



NATIONAL TYPE EVALUATION PROGRAM

Certificate of Conformance

for Weighing and Measuring Devices

For:

Grain Analyzer
Moisture(grain) and Test Weight (grain)
Dielectric
Model: AM5100
Note: Only units with UI software version 28 Sep09 v. 3.12T or higher are approved for test weight per bushel determinations.

Submitted By:

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Standard Features and Options

- Liquid Crystal Display
- Menu System (Press Function Key)
- Built-in Printer
- Serial RS232 Interface Port
- Electronic Level Indicator (required)
- Audit Trail
- Remote Display (optional)


Conditions of Certification:

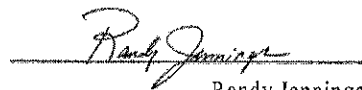
This Certificate covers the use of the AM5100 only with the grains and calibrations listed on Page 6. Moisture and test weight per bushel calibration data will be reviewed annually.

AM5100 meters manufactured prior to 2007 must be installed in a system, which provides means for printing audit trail information. Meters manufactured or updated after January 1, 2007, includes the means to print audit trail information using the internal printer (see Field Inspection Notes for details on printing the audit trail).

Certificates of Conformance are issued after successful completion of Phase I NTEP testing. To maintain a current NTEP Certificate of Conformance for grain moisture meters, the manufacturer must participate in the NTEP on-going calibration program that represents Phase II. Under Phase II, the manufacturer is provided calibration data for use in making calibration updates. NTEP Certificates of Conformance are run annually to reflect these calibration updates. Calibrations for commodities, or constituents other than moisture, not listed on page 6 of this Certificate may be used on this device at the discretion of the regulatory body having authority over the device.

This device was evaluated under the National Type Evaluation Program and was found to comply with the applicable technical requirements of "NIST Handbook 44: Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages.


Tim Tyson
Chairman, NCWM, Inc.
Effective: July 1, 2011


Randy Jennings
Chairman, National Type Evaluation Program Committee
Issued: May 26, 2011

Expiration: June 30, 2012

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Application: For use in determining the moisture content of whole grain samples in commercial grain applications.

Identification: The identification sticker listing the manufacturer's name, serial number, model name, and NTEP Certificate of Conformance number is located on the rear of the meter.

Sealing: The AM5100 uses an audit trail as a means of providing security for metrologically significant parameters. The form of audit trail used by the device is an event logger, which keeps a record of all changes to the Unified Grain Moisture algorithm or metrological adjustment. Accesses to metrological menu items protected by a security password, either through the keypad or through remote communication, are automatically logged into the audit trail. Each audit trail entry includes the event description, the event detail, and the time and date of the change. (See "Field Inspection Notes" for details on accessing audit trail information.)

Operating Ranges:

Ambient Temperature Range (Environment): 50 °F to 90 °F (10 °C to 32 °C)
Temperature Difference (Room to Grain Temperature): 20 °F (12 °C) see comments on Page 4
Grain Temperature Range: 40 °F to 100 °F (4 °C to 38 °C) for all grains
Grain Moisture Range: Refer to Page 4

Conditions of Operations: The AM5100 is a fully automatic grain moisture meter. The appropriate sample size is determined by the instrument. An approximate 600 ml or 500 g sample is required.

The instrument is equipped with an electronic leveling device. (See "Field Inspection Notes" for details on accessing the electronic level.)

Field Inspection Notes: The calibration names listed on Page 6 will be used in all instruments of the approved models without variation.

