

## Viscosity Guide For Paints, Petroleum & Food Products

### Viscosity

Viscosity is a measure of the resistance of a fluid to flow. The more viscous a liquid, the greater is the quantity of energy required to produce a desired state of flow

Low viscosity liquids show little resistance to flow and therefore require smaller amounts of energy per unit volume for mixing to occur. High viscosity liquids dampen the mechanical energy transmitted from a rotating agitator and require more power for mixing

In everyday terms viscosity is thickness or internal friction. Thus, water is thin, having a low viscosity, while honey is thick, having a higher viscosity

Liquid viscosity affects the flow created by a rotating mixing agitator and therefore the power per unit volume to reach a state of flow great enough for adequate mixing to occur. Viscosity and tank size will largely determine the basic type of mixer



A viscosity cup is a simple tool for measuring the viscosity of flowable paints and liquids

Propeller and vane-foil mixers are the main choice up to 2000 cps

Spiral and helix type mixers are the main choice up to 20,000 cps

Higher viscosities up to 100,000 cps require use of gate or anchor paddles used at slow speeds

Water to 500 cps, low viscosity; use a direct drive motor at speeds up to 1000rpm

500 to 4000 cps, medium viscosity; use a geared motor at speeds up to 750rpm

5000 to 20,000 cps, high viscosity creams; use a geared motor at speeds up to 500 rpm

Different types of liquids display different characteristics when force is applied through mixing. The most common types of liquid behaviours are dilatant, Newtonian, pseudo plastic or thixotropic

Dilatant liquids, the viscosity increases as shear rate increases. Mixers can stall after initially mixing such liquids including slurries, clay slips, plasters and cements

Newtonian liquids, the viscosity remains constant regardless of shear rate or agitation. The viscosity of a Newtonian fluid is dependent on temperature. As mixer speed increases, flow increases proportionately. Newtonian liquids include water, mineral oils, milk, sugar solution and hydrocarbons

Pseudo plastic liquids, the viscosity decreases as shear rate increases, but initial viscosity may be sufficiently great to prevent mixing. Examples of pseudo plastic liquids are gels, latex paints and lotions

Thixotropic liquids describes materials that are gel-like at rest but fluid when agitated, the viscosity decreases as shear rate or agitation increases. Thixotropic fluids are common in the chemical and food industries. Examples of thixotropic liquids include soaps, tars, shortening, glue, inks and peanut butter

Rheopetic liquids are time thickening ie viscosity increases with time. Examples of rheopetic fluids are rare but include gypsum paste

Shear thinning fluids are also called pseudoplastic and shear thickening fluids are also called dilatant. Examples of shear thinning fluids include paint, shampoo, slurries, fruit juice concentrates, ketchup. Examples of shear thickening fluids include wet sand, concentrated starch suspensions. Examples of plastic fluids include tooth paste hand cream, ketchups, grease

## Chart

Below is a general list of commonly used industrial products and a guide to their viscosity nominally at room temperature; the viscosity is listed in Centipoise (cP)

Water has a viscosity of 1 cP at 20°

Product	Viscosity	Product	Viscosity
Acetate glue	1,200-1,400	Maple syrup	150-300
Alcohol, sopropyl	2	Mayonnaise	5,000-20,000
Alkyd resins	500-3,000	Methyl ethyl ketone	4
Anti-freeze	15	Milk	3
Beer	18	Milk condensed	40-80
Benzine	5	Milk evaporated	6,100
Blood	10	Milk condensed	6,000
Butter	30,000	Molasses	5,000-10,000
Butter cream, sour	550	Motor oil SAE 10	50
Butter fat	45	Motor oil SAE 20	125
Castor oil	500-1,000	Motor oil SAE 30	200
Caulking compound	5,000,000-10,000,000	Motor oil SAE 40	320
Caustic soda 50%	45	Motor oil SAE 50	540
Cheese, soft	30,000	Motor oil SAE 60	1,000
Chocolate syrup	2,250	Motor oil SAE 70	1,600
Cleaning emulsions	1,500	Oleic acid	40
Coconut oil	80-110	Olive oil	40
Com oil	50-100	Paint, water based	2,400
Corn syrup	15,000	Pancake batter	2,200
Cream, cheese	100,000	Paraffin	10
Cream, clotted	20,000	Paraffin emulsion	3,000
Cream, double	120	Peanut butter	150,000-250,000
Cream, single	50	Peanut oil	100
Cream, sour	15,200	Petrol, gasoline	8
Detergents	1,500	Petroleum jelly	64,000
Diesel	14	Plastisol	28,000
Diethylene	32	Polyester resin	3,000
Dipropyleneglycol	107	Polyglycerine caprinate	6,000-7,000
Epoxy resin	5,000-10,000	Polyisobutylene	12,500
Ethylene glycol	16	Polymer solution	20,000
Fuel oil no 4	12	Polyol, non-pigmented	500-5,000
Gelatine	1,200	Polypropylene	240,000
Glucose	4,300-6,800	Potassium hydroxide	67
Glue, gun grade	5,000-50,000	Propylene	52
Glue, pourable	3,000-5000	Putty	100,000,000
Glycerine	1,000-2,000	PVA resin	65,000
Glycol	20	Resin pourable	880-975
Hand cream	8,000	Resin solution	7,100
Hand lotion	5,000	Salad cream	1,300-2,600
Honey	1,800-3,000	Sesame oil	94
Hydraulic oil	30-120	Shampoo	3,000-5,000
Icing	10,000	Soap solution	82
Ink, printing, liquid	550-2,200	Spaghetti sauce	1,000
Ink, printers	20,000	Starch solution 25%	300
Jam	8,500	Sugar syrup, sucrose	1,210
Kerosene	10	Titanium dioxide	5,000
Lacquer, water-based	900	Toluol	6
Lacquers 25% pigments	3,000	Tomato juice	180
Lard	1,000,000	Tomato ketchup	1,000
Lard oil	3,800	Tomato puree	50,000
Latex emulsions	200	Tomato sauce	2,600
Latex neoprene	5,000	Toothpaste	70,000-100,000
Latex paint	750	Triethylene	40
Linseed oil	30-70	Turpentine	10
Liquid soap	85	Varnish	320
Liquid wax	500	Vegetable oil	40
Lubricating oil	60-200	Water	1
Machine oil, heavy	600	Wax, liquid	75
Machine oil, light	150	Whey	800-1,500
Malt extract	9,500	Yoghurt	3,000-8,000