TROXLER®
The Leader in Construction Testing Equipment

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SPECIFICATIONS

Troxler Model 3440+
Nuclear Moisture Density Gauge
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The Model 3440+ to be purchased under these specifications shall be the manufacturer's current production model and design. The gauge shall have an 18 month limited warranty on parts and labor. The following are the specifications representing only minimum requirements:

Applications:

Surface nuclear gauges use the interaction of gamma radiation with matter to measure density through direct transmission or backscatter. In the direct transmission position the source rod extends up to 30 cm (12 in.) deep through the base of the gauge into a predrilled hole in the material being tested. The gamma rays are transmitted from the density source, through the test material and are counted by detectors located within the gauge. The average density between the source and detectors is then determined.

The backscatter mode is a rapid and nondestructive means of testing materials that are approximately 10 cm (4 in.) in depth. The gamma source and the detectors remain inside the gauge, which rests on the surface of the test material. Gamma rays from the density source enter the test material. Those that are scattered back toward the detectors are counted, determining the density count for the material. This means of testing is usually used on asphalt and concrete.

Moisture content is also measured in a nondestructive test mode. Moisture is determined through the detection of thermalized neutrons ("fast" neutrons which have been slowed by the hydrogen present in the material, normally in the form of water). As the moisture level of the test material increases, neutrons are thermalized at a greater rate so the moisture count increases.

Standard Components:

Accessories furnished shall include; Drill Rod, Drill Rod Extraction Tool, Scraper Plate, Reference Block, 110/220 volt 50-60 Hz Charger, DC Charger/Adapter, Operator's Manual, Quick Reference Card, Gauge Warranty, Gauge Certificate, Calibration Data Sheet, Shipping Documents, Handle Lock and Keys for Handle Lock. The gauge shall also be supplied with a sturdy lockable transport case capable of storing all accessories furnished with the gauge.

Available Accessories:

Optional accessories include (but not limited to):
☐ Serial Printer ☐ Serial Interface Cable ☐ Survey Meter ☐ Leak Test Kit

☐ Radiation Sign Kit ☐ TLD Film Badge Service ☐ Gauge to PC Cable

Operating Specifications:

The gauge shall be capable of measuring density in a nondestructive backscatter mode or below the test material surface in direct transmission mode. Moisture testing shall be performed in a nondestructive surface mode. The Model 3440+ shall be capable of automatic depth or manual depth indication.
Erasable memory shall be provided to store up to approximately 999 readings indexed by project number. The gauge must be capable of storing station numbers, distance from centerline and position relative to centerline with each reading. The gauge shall also have the ability to store additional numeric information. The gauge control shall provide the means to compensate for chemical composition errors, which can occur when the test material has a chemical composition, which is different than that of the normal range of soils. This compensation shall be made by either the entry of an offset or by entry of alternative test results.
The gauge controls shall allow the input of:

1. Target Density
2. Maximum Design Density (voidless)
3. Measurement Time (15 sec., 1 min., 4 min.)
4. Project number (when storing readings)
5. Notes for stored record
6. Offset information

Electrical Specifications:

Power Source(s):	
Main	5 C NiMH (Rechargeable Pack)
Backup	5 AA Alkaline Batteries
Stored power:	4 ampere hours
Battery recharge time:	3 hours maximum, automatic cutoff
Charge source:	110/220 VAC, 50-60 Hz or 12-14 VDC
Current consumption average:	35 mA
Power consumption after automatic battery cutoff:	0.00
Time Before Automatic Shutdown:	5 hours of inactivity
Readout:	4 x 20 alpha-numeric
Keypad:	30 key sealed membrane
Serial data format:	9600 Baud rate, 8 Data Bits, 1 Stop Bits, No Parity, Xon-Xoff flow control

Memory and Communication Specifications:

Battery packs are fully protected against overcharge and over-discharge. Charge life is updated every 1.9 seconds and is indicated under the SETUP menu. Full NiMH recharge shall be made within 3 hours by means of a 110/220 volt AC 50-60 Hz charger. Recharging shall also be accomplished by a 12-14 VDC charger. Battery Select toggle switch shall be in the “Rechargeable” position when charging.

A fully charged battery will remain operational for approximately 3 weeks (of standard use) without the GPS option or use of backlight options. These options will reduce the battery life when utilized. The alkaline back-up batteries will add an additional 1.5 weeks when the GPS and backlight features are not operating.

The 3440+ gauge can store up to 999 test readings for later recall or downloading to a printer or computer. The Model 3440+ gauges allow for data transfer via a USB port utilizing a USB printer or a removable drive. A complete list of USB compatible devices is available at: www.troxlerlabs.com/PRODUCTS/PRODLIT/otherlit.shtml .

