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Vane Spindles

Assembly & Operating Instructions

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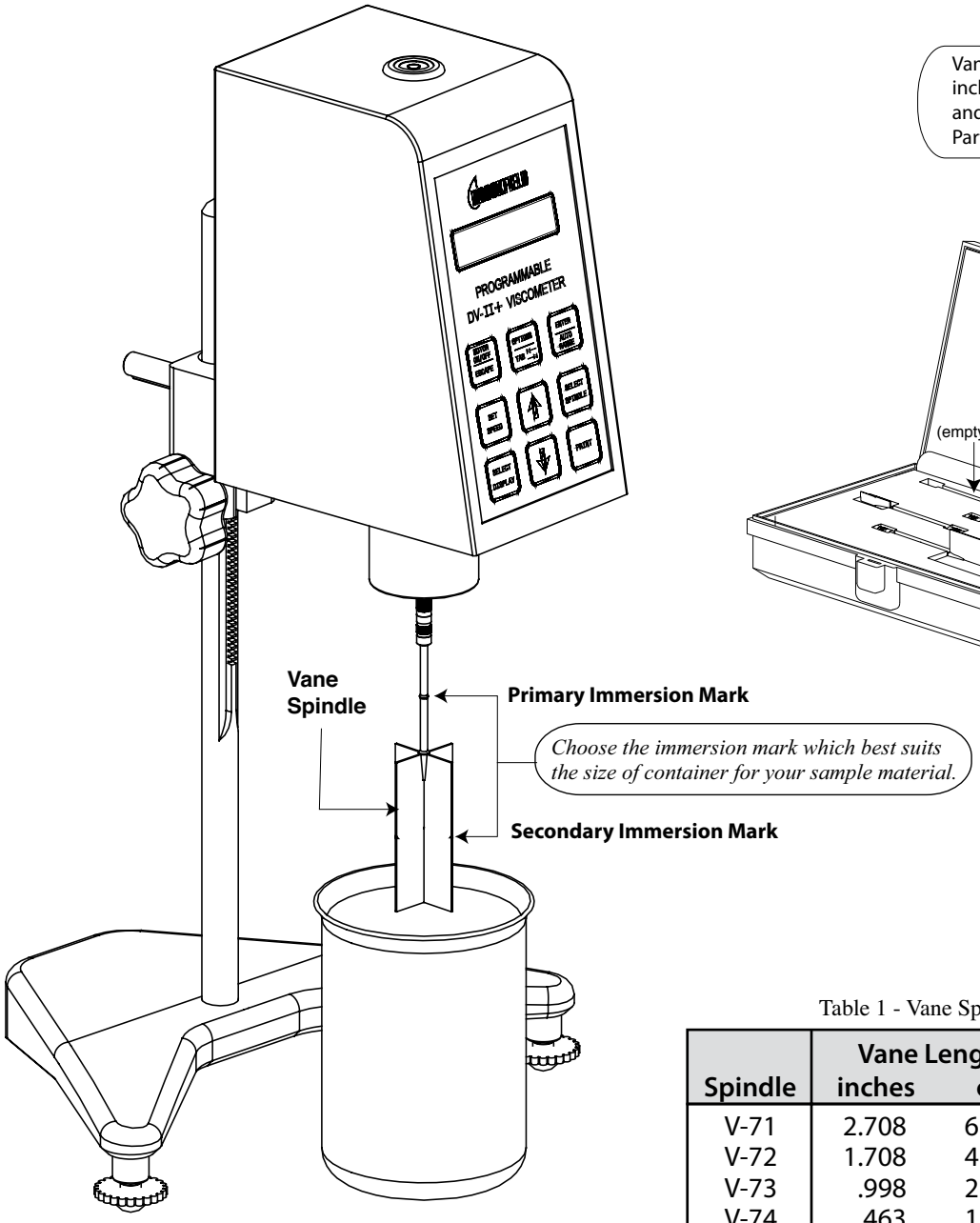
Vane spindles can be used with any standard Brookfield Viscometer/Rheometer. V-71, V-72, and V-73 are supplied in the Vane Spindle Set (Part No. SSVANE). The V-74 and V-75 spindles are optional extras. The small size of the V-74 vane spindle is ideal for testing small sample sizes and fitting into sample containers with small openings. However, limited surface area for spindle measurement geometry may make it more challenging to obtain repeatable shear stress and viscosity values.



