

TEXAS DEPARTMENT OF TRANSPORTATION
GENERAL SERVICES DIVISION

SPECIFICATION NO.
TxDOT 845-06-5291
DATED: MARCH 2006

CONCRETE COMPRESSION TESTING MACHINE
300,000 POUNDS (1334 kN)

PART I

GENERAL CLAUSES AND CONDITIONS

1. The equipment furnished under this specification shall be the latest improved model in current production, as offered to commercial trade, and shall be of quality workmanship and material. The respondent represents that all equipment offered under this specification shall be new. USED, SHOPWORN, DEMONSTRATOR, PROTOTYPE, REMANUFACTURED, RECONDITIONED, OR DISCONTINUED MODELS ARE NOT ACCEPTABLE.
2. Respondent should submit with the solicitation or have on file with TxDOT, Austin, Texas, the latest printed literature and detailed specifications on equipment the respondent proposes to furnish. This literature is for informational purposes only.
3. The unit shall be completely assembled and adjusted, and all equipment including standard and supplemental equipment shall be installed and the unit made ready for continuous operation upon delivery.
4. All parts not specifically mentioned which are necessary for the unit to be complete and ready for operation or which are normally furnished as standard equipment shall be furnished by the vendor. All parts shall conform in strength, quality and workmanship to the accepted standards of the industry.
5. The unit provided shall meet or exceed all Federal and State of Texas safety, health, lighting and noise regulations and standards in effect and applicable to equipment furnished at the time of manufacture.
6. It is the intent of TxDOT to purchase goods, equipment and services having the least adverse environmental impact, within the constraints of statutory purchasing requirements, TxDOT need, availability, and sound economical considerations. Suggested changes and environmental enhancements for possible inclusion in future revisions of this specification are encouraged.
7. TxDOT encourages all manufacturers to comply voluntarily with the Society of Automotive Engineers (SAE) Recommended Practice for marking of plastic parts per SAE J1344, latest revision. All plastic components furnished to this specification should have an imprinted SAE symbol identifying the resin composition of the component so that the item can be recycled after its useful life. Manufacturers are encouraged to use recycled plastics and materials in the manufacture of their products in order to conserve natural resources, energy and landfill space. Respondents should note that future specification revisions may require mandatory compliance with the SAE plastic coding system.

8. TxDOT is committed to procuring quality goods and equipment. We encourage manufacturers to adopt the International Organization for Standardization (ISO) 9001-9003 standards, technically equivalent to the American National Standards Institute/American Society for Quality Control (ANSI/ASQC Q91-93 1987), and obtain certification. Adopting and implementing these standards is considered beneficial to the manufacturer, TxDOT, and the environment. It is TxDOT's position that the total quality management concepts contained within these standards can result in reduced production costs, higher quality products, and more efficient use of energy and natural resources. Manufacturers should note that future revisions to this specification may require ISO certification.
9. Measurements will be given in both the English and metric system. Where any conflict between the two stated measurements may occur, the measurements provided in the English system shall supersede those provided in the metric system.

PART II

SPECIFICATIONS

1. SCOPE: This specification describes a concrete compression testing machine with a rating of 300,000 pounds force (1334 kN) for testing the compressive and flexural strength of bonded and unbonded concrete cylinders and cores. The machine furnished to this specification shall meet or exceed the following requirements:

EXAMPLE: Forney Model FX-250-F-PILOT Premium Compression Machine including accessories.

Minimum testing range 3,000 pounds force (13 kN) to 300,000 pounds force (1334 kN).

NOTICE TO RESPONDENT: Any example shown is listed to show type and class of equipment desired. Respondents are cautioned to read the specifications carefully, as there may be special requirements not commonly offered by the manufacturer. **DO NOT ASSUME YOUR STANDARD EQUIPMENT MEETS ALL DETAILED SPECIFICATIONS MERELY BECAUSE IT IS LISTED AS AN EXAMPLE.** Respondents are cautioned that units delivered to the FOB point which do not meet specifications in every aspect will not be accepted.

