



**Troxler Electronic Laboratories, Inc. - Troxler International, Ltd.**  
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Troxler Model 03430 Main Calibration Report

Gauge Serial number: 28086 Calibration Date: 6/10/2015  
 Density Standard Count: 2220 Water Standard Count: 640 Bay: 59

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	01028	00688	00468
051	03495	02251	01384
102	03544	02163	01234
152	02850	01624	00851
203	01968	01037	00505
254	01223	00597	00273
305	00724	00328	00144

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	3.071	1.15902	-0.06079	9.1
051	9.413	0.98373	0.10254	4.5
102	11.332	1.06728	0.14718	4.1
152	11.846	1.22022	0.11012	4.1
203	11.866	1.45266	0.04231	4.4
254	10.817	1.68676	0.01069	5.1
305	9.740	1.94209	-0.00298	6.2

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
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17	417	403	0.02656	1.05753	5.0	-20.7	15.3

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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
7/1/2015	2195	2239
8/1/2015	2191	2235
9/1/2015	2186	2231
10/1/2015	2182	2226
11/1/2015	2178	2222
12/1/2015	2174	2218
1/1/2016	2170	2214
2/1/2016	2165	2209
3/1/2016	2162	2205
4/1/2016	2157	2201
5/1/2016	2153	2197
6/1/2016	2149	2192
7/1/2016	2145	2188

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	168	1774.7	5.6	10/19/2014	10/19/2019
Mag/Alum	186	2225.5	6.2	10/20/2014	10/20/2019
Aluminum	152	2701.7	10.3	10/21/2014	10/21/2019

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.

## Troxler Model 03430 Main Calibration Report

Gauge Serial number: 28086 Calibration Date: 6/10/2015  
 Density Standard Count: 2220 Water Standard Count: 640 Bay: 59

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	168	591.4	8.6	10/24/2014	10/24/2019

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 pm using the Method 1 Calibration process. This process is fit for the intended use of the instrument.

This calibration was performed by pm 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

Gauge Serial number: 28086 Measurement Date: 6/10/2015  
Density Standard Count: 2221 Water Standard Count: 643 Bay: 59

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	-2	0	16
051	14	-1	-7
102	10	0	-12
152	2	-1	-15
203	0	-16	6
254	-2	7	9
305	-2	-1	-15

M measurement errors: On mag. = 5 kg/m<sup>3</sup> On mag/poly = -2 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 Peter Matthews 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.

Eric Hayes  
Quality Manager

6-10-2015

Approved Signatory (Sign and Print)

Date



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# Gauge Safety Inspection Report

Model: 3430

SN: 28086

RO#: 39122

Inspected at: TX

- ☒ 1 - Auto (Orbital) weld
- ☐ 2 - Manual Weld

Inspection Date: 6/5/2015

## Handle Condition

- ☒ 1 - Normal
- ☐ 2 - Abused (comments)

## Overall Gauge Condition

- ☒ 1 - Good
- ☐ 2 - Normal
- ☐ 3 - Poor (comments)
- ☐ 4 - Abused (comments)

## AmBe Plug - As Found

- ☒ Tight
- ☐ Loose
- ☐ Not applicable

## Sliding Block - As Found

- ☒ 0 - Fully Closed
- ☐ 1 - <= 25% Open
- ☐ 2 - 26-50% Open
- ☐ 3 - 51-75% Open
- ☐ 4 - 75-100% Open
- ☐ 5 - Fully Open

## Reason Not Fully Closed

- ☐ 1 - Excessive Dirt
- ☐ 2 - Weak Spring
- ☐ 3 - Both
- ☐ 4 - Other (Comments)

## AmBe Plug - Fixed

- ☐ Yes (Loctite applied)
- ☒ No (already done)
- ☐ Not required

Only required for gauges with  
tall plugs & serial numbers  
less than 39000.

## Sliding Block Cracks

- ☒ Uncracked
- ☐ Cracked
- ☐ Not applicable

(Only models 3450 or 3451)

## Source Rod Wear

- ☒ 0 - None
- ☐ 1 - Slight
- ☐ 2 - Some.
- ☐ 3 - Medium
- ☐ 4 - Significant.
- ☐ 5 - Extreme (comments)

## Cause of Rod Wear

- ☒ 0 - None
- ☐ 1 - Sliding Block
- ☐ 2 - Bearing/Wiper
- ☐ 3 - Both
- ☐ 4 - Other (comments)

## I. Concavity

- ☒ 0 - None
- ☐ 1 - Slight
- ☐ 2 - Some.
- ☐ 3 - Medium
- ☐ 4 - Significant
- ☐ 5 - Extreme (comments)

## II. Porosity/Pitting

- ☒ 0 - None
- ☐ 1 - Slight
- ☐ 2 - Some
- ☐ 3 - Medium
- ☐ 4 - Significant.
- ☐ 5 - Extreme (comments)

## III. Cracks

- ☒ 0 - None
- ☐ 1 - 1 to 20%
- ☐ 2 - 21 - 40%
- ☐ 3 - 41 to 60%
- ☐ 4 - 61 to 80%
- ☐ 5 - 81 to 100%

COMMENTS: