

# Cold Test on Tubing

Date of Testing: 2/17 - 2/18

Tested by: William Butler

## Items needed for testing:

- 2 x 4  $\frac{3}{4}$  inch of tubing
- Vise
- Vice extension grips
- Known mass for applying a force
- Multimeter w/ thermal probe
- Freezer
- Ruler

## Procedure for testing:

1. Cut two 4  $\frac{3}{4}$  inch lengths of tubing
2. Measure length
3. Measure width
4. Use vise to hold tubing in place
  - a. Suspend tubing between two vise extensions
5. Measure initial height of tubing from base of vise grip
6. Place known mass on the tubing
7. Measure the displacement of the tubing with applied force
8. Take one of the tubes and wet
9. Place both tubes in the freezer
10. Measure temperature of the freezer via multimeter temperature probe
11. Repeat steps 2-7 with frozen and frozen/wetted tube

Tube #	Length	Width		Length (Frozen)	Width (Frozen)
Tube 1 (Control)	102.11 mm	17.55 mm		102.1mm	17.17 mm
Tube 2 (Wet)	102.39mm	17.71mm			

Table 1: Length and widths of the tubing prior to and after freezing

Object	Mass	Weight
Mass 1 (Cylinder)	1.523 Kg	14.951 N
Mass 2 (Rectangular Rod)	0.251 Kg	2.462 N
	<b>TOTAL WEIGHT:</b>	17.413 n

Table 2: Masses and force generated by each mass

Tube #	Height (i)	Height (f)	Deflection
Tube 1 (Room Temp.)	20.6375 mm	9.525 mm	11.1125 mm
Tube 2 (Room Temp.)	19.05 mm	11.1125 mm	7.9375 mm
Tube 1 (8°F = -13.33°C)	12 mm	3 mm	9 mm
Tube 2 (Wet) (8°F = -13.33°C)	14.5 mm	8.5 mm	6 mm

Table 3: Total deflection of each tube room temperature or frozen

Use deflection data to see how modulus of elasticity changes?