UGMA Calibration Constants May Be Viewed on the Instrument By:

1. Select F4, System
2. Select 7, Coefficient view
3. Select F3, UMA, to view the Unified Moisture Algorithm constants.
4. Select F4, Back, to return to the previous screen

Grain Calibration Versions May Be Viewed on the Instrument By:

1. Select F1, Analyze
2. If Full List not present, Select F1, Full List
3. Initial screen will show Moisture Limits for each Grain
4. Select F3, Rev/Limits, to view the Calibration Version and Lock status for each Grain.
5. Select F4, Back, to return to the previous screen

Grain Specific Adjustments (slope and bias) for Moisture and Test Weight per Bushel May Be Viewed on the Instrument By:

1. Select F4, System
2. Select 3, Bias & Slope
3. Use the up arrow to scroll through the different grains
4. Select F4, Back, to return to the previous screen

Steps to View and Print for Meters Manufactured or Updated After January 1, 2007, the Audit Trail Entries of the AM5100 Are:

1. Select F4, System
2. Select 5, Data logger view.
3. Select 1: adjustments log
4. Use the up and down arrows to view the events on the instrument.
- 4a. Select F2 to print the displayed event with the internal printer, if desired.
5. Select F4, Back, to return to the previous screen

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Field Inspection Notes Continued:**Steps to Access the Electronic Level Indicator Are:**

1. Select F4, System
2. Select I, Settings...
3. Select 8, Instrument leveling
4. Select F4, Back, to return to the previous screen

Test Conditions: This Certificate supersedes Certificate of Conformance Number 06-120A4 and is issued to update the moisture calibrations for all fifteen NTEP grains based upon testing performed in the on-going moisture calibration program and the criteria specified in NCWM Publication 14, Section IV and Section V for Grain Moisture Meters. It is also issued to update the test weight per bushel calibrations for corn, hard red spring wheat, hard red winter wheat, hard white wheat, six-row barley, soft red winter wheat, soft white wheat, sunflower seeds, and two-row barley based upon data collected in the on-going moisture calibration program and the tolerances specified in NCWM Publication 14, Section VII.

Certificate of Conformance Number 06-120A4: This Certificate superseded Certificate of Conformance Number 06-120A3 was issued to update the calibrations for corn, durum, medium grain rough rice, and soybeans based upon testing performed in the on-going calibration program and the criteria specified in NCWM Publication 14, Section IV and Section V for Grain Moisture Meters. This Certificate adds the test weight per bushel testing features for the following grains: barley (two-row barley and six-row barley), corn, sunflower seed, and wheat excluding durum (hard red spring wheat, hard red winter wheat, hard white wheat, soft red winter wheat, and soft white wheat). The following tests were performed on each of two instruments submitted for evaluation. The emphasis of the evaluations was on the device design and operation.

Basic instrument tests were conducted using a stable moisture sample to check the effect of sample volume, initial precision and storage temperature. Instrument stability tests were conducted using three HRW samples representative of the test weight per bushel range of 56 - 61 pounds per bushel. Testing for calibration performance was performed using the following grains and constituent ranges: Barley 10 to 16 percent moisture with Six Row Barley 42.3 to 50.8 pounds per bushel (lb/bu) test weight and Two Row Barley 47.1 to 55.3 lb/bu test weight; Corn 12 to 18 percent moisture and 53.5 to 60.4 lb/bu test weight; Sunflower Seed 6 to 12 percent moisture and 26.7 to 32.9 lb/bu test weight; and wheat excluding durum 8 to 16 percent moisture with hard red spring wheat 56.8 to 62.6 lb/bu test weight, hard red winter wheat 56.7 to 64.3 lb/bu test weight, hard white wheat 58.9 to 65.8 lb/bu test weight, soft red winter wheat 56.2 to 63.7 lb/bu test weight, and soft white wheat 57.4 to 62.7 lb/bu test weight.

Certificate of Conformance Number 06-120A3: This Certificate superseded Certificate of Conformance Number 06-120A2 and was issued without additional testing to reactivate Certificate of Conformance Number 06-120A2 without lapse.

Certificate of Conformance Number 06-120A2: This Certificate superseded Certificate of Conformance Number 06-120A2 and was issued to update the calibrations for corn and long grain rough rice based upon testing performed in the on-going calibration program and the criteria specified in NCWM Publication 14, Section IV and Section V for Grain Moisture Meters.

