.31T - 550 \div T$

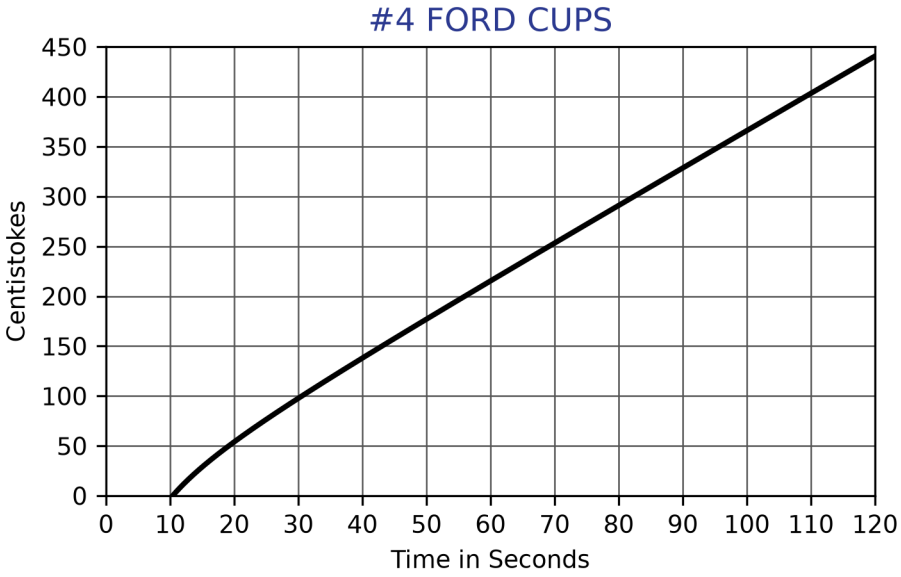
Where T is in Seconds

or

Seconds, $T = (V + \sqrt{V^2 + 5082}) \div 4.62$

Where V is in Centistokes

Efflux Time and Viscosity Conversion (continued)



GARDCO STANDARD FORD CUP #4

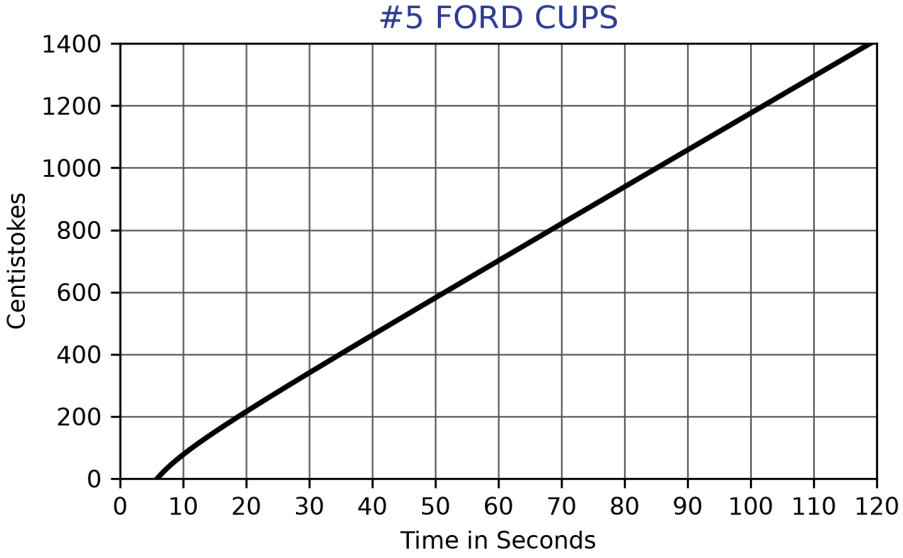
Centistokes, $V = 3.70T - 400 \div T$

Where T is in Seconds

or

Seconds, $T = (V + \sqrt{V^2 + 5920}) \div 7.40$

Where V is in Centistokes



GARDCO STANDARD FORD CUP #5

Centistokes, $V = 11.80T - 408 \div T$

Where T is in Seconds

or

Seconds, $T = (V + \sqrt{V^2 + 19258}) \div 23.60$

Where V is in Centistokes