Hydramotion
viscosity

Units of viscosity

Dynamic viscosity

Poise (symbol: P)

Named after the French physician Jean Louis Marie Poiseuille (1799–1869), this is the cgs unit of viscosity, equivalent to dyne-second per square centimetre. It is the viscosity of a fluid in which a tangential force of 1 dyne per square centimetre maintains a difference in velocity of 1 centimetre per second between two parallel planes 1 centimetre apart.

Even in relation to high-viscosity fluids, this unit is most usually encountered as the centipoise (cP), which is 0.01 poise. Many everyday fluids have viscosities between 0.5 and 1000 cP (see table).

Pascal-second (symbol: Pa·s)

This is the SI unit of viscosity, equivalent to newton-second per square metre (N·s m^{-2}). It is sometimes referred to as the "poiseuille" (Pl).

One poise is exactly 0.1 Pa·s. One poiseuille is 10 poise or 1000 cP, while 1 cP = 1 mPa·s (one millipascal-second).

Some typical viscosities (cP at 20°C)

air	0.02	motor oil SAE 20	125
acetone	0.3	motor oil SAE 50	540
methanol	0.6	castor oil	986
water	1.0	glycerin	1490
ethanol	1.2	pancake syrup	2500
mercury	1.5	maple syrup	3200
linseed oil (raw)	28	treacle	20,000
corn oil	72	peanut butter	250,000
olive oil	84	window putty	100,000,000

Kinematic viscosity

Stokes (symbol: St)

This is the cgs unit, equivalent to square centimetre per second. One stokes is equal to the viscosity in poise divided by the density of the fluid in g cm^{-3}. It is most usually encountered as the centistokes (cSt) (= 0.01 stokes).

Saybolt Seconds Universal

This is the time for 60 ml of fluid to flow through the calibrated orifice of a Saybolt Universal viscometer at a specified temperature, as prescribed by test method ASTM D 88. For higher viscosities, SSF (Saybolt Seconds Furol) is used. "Furol" comes from "fuel and road oil".

Degree Engler

This is the ratio of the time of flow of 200 ml of fluid to the time of flow of 200 ml of water at the same temperature in a standardized Engler viscosity meter.

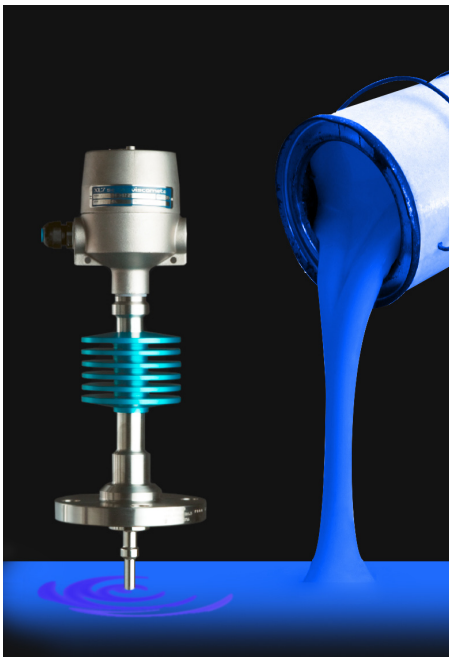

Table of equivalents

Dynamic viscosity	symbol	centipoise equivalent
1 kilogram-force second per square metre	kgf·s m^{-2}	9 806.6501248
1 poundal second per square foot	pdl·s ft^{-2}	1 488.164435
1 pound per foot hour	lb $(ft·h)^{-1}$	0.4133789
1 pound per foot second	lb $(ft·s)^{-1}$	1 488.1639328
1 pound-force second per square foot	lbf·s ft^{-2}	47 880.2595148
1 pound-force second per square inch (reyn)	lbf·s in^{-2}	6 894 757
1 slug per foot-second	slug $(ft·s)^{-1}$	47 880.25898

Kinematic viscosity	symbol	centistokes equivalent
1 square centimetre per second	cm^2 s^{-1}	100
1 square metre per second	m^2 s^{-1}	1 000 000
1 square foot per second	ft^2 s^{-1}	92 903.04
1 square inch per second	in^2 s^{-1}	645.16