

# ENGINEERING SPECIFICATIONS

## Concrete Platform Truck Scale

### 1 GENERAL PROVISIONS

Yes No

- 1.1 Furnish and install one pit-type concrete deck truck scale and associated electronic controls.
- 1.2 The scale shall have a clear and unobstructed weighing surface of not less than 70 feet long and 10 feet wide.
- 1.3 The scale shall be fully electronic in design and shall not incorporate any mechanical weighing elements, check rods, or check stays.
- 1.4 The scale shall be designed to perform as a single weighing platform and shall incorporate a pit-type design.
- 1.5 The scale shall have a gross weighing capacity of 100 tons.
- 1.6 The scale shall be designed to accept vehicles that generate up to 55,000 pounds per tandem axle.
- 1.7 The scale shall be calibrated to 200,000 pounds by 20-pound increments.
- 1.8 The scale's weighing-related electronics shall consist solely of load cells, load cell cables, and digital weight display. No other devices shall be permitted between the load cell and the digital weight display. Junction boxes, summing boards, gathering boards, gathering boxes, totalizers, external analog-to-digital converter boxes, and sectional controller boxes will not be accepted because of their significant and inherent maintenance issues.
- 1.9 The scale shall meet the requirements set forth by the current edition of the National Institute of Standards and Technology Handbook 44 (NIST HB-44). The scale manufacturer shall provide a Certificate of Conformance (NTEP Certification) to these standards upon request.
- 1.10 The design and manufacture of the scale weighbridge, load cells, and digital instrument shall all be of one manufacturer to maximize compatibility and availability of components and to insure maximum benefit from the system's lightning protection capability. Also, the manufacturer shall have a quality system that has been registered to the standards of ISO 9001.
- 1.11 The manufacturer or bidder shall provide with the bid proposal a listing of the total cost (labor, parts, travel time, and mileage) for two service technicians to travel to the scale site with a heavy duty test truck, stay on site for four (4) hours to troubleshoot and replace one load cell in the scale and the main printed circuit board in the weight display. This listing shall be provided for service in the following three timeframes: 6 months after installation, 36 months after installation, and 58 months after installation. Listings of the same costs at these three time periods must also be provided assuming the failure is the result of a lightning strike. The cost of recalibration must be included in each service cost

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summary. Failure to provide the information required in this section will cause your bid submittal to be considered non-responsive and disqualified from consideration.

- 1.12 The scale shall be a METTLER TOLEDO Model 7541 or equivalent.

### **2 SCALE FOUNDATION REQUIREMENTS**

- 2.1 The foundation shall meet all local requirements and the minimum specifications as stated in this section.
- 2.2 The minimum soil bearing required shall be 1,500 pounds per square foot. The buyer shall be responsible for determining whether or not the soil conditions are adequate.
- 2.3 The foundation shall have a pit-type design.
- 2.4 The pit shall provide a minimum of 11 inches of clearance to the weighbridge.
- 2.5 The foundation shall be constructed to provide positive drainage away from its center.
- 2.6 Accommodations must be made to promote proper drainage away from the scale.
- 2.7 The foundation shall be poured and constructed of concrete with a minimum strength of 3,000 psi at a 28-day cure with 5 to 7% air entrainment.
- 2.8 The foundation shall be reinforced in all load-bearing areas.
- 2.9 The foundation shall be designed to include an approach on each end of the scale in accordance with local regulations and the guidelines of NIST HB-44.

### **3 WEIGHBRIDGE SPECIFICATIONS**

- 3.1 The scale weighbridge shall be capable of weighing trucks that have dual-tandem axle weights (4 feet minimum between dual axles and at least 10 feet from next axle) of up to 55,000 pounds.
- 3.2 The weighbridge shall consist of prefabricated modules that are bolted together by using tie rods.
- 3.3 The concrete shall be placed on top of the main beams of the weighbridge structure and shall incorporate two manholes.
- 3.4 The weighbridge shall be designed to allow access to the load cell cables, base plates, and all foundation anchor bolts through the manholes installed in the concrete platform.
- 3.5 The concrete deck shall be a minimum of 10 inches thick and reinforced with rebar.

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- 3.6 There shall be no bolted connections between the load cell and weighbridge assemblies.
- 3.7 The main girders shall be a minimum of W 24 x 62. The cross members shall be a minimum of W 12 x 22.

#### **4 SURFACE PREPARATION AND FINISH**

- 4.1 The weighbridge shall be shot blasted to a minimum SSPC-SP6 specification prior to painting.
- 4.2 The exterior of the scale shall be coated to provide superior corrosion resistance, chemical resistance, UV protection and impact and abrasion resistance. For more detail, please review the paint specification for current material and manufacturer detail.
- 4.3 The finish shall be force cured in order to reduce risk of contamination and ensure durability of the surface.

