

Engineering Specification

Low Profile Steel Deck Truck Scale

The following set of specifications will describe a fully electronic, low profile, modular type steel deck truck scale system, designed to be optionally mounted on an above grade pier, floating slab or pit type foundation. Scale shall be a 3-module 4-section system that is suitable for easy movement from one location to another.

1.0 General Provisions – Truck Scale

The scale will be a fully electronic, low profile, steel deck design truck scale. The scale platforms, load cells, and digital indicators will be 100 percent designed, manufactured and assembled by one manufacturer located in the United States of America. The scale shall be a Rice Lake Weighing Systems Model 7011-ST-100-OTR or equivalent that will meet the following minimum standards.

Please Check One

Yes **No**

- | | | | |
|--------------------------|--------------------------|------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1.1 | The scale shall have a full scale capacity of 135 Tons (270,000 lbs) with a displayed resolution of 200,000 lbs x 20 lbs in accordance with NIST, Class IIII devices. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.2 | Scale shall be a fully electronic design. The scale weighbridge will consist of factory welded modules having a total longitudinal span of 70' (69' 10.5") and platform width of 11' (10' 10.5"). No field assembly or welding will be allowed. Mechanical lever systems are not acceptable. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.3 | Each scale module shall be designed with a Concentrated Load Capacity (CLC) of 45 Tons (90,000 lbs), as defined by NIST. When the CLC is applied at midspan on a module, according to NIST regulations, the maximum stress of the steel shall not exceed 26,000 PSI as determined by Finite Element Analysis (FEA) software. The deflection at this loading condition shall not cause the scale to exceed the allowable accuracy tolerance as specified by NIST in Handbook 44. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.4 | The scale provided will have an unobstructed weighing surface of 11' (10' 10.5") wide by 70' (69' 10.5") in length and a 16.5" minimum profile. A minimum clearance of 4" shall be provided between the concrete floor and the bottom of the weighbridge. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.5 | The scale modules will be designed as such to eliminate use of grout plates requiring setting and leveling prior to arrival of the scale at job site. A maximum of 2 drilled anchors (3/4" x 7") will be provided for each load cell stand. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.6 | The scale system shall be a full electronic design, with internal self-checking weighbridge. Weighbridges using bumper bolts, externally fixed check rods, or embedded bumper plates in the end walls will not be permitted. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.7 | The scale shall have a maximum span deflection ratio of no less than 1:1100 under legal highway loading at mid span of module. |
| <input type="checkbox"/> | <input type="checkbox"/> | 1.8 | Minimum weighbridge thickness will be 12". Scale shall be an open bottom design. Weighbridges that utilize a sealed bottom plate for structural strength shall not be permitted. |

- 1.9** Diamond checkered steel treadplate shall be supported with a minimum of (12) 12" wide flange, 14 lbs per foot, structural longitudinal beams, welded to top flange of beam and module end plate. Only structural wide flange beam construction shall be allowed. Weighbridge designs utilizing junior beams or bent plate shall not be permitted.
- 1.10** Scale weighbridge shall be designed to accommodate up to 250 trucks per day for a period of 25 years without weighbridge fatigue.
- 1.11** The entire bridge assembly shall be cleaned prior to the addition of any coatings or paint to the weighbridge modules. Customer reserves the right to inspect the steel surfaces prior to application of any coatings to the prepared steel surfaces. All steel surfaces shall be free of all welding gases, residue, oil, mill scale and rust.
- 1.12** All non-visible steel shall be evenly spray coated with an asphalt emulsified coating.
- 1.13** All steel elements shall be steel shot blasted to SSPC-A-SP6 standards.
- 1.14** All visible steel surfaces will receive a 3-5 mill application of a high solids urethane primer and a high solids acrylic urethane top coat to a finish of 2-3 mill thickness.
- 1.15** Module end plates shall be a minimum 3/4" thick, and shall be reinforced on each side with longitudinal I-beams. Load cell pockets shall be constructed of 3/4" steel plate and shall be tied to the end plates using tabs and laser cutouts. Scale modules using flat welded or bolted end boxes shall not be allowed.
- 1.16** The scale will be NTEP-certified and shall meet the requirements set forth by the NIST Handbook 44 for Class III-L devices. The bidder shall submit a current copy of Certificate of Conformance (COC) with bid.
- 1.17** Structural steel elements will have a combined minimum weight of 30,800 lbs.
- 1.18** Access covers to the load cells shall be from the top of the scale and shall be boltless in design. Cover plates will be reinforced to adequately handle axle traffic over the covers and will be kept in place with 1/2" diameter x 1" long steel dowels. Cover plates utilizing bolts of any type shall not be permitted.
- 1.19** A 1/2" diameter steel rock guard shall be welded to the end modules.
- 1.20** The truck scale shall be provided with a fabricated cleanout area measuring 12" x 84" with removable end plates at each end of the scale system.(Optional)
- 1.21** Manhole frame and cover (24" square) shall be provided for access to the pit area beneath the scale. (Optional for pit installations)
- 1.22** Scale shall be equipped with optional gusseted bolt-on safety guide rails on each side of the scale with a minimum of 4" diameter pipe. A minimum of 3 bolts will be used at each gusset to attach side rail. Guide rails welded to weighbridge shall not be permitted. (Optional)
- 1.23** The scale provided shall be a Rice Lake Weighing Systems Survivor Series Model 7011-ST-100-OTR or equivalent.

