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Viscosity

Flow Cups

These easy to use cups determine the flow time of paints, varnishes and other Newtonian (or near Newtonian) fluids. There are many types available, all engineered to the relevant national standards.

Certification

Certificates of Conformity or Calibration can be supplied for any cup. These certificates must be requested at the time of purchase. Calibration certificates for 419 series and stated special size orifices are available calibrated against our Reference cups.

Method of Use

(excluding Zahn - and shell type cups)
N.B. Please refer to the relevant national standard for detailed instructions.

1. Select a suitable cup. (Please see over for flow times).
2. Ensure that the cup and test fluid are at the required temperature (or use a temperature / viscosity calculator, Ref 415/416.
3. Ensure no bubbles or debris are in the test fluid.
4. Seal the cup orifice (usually with a finger) and fill with test fluid, level the top of the fluid with a scraper.
5. Break-point procedure - remove finger from the orifice and simultaneously begin to time. At the first break in flow stop the timer. This elapsed time represents the ‘flow-time’ of the test fluid.
6. Fixed-volume procedure - proceed as above, but stop timing when 50ml has passed into a graduated measuring cylinder.

401/2 Flow cup and 418 stand

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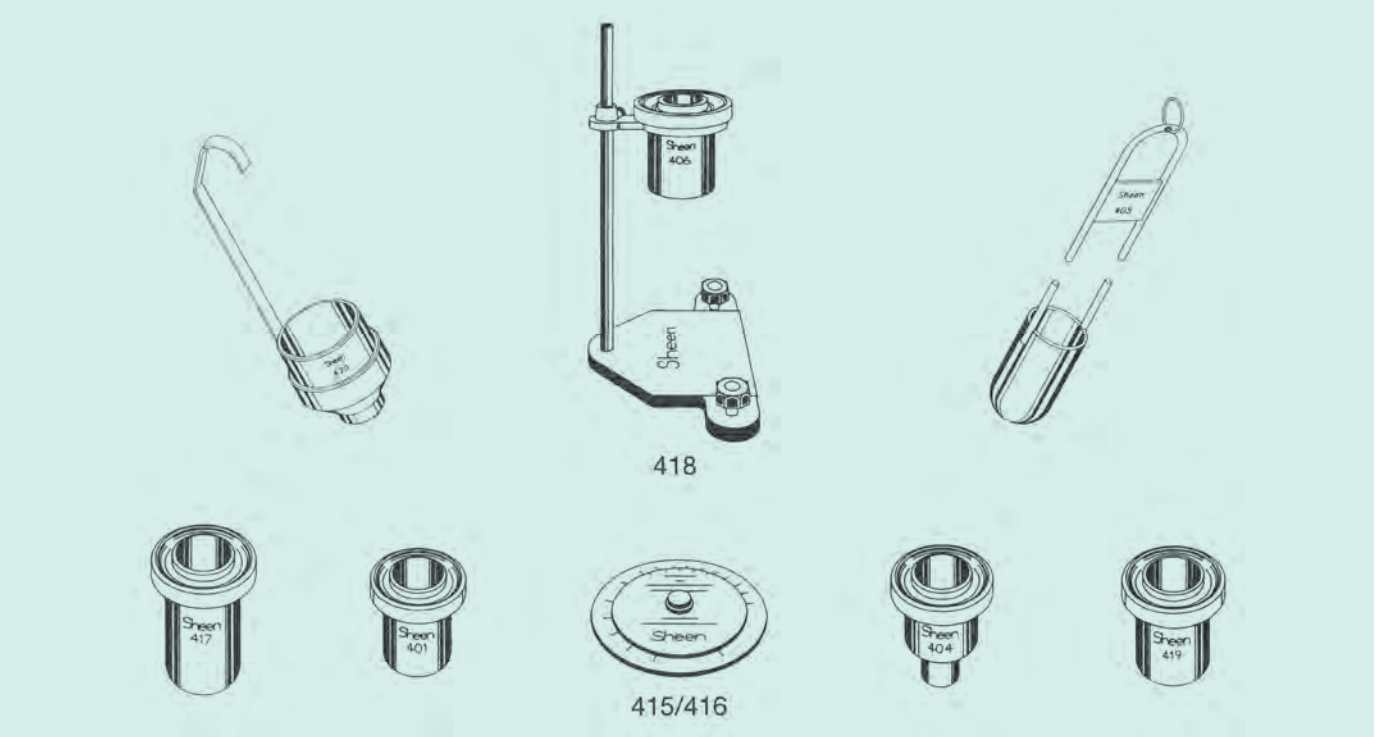
Viscosity Flow Cups



These flow cups are precision engineered from hard aluminium alloy and conform to the stated national and international standards, unless otherwise stated.

	FLOW CUP COMPARISON CHART					
Oil Viscosity cSt (mm²/s) @ 25°C	Cup reference / Flow time (seconds)					
	401-No 4	404-No 4	405-No 2	406-No 4	417-No4	420-No 4
87	34	23	39	27	66	23
115	43	29	47	34	86	29
228	82	52	79	64	167	52
393	139	87	126	106	287	87

This chart illustrates the variations in flow times which may be expected when comparing different cup types. N.B. These times must not be used as a basis of calibration, as they are derived by calculation and are for illustrative purposes only.

