MACLEAN POWER SYSTEMS

Engineering Test Report

C20P003B

SI-4040 STATIC LOAD TESTS

WITH COMPOSITE POLE

Rev A (07/10/2025) Initial Release

Prepared by

Ron Kmiecik
Product Manager, Hardware
MacLean Power Systems

1. Abstract

The SI4040 pole step was assembled to a composite pole section and loaded via a looped cable to verify the strength of the assembly under a static load.

2. Procedure

Test 1: 5000 pound load with 3 minute hold

Reference is ANSI Z359.18 (2017) section 4.2.1

1) Affix the pole step to composite pole.
2) Loop the pulling cable onto pole step at the base; increase load to 5000 lbs at rate of less than 2 inches per minute. Hold target load for 3 minutes.
3) Remove load and disassemble pole step from pole.
4) Examine step and pole for any damage.
5) Repeat test for a total of two samples.

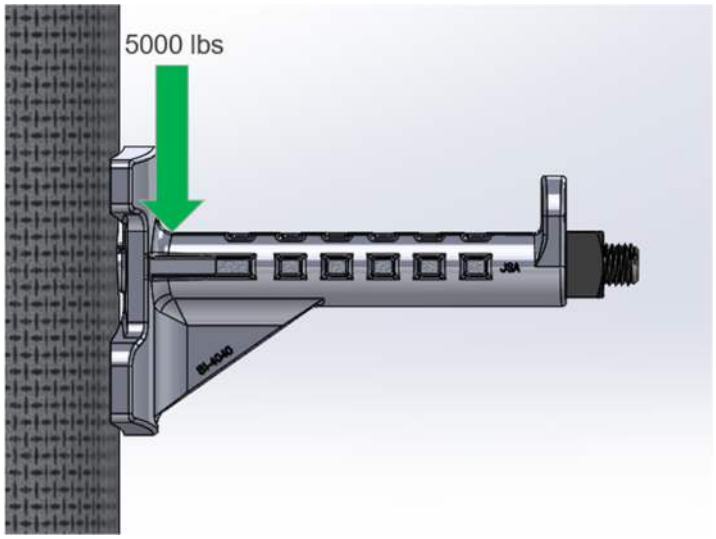


Figure 1: Test 1 setup.

Test 2: 3000 pound load with 1 minute hold

Reference is utility specifications.

1) Affix pole step to composite pole.
2) Loop pulling cable onto the pole step at 2 inches from the pole face; increase load to 3000 lbs at a rate of 0.25 inches per minute, hold target load for 1 minute. Note: the appendix contains the same test conducted 1.5 inches from the pole face.
3) Repeat test 2 for a total of three samples.

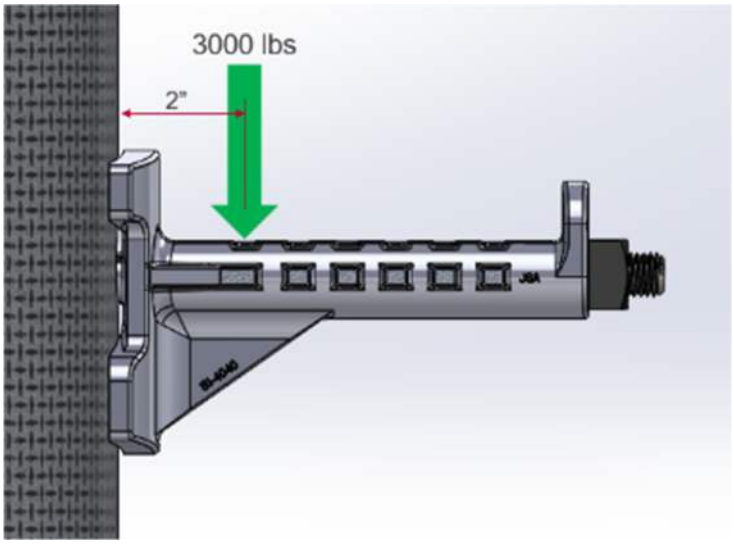


Figure 2: Test 2 setup

Test 3: 600 pound load with deflection measured

Reference is NESC 261N and utility specifications.