2.0 Load Cells and Junction Boxes

Load cells are rigidly mounted utilizing a single link suspension to provide equal and consistent and evenly distributed force to the load cell. Load cells are totally self-contained, and come complete with mounting stands, single-link suspension, and 60' of cable to junction box. Compression or rocker style load cells shall not be permitted.

- 2.1** Load Cells shall be rigidly mounted in fabricated steel stands parallel to traffic flow. Suspension system will be E4340 material forged single link suspension hardened to Rockwell "C" 40-45 to allow self-centering and free floating platform. Rocker column or compression type load cells requiring check rods, anti-rotation pins or bumper bolts will not be permitted.
- 2.2** Load cells will be of the analog type and have a minimum capacity of 75,000 lbs each with an overload safety factor of 150 percent. Scales utilizing a lower capacity load cell than 75,000 lbs will not be permitted.
- 2.3** Scales utilizing adjustable bumper bolts or embedded plates in the wall to minimize movement of the bridge shall not be allowed.
- 2.4** Systems utilizing proprietary, internal circuitry to convert analog to digital conversion of the load cell signal within the load cell shall not be permitted.
- 2.5** All access to load cells will be from the top of the scale through formed boltless steel access panels. Covers should be form fitted and should be accessible without use of tools.
- 2.6** Steel conduit will be provided within the weighbridge for load cell cable runs.
- 2.7** A flexible screw-type conduit fitting shall be provided at each load cell. Load cell cable shall be totally enclosed within permanent conduit provided within the weighbridge. Load cells using connectors of any type will not be permitted.
- 2.8** Load cells shall be of 4340 alloy steel nickel plated and shall be scientifically sealed with a minimum IP67 rating.
- 2.9** Load cells shall be non-proprietary in design, including both mechanical operation and electronic transmission of data. Manufacturers using proprietary load cell technology available from a single source will not be permitted.
- 2.10** Replacement load cells shall be available from a multitude of vendors nationally, and shall not be single sourced or of a proprietary design.
- 2.11** Fiberglass Reinforced Polyester (FRP) junction box with formed contoured edges and gasketed top access. Junction box shall have a Gore™ single directional membrane vent. Steel junction boxes shall not be permitted.
- 2.12** Load cell stands will be flush mounted to concrete piers and anchored using wedge locks or similar bolts. A maximum of (2) 3/4" x 7" anchor bolts will be required per stand and will be included in the cost of the scale. Grout plates or embedded items in the foundation concrete will not be allowed.

- 2.13** A 1" braided copper transient bypass cable shall be provided at each load cell from the weighbridge to the base stand.
- 2.14** UPS Duplex Voltage regulating transformer, or equivalent.
- 2.15** UJB-3T6 DC Transient circuitry protection or equivalent.
- 2.16** Load cells shall be warranted a full five years against failure of all types including lightning or surge voltage
- 2.17** A single-point grounding system will be provided. Systems utilizing a multiple point ground will not be permitted.