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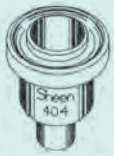
Specification

Product		Code	Orifice diameter	Viscosity range	Flow times
Ref 401 Series (old type) BS3900 : Part A6, 1971 This specification replaced by EN ISO 2431/8S3900 part A6:1996 - see Ref 417		**401/2 - B2** **401/3 - B3** **401/4 - B4** **401/5 - B5** **401/6 - B6**	2.38mm (0.09″) 3.17mm (0.12″) 3.97mm (0.16″) 4.76mm (0.19″) 7.14mm (0.28″)	38-71cSt 38-147cSt 71-455cSt 299-781cSt 781-1650cSt	30 - 300 secs
Ref 404 Series (old type) DIN 53 211 The orifices are manufactured from stainless steel. N.B. Special orifices available to order e.g. 404/2mm; 404/6mm; 404/8mm. This specification replaced by EN ISO 2431 - see Ref 417		**404/4**	4mm (0.16″)	112 - 685cSt	25 - 150 secs *(For options see Ref 417)*
Ref 406 series ASTM D1200 (Ford) The orifices are manufactured from stainless steel.		**406/1 No 1** **406/2 No 2** **406/3 No 3** **406/4 No 4** **406/5 No 5**	2.1mm (0.08″) 2.8mm (0.11″) 3.4mm (0.13″) 4.1mm (0.16″) 5.8mm (0.23″)	10-35cSt 25-120cSt 49-220cSt 70-370cSt 200-1200cSt	55-100 secs 40-100 secs 30-100 secs 30-100 secs 30-100 secs
Ref 417 Series BS EN ISO 2431, ASTM D 5125, BS3900 part A6:1996 The orifices are manufactured from stainless steel		**417/3 No 3** **417/4 No 4** **417/5 No 5** **417/6 No 6** **417/8 No 8**	3 mm (0.12″) 4mm (0.16″) 5mm (0.20″) 6mm (0.24″) 8mm (0.31″) special size	7-42cSt 35-135cSt 91-325cSt 188-684cSt 600-2000cSt	30-100 secs
Ref 419 Series AFNOR CUPS. NF -T - 30014		**419/2.5** **419/4** **419/6** **417/8 No 8**	2.5mm (0.10″) 4mm (0.16″) 6mm (0.24″) 8mm (0.31″) special size	5-140cSt 50-1100cSt 510-5100cSt 700-11500cSt	30-100 secs
Ref 420 Series FRIKMAR CUP. A dip cup format based on old Ref. 404 style cup DIN 53 211. (internal dimensions) The orifices are manufactured from stainless steel		**420/2** **420/4** **420/6**	2mm (0.08″) special size 4mm (0.16″) 6mm (0.24″) special size	112-685cSt	25-150 secs
Ref 405 Series ASTM D 4212 Zahn Cups. These cups are manufactured from brass and then bright nickel plated for a superior finish		**405/1** **405/2** **405/3** **405/4** **405/5**	1.93mm (0.08″) 2.69mm (0.11″) 3.86mm (0.15″) 4.39mm (0.17″) 5.41mm (0.21″)	5-60cSt 20-250cSt 100-800cSt 200-1200cSt 400-1800cSt	35-80 secs 20-80 secs 20-80 secs 20-80 secs 20-80 secs

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Flow Cup Stands

Ref **405 ST** - Zahn Cup Stand. Aluminium alloy 41cm high, which will store up to five Zahn viscosity flow cups. Flow cup stands designed to hold cups (except 405/420) steady and level during flow time measurement.

Ref **418** Construction - Stainless Steel rod mounted in a cast aluminium base with two adjustable feet. The cup is held within a cast aluminium height adjustable ring. A superior quality spirit level is also supplied.

Ref **418/LC** - A lightweight aluminium frame supplied with spirit level.

Temperature/Viscosity Calculators

These allow viscosity corrections to be calculated when tests are not carried out at the specified temperature. For example a measured viscosity, in a flow cup, of 80 seconds at 25°C is equivalent to 99 seconds at 21°C and a specified viscosity of 80 divided by 10 i.e. 8 poises at 25°C is equal to 10.5 (105 divided by 10) poises at 20°C at which the determination is to be made. These relationships are not applicable to structured products and heavily pigmented compositions.

Ref **415** - coefficient of 5.5% per °C. e.g. resins, clear or pigmented products.

Ref **416** - coefficient of 2.66% per °C. e.g. water based products.

Calibration Oils

We offer a full range of oils for calibrating each of our flow cups and spindle viscometers, (nominal volume 500cc). Our recommended oils for calibration of flow cups (nominal values).

404/4 259cSt@ 23°C (73.4°F)

405/1 34cSt @ 25°C (77°F)
405/2 118cSt @ 25°C (77°F)
405/3 463cSt @ 25°C (77°F)
405/4 572cSt @ 25°C (77°F)
405/5 1131cSt @ 25°C (77°F)

406/1 17.4cSt @ 25°C (77°F)
406/2 58cSt @ 25°C (77°F)
406/3 118cSt @ 25°C (77°F)
406/4 228cSt @ 25°C (77°F)
406/5 800cSt @ 25°C (77°F)

417/3 19c5t @ 23°C (73.4°F)
417/4 65cS @ 23°C (73.4°F)
417/5 259cS @ 23°C (73.4°F)
417/6 533cSt @ 23°C (73.4°F)
417/8 1322cSt @ 23°C (73.4°F)

419/2.5 76cSt @ 20°C (68°F)
419/4 159cSt @ 20°C (68°F)
419/6 1130cSt @ 25°C (77°F)

420/4 259cSt @ 23°C (73.4°F)

Note: The oil viscosities have been selected to enable cups to be calibrated at the mid point of recommended working viscosity range at the temperatures stated.
Ref 440 Calibration Oils calibrated @ 20 & 25°C only, accuracy ±2%.
Ref 441 Calibration Oils calibrated @ 20, 23, 24, 24.5, 25, 25.5 and 26°C, accuracy ±0.2%.
Accuracy of Ref 441 oils up to 1000 cSt ±0.3% 1001 - 10,000 cSt ±0.4%

Note
Owing to continuous development, we reserve the right to introduce improvements and modify specifications without prior notice.

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