

# **ENGINEERING SPECIFICATIONS**

## **Concrete Platform Motor Truck Scale**

### **1 GENERAL PROVISIONS**

- 1.1 Furnish and install one steel deck motor 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 11 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 be of flat-top design. Side rail support beams are not acceptable.
- 1.5 The scale shall have a gross weighing capacity of 100 tons.
- 1.6 The scale shall have a Concentrated Load Capacity (CLC) of 80,000 pounds.
- 1.7 The scale shall be designed to accept vehicles that generate up to 60,000 pounds per tandem axle.
- 1.8 The scale shall be calibrated to a minimum of 120,000 pounds by 20-pound increments and not to exceed 200,000 pounds. System configurations with increments greater than 20-pound increments will not be accepted; therefore scales with gross capacities in excess of 200,000 pounds will not be acceptable in order for the scale to meet NTEP Legal For Trade regulatory requirements.
- 1.9 In order for the bid to be considered, Supplier must provide written confirmation of empirical testing data to validate the design of the weighbridge through actual life-cycle testing. During the testing process the weighbridge must see a minimum of 1 million cycles, with at least 60,000 lbs. of test load, applied on the 8 contact points of a standard truck's dual tandem axle tires. This documentation must be provided with the proposal submittal. Failure to provide this information will result in the bid being considered non-responsive.
- 1.10 The junction boxes, load cells, and load cell mounting hardware shall be constructed of stainless steel.
- 1.11 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.
- 1.12 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.

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- 1.13 The manufacturer shall provide with the bid proposal a listing of major spare parts and their prices, including (but not limited to) replacement load cells, digital instrument, printer, junction box circuit boards, and associated parts.
- 1.14 The scale shall be a Mettler-Toledo, Inc. Model VTC100 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 2,500 pounds per square foot (psf) for a variable footer, 1,500 psf for a beam slab, and 2,000 psf for a pit foundation. The buyer shall be responsible for determining whether or not the soil conditions are adequate.
- 2.3 The foundation shall extend the full length and width of the scale platform.
- 2.4 The foundation shall provide a minimum of 3 inches of clearance to the weighbridge along the length of the scale.
- 2.5 The foundation shall be constructed to provide positive drainage away from its center.
- 2.6 The foundation must be higher than the surrounding grade to promote 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 constructed of three prefabricated scale modules each with a nominal surface dimension of 11' wide by 23'-4" long.
- 3.2 The prefabricated scale modules shall be so designed to enable field pouring of the concrete without additional field forming. No field added steel reinforcing bar shall be required for installation. Field reinforcement shall be accomplished through the use of polypropylene fibers such as Fiber-Lok or equivalent.
- 3.3 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 60,000 pounds, and shall have a Concentrated Load Capacity (CLC) of 80,000 pounds.

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- 3.4 The scale deck shall be poured and constructed of concrete with a minimum strength of 4,000 psi at a 28-day cure with 5 to 7% air entrainment.
- 3.5 The concrete deck shall be supported by an integral steel structure of sufficient design and construction to meet the loading and life cycle testing as specified in Section 1 of this specification.
- 3.6 All welding shall be completed in accordance with the American Welding Society (AWS) D1.1 Structural Welding Code.
- 3.7 All welding shall be performed by welding operators who have been certified to the AWS D1.1 Structural Welding Code.
- 3.8 The weighbridge and load cell mounting assemblies shall be designed to allow installation or replacement of a load cell with only one additional inch of clearance required between the top of the foundation and the bottom of the weighbridge on pit-less installations.
- 3.9 There shall be no bolted connections between the load cell and weighbridge assemblies.
- 3.10 The load cell assembly shall be designed so that when you are at the scale weighbridge with a lifting jack, the load cell can be replaced in less than 5 minutes
- 3.11 There shall be no field welding required for the installation of the scale.

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

- 4.1 The weighbridge shall be shot blasted to a minimum SSPC-SP6 specification prior to painting.
- 4.2 All exterior surfaces of the scale shall have a two component, high build epoxy finish, impregnated with aluminum flake for increased corrosion resistance and UV protection, providing total Dry Film Thickness of 5-7 mils; International/Akzo Nobel Intergard 7562 or equivalent.
- 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 30 metric tons (60,000 pounds) with 400% 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 IIII devices. The manufacturer shall provide a Certificate of Conformance to these standards upon request.
- 5.3 Load cells shall be analog.

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- 5.4 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.
- 5.5 The load cell shall not require check rods, flexures, or chain links for stabilization, as each of these items are sources of ongoing maintenance requirements.
- 5.6 The load cell shall be of stainless steel construction and hermetically sealed with a minimum NEMA 6P / IP68 (submersible) rating.
- 5.7 The load cell shall have the following specifications:
  - 5.7.1  $V_{\min}$ : 0.007% of rated capacity maximum
  - 5.7.2 Hysteresis:  $\pm 0.01\%$  of full scale
  - 5.7.3 Non-Linearity:  $\pm 0.015\%$  of full scale
  - 5.7.4 Creep (30 minutes):  $\pm 0.01\%$  of applied load
  - 5.7.5 Compensated Temperature range:  $-10^{\circ}\text{C} + 40^{\circ}\text{C}$
  - 5.7.6 Operational Temperature Range:  $-30^{\circ}\text{C} + 60^{\circ}\text{C}$
- 5.8 Load cells shall be Mettler-Toledo, Inc. Model 0782 analog load cells or equivalent.