2. FUNCTIONAL REQUIREMENTS: The machine shall:
 - 2.1. Have a load cell to measure compressive forces within the testing range and shall be calibrated and verified in accordance with ASTM latest revision.
 - 2.1.1. ASTM 39/C 39M-04A, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens",
 - 2.1.2. ASTM E4-03, "Standard Practices for Force Verification of Testing Machines"
 - 2.2. Conform to all the requirements of ASTM C39, Section 5, "Apparatus" for digital hydraulic testing machines.
 - 2.3. Be calibrated to an accuracy within plus or minus a maximum of one percent of the indicated force, in accordance with ASTM E-4-03. Factory and field calibrations shall be performed (Ref. Part III, Para. 2, Calibration).
 - 2.4. **BODY AND LOAD FRAME**
 - 2.4.1. Load frame shall be solid steel, rigid, and welded to make a one-piece construction which shall not deform under repeated use. Each vertical side wall shall consist of a

solid steel panel.

- 2.4.2. Load frame shall support the motor and hydraulic pump.
- 2.4.3. Inside dimensions of the compression area of the load frame shall be a minimum vertical opening of 19 inches (483 mm); and a minimum horizontal opening of 10 inches (254 mm).
- 2.4.4. The base of the load frame shall have a minimum of four pre-drilled bolt-holes to allow for floor mounting.
- 2.4.5. Machine design shall be portable to allow relocation without removing or disassembling any components with the exception of floor mounting bolts, and shall include a lifting eyebolt.
- 2.4.6. Machine shall be equipped with a writing shelf, document holder and platen brush.

2.5. PISTON, PLATENS AND CYLINDER

2.5.1. Piston

- 2.5.1.1. Piston diameter shall be a minimum of 6 $\frac{3}{4}$ inches (171 mm).
- 2.5.1.2. Piston shall have a minimum working stroke of 2 $\frac{1}{2}$ inches (64 mm).
- 2.5.1.3. Piston shall be solid steel, precision ground and polished.
- 2.5.1.4. Piston shall travel to allow the proper support and testing of bonded or unbonded, concrete cylinders or cores in the following sizes:
 - 2.5.1.4.1. 3 inch (76 mm) diameter x 6 inches (152 mm) long
 - 2.5.1.4.2. 4 inch (102 mm) diameter x 8 inches (203 mm) long
 - 2.5.1.4.3. 6 inch (152 mm) diameter x 12 inches (305 mm) long

- 2.5.2. Cylinder: Cylinder shall be seamless high strength 4140 steel. Inside wall shall be precision honed to an 8 Root Means Square (RMS) finish.

2.5.3. Platen

- 2.5.3.1. Lower platen shall be a two-piece removable assembly with a wear plate. Lower compression platen shall be a minimum of 8 $\frac{1}{4}$ inches (209 mm) diameter, with concentric circles centered in relationship to upper platen. Surface shall be hardened to a minimum 55 Rockwell C, and shall be hard nickel plated for wear and rust resistance, and shall be flat within 0.0005 inches (0.0127 mm) in any direction.
- 2.5.3.2. Upper bearing platen shall be spherically seated, with a hardened metal bearing block attached at the center of the upper head. Center of the sphere shall lie at the center of the surface of the bearing block in contact with the specimen. Bearing block shall be closely held in its spherical seat and shall be free to tilt in any direction by a minimum of four degrees.

2.6. HYDRAULIC PUMPING SYSTEM

- 2.6.1. Shall provide low-pressure, high volume delivery for rapid advance of the piston. Shall deliver high pressure to the cylinder.
- 2.6.2. Pump motor shall operate on 110 volts, 60 Hz, and 3/4 horsepower.
- 2.6.3. Pumping system shall be directly connected to the electric motor. Pumping system shall run immersed in oil and shall be maintenance free.
- 2.6.4. Shall be equipped with an oil filtration system with replaceable spin-on canister filter, an oil drain valve, an oil level and temperature gauges.
- 2.6.5. Combined noises of the motor and pump shall not exceed 80 dBA at a distance of 5 feet (1.5 m).
- 2.6.6. The motor and hydraulic pump shall be mounted inside the base cabinet.

