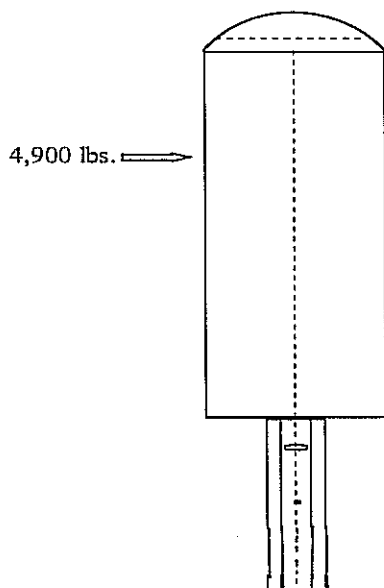


Highline Products Pole Top Extension Testing

Highline Products has been manufacturing and selling Pole-Top extension for over 40 years. The following results are from testing performed by various Electric Utilities.

Test #1 Cantilever Pull Test

54" Pole Top Extension with a force applied 31" from the bottom of the pole top and the force parallel to the conductors. Deflection measurements were taken.



Lbs.	Deflection
200	0.000"
500	.354"
1000	.679"
1500	.989"
2000	1.294"
2500	1.594"
3000	1.889"
3500	2.179"
4000	2.399"
4500	2.849"
4900	3.629"

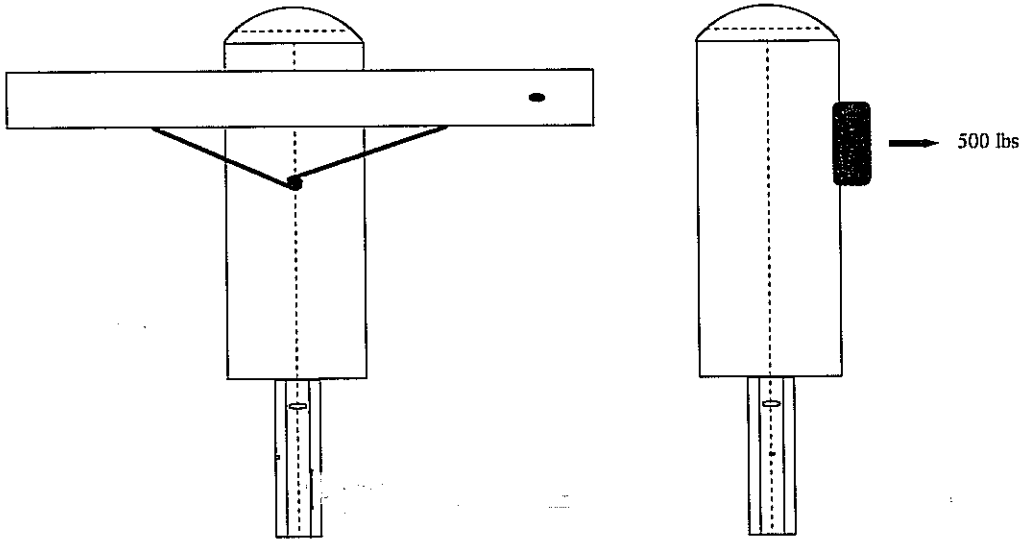
Comments: The pole top hold down in line with the force failed by shear at 4900 pounds. Initial composite cracking was heard at 2500 pounds but no damage to the pole top was detected after the test.

Test #2- Crossarm- Cantilever torsion

54" Poletop Extension with a 8ft Crossarm mounted 40" above mounting brace. Force was applied at the end of the Crossarm, where dead end insulator would be mounted, 42" from pole centerline. Deflection measurements were taken of the crossarm.

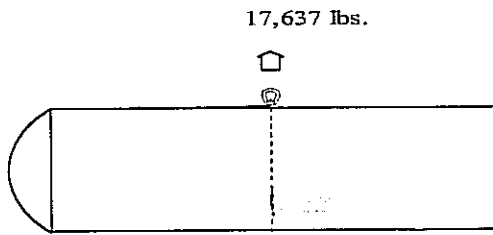
Lbs.	Deflection
100	0.000"
200	8.000"
300	14.000"
400	19.590"
500	21.000"

Comments: The 8ft cross arm bolting and braces bent during this torsional test with no detectable deflection of the pole top extension and no permanent deformation in the support bracket.



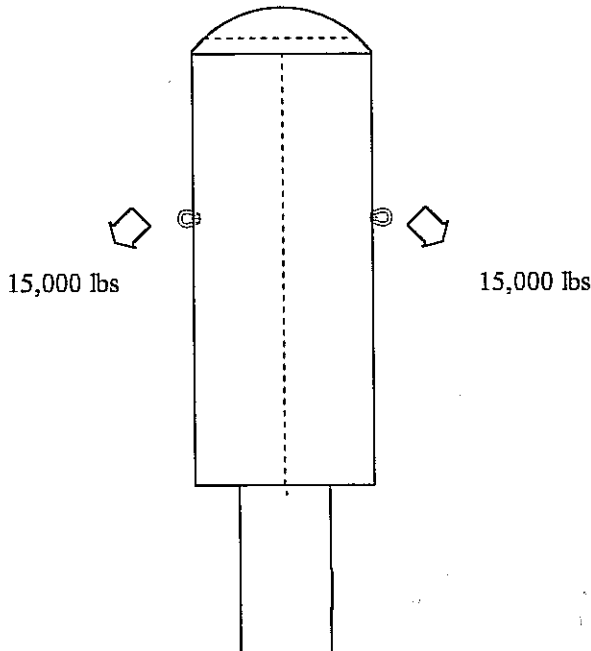
Test #3- Shear test on bolt holes

An 8,000kg (17,637 lbs) load was applied to 5/8" thru bolt pass through pole top extension. No significant damage noticed, just minor scratches.



Test #4- Guying

A 54" pole top extension was tested using (2) standard guy fixtures on opposite sides of the extension. A load of 15,000 lbs was applied on each guying fixture. No hole elongation or damage was noted to the fiberglass, but there was noticeable bending to bolts.



Over the past 40 years Highline Products has sold thousands of Pole Top Extensions with no known failures or issues. Generally, the pole top extension is stronger than the mounting equipment.

The fiberglass tube manufactured by Highline is circularly wound using high-grade fiberglass and epoxy resin for superior strength and durability. Black carbon pigment is added to for additional UV protection. The outer surface has a minimum of 10mils of resin and is then painted with a high quality polyurethane paint. This combination offers the best protection available against the elements and results in a superior looking product.