

# Certificate of Calibration

## Viscometer No. 50



Y545

CANNON-FENSKE ROUTINE TYPE FOR TRANSPARENT LIQUIDS

1262.01

(Standard Test ASTM D 445, IP 71 and ISO 3104)

Constant at 40°C	0.003653	mm <sup>2</sup> /s <sup>2</sup> , (cSt/s)
Constant at 100°C	0.003636	mm <sup>2</sup> /s <sup>2</sup> , (cSt/s)

The viscometer constant at other temperatures can be obtained by interpolation or extrapolation. To obtain kinematic viscosity in mm<sup>2</sup>/s(cSt) multiply the efflux time in seconds by the viscometer constant. To obtain viscosity in mPa · s (cP) multiply the kinematic viscosity in mm<sup>2</sup>/s(cSt) by the density in grams per milliliter.

The above constants assume a value for the coefficient of thermal expansion typical to that for mineral oil, and that the viscometer was filled with test sample at room temperature. If the filling temperature T<sub>F</sub> is substantially different than room temperature, the viscometer constant at test temperature T<sub>T</sub> is C<sub>0</sub> (1 - B [T<sub>T</sub> - T<sub>F</sub>]). The values of C<sub>0</sub> and B shown below are based on a coefficient of thermal expansion typical to that for a mineral oil.

Kinematic viscosities of the standards used in calibrating were established in Master Viscometers as described in Ind. Eng. Chem. Anal. Ed. 16,708(1944), ASTM D 2162, and the Journal of Research of the National Bureau of Standards, Vol. 52, No. 3, March 1954, Research Paper 2479.

Kinematic viscosities are based on the primary viscosity standard, water, at 20°C (ITS-90). The internationally accepted value for the viscosity of water at 20°C (ITS-90) is 1.0016 mPa · s or kinematic viscosity is 1.0034 mm<sup>2</sup>/s as listed in ISO 3666. The gravitational constant, g, is 980.1 cm/sec<sup>2</sup> at the Cannon Instrument Company. The gravitational constant varies up to 0.1% in the United States. To make this small correction in the viscometer constant, multiply the above viscometer constant by the factor [g(at your laboratory) /980.1]. The calibration data below are traceable to the National Institute for Standards and Technology. Temperature measurement traceable to NIST (Test No. 260470).

### CALIBRATION DATA AT 40°C

Viscosity Standard	Kinematic Viscosity mm <sup>2</sup> /s, (cSt)	Efflux Time Seconds	Constant mm <sup>2</sup> /s <sup>2</sup> , (cSt/s)
0003	1.0262	281.04	0.003651
0004	2.250	615.79	0.003654
Room Temp. (approx.)	23 °C.	Average =	0.003653
Charge (approx.)	6.9 ml.	C <sub>0</sub> =	0.003657
Driving fluid head (approx.)	9.4 cm.	B =	76 x 10 <sup>-6</sup> /°C
Working diameter of lower reservoir	3.0 cm.		

Constant at 100° C. is 0.46 % lower than the constant at 40° C.

Calibrated by SAB 538118 on 17-Aug-00 under supervision of

Please note: This calibration remains valid for 10 years unless (1) the viscometer has been damaged or (2) materials which chemically attack borosilicate glass (e.g., hydrofluoric acid or highly alkaline solutions) have been used. Nonetheless, it is recommended that the calibration be verified with kinematic viscosity standards periodically. If a change in calibration is indicated, carefully examine all sources of error, including especially temperature measurement, since most apparent changes in calibration of the viscometer are due to errors in temperature measurement.

M. R. Hoover, Ph.D.    M. K. Gerfin, C.Q.E.  
 K. O. Henderson    R. E. Manning, Ph.D., P.E.  
 Cannon Instrument Co.  
 State College, PA 16804, USA

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The S.I. unit of kinematic viscosity is 1 meter squared per second, and is equal to 10<sup>4</sup> stokes. The S.I. unit of viscosity is 1 pascal second, and is equal to 10 poises. One centistokes is equal to one millimeter squared per second.