2.7. CONTROLLER FUNCTIONS: The following functions shall be included as a minimum:

- 2.7.1. All electronics that process test results that are immediate or stored data, including the displays, the wiring leading to the display, and the wiring to the load cell or transducer shall be shielded from radio frequency interference. The shielding shall block all cell phone and walkie-talkie signals that are generated within a minimum distance of 2 feet (.6 m) from the machine.
- 2.7.2. Push button system for zeroing the load cell or transducer.
- 2.7.3. The alpha/numeric display shall simultaneously show date and time, number of stored tests, peak load, load rate, stress, specimen number, cross-sectional area of the specimen and an x-y graph. The actual load or the peak load, and either force or stress measurements from 0 pounds to the maximum capacity of the machine shall be expressed by a minimum of six digits and a units digit.
- 2.7.4. Display actual load rate in pounds per second (kN per second).
- 2.7.5. Show stress and modulus of rupture.
- 2.7.6. Display real time X-Y (load vs. time) plots.
- 2.7.7. Pace Rate Deviation: The error between the actual pace rate and the target pace rate shall be shown as a numeric display expressed in either load units per second or as a percentage as selected by operator, and shall include a pace rate deviation indicator.
- 2.7.8. Data Storage: Shall electronically store data from the last 500 test specimens including but not limited to: maximum force exerted, diameter for round specimens, length and width for rectangular specimens, specimen height, specimen area, stress, load rate, test date and time, specimen age and weight, a reference number, and selected or actual loading rate. Stored data shall be permanently retained and retrievable in the event of a power loss.
- 2.7.9. Data Transfer: The ability to transfer data to an external desktop computer with Microsoft Windows XP compatibility and to a printer via RS232 or USB 2 port.

- 2.7.10. Data Printing: The machine shall interface with a common and commercially available inkjet, laser or other type of non-impact printer via RS232 or USB 2 port. Vendor shall identify a minimum of two current printer models that interface with the machine.
- 2.7.11. Data Erase: Stored test data shall be erased at operator's command.
- 2.7.12. Reference Number: Readout system shall assign a consecutive number to each test run.
- 2.7.13. Language: Display values using either English or metric units.
- 2.7.14. Date and Time: Date and time shall be changeable at operator's command, and shall retain current date and time during a power loss.
- 2.7.15. Result Display: Upon specimen failure, the machine shall automatically calculate and display the operator selected peak stress or peak force.
- 2.7.16. Data Entry: Shall have an alpha/numeric keypad with function keys for entering values and functions.
- 2.7.17. Shall be equipped with a quick release transducer connector.
- 2.7.18. The controller mount and arm shall be adjustable to operator eye level by a manually operated knob on the controller mount.
- 2.8. SAFETY FEATURES: The following safety features shall be included:
 - 2.8.1. A high pressure safety relief valve shall protect the hydraulic circuit and the load frame from exceeding maximum rated capacity.
 - 2.8.2. A piston over-extension non-mechanical limit switch to prevent the piston from being extended beyond maximum travel.
 - 2.8.3. The piston shall incorporate an accordion-type flexible bellows cover arrangement to protect it from dirt and debris.
 - 2.8.4. Front and rear solid plexiglass and steel fragment guard doors.
 - 2.8.5. An ON/OFF switch which powers all systems of the machine.
- 3. ACCESSORIES: The following accessories shall be provided with each machine:
 - 3.1. STEEL SPACERS AND BEARING BLOCKS
 - 3.1.1. Steel spacers and bearing blocks shall be provided for testing the following sizes of concrete cylinders and cores both bonded and unbonded pads:
 - 3.1.1.1. 3 inch (76 mm) diameter x 3 to 6 inches (76 to 152 mm) long
 - 3.1.1.2. 4 inch (102 mm) diameter x 4 to 8 inches (102 to 203 mm) long
 - 3.1.1.3. 6 inch (152 mm) diameter x 6 to 12 inches (152 to 305 mm) long

- 3.1.2. All spacers and blocks shall be removable to allow for the ability to re-plane the bearing faces, and shall be hardened throughout to a minimum of 55 Rockwell C, hard nickel plated, hard chrome plated or other alloy plated for wear and rust resistance. The bearing faces shall be flat within 0.0005 inches (0.0127 mm) in any direction.
- 3.2. STEEL RETAINERS: Shall include one set of steel retainers with neoprene caps that meet or exceed American Association of State Highway and Transportation Officials (AASHTO) T22 ± 50 durometer for neoprene for the following sizes of concrete cylinders and cores:
 - 3.2.1. 4 inch (102 mm) diameter
 - 3.2.2. 6 inch (152 mm) diameter
4. SAFETY PLAQUES OR DECALS: Safety plaques or decals shall be furnished and shall be affixed at any hazardous area of the machine. The safety plaques or decals shall describe the nature of the hazard, level of hazard seriousness, how to avoid the hazard, and the consequence of human interaction with the hazard. Permanent plaques are preferred to decals. Types, size and location of product safety plaques or decals shall be in accordance with the latest revision of ANSI 535.4-1991.
5. MANUAL(S): Equipment shall be delivered with current manual(s) containing illustrated parts list, operating, calibration, and service instructions in English. The manual(s) shall be as detailed as possible outlining all necessary service and operating instructions for the equipment delivered. Manual(s) shall include necessary warnings and safety precautions. It is requested, but not required, that the manual be printed on recycled paper.

PART III

DELIVERY, ACCEPTANCE AND PAYMENT

1. DELIVERY REQUIREMENTS: Delivery of all machines ordered shall be completed within the number of days specified on the purchase order. Any machines not delivered within this time frame may be canceled from the purchase order or, at TxDOT's option, an extension may be granted, whichever is in TxDOT's best interest. If any machines are canceled for non-delivery, the needed machines may be purchased elsewhere and the vendor may be charged the full increase, if any, in cost and handling.
2. INSTALLATION: Vendor shall be responsible for complete installation of the equipment, excluding physical modifications to the installation site. All cables and accessories necessary for a complete and safe installation shall be provided by the vendor. TxDOT will provide a forklift and operator for assistance in placing the equipment.
3. CALIBRATION: The vendor shall perform all factory calibrations and verification of factory calibrations according to Part II, Para. 2.3, on all machines ordered. If a machine is delivered with a factory calibration certificate, the vendor shall verify the factory calibration at the machine set up site. If a machine is delivered without a factory calibration certificate, the vendor shall calibrate the machine at the machine set up site.
4. TRAINING: The vendor shall provide training at each machine set up site for all machines ordered. The vendor shall provide the services of a competent factory trained technician thoroughly trained in the use and operation of the machines for a minimum of one hour on safety, operation, and preventive maintenance of the machine. Training shall take place after the machine has been delivered and is ready for operation but prior to acceptance and payment. The training shall take place on TxDOT's premises at a time and date mutually agreed upon by the vendor and TxDOT.

5. ACCEPTANCE: All machines ordered shall be subject to inspection, calibration verification and performance testing upon receipt at each machine set up site. Acceptance shall occur after a minimum of five working days, from receipt and calibration verification of machine. The vendor will be notified within this time frame of any machines not delivered in full compliance with the purchase order specifications. If any machines are canceled for non-acceptance, the needed equipment may be purchased elsewhere and the vendor may be charged the full increase, if any, in cost and handling.
6. PAYMENT: Payment will be made 30 days after installation, calibration, training , performance testing and acceptance inspection have been completed and TxDOT determines that the equipment delivered meets specifications or the day on which the correct invoice for the materials was received, whichever is later.
7. WORKING DAY: A working day is defined as a calendar day, not including Saturdays, Sundays, or regularly observed state and federal holidays.

PART IV

WARRANTY, PARTS AND SERVICE

1. WARRANTY: The equipment offered shall be warranted against all defects in material and workmanship for a period of not less than 36 months and shall cover 100 percent parts and labor for the unit. If manufacturer's standard warranty period is in excess of 36 months, the standard warranty period shall apply. The warranty begins on the date the unit is determined to meet specifications and is accepted by TxDOT.
2. PARTS AND SERVICE: The manufacturer of the equipment shall have an authorized dealer within the state of Texas or factory-trained personnel available for warranty repairs and the performance of service within 72 hours after notification by TxDOT. The authorized dealer shall have factory-trained personnel available for warranty repairs and the performance of service. The dealer shall also maintain an inventory of high-usage parts and a quick source for low-usage parts.