1) Affix pole step to composite pole.
2) Loop pulling cable onto the pole step at boot-keeper end; increase load to 600 lbs at a rate of 0.25 inches per minute.
3) Hold at target load and measure deflection of the step; not to exceed 15°.
4) Repeat for two samples.

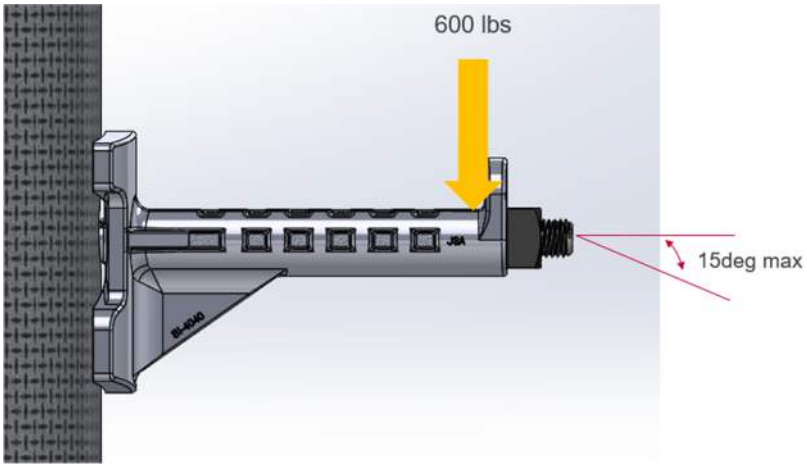


Figure 3: Test 3 setup

Test 4: 1250 pound load with one minute hold

Reference is utility specifications.

1) Affix pole step to composite pole.
2) Loop pulling cable onto the pole step at 1 inch from the boot-keeper end; increase load to 1250 pounds at a rate of 0.25 inches per minute.
3) Hold 1250 pound load for one minute.
4) Repeat for three samples.

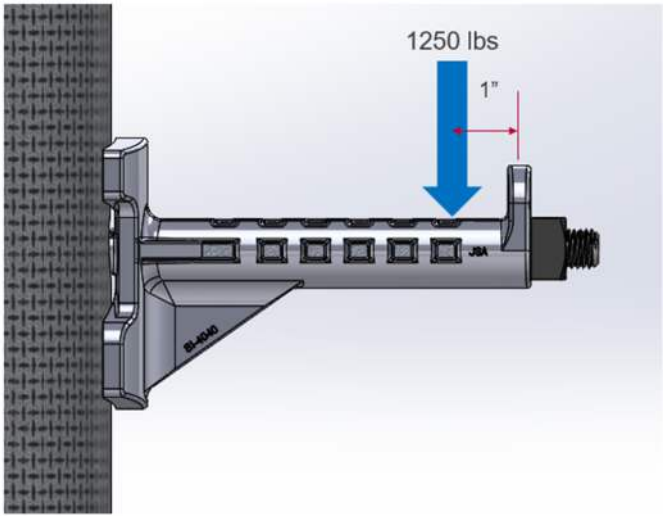


Figure 4: Test 4 setup

3. Results

Results are shown in Table 1.

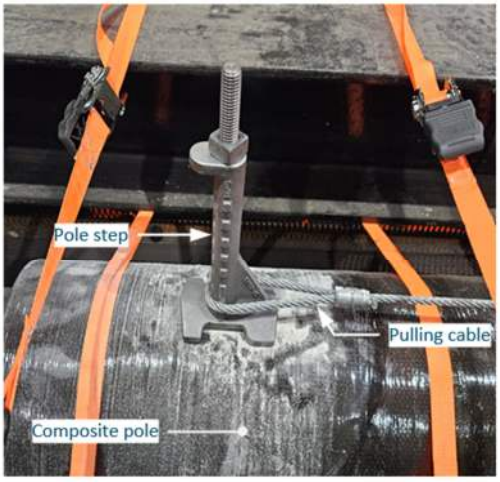
Table 1: Test results

Test #	Description	Sample #	Actual load (lbs)	Deflection Angle	Results
1	5000-pound load at base with 3-minute hold	1	5165	3.5°	No permanent deflection; no pole damage
	5000-pound load at base with 3-minute hold	2	5040	3.4°	No permanent deflection; rear tab separated at 4535 lbs; no pole damage
2	3000-pound load with one minute hold	1	3065	3.2°	No permanent deflection; no pole damage
	3000-pound load with one minute hold	2	3040	3.4°	No permanent deflection; no pole damage
	3000-pound load with one minute hold	3	3190	3.5°	No permanent deflection; no pole damage
3	600-pound load with deflection measured	1	600	1.0°	No permanent deflection; no pole damage
	600-pound load with deflection measured	2	620	1.2°	No permanent deflection; no pole damage
4	1250-pound load with one minute hold	1	1255	2.0°	No permanent deflection; no pole damage
	1250-pound load with one minute hold	2	1250	1.8°	No permanent deflection; no pole damage
	1250-pound load with one minute hold	3	1265	2.1°	No permanent deflection; no pole damage

4. Conclusion

The SI-4040 pole step passes the test requirements.

5. Appendix: Photos



Typical angle measurement

Figure 5: Typical test setup.

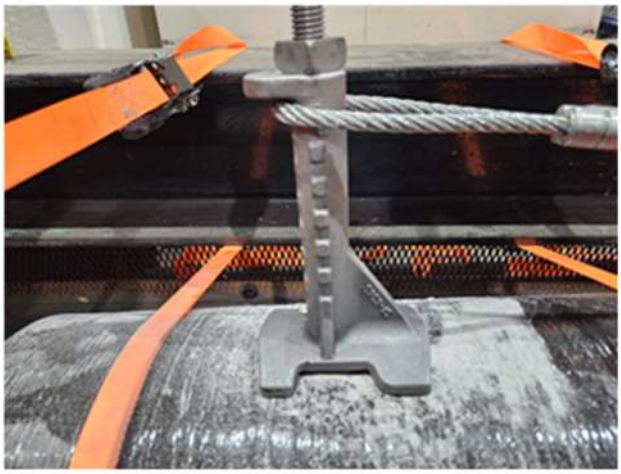


Figure 6: Typical test setup for pulling at far end.

Composite pole dimensions

- Diameter = 12”
- Wall thickness = 0.40”

Supplemental test: 3000 pound load with 1 minute hold

Procedure:

1) Affix pole step to composite pole.
2) Loop pulling cable onto the pole step at 1.5 inches from the pole face; increase load to 3000 lbs at a rate of 0.25 inches per minute, hold target load for 1 minute.
3) Repeat supplemental test for a total of two samples.