3.0 Digital Instrumentation Specifications

The scale instrument shall be a Rice Lake Weighing Systems 920i[®] Programmable HMI Indicator/Controller complete with operator friendly diagnostics for the load cells and digital j-box or equivalent.

- 3.1** The scale instrument shall be NTEP-certified and meet or exceed all specifications set forth by NIST, Handbook 44 for Class II, III, and III-L devices. Additionally the instrument shall meet or exceed approvals for UL, C-UL and CE. The manufacturer, on request, shall provide a Certificate of Conformance (COC) to these standards.
- 3.2** The scale instrument shall be housed in an all stainless steel, NEMA 4X/IP66 enclosure measuring 10.5" wide x 11.5" high x 4.5" deep with swing-away mounting base for ease of installation.
- 3.3** The instrument shall be 100 percent manufactured by the manufacturer of the weighbridge assembly.
- 3.4** The instrument shall be microprocessor based.
- 3.5** The scale instrument shall be fully programmable and configurable according to the needs of the application. Custom programming for the application will be available through common programming techniques.
- 3.6** The scale display shall be a backlit LCD graphical display with minimum size of 3.4" high x 4.6" wide with characters from .25" to 1.2" high. Display must be capable of displaying alpha and numeric characters or graphic images.
- 3.7** The instrument shall allow hook up of a QWERTY-type, computer-style keyboard.
- 3.8** The front panel of the instrument shall have the following operational keys as standard with tactile feedback:
 - Zero
 - Gross/Net
 - Tare
 - Units
 - Print
 - Clear
 - Decimal Point
 - Numeric 0-9

- 3.9** The instrument shall have the following custom soft keys - 5-user defined function keys:
- Driver Number
 - Contract Number
 - Weigh In
 - Weigh Out
- 3.10** The instrument shall have the following displayed operational annunciators:
- Gross, Tare, Net, Zero, Motion
 - Three units of measurement
- 3.11** The scale instrument shall have the capability of powering up to 16 - 350 Ohm load cells.
- 3.12** The instrument shall have the ability to display both gross and net weights and the ability to recall gross or tare weights in the net mode.
- 3.13** The instrument shall have the ability to provide in/out, gross/tare/net calculation of individual truck weights and storage for the following information
- 1,000 open transactions
 - 1,000 tare weights
 - Data base report
- 3.14** The instrument shall have a minimum of four standard bi-directional serial ports with the following configurations available:
- Com. 1 – RS-232
 - Com. 2 – RS-232, 20mA current loop
 - Com. 3 – RS-232, 20mA current loop
 - Com. 4 – RS-232, RS-485, 20mA current loop
- 3.15** Set Points
Four digital I/O ports on board.
- 3.16** The scale instrument shall be designed to provide noise protection for RFI, EMI and ESD.
- 3.17** The excitation voltage shall be 10 VDC.
- 3.18** The instrument shall have an automatic zero tracking feature that will be programmable and in compliance with NIST, Measurement Canada and OIML regulations.
- 3.19** The instrument shall be fully programmable through the front panel.
- 3.21** The instrument shall include as standard surge voltage protection as recommended by the manufacturer.
- 3.22** The digital instrument shall be warranted by the manufacturer for two years from date of installation.
- 3.23** The instrument shall have a multi-level digital filtering system for environmental noise or vibration.

- 3.24** Individual load cell monitoring and system diagnostics when paired with the iQUBE[®] digital diagnostic junction box.
- 3.25** The scale instrument shall have an internal resolution of 8.000.000 counts.
- 3.26** Operating temperature for the instrument shall be 14°F to 104°F (-10°C to 40°C).
- 3.27** Scale instrument shall have the ability to be panel mounted.
- 3.28** Customized programmable print formats including 20 auxiliary print formats.
- 3.29** Operational power input shall be 115 or 230 VAC, ±10 percent @ 3.15 Amp maximum. 50/60 Hz single phase.
- 3.30** The scale instrument shall have the capability of receiving custom programs with up to 256 display widgets and 10 screens.
- 3.31** The instrument shall have a real time clock and battery backed feature.
- 3.32** A/D conversion rate shall be updated at 120 times per second minimum.
- 3.33** Multi-range/internal selection for setting two or three weight ranges with different division sizes.