

SPECIFICATION for  
Laser Alignment Tool  
Projects #789-832  
16 Jun 16

**ENCLOSURE 2**

**TECHNICAL SPECIFICATION FOR GPS REMOTE OPERATION LOAD CELLS  
(10,000 Through 200,000 Pound Working Load Limit)**

**1 DESIGN CHARACTERISTICS**

- 1.1 Load cell shall meet the selection, use, and maintenance criteria of ASME B30.26, with additions and changes as noted in this specification.
- 1.2 Safety Factors - The load bearing parts of the load cell shall have a minimum safety factor of 5:1 for steel and 7:1 for aluminum, based on the minimum ultimate strength of the material.  
**CERTIFICATION REQUIRED**
- 1.3 Accuracy - Accuracy of the load cell shall be better than  $\pm 0.5\%$  of full scale.
- 1.4 General -The load cell and readout shall be capable of operation in an outdoor environment (temperature, humidity, rain) without causing damage or affecting the operation of the entire load indicating system. The load cell shall operate within the tolerance specified between  $-4$  deg F. to 140 deg F.
- 1.5 Protection Against Inadvertent Disassembly - The load cell shall be restrained or manufactured so that it will not inadvertently disassemble (e.g., due to rotation of the handling equipment below/above the load cell ).
- 1.6 The load cell shall be a current proven production model with repair parts readily available. One-of-a-kind configurations shall not be allowed.
- 1.7 Calibration - The load cell shall be capable of being calibrated using standard industrial calibration equipment.
- 1.8 Remote Readout - The remote readout shall be readable from a distance of 10 feet in both daylight and low light conditions. The display shall read a minimum of seven digits and calibrated for pounds. Maximum display increments shall be 200 lbs for 200,000 lb and greater load cells, 100 lbs for 100,000 lb Laser Alignment Tool and 50 lbs for the 50,000 lbs and lower load cells. The readout shall have a minimum range of 150 feet. A protective case and neck strap shall be provided for the remote readout.
- 1.9 Battery - Batteries for both the load cell and remote readout shall have a minimum use time of 20 hours. For rechargeable batteries the vendor shall provide a charger.
- 1.10 Operating Frequency – The vendor shall provide a load cell/readout that will operate on a frequency of 418 MHz. Other frequencies may be allowed, but they must be verified to not conflict with others used at the Shipyard prior to acceptance.  
**CERTIFICATION REQUIRED**
- 1.11 Material Composition - The load bearing elements of the load cell shall have no cast iron parts. Precipitation hardened stainless steel (e.g., PH 17-4) load bearing elements shall be age hardened at minimum temperature of 1025 F. The material composition and heat treatment of aluminum shall meet the requirements for ASTM B211. Shackle material requirements given elsewhere on this specification.  
**CERTIFICATION REQUIRED**
- 1.12 Hardness - The steel load bearing elements shall have a hardness value of less than or equal to 40 HRC.  
**CERTIFICATION REQUIRED**

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- 1.13 The load cell components shall be permanently and legibly marked with the manufacturers name or trademark as well as working load limit.

**2. TEST REQUIREMENTS**

- 2.1 Vendor Initial Testing – Vendor shall perform a visual inspection of all load bearing surfaces and elements for presence of nicks, cracks, gouges, peening, distortion or damage before load test. Vendor shall then perform a load test of the load cell as an assembly to a minimum of 200% of the rated capacity based on certified test equipment. The load test must be held for a minimum of 2 minutes. Following load testing, re perform the pretest visual inspection of the same components.

**CERTIFICATION REQUIRED**

- 2.2 Periodic Load Testing - The manufacturer shall authorize periodic load testing between 200% and 205% of the manufacturer's rated capacity.

**CERTIFICATION REQUIRED**

- 2.3 The manufacturer shall authorize disassembly/reassembly of the load cell to perform periodic load testing.

**CERTIFICATION REQUIRED**

- 2.4 The manufacturer shall specify its recommended maximum periodic test load (must be no less than 205%).

**CERTIFICATION REQUIRED**

- 2.5 The manufacturer shall provide written authorization that a periodic load test as specified above will not damage, cause permanent deformation or affect the operation or warranty of the load cell.

**CERTIFICATION REQUIRED**

**3. SHACKLES OR END ATTACHMENTS**

- 3.1 The load cell shall be provided with standard shackles if the configuration requires the use of shackles. The shackles shall have a minimum safety factor of 5:1.

- 3.2 Material - Shackles shall be forged and meet the technical requirements of Federal Specification RR-C-271 for material composition (Grade A or B as applicable).

**CERTIFICATION REQUIRED**

**4. REQUIRED DOCUMENTATION**

- 4.1 Technical Manual - Two each technical manuals shall be provided which have detailed maintenance, operational, calibration and troubleshooting procedures.

- 4.2 Drawings - Detailed drawings showing complete construction of the load cell and electrical schematics for the strain gage and remote shall be provided. Drawings considered to be proprietary by the OEM are not required.

**5. CERTIFICATIONS**

- 5.1 Manufacturer shall provide written certification of compliance with paragraphs 1.2, 1.3, 1.10, 1.11, 1.12, 2.1, 2.2, 2.3, 2.4, 2.5, and 3.2 of this specification.

- 5.2 Failure to provide the certifications required by paragraph 5.1 of this specification shall be cause for rejection of this material.

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**6. COMPLIANCE SECTION**

6.1 Material Composition (shackles addressed elsewhere in this specification) - The load bearing elements of the load cell have no cast iron parts. Precipitation hardened stainless steel (e.g., PH 17-4) load bearing elements is age hardened at minimum temperature of 1025 deg F. The material composition and heat treatment of aluminum meets the requirements for ASTM B211.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.2 Hardness – The steel load bearing elements have a hardness value less than or equal to 40 HRC.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.3 Minimum Factor Of Safety – The load bearing parts of the load cell shall have a minimum safety factor of 5:1 for steel and 7:1 for aluminum, based on the minimum ultimate strength of the material.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.4 Accuracy – Accuracy of the load cell shall be better than  $\pm 0.5\%$  of full scale.

Load cell accuracy is \_\_\_\_\_

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.5 Periodic Load Testing – The manufacturer authorizes periodic load testing between 200% and 205% of the manufacturer's rated capacity.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.6 The manufacturer authorizes disassembly/reassembly of the load cell to perform periodic load testing.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.7 The manufacturer specifies its recommended maximum periodic load test (must be no less than 205%).

Maximum Periodic Test Load \_\_\_\_\_

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.8 The manufacturer authorizes that a periodic load test as specified above will not damage, cause permanent deformation or affect the operation or warranty of the load cell.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.9 The Vendor has performed a 2 minute load test and has recorded load test value.

Test Load \_\_\_\_\_

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

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6.10 Vendor provided a load cell/readout that operates within a pre-approved shipyard frequency.

Frequency \_\_\_\_\_

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

6.11 Material – Shackles are forged and meet the technical requirements of Federal Specification RR-C-271 for material composition (Grade A or B as applicable).

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_