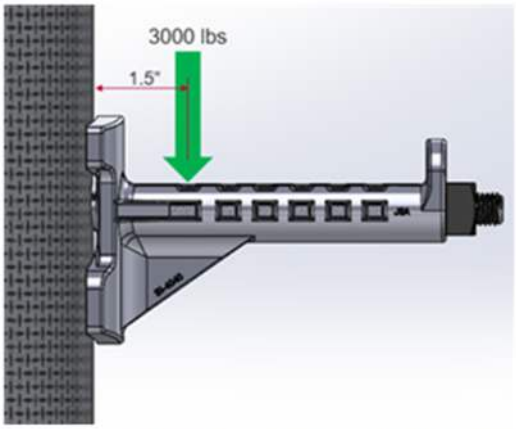
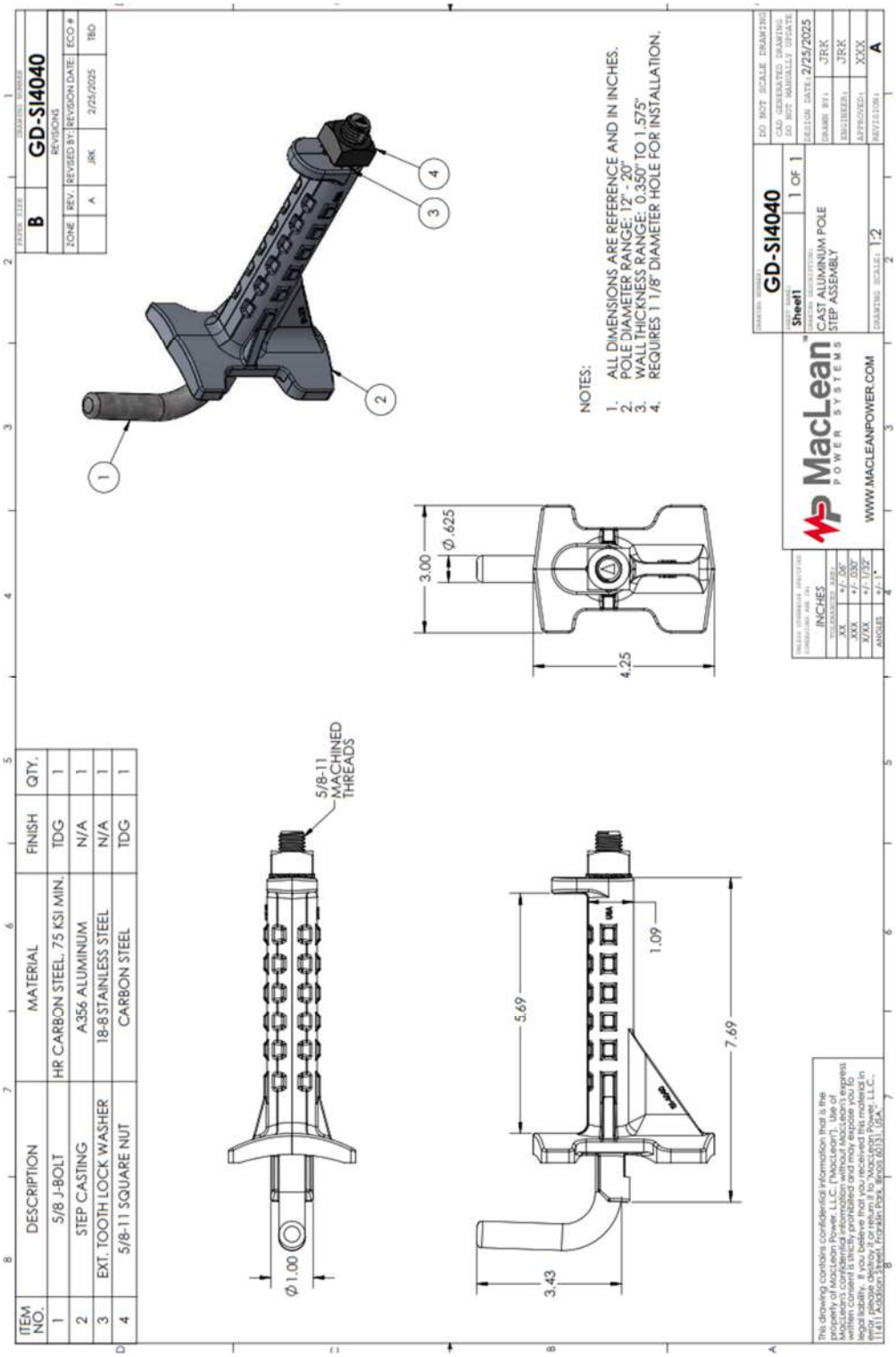


Figure 7: Supplemental test: 3000 pounds at 1.5" from pole face.

Table 2: Supplemental 3000-pound load test results

Description	Sample #	Actual load (lbs)	Deflection Angle	Results
3000-pound load with 1 minute hold (1.5")	1	3115	3.2°	No permanent deflection; no pole damage
3000-pound load with 1 minute hold (1.5")	2	3065	3.2°	No permanent deflection; no pole damage

Product drawing



End of test report