Certificate of Conformance Number 06-120A1: This Certificate superseded Certificate of Conformance Number 06-120 and was issued to update the calibrations for barley, corn, durum wheat, long grain rough rice, medium grain rough rice (note that the rough rice calibration has been separated), oats, soybeans, sunflower seed, and wheat excluding durum based upon testing performed in the on-going calibration program and the criteria specified in NCWM Publication 14, Section IV and Section V for Grain Moisture Meters.

Certificate of Conformance Number 06-120: The following tests were performed on each of two instruments submitted for evaluation. The emphasis of the evaluations was on the device design, operation, and compliance with temperature requirements. For purposes of the evaluation, room temperature was defined as 22°C ± 2°C.

Basic instrument tests were conducted using a stable moisture hard red winter wheat (HRW) sample between 12 and 14 percent moisture to check the effect of power supply fluctuations, storage temperature, leveling, warm-up time, and humidity. Instrument stability and instrument temperature sensitivity tests were conducted using HRW samples selected from all three 2 percent moisture intervals in the 10 to 16 percent moisture range. Testing for calibration performance was performed using corn, soybeans, and hard red winter wheat samples over a 6 percent moisture range.



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Certificate of Conformance Number 06-120 Continued: Temperature Difference (Room to Grain Temperature): Sample temperature sensitivity, the effect of differences between room and grain temperature, was tested for the following grains: corn, soybeans, and HRW wheat.

Moisture calibration constants listed on this Certificate are evaluated using procedures and tolerances specified for either the Phase I Type Evaluation testing or the Phase II On-going Moisture Calibration Program. The categories are described as follows:

Phase I Type Evaluation: Phase I Type Evaluation testing for Corn, HRW wheat, and soybean calibration performance is over the 6% moisture range listed in the first column of Table 1 and evaluated during the Accuracy testing. Calibration performance is evaluated and approved in 2% moisture intervals. The calibration is approved for a specified moisture interval if the average bias, i.e., the difference between predicted moisture values and reference air oven values for samples within the 2% moisture intervals, does not exceed one-half the handbook 44 acceptance tolerance.

The initial evaluation for the remaining NTEP grain moisture calibrations listed on the Certificate performance are evaluated over the 6% moisture range listed in the first column of Table 1 during the Bias Check testing. A set of 10 to 12 samples is used to verify that the calibration bias is within ± 0.40 of the GIPSA reference air oven.

Phase II On-going Moisture Evaluation: After a meter has been in the on-going national calibration program, the calibration performance is evaluated annually over the 2% moisture intervals for the moisture range listed in the second column of Table 1.

The calibration meets the evaluation criteria and remains listed on the Certificate if the average bias, i.e., the difference between predicted moisture values and reference air oven values for samples within the 2% moisture intervals, does not exceed one-half the Handbook 44 acceptance tolerance over the moisture range listed in the first column of Table 1 and does not exceed one-half the Handbook 44 acceptance tolerance plus a 95% confidence interval over the remaining 2% moisture intervals in the moisture range listed in the second column of Table 1.

Table 1: NTEP Moisture Evaluation Ranges

Grain	Phase I Type Evaluation 6% Moisture Range	Phase II On-Going Evaluation Moisture Range
Corn	12 - 18%	10 - 26%
Grain Sorghum	10 - 16%	10 - 18%
Durum Wheat	10 - 16%	8 - 16%
Hard Red Spring Wheat	10 - 16%	8 - 18%
Hard Red Winter Wheat	10 - 16%	8 - 18%
Hard White Wheat	8 - 14%	8 - 14%
Soft Red Winter Wheat	10 - 16%	10 - 18%
Soft White Wheat	10 - 16%	8 - 16%
"All Class" Wheat	10 - 16%	8 - 18%
Wheat Excluding Durum	10 - 16%	8 - 18%
Long Grain Rough Rice	10 - 16%	10 - 20%
Medium Grain Rough Rice	10 - 16%	10 - 20%
"All Class" Rough Rice	10 - 16%	10 - 20%
Oats	8 - 14%	8 - 14%
Soybeans	10 - 16%	8 - 18%
Sunflower Seed	6 - 12%	6 - 16%
Six-Row Barley	10 - 16%	8 - 16%
Two-Row Barley	10 - 16%	8 - 16%
"All Class" Barley	10 - 16%	8 - 16%

Evaluated By: C. Brenner, P. Schumacher, and S. Coulibaly (GIPSA Type Evaluation and Calibration Group) 06-120, 06-120A1, 06-120A2, 06-120A4, 06-120A5

Type Evaluation Criteria Used: NIST, Handbook 44: Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices, 2006. NCWM, Publication 14: Grain Analyzers, 2006.

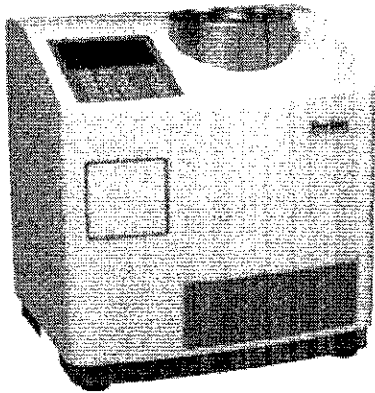


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Conclusion: The results of the evaluation and information provided by the manufacturer indicate the device complies with applicable requirements.

Information Reviewed By: S. Patoray (NCWM); L. Bernetch (NCWM) 06-120, 06-120A1; J. Truex (NCWM) 06-120A2, 06-120A3, 06-120A4, 06-120A5

Example of Device:



Model AM5100

This meter uses a common moisture equation, Unified Moisture Algorithm (UMA) for all grain types. The constants for the UGMA0511 cal set are:

Unified Moisture Algorithm Constants:

UMA COEFFS: order 5

0	-110.335	aminF	40.
1	108.5338	amaxF	90.
2	-39.2476	sm inF	40.
3	7.184863	smaxF	100.
4	-0.62922	sadiff	20.
5	0.02122		

tw 237.56 UGMA 0511

This meter also groups different grains together to compensate for grain specific densities and adjustments (slope and bias). The following table lists the grain specific adjustments for each grain grouping associated with the UGMA 0511 cal set.



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Moisture and Test Weight per Bushel Meter Calibration Update – 2011 / Grain Specific Calibration Constants for UGMA 0511
The Effective Date for All Moisture and Test Weight per Bushel (TW) Calibrations is July 1, 2011

Grain	Designation	Includes	Moisture and Test Weight Calibration Version	Grain Constants			
				Moisture slope	Moisture bias	TW slope	TW bias
Barley	Barley	6-Row Barley 2-Row Barley	0511 cal set Meets On-going Calibration Evaluation	1.0500	-0.8	-0.2365	-0.9
Corn	Corn		0511 cal set Meets On-going Calibration Evaluation	1.1300	-1.55	-0.2423	-0.25
Durum	Durum		0511 cal set Meets On-going Calibration Evaluation	1.1000	-1.69	Not Approved	
Grain Sorghum Milo	Sorghum		0511 cal set Meets On-going Calibration Evaluation	1.0790	-0.89	Not Approved	
Long Grain Rough Rice	Long Gr Rice		0511 cal set Meets On-going Calibration Evaluation	1.0100	-0.96	Not Approved	
Medium Grain Rough Rice	Med Gr Rice		0511 cal set Meets On-going Calibration Evaluation	1.1400	-1.97	Not Approved	
Oats	Oats		0511 cal set Meets On-going Calibration Evaluation	0.9260	0.32	Not Approved	
Soybeans	Soybeans		0511 cal set Meets On-going Calibration Evaluation	1.1150	-1.86	Not Approved	
Sunflower Seed	Sunflower		0511 cal set Meets On-going Calibration Evaluation	1.1200	-1.7	-0.2271	0.56
Wheat (exdur)	Wheat	Hard Red Spring Hard Red Winter Hard White Wheat Soft Red Winter Soft White Wheat	0511 cal set Meets On-going Calibration Evaluation	1.0230	-0.8	-0.2343	-0.65