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# VISCOSITY

Viscosity is the measurement of a fluid's internal resistance to flow. This is typically designated in units of centipoise or poise but can be expressed in other acceptable measurements as well. Some conversion factors are as follows:

100 Centipoise = 1 Poise  
1 Centipoise = 1 mPa s (Millipascal Second)  
1 Poise = 0.1 Pa s (Pascal Second)  
Centipoise = Centistoke x Density

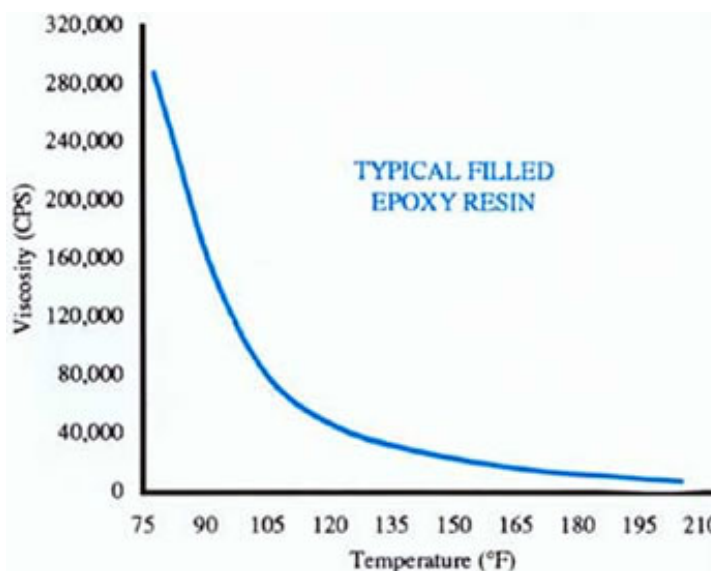
**Newtonian** materials are referred to as true liquids since their viscosity or consistency is not affected by shear such as agitation or pumping at a constant temperature. Water and oils are examples of Newtonian liquids.

**Thixotropic** materials reduce their viscosity as agitation or pressure is increased at a constant temperature. Ketchup and mayonnaise are examples of thixotropic materials. They appear thick or viscous but actually pump quite easily.

**Paste** viscosity is a vague term the viscosity of many materials but needs further definition to design a machine. Some paste viscosity materials will seek their own level or flow slowly and the shorter the time it takes, the easier they are to pump. Others do not seek their own level or flow at all and require pressure to move them from the supply container (cartridges, pails or drums) to the metering pump. These materials require special consideration regarding their feeding into metering pumps to assure the metering pump does not cavitate or to prevent air from being introduced into the material.

One way to differentiate between easy and difficult to flow pastes is to obtain Brookfield viscosities using the same spindle at two different rotational speeds, usually a tenfold difference (e.g. 1 RPM and 10 RPM). This will provide a "thixotropic index" for the particular material. The higher the difference in viscosity at the two speeds, the more thixotropic the material is and easier to pump.

To reduce the viscosity of paste materials to allow easier pumping, heat is often applied. The following graph illustrates how a typical filled epoxy resin reduces in viscosity as it is heated.



**Solid** materials at room temperature that are designed to be melted to allow pumping require heating above their melt point before they become a liquid. Maintaining heat on this material throughout the metering system (feed tank, pump, material supply hose, mixer, etc.) is normally

critical to preventing this material from resolidifying somewhere in the system. A heated cabinet that encapsulates all wetted components of the machine is typically employed instead of just heat blanketing the various components.

Typically, the closer the "A" and "B" materials are in viscosity, the easier they will be to mix. The most difficult materials will have a high viscosity "taffy-like" consistency for one-component with a water thin viscosity as the other component.

### Approximate Viscosities of Common Materials

(At Room Temperature-70°F)

Material	Viscosity in Centipoise
Water	1 cps
Milk	3 cps
SAE 10 Motor Oil	85-140 cps
SAE 20 Motor Oil	140-420 cps
SAE 30 Motor Oil	420-650 cps
SAE 40 Motor Oil	650-900 cps
Castrol Oil	1,000 cps
Karo Syrup	5,000 cps
Honey	10,000 cps
Chocolate	25,000 cps
Ketchup	50,000 cps
Mustard	70,000 cps
Sour Cream	100,000 cps
Peanut Butter	250,000 cps

### Viscosity Conversion Chart

The following viscosities are based on materials with a specific gravity of one.

Centipoise (CPS) or Millipascal (mPas)	Poise (P)	Centistokes (CKS)	Stokes (S)	Saybolt Universal (SSU)
1	0.01	1	0.01	31
2	0.02	2	0.02	34
4	0.04	4	0.04	38
7	0.07	7	0.07	47

10	0.1	10	0.1	60
15	0.15	15	0.15	80
20	0.2	20	0.2	100
25	0.24	25	0.24	130
30	0.3	30	0.3	160
40	0.4	40	0.4	210
50	0.5	50	0.5	260
60	0.6	60	0.6	320
70	0.7	70	0.7	370
80	0.8	80	0.8	430
90	0.9	90	0.9	480
100	1	100	1	530
120	1.2	120	1.2	580
140	1.4	140	1.4	690
160	1.6	160	1.6	790
180	1.8	180	1.8	900
200	2	200	2	1000
220	2.2	220	2.2	1100
240	2.4	240	2.4	1200
260	2.6	260	2.6	1280
280	2.8	280	2.8	1380
300	3	300	3	1475
320	3.2	320	3.2	1530
340	3.4	340	3.4	1630
360	3.6	360	3.6	1730
380	3.8	380	3.8	1850
400	4	400	4	1950
420	4.2	420	4.2	2050
440	4.4	440	4.4	2160
460	4.6	460	4.6	2270
480	4.8	480	4.8	2380
500	5	500	5	2480
550	5.5	550	5.5	2660
600	6	600	6	2900
700	7	700	7	3380
800	8	800	8	3880
900	9	900	9	4300
1000	10	1000	10	4600
1100	11	1100	11	5200
1200	12	1200	12	5620
1300	13	1300	13	6100
1400	14	1400	14	6480
1500	15	1500	15	7000
1600	16	1600	16	7500
1700	17	1700	17	8000
1800	18	1800	18	8500
1900	19	1900	19	9000
2000	20	2000	20	9400
2100	21	2100	21	9850
2200	22	2200	22	10300

2300	23	2300	23	10750
2400	24	2400	24	11200
2500	25	2500	25	11600
3000	30	3000	30	14500
3500	35	3500	35	16500
4000	40	4000	40	18500
4500	45	4500	45	21000
5000	50	5000	50	23500
5500	55	5500	55	26000
6000	60	6000	60	28000
6500	65	6500	65	30000
7000	70	7000	70	32500
7500	75	7500	75	35000
8000	80	8000	80	37000
8500	85	8500	85	39500
9000	90	9000	90	41080
9500	95	9500	95	43000
15000	150	15000	150	69400
20000	200	20000	200	92500
30000	300	30000	300	138500
40000	400	40000	400	185000
50000	500	50000	500	231000
60000	600	60000	600	277500
70000	700	70000	700	323500
80000	800	80000	800	370000
90000	900	90000	900	415500
100000	1000	100000	1000	462000
125000	1250	125000	1250	578000
150000	1500	150000	1500	694000
175000	1750	175000	1750	810000
200000	2000	200000	2000	925000

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