Mechanical Specifications:

Housing	Colored Xenoy Top Shell w/ Anodized Aluminum Base
Operating Temperature	Ambient: 32 to 158°F (0 to 70°C) Surface: 350°F (175°C) for 15 minutes
Storage Temperature	-70 to 185°F (-55 to 85°C)
Humidity	98%, noncondensing
Gauge Size (including handles)	12”- 23.5 x 9 x 14.5 inches (59 x 22.9 x 36.8 cm) or 8”- 19.5 inches height (49.5 cm)
Shipping Case Dimensions	29.4 x 13.9 x 16.9 inches (75 x 35 x 43 cm)
Gauge Weight	29 pounds (13.1 kg)
Shipping Weight	85 pounds (38.5 kg) in shipping case

Accuracy and Precision Specifications: (U.S. Customary and Metric Units)

Direct Transmission (6” / 15 cm)	**15 sec.**	**1 min.**	**4 min.**
Precision at 125 pcf	*+/-0.42*	*+/-0.21*	*+/-0.11 pcf*
2000kg/m³	+/-6.8	+/-3.4	+/-1.7 kg/m³
Composition error at 125pcf	*+/-1.25*	*+/-1.25*	*+/-1.25pcf*
2000kg/m³	+/-20	+/-20	+/-20kg/m³
Surface error (0.05”, 100% Void) pcf	*-1.06*	*-1.06*	*-1.06 pcf*
(1.25mm, 100%Void) kg/m³	-17	-17	-17kg/m³
Backscatter (98%) (4” / 10 cm)			
Precision at 125 pcf	*+/-1.00*	*+/-0.50*	*+/-0.25pcf*
2000kg/m³	+/-16	+/-8	+/-4kg/m³
Composition error at 125 pcf	*+/-2.5*	*+/-2.5*	*+/-2.5pcf*
2000kg/m³	+/-40	+/-40	+/-40kg/m³
Surface error (0.05”, 100% Void) pcf	*-4.7*	*-4.7*	*-4.7pcf*
(1.25mm, 100%Void) kg/m³	-75	-75	-75kg/m³
Moisture			
Precision at 15 pcf	*+/-0.64*	*+/-0.32*	*+/-0.16pcf*
250kg/m³	+/-10.3	+/-5.1	+/-2.5kg/m³
Surface error (0.05”, 100% Void) pcf	*-1.12*	*-1.12*	*-1.12pcf*
(1.25mm, 100%Void) kg/m³	-18	-18	-18kg/m³

Depth of measurement at 15 pcf = 8.5 ”
250 kg/m³ = 21.25 cm

Radiological Specifications:

Source Housing	Stainless steel, encapsulation
Shielding	Tungsten, lead, and cadmium
Surface Dose Rate (5 cm)	19 mrem/hour max., neutron and gamma
Source Rod Material	Stainless Steel
Shipping Case	DOT 7A, Type A, Yellow II label, TI = 0.3
Gamma Source	0.30 GBq (8 mCi) +/- 10% Cs-137
Neutron Source	1.48 GBq (40 mCi) +/- 10% Am-241:Be
Source Seal Approval for Domestic and International Shipment	Cs-137, SPECIAL FORM certificate; USA/0614/S Am-241:Be, SPECIAL FORM certificate; USA/0632/S

Special Features and Functions:

The 3440+ gauges must provide:

- Auto-store feature; when enabled all measurement records are stored in gauge memory
- Field offset of moisture, density and / or trench measurement data
- Backlit display screen and keypad activated by a keystroke
- Remote keypad located near the handle to start measurement
- Automatic standard count comparison and storage (last 4 readings stored)
- Self test and diagnostics tests
- Statistical stability test (STAT) and Drift test
- Language capabilities to be added soon after release (Spanish, French, German)
- Source decay calculation
- USB Data transfer capability
- Optional GPS capability
- Automatic Depth indication
- External loud beeper

Warranty Specifications:

The gauge shall have an 18 month limited warranty.

Standard Compliance Specifications:

This equipment must comply with ASTM standard numbers D-6938 (replaced ASTM D-2922 and ASTM D-3017 as of November 2006), D 2950, and C 1040.

Packaging and Shipping Specifications:

The package (shipping case or outer cover) will be labeled with two Yellow II labels and a label which gives the package type and proper shipping name of the material. The package will also be labeled "Cargo Aircraft Only" if shipped by air in the United States. A transportation guide shall be provided with each gauge; this guide contains shipping documents such as Certificates of Competent Authority, results of type A package test, emergency response sheet, and sample shipping forms to assist the owner. Troxler will provide a 24 hour emergency response telephone number to list on the Bill of Lading as a service to instrument users at no charge.