Calibration Certificate 15145

Missouri Department of Agriculture
Weights, Measures & Consumer Protection Division, Metrology Laboratory
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Certificate Expires
November 2019

Rev(8/16)

FarmChem Corporation; 616 Madison St; Floyd, IA 50435; Phone:
Customer Number: 708; Submission Date: 11/27/17; Calibration Date: 11/28/17

Test Item(s) Description

1 - lb weight set; Material: stainless steel; Manufacturer: Rice Lake; Serial: FCM9; Condition: good; Range: 5 lb to 1 oz

Method and Traceability

The SI unit for mass is the kilogram (kg) 1 lb = 0.45359237 kg

National Institute of Standards and Technology (NIST) IR 6969 modified substitution standard operating procedure (SOP) 8 compares a standard and an unknown weight once to determine the difference. The Missouri metrology laboratory has demonstrated measurement proficiency through training and interlaboratory comparisons compliant to *NIST Handbook 143 - Program Handbook for State Weights and Measures Laboratories (ISO/IEC 17025:2010):* Laboratory standards used for comparison are traceable to the international system of units (SI) through NIST.

Uncertainty

NIST HB-112 OIML R111 NIST SOPs NIST Handbooks

The uncertainty is the root sum square of the uncertainty of the standard, the standard deviation of the process (obtained using a check standard which characterizes balance performance), a component for balance sensitivity and drift, and an uncorrected systematic error for lack of buoyancy corrections, multiplied by a coverage factor (*k*) [1] from the *Student's t distribution table* according to the measurement degrees of freedom[2] associated with a 95.45 % confidence interval.
(k) was calculated using the Excel TINV function [two tailed probability 0.0455, TINV(0.0455,df)].
Magnetism was not included in the uncertainty evaluation.

Environmental Conditions During Test: Temperature 20.3 to 20.5 (°C); Relative Humidity 42 to 43 (%).

Calibrated by: Kevin Hanson Lab Manager: Kevin Hanson Date Calibrated: 11/28/17

Weights are not checked for magnetism or material hardness with this procedure. The weight surface finish was visually inspected with a Flexbar surface finish comparator and the finish is considered adequate for the tolerance class listed unless otherwise noted in the "Remarks" section. This document shall not be reproduced except in full or used to claim product endorsement by this laboratory without written approval from the Missouri Metrology Lab. The results listed in this report only apply to the items calibrated.

NIST Handbook 105-1 Class F Tolerances For Field Standard Weights: Tables 2, 3, 4, & 5 respectively

Farmchem Corporation Cert No. 15145 Serial: FCM9

Nominal Value	Units	Standard Serial/ID	As Found Value	Value If Adjusted	± Tolerance NIST Class F	± Measurement Uncertainty	[1] *t* Table *k* factor	[2] Degrees of Freedom
5	lb		41 mg		230 mg	27 mg	2.02	147
5	lb	B	67 mg		230 mg	27 mg	2.02	147
5	lb	C	56 mg		230 mg	27 mg	2.02	147
5	lb	D	64 mg		230 mg	27 mg	2.02	147
5	lb	E	99 mg		230 mg	27 mg	2.02	147
2	lb	4T5L	30 mg		91 mg	11 mg	2.02	147
1	lb	A	8.5 mg		70 mg	8.4 mg	2.02	147
1	lb	B	19.3 mg		70 mg	8.4 mg	2.02	147
1	lb		27.0 mg		70 mg	8.4 mg	2.02	147
1	lb	D	29.3 mg		70 mg	8.4 mg	2.02	147
1	lb	E	27.4 mg		70 mg	8.4 mg	2.02	147
8	oz		25.7 mg		45 mg	5.4 mg	2.02	147
4	oz		10.3 mg		23 mg	2.1 mg	2.02	147
2	oz		-0.3 mg		11 mg	1.1 mg	2.02	147
1	oz		1.27 mg		5.4 mg	0.54 mg	2.02	147

United States Department of Commerce

National Institute of Standards and Technology

Certificate of Metrological Traceability For:

Missouri

This laboratory has demonstrated evidence of an unbroken chain of metrological traceability of its standards to the international system of units (SI), documented measurement uncertainties, uses documented measurement procedures, successfully completed training and proficiency tests, documented calibration intervals, submitted a quality management system, and demonstrated suitable measurement assurance for the Scope listed on this certificate.

The Office of Weights and Measures Program assesses laboratories to NIST Handbook 143 - Program Handbook for State Weights and Measures Laboratories and ISO/IEC 17025:2005.

Scope

Mass Echelon II
30 kg to 1 mg
50 lb to 0.001 lb
4 oz to 0.03125 oz

Mass Echelon III
250 kg to 1 mg
6500 lb to 0.001 lb
4 oz to 0.03125 oz

Weight Carts
6500 lb to 2000 lb

Railroad Test Cars
110 000 lb to 80 000 lb

Volume Transfer, II
1500 gal to 5 gal
100 gal to 25 gal LPG

Grain Moisture
19 % to 8 %

2017 to 2018

Georgia L. Harris, Acting Chief
NIST Office of Weights and Measures

Effective Dates: 2017-01-01 to 2018-12-31

(Rev.: March 2013)