## **6 SCALE INSTRUMENT SPECIFICATIONS**

- 6.1 The scale instrument shall be designed for use in vehicle scale weighing applications. It shall be capable of performing basic weighing operations including but not limited to:
  - 6.1.1 Inbound/outbound two-weighment operations.
  - 6.1.2 Single weighment operations where vehicle tare weights are known either through preset tares which are stored in the scale instrument memory or manually entered tare values which are entered through the keyboard.
  - 6.1.3 Transient vehicle weighing operations where the transaction is to be completed but the record will not be added to memory accumulators or totals.
- 6.2 The instrument shall, as a minimum, utilize a vacuum fluorescent graphical display to present the transactional information along with weight to the operator. During normal weighing operations the display will incorporate the following elements:
  - 6.2.1 Weight
  - 6.2.2 Center of Zero
  - 6.2.3 Mode of Operation (Gross or Net)
  - 6.2.4 Weighing Unit (lb or kg)

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- 6.2.5 Motion indication
- 6.3 The scale instrument shall have the following keyboard operations:
  - 6.3.1 0-9 Numeric Keys
  - 6.3.2 . (Decimal Point)
  - 6.3.3 Clear
  - 6.3.4 Tare
  - 6.3.5 Zero
  - 6.3.6 Print
  - 6.3.7 Five Application-Specific Assignable Soft Keys with icons for easy operator use to identify TempID and VehID, etc.
  - 6.3.8 Screen Navigation Keys for Up, Down, Left, and Right Commands
  - 6.3.9 Enter
- 6.4 The operator shall be capable of entering alphanumeric characters through the terminal without the need for an external keyboard.
- 6.5 The scale instrument shall have the following operational parameters:
  - 6.5.1 Capable of communicating with up to 22 1,000-ohm, analog load cells.
  - 6.5.2 Capable of being programmed for sign-corrected net weighing so that all net weights are positive.
  - 6.5.3 Have a transaction counter to automatically assign sequence numbers to transactions.
  - 6.5.4 Have automatic zero capture on power-up selectable to capture zero at 2% or 10% of the full-scale capacity.
  - 6.5.5 Have adjustable digital filtering.
  - 6.5.6 Have adjustable automatic zero maintenance selectable for 0.1 to 9.9 displayed increments.
  - 6.5.7 Have push-button zero selectable for  $\pm 1\%$  to  $\pm 99\%$  of full-scale capacity.
  - 6.5.8 Tare, Zero, and Print functions shall be inhibited while the weight display is changing. Motion detection shall be selectable for  $\pm 0.1$  to  $\pm 99.9$  increments.
  - 6.5.9 Have an integral analog-to-digital converter built in with a minimum analog-to-digital update rate of 350 updates per second.
- 6.6 The scale instrument shall have the following service characteristics:
  - 6.6.1 Set-up and navigation through all phases of set-up, calibration, and testing shall be intuitive through a decision-tree format.

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- 6.6.2 Capable of performing calibration, span, zero, and shift adjustment through software calculations that require no in-scale adjustment.
- 6.6.3 Entry of information shall be accomplished through the instrument's keyboard only.
- 6.7 The scale instrument shall be NTEP certified and meet or exceed the specifications set forth by NIST HB-44 for Class II, III, and III-L Devices. The manufacturer upon request shall provide a Certificate of Conformance to these standards.
- 6.8 The scale instrument shall be housed in a stainless steel metal enclosure that is suitable for desk or wall mounting.
- 6.9 The scale instrument shall have flexible storage capability with a minimum of 4 Mbytes of flexible memory in which to store pertinent vehicle, transactional, and commodity information. The scale instrument shall be capable of storing the weight information automatically or enabling the operator to assign a memory location to the weight manually.
- 6.10 The scale instrument shall have subtotal and total weight accumulators.
- 6.11 The operator shall be able to enter up to 12 digits of alphanumeric ID through the instrument keyboard.
- 6.12 The scale instrument shall have gross/net weight switching.
- 6.13 The scale instrument shall be capable of being programmed and calibrated in pounds or kilograms.
- 6.14 The scale instrument shall have the following data communications capabilities:
  - 6.14.1 One com port RS232, RS422, or RS485
  - 6.14.2 Optional 2 additional com ports (RS232, and RS232/RS422/RS485)
  - 6.14.3 Optional One TCP/IP 10 Base-T Ethernet
- 6.15 The scale instrument shall output the following information:
  - 6.15.1 Gross, Tare, and Net Weight
  - 6.15.2 ID
  - 6.15.3 Transaction Counter
  - 6.15.4 Time and Date
  - 6.15.5 Variable Application-Specific Information
  - 6.15.6 Standard Reports Generated by the Scale Instrument

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- 6.16 The scale instrument shall be UL/cUL listed.
- 6.17 The scale instrument shall be a Mettler-Toledo, Inc. Model IND560 or equivalent.

### **7 JUNCTION BOXES AND CABLES**

- 7.1 All junction boxes shall be NEMA 4X rated and constructed of stainless steel.
- 7.2 Junction boxes shall be accessible for inspection and maintenance from the side of the scale platform.
- 7.3 Junction boxes shall have built in adjustment capability for trimming the scale by sections and by individual load cells.

### **8 LIGHTNING PROTECTION SPECIFICATIONS**

- 8.1 A comprehensive lightning protection system shall be provided with the scale.
- 8.2 Major scale components including load cells and scale instrument shall be included in the lightning protection system.
- 8.3 Active lightning protection shall be provided both at the scale and at the instrument location.
- 8.4 The components shall be capable of being replaced in the field and shall be separate from the active weighing components for ease of maintenance.
- 8.5 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.
- 8.6 An AC line surge protector shall conveniently plug into a common electrical outlet and have a receptacle.
- 8.7 Each AC line surge protector required shall have one isolated, grounding, hospital-grade duplex receptacle, and an internal 15-amp circuit breaker.

### **9 PRINTER SPECIFICATIONS – DOCUMENT PRINTER**

- 9.1 The printer shall be housed in a suitable enclosure for desktop mounting.
- 9.2 The printer shall interface with the scale instrument using a singular cable with quick connectors on each end and shall not require any modifications to the instrument or printer.
- 9.3 The printer shall have a serial interface capable of communicating with the instrument using an RS232C interface with selectable transmission rates from 300 to 9,600 baud. Transmission must be on demand.
- 9.4 The printer shall have a nine-pin dot matrix print head with a minimum rated life of 200 million characters.

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- 9.5 The printer shall be capable of printing at a minimum speed of 300 characters per second.
- 9.6 The printer shall have an easily replaceable ink ribbon cartridge that shall be rated for a minimum life of 3 million characters.
- 9.7 The printer shall be capable of accepting single or up to six-part forms.
- 9.8 An adjustable paper guide shall be provided.
- 9.9 The printer shall provide both friction-feed and tractor-feed paper advance.
- 9.10 The printer shall have a minimum buffer memory capable of storing at least 28,000 characters.
- 9.11 The printer shall be capable of printing all information sent from the scale instrument, including:
  - 9.11.1 Gross, Tare, and Net Weights
  - 9.11.2 Time and Date
  - 9.11.3 Transaction Counter Number
  - 9.11.4 12-Digit Alphanumeric ID
  - 9.11.5 Standard Reports Generated by the Scale Instrument
- 9.12 All materials, components, and electrical design shall comply with UL and CSA standards and requirements.
- 9.13 The printer shall be an Okidata Microline 320 Turbo or equivalent.

#### **10 PRINTER SPECIFICATIONS – TICKET PRINTER**

- 10.1 The printer shall be housed in a suitable enclosure for desktop mounting.
- 10.2 The printer shall interface with the scale instrument using a singular cable with quick connectors on each end and shall not require any modifications to the instrument or printer.
- 10.3 The printer shall have a serial interface capable of communicating with the instrument using an RS232C interface with selectable transmission rates from 300 to 9,600 baud. Transmission must be on demand.
- 10.4 The printer shall have a nine-pin dot matrix print head with a minimum rated life of 70 million characters.
- 10.5 The printer shall be capable of printing 3.1 lines per second.
- 10.6 The printer shall have an easily replaceable ink ribbon cartridge that shall be rated for a minimum life of 1.2 million characters.

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- 10.7 The printer shall be capable of accepting forms up to 0.25 mm thick, original plus 2.
- 10.8 The printer shall provide friction-feed paper advance.
- 10.9 The printer shall have a minimum buffer memory capable of storing at least 2000 bytes.
- 10.10 The printer shall be capable of printing all information sent from the scale instrument, including:
  - 10.10.1 Gross, Tare, and Net Weights
  - 10.10.2 Time and Date
  - 10.10.3 Transaction Counter Number
  - 10.10.4 12-Digit Alphanumeric ID
- 10.11 All materials, components, and electrical design shall comply with UL and CSA standards and requirements.
- 10.12 The printer shall be a Mettler-Toledo, Inc. APR 310 or equal.

## **11 WARRANTY REQUIREMENTS**

- 11.1 The scale manufacturer shall 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.
- 11.2 The scale manufacturer shall warrant the scale assembly including all load cells, weighbridge structure, scale instrument, junction boxes, and associated cables from failures due to a defect in manufacturing, workmanship.
- 11.3 System shall include Strike Shield Lightning Protection which covers the weighbridge, load cells, cables, junction boxes, and Instrument for any failures or damage related to lightning during the warranty period. This protection must include all parts and on-site labor, the full cost of which shall be covered solely by the manufacturer and not in part by any other 3<sup>rd</sup> party or service provider.