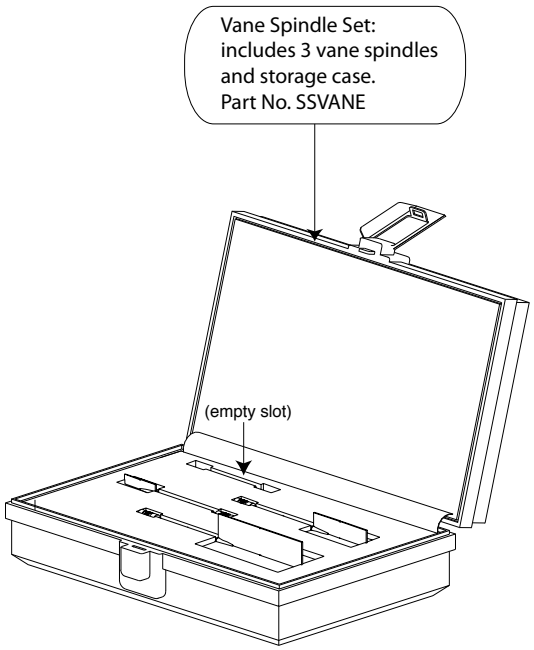


Table 1 - Vane Spindle Dimensions

Spindle	Vane Length inches	Vane Length cm	Vane Diameter inches	Vane Diameter cm
V-71	2.708	6.878	1.354	3.439
V-72	1.708	4.338	.853	2.167
V-73	.998	2.535	.499	1.267
V-74	.463	1.176	.232	.589
V-75	.632	1.61	.316	.803

Note: Sample container diameter should be at least twice (2x) the vane diameter when possible. Sample container depth should provide clearance, at the bottom, greater than or equal to vane spindle diameter when possible.

Spindle Range Data

Table 2 - Spindle Range Data

Spindle	Torque Range	Shear Stress Range Pa	Shear Stress Range dyne/cm²	Viscosity Range cP (mPa•s) @ 10 rpm
V-71	NOT RECOMMENDED FOR USE ON LV TORQUE			
V-72	LV	.188-1.88	1.88-18.8	104.04 - 1040
V-73	LV	.938-9.38	9.38-93.8	502 - 502000
V-74	LV	9.38-93.8	93.8-938	5.09 - 50900
V-75	LV	3.75-37.5	37.5-375	1996 - 19960
V-71	RV	.5-5	5-50	262 - 2620
V-72	RV	2-20	20-200	1110 - 11100
V-73	RV	10-100	100-1000	5350 - 53500
V-74	RV	100-1000	1000-10000	54300 - 543000
V-75	RV	40-400	400-4000	21300 - 213000
V-71	HA	1-10	10-100	524 - 5240
V-72	HA	4-40	40-400	2220 - 22200
V-73	HA	20-200	200-2000	10700 - 107000
V-74	HA	200-2000	2000-20000	108600 - 1086000
V-75	HA	80-800	800-8000	42600 - 426000
V-71	HB	4-40	40-400	2096 - 20960
V-72	HB	16-160	160-1600	8880 - 88800
V-73	HB	80-800	800-8000	42800 - 428000
V-74	HB	800-8000	8000-80000	434400 - 4344000
V-75	HB	320-3200	3200-32000	170400 - 1704000
V-71	5XHB	20-200	200-2000	10480 - 104800
V-72	5XHB	80-800	800-8000	44400 - 444000
V-73	5XHB	400-4000	4000-40000	214000 - 2140000
V-74	5XHB	4000-40000	40000-400000	2172000 - 21720000
V-75	5XHB	1600-16000	16000-160000	852000 - 8520000

Notes: 1) 1 Pa = 10 dyne/cm² 2) 1cP = 1 mPa•s 3) Possibility of turbulence at speeds above 10 rpm may give artificially higher viscosity readings 4) 5xHB torque available with DV-III Ultra Rheometer only.

Viscometer Operation

Attach the Vane Spindle to your Viscometer as shown in the illustration on page one (Note: spindles have a left-hand thread for installation). Immerse the Vane Spindle into the fluid past the top of the Vane to the primary immersion mark on the shaft. Operate your Viscometer per the instructions in the Operator's Manual that came with your instrument. Record the instrument Speed (in RPM) and the Torque Reading (as a percent). The Viscosity is calculated manually using the following equation:

$$\text{Viscosity (cP)} = \frac{100}{\text{RPM}} * \text{TK} * \text{SMC} * \text{Torque}$$

where

RPM = Viscometer spindle speed in RPM
TK = Viscometer torque constant from Table 3
SMC = Spindle multiplier constant from Table 4
Torque = Viscometer torque (%) expressed as a number between 0 and 100

Table 3 - Viscometer Torque Constants

Model	TK
LV	0.09373
RV	1
HA	2
HB	8
5xHB	40

Table 4 - Spindle Multiplier Constants and Accuracy

Spindle	SMC	Accuracy*
V-71	2.62	±2%
V-72	11.1	±2%
V-73	53.5	±2%
V-74	543	±5%
V-75	213	±3%

** Allowable error percentage is calculated on the full scale range viscosity for each spindle at a defined speed.*

If the secondary immersion mark (midpoint of the vane) is chosen due to small container size, multiply the torque reading by a factor of two (2).

$$\text{Viscosity (cP)} = \frac{100}{\text{RPM}} * \text{TK} * \text{SMC} * 2\text{xTorque}$$