

A. SHEAR STRESS CALIBRATION (DEAD WEIGHT METHOD)

The dead weight calibration method requires the use of the Model DW-7 calibrating fixture (Part No. 35284) to perform an absolute shear stress calibration by impressing known torques onto the bob shaft.

1. Both rheometer and recorder should be at operating temperature before calibrating is attempted.
2. Short out the input terminals on the Y-axis of the recorder and then use the recorder zero control to position the pen to the first major line above base. Remove the short and turn the RANGE switch through the five positions. If the pen deflects from its zero position, adjustment of the Rheometer ZERO control is required so that the recorder reading is the same at RANGE positions 1 and 5.
3. Remove the sample cup/rotor from the rheometer by holding the knurled flange of the mainshaft with one hand and rotating the rotor counter-clockwise and then pulling it straight down with the other. Remove the bob by turning it clockwise to unscrew the left hand thread.
4. Clamp the calibrating fixture firmly and squarely to the Rheometer head mainplate (Refer to Figure 1). Install the calibrating spool onto the bobshaft in the same manner as a standard bob.
5. Place the range switch in position 5 (200 dynes/cm² full scale with No. 340 Standard torsion spring assembly and Bob B1). Refer to Appendix A for Shear Stress range for other torsion spring assemblies and bobs.
6. Select the 10g weight and insert the bead into one of the holes on the calibrating spool with string exiting through the slot of the hole. Wrap the string around the spool clockwise approximately one turn and then over the low friction pulley (be sure the string is horizontal) letting the weight hang freely.
7. Adjust the RPM to approximately 300 rpm.
8. Adjust the Y-axis attenuation on the recorder so that the pen is at the full scale line on the chart paper. This equivalent to a shear stress of 200 dynes/cm² on the B1 Bob (Consult Appendix A for other torsion spring and bob combinations).
9. Repeat steps 6 and 7 with other weights and RANGE positions per table to verify instrument calibration, or to calibrate for a specific shear stress range.

Fig. 1 - DW-7 CALIBRATION FIXTURING

RANGE Switch Position	SHEAR STRESS Fullscale dynes/cm ² w/#340 Spring Assembly & B1 Bob	Calibrating Weight w/calibrating spool grams
5	200	10
4	400	20
3	800	40
2	2000	100
1	4000	200

Table 1

Dimensional Data	R1 B1 Standard	R1 B2	R1 B3	R1 B4	R2 B1
Rotor Radius R_o [cm]	1.8415	1.8415	1.8415	1.8415	1.7588
Bob Radius R_i [cm]	1.7245	1.2276	0.822	0.622	1.7245
Bob Height L [cm]	7.620	7.620	7.620	3.810	7.620
Shear Gap in Annulus [cm]	0.1170	0.6139	0.9793	0.9793	0.0343
Radii Ratio R_i/R_o	0.9365	0.6666	0.4682	0.4682	0.9805
Surface Area A_s [cm]	82.57	58.77	41.28	20.64	82.56
Shear Stress Factor: $K_2=1/(A_s R_i)$ [cm ⁻³]	0.007023	0.01386	0.02810	0.05619	0.007023
Torque Range Factor: Actual	1.0000	1.9734	4.0004	8.0008	1.0000
Torque Range Factor: Nominal	1	2	4	8	1
Shear Rate Factor: Install Equation Editor and double - $K_3 =$ click here to view equation. 1 Install Equation Editor and double - click here to view equation. 2 Install Equation Editor and double - click here to view equation. 3	1.7023	0.377	0.268	0.268	5.4225

Fig. 2 - DATA AND SHEAR STRESS RANGES ROTOR CUPS & BOBS

B. DATA AND SHEAR STRESS RANGES

Install Equation Editor and double-click here to view equation.

SHEAR STRESS - FULL SCALE

Torsion Spring Assembly	Range Switch Positions	Full Scale Deflection	Bob B1 Standard	Bob B2	Bob B3	Bob B4
#310 P/N 31714 Color Code Green	1	50	1000	2000	4000	8000
	2	25	500	1000	2000	4000
	3	10	200	400	800	1600
	4	(5)*	100	200	400	800
	5	(2.5)	50	100	200	400
#320 P/N 31713 Color Code Yellow	1	100	2000	4000	8000	16000
	2	50	1000	2000	4000	8000
	3	20	400	800	1600	3200
	4	10	200	400	800	1600
	5	(5)	100	200	400	800
#340 Standard P/N 30107 Color Code Blue	1	200	400	8000	16000	32000
	2	100	2000	4000	8000	16000
	3	40	800	1600	3200	6400
	4	20	400	800	1600	3200
	5	10	200	400	800	1600
#380 P/N 31712 Color Code Red	1	400	8000	16000	32000	64000
	2	200	4000	8000	16000	32000
	3	80	1600	3200	6400	12800
	4	40	800	1600	3200	6400
	5	20	400	800	1600	3200

() * not normally provided with FANN® calibration kit.

Fig. 3 - CALIBRATING LOAD [gms]

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