#### **5 LOAD CELL SPECIFICATIONS**

- 5.1 Each load cell shall have a minimum capacity of 50 metric tons (110,000 pounds) with 300% ultimate overload rating.
- 5.2 All load cells shall be certified by NTEP and meet the specifications as set forth by NIST HB-44 for Class III L devices. The manufacturer shall provide a Certificate of Conformance to these standards upon request.
- 5.3 All load cells shall be certified to meet the specifications set forth by the International Organization of Legal Metrology (OIML) in document R60 for C3 load cells, which requires 60% tighter accuracy tolerances than NIST HB-44 for Class III L devices. The manufacturer shall provide a Certificate of Conformance to these standards upon request.
- 5.4 Load cells shall be digital with an integral microprocessor and analog-to-digital conversion function located within the load cell housing.
- 5.5 Load cells shall output only converted digital information without load correction for load position to the scale instrument. Analog output of signals from the load cell is not acceptable due to susceptibility of signal interference.
- 5.6 The load cell assembly shall be constructed so as to perform as a rocker pin and shall have no positive fixed mechanical connectors, such as bolts or links that are required in mounting the load cell to the weighbridge or foundation base plates.
- 5.7 The load cell shall not require check rods, flexures, or chain links for stabilization, as these items are sources of ongoing maintenance requirements.
- 5.8 The load cell shall not require a junction box to communicate between the load cell and scale instrument. No other devices shall be permitted between the load

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cell and the digital weight display. Junction boxes, summing boards, gathering boards, gathering boxes, totalizers, external analog-to-digital converter boxes, and sectional controller boxes will not be accepted because of their significant and inherent maintenance issues.

- 5.9 The load cell shall be of stainless steel construction and hermetically sealed with a minimum NEMA 6P / IP68 (submersible) and IP69K rating.
- 5.10 The load cell shall contain integral Transient Voltage Surge Suppressors (TVSS) for all input and communication lines. Each TVSS shall contain self-resetting thermal breakers to protect the load cell components from voltage and current surges.
- 5.11 The load cell shall come equipped with a neoprene rubber boot to keep debris from contaminating the lower bearing surface.
- 5.12 The load cell shall have a positive-lock quick connector integral to its housing for connecting and disconnecting the load cell interface cable at the load cell. The connector shall be of glass-to-metal, pin-type construction to maintain a hermetic seal.
- 5.13 The system shall be so designed as to permit a load cell cable to be replaced without either splicing the load cell cable or replacing the load cell, either of which will contribute to eventual system failure and unnecessary service costs. The system shall be so designed as to permit replacing the load cell cable without requiring the scale to be recalibrated, further reducing service and maintenance costs.
- 5.14 The load cell shall have the following specifications:
  - 5.14.1  $V_{min}$ : 5.0 pounds maximum
  - 5.14.2 Hysteresis:  $\pm 0.025\%$  of full scale
  - 5.14.3 Non-Linearity:  $\pm 0.015\%$  of full scale
  - 5.14.4 Creep (30 minutes):  $\pm 0.017\%$  of applied load
  - 5.14.5 Temperature range:  $-10^{\circ}\text{C} + 40^{\circ}\text{C}$
- 5.15 The load cell interface cable shall be stainless steel sheathed for environmental and rodent protection. Neoprene covered load cell cable shall not be permitted.
  - 5.15.1 Load cell cables which are hard wired directly to the load cell are not acceptable due to the failure rates associated with moisture wicking into the load cell from aged cables or damaged cables, and due to the unnecessary expense associated with replacing entire load cells when only a cable has been damaged.
- 5.16 The load cell shall have a minimum 10-year warranty against defects in materials and workmanship and failure resulting from lightning or surge voltages. The warranty shall cover all costs associated with replacement parts, travel, mileage,

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on-site labor, and recalibration after repair, the full cost of which shall be supported solely by the manufacturer and not in part by any other third party.

- 5.17 Load cells shall be METTLER TOLEDO POWERCELL® PDX® load cell or equivalent.

#### **6 JUNCTION BOXES AND CABLES**

- 6.1 Junction boxes shall not be permitted in the scale, attached to the exterior of the scale, or remotely mounted from the scale. Sectional controllers with encapsulated PCBs shall not be permitted due to the failure rates associated with PCBs that have wired connections made within enclosures which are not hermetically sealed.
- 6.2 Load cell cables and scale instrument cables shall be stainless steel sheathed for environmental and rodent protection.
- 6.3 In order to minimize maintenance issues, only a single cable shall be used to transmit data or weight signals between the weighbridge and the digital weight display.

#### **7 LIGHTNING PROTECTION SPECIFICATIONS**

- 7.1 A comprehensive lightning protection system shall be provided with the scale.
- 7.2 The system shall not require complicated wiring or devices to provide this protection.
- 7.3 Major scale components including load cells and scale instrument (terminal) shall be included in the lightning protection system.
- 7.4 Grounding of all scale components including load cells, scale instrument, and accessories shall be to one common point. Systems with multiple ground points are not acceptable.
- 7.5 An AC line surge protector shall conveniently plug into a common electrical outlet and have a receptacle.
- 7.6 Each AC line surge protector required shall have one isolated, grounding, hospital-grade duplex receptacle, and an internal 15-amp circuit breaker.
- 7.7 Verification of the lightning protection system's performance shall be available in writing from a third-party verification laboratory upon request. Proposals submitted without confirming the availability of third-party verification that the load cells, cables, and instrument as a system have been able to withstand the equivalent of a lightning strike with 80,000 amperes will be rejected.
- 7.8 The lightning protection system shall be a METTLER TOLEDO StrikeShield™ Lightning Protection System or equivalent.

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### 8 WARRANTY REQUIREMENTS

- 8.1 The scale manufacturer shall warrant the scale assembly including weighbridge structure, scale instrument, and associated cables from failures due to a defect in manufacturing, workmanship, lightning, or surge voltages.
- 8.2 The warranty will warrant the product for a period of 5 years from date of installation or 62 months from date of shipment to the Buyer, whichever occurs first. Bidder shall promptly correct any such defect appearing within the warranty period.
- 8.3 The warranty shall support 100% coverage of repair parts, labor, travel time, and mileage from the closest service location, or at the manufacturer's sole discretion, replacement of the product under warranty. The full cost of warranty as specified herein shall be supported by the manufacturer and not in part by any other third party or service provider.