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Testing Grain Moisture Meters (GMMs)

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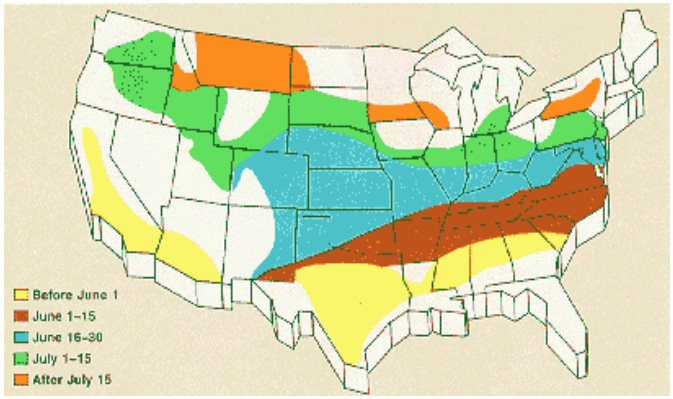
Spring is here and many States choose this time of year to inspect and test grain moisture meters. However, inspection and testing is conducted at the discretion of the State and is not, in many cases, confined to the spring. In many States, winter wheat is the first grain to be harvested (typically from May to July). Inspecting and testing meters in early spring provides the device owners with verification of meter accuracy and if the device is rejected, allows the device owner time to repair the device before the harvest season begins. This inspection time frame also allows the weights and measures inspector time for callbacks or follow-ups on any rejected devices before the harvest season begins.



Usual Start of Winter Wheat Harvest

Two methods for testing GMMs are recognized in NIST Handbook 44 (HB 44). GMMs may be tested using the air oven reference test method (grain samples are used to test the meters) or by like-type meter test method (use of standardized reference like-type meters, in a side–by-side comparison of a grain sample). This article provides some helpful hints on proper sample prepara-tion and testing of grain moisture meters using the air oven reference test method (grain samples are used to test the device).

Using grain samples to test moisture meters requires that grain be collected, cleaned, tested, stored in proper containers, retested, and then distributed to weights and measures inspectors for use in the inspection and test of grain moisture meters.

Collection, Cleaning and Storing

Several different lots of various types of grain (wheat, soybeans, corn, etc.) should be collected from different locations within the State and at different moisture levels (high and low moistures). These grains are typically collected from the prior