



The Leader in Construction Testing Equipment

**Troxler Electronic Laboratories, Inc. - Troxler International, Ltd.**  
 3008 Cornwallis Road, P.O. Box 12057, Research Triangle Park, NC 27709 - USA  
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Troxler Model 03430 Main Calibration Report (Page 1 of 3)

Gauge Serial number: 28086 Calibration Date: 7/1/2013  
 Density Standard Count: 2334 Water Standard Count: 640 Bay: 74

The density counts used in this calibration are shown hereunder. "Pos" refers to the source position below the surface of the standard, in millimeters.

Pos	Magnes standard	Mag/Al standard	Alumin standard
-----	-----	-----	-----
BS	01067	00746	00492
051	03651	02455	01460
102	03690	02350	01294
152	02973	01771	00895
203	02062	01133	00522
254	01286	00646	00274
305	00753	00359	00148

The density system calibration constants and precision for each source position of this gauge are listed hereunder. The gauge precision ("Prec") is the measurement precision under a set of repeatability conditions of measurement (VIM Sec. 2.21.) Density precision is evaluated at 2002 kilograms per cubic meter. The calibration constant B\*1000 is listed in units of cubic meter per kilogram.

Pos	A	B*1000	C	Prec
---	-----	-----	-----	-----
BS	2.690	1.07785	-0.04992	9.3
051	8.962	0.95960	0.10434	4.5
102	11.341	1.08748	0.10684	4.0
152	12.421	1.27247	0.06314	4.0
203	12.882	1.51612	0.02137	4.3
254	13.092	1.81071	-0.00208	4.9
305	10.596	2.00676	-0.00750	6.0

The water system calibration counts, constants, precision ("Prec"), and anticipated errors for this gauge are listed hereunder. The "SR" value refers to a count made on the magnesium/polyethylene standard with 1.3 mm. shims beneath the gauge. "SR Error" is the anticipated error in the water system readings due to surface texture imperfections and "Exerr" is the anticipated error from the combination of gauge imprecision and texture imperfections. The calibration constant F is listed in units of cubic meter per kilogram, and the precision and errors are listed in units of kilogram per cubic meter. The precision is evaluated at 250.0 kilograms per cubic meter.

Magnesium Standard count	Mag/Poly Standard count	SR count	E	F*1000	Prec	SR	Exerr
-----	-----	-----	-----	-----	-----	-----	-----
18	408	394	0.02813	1.04704	5.1	-20.9	15.4



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Listed hereunder is a range of projected density standard counts at future dates. These projected ranges are computed based solely upon the known decay rate of the density source

Date	Lower Limit of Projected density Standard Count	Upper Limit of Projected density Standard Count
7/1/2013	2311	2357
8/1/2013	2306	2353
9/1/2013	2302	2348
10/1/2013	2297	2344
11/1/2013	2293	2339
12/1/2013	2289	2335
1/1/2014	2284	2330
2/1/2014	2280	2326
3/1/2014	2276	2322
4/1/2014	2271	2317
5/1/2014	2267	2313
6/1/2014	2263	2308
7/1/2014	2258	2304

This gauge was calibrated using the method described in Troxler Report M-708. The density standards utilized in this calibration listed hereunder are traceable to the National Institute of Standards & Technology (NIST) as documented in Troxler Reports R-703 and R-705. The uncertainties for these standards are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

Standard Material	Standard Serial No.	Density (kg/m <sup>3</sup> )	Density Expanded Uncert. (kg/m <sup>3</sup> )	Date of Measurement	Date of Expiration
Magnesium	199	1773.4	5.6	10/19/2009	10/19/2014
Mag/Alum	208	2190.6	6.2	10/20/2009	10/20/2014
Aluminum	198	2710.7	10.3	10/20/2009	10/20/2014

To account for the influence of the elemental composition of these blocks on instrument response (as prescribed in ASTM D2950, Section A1.3, and D6938, Section A1.1.1), the densities for the metallic block are multiplied by elemental composition correction factors prior to the calculation of the density calibration parameters shown on Page 1 of this document. These correction factors are 0.988 for magnesium, 0.974 for magnesium/aluminum, and 0.964 for aluminum.



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Troxler Model 03430 Main Calibration Report (Page 3 of 3)

Gauge Serial number: 28086 Calibration Date: 7/1/2013  
Density Standard Count: 2334 Water Standard Count: 640 Bay: 74

The measurements used to establish the water mass per unit volume values for the standards utilized in this calibration are traceable to the National Institute of Standards & Technology (NIST) as documented in Troxler Report R-704. The uncertainty for this standard is expressed as an expanded uncertainty value at approximately the 95% confidence level using a coverage factor of  $k = 2$ . Water mass per unit volume is defined as the mass of water contained in a unit volume of material, and is represented in the table hereunder as 'M'.

Standard Material	Standard Serial No.	M Value (kg/m <sup>3</sup> )	M Expanded Uncert. (kg/m <sup>3</sup> )	Date of Measurement	Date of Expiration
Mag/Poly	198	581.7	8.6	11/1/2011	11/1/2016

The maximum estimated measurement uncertainties (EMUs) of this gauge are listed hereunder. The uncertainties apply to measurements of one minute in duration on typical soil, and are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of  $k = 2$ . These values relate only to the source rod positions for which this gauge has been manufactured to operate. EMU values are in kilograms per cubic meter.

For DENSITY Measurements:

Pos	Max EMU	Pos	Max EMU	Pos	Max EMU	Pos	Max EMU
BS	35.8	51	26.3	76	24.6	102	22.9
127	25.4	152	27.8	178	25.0	203	22.1
229	22.7	254	23.3	279	25.4	305	27.5

The maximum EMU for M measurements is 21.0 kilograms per cubic meter.

This instrument was found to be mechanically sound and electronically stable prior to and after its calibration. This calibration was performed in an environment with a temperature between 14.4 °C and 25.6 °C. All data listed in this report are applicable to this instrument only. This instrument was calibrated by using the Method 1 Calibration process. This process is fit for the intended use of the instrument.

This calibration was performed by to at Troxler Electronic Labs  
2016 E. Randol Mill Rd., Suite 406, Arlington, TX 76011

Special considerations and limitations of use for this device and its calibration are described in the Manual of Operation and Instruction provided with this instrument.



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Troxler Model 3430 As Left Calibration Report (Page 1 of 1)

Gauge Serial number: 28086 Measurement Date: 7/1/2013  
Density Standard Count: 2328 Water Standard Count: 641 Bay: 74

Listed hereunder are the results of a gauge accuracy check for this instrument for soil and asphalt measurement modes. The results are listed in terms of measurement error (as defined in VIM Section 2.16), where the measurement error is the value read by the instrument minus the value assigned to the standard upon which the measurement was made. Measurement errors for density are listed in kilograms per cubic meter, as are measurement errors for water mass per unit volume measurements (denoted by M.) "Pos " refers to the source position below the surface of the standard, in millimeters.

Pos	Magnes standard	Mag/Al standard	Alumin standard
-----	-----	-----	-----
BS	-1	-12	14
051	12	3	-2
102	8	-5	-12
152	5	-8	-4
203	4	3	-7
254	5	-8	-10
305	-8	8	11

M measurement errors: On mag. = -2 kg/m<sup>3</sup> On mag/poly = 9 kg/m<sup>3</sup>

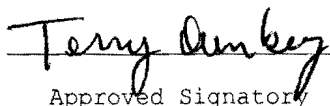
All measurements were one minute in duration, except for the standard counts, which were four minutes in duration. These measurements were made at the conclusion of the factory calibration for this gauge.

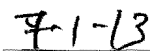
This instrument was evaluated using the method described in Troxler Report W-700. The quantity values and uncertainties of the standards used in this calibration are listed in the Main Calibration Report for this instrument. The maximum estimated measurement uncertainties (EMUs) of a gauge of this variety that has undergone a Troxler factory calibration are listed and in the Main Calibration Report for this instrument.

This calibration was performed in an environment with a temperature between 14.4 °C and 25.6 °C.

This "as left" calibration was performed by Terry Ownbey at Troxler Electronic Labs, 2016 E. Randol Mill Rd., Suite 406, Arlington, TX 76011.

This report shall not be reproduced except in full, without the written approval of Troxler Electronic Laboratories, Inc. This process is fit for the intended use of the gauge, compliant with the requirements of ASTM D6938, Section A1.1.1.

  
Approved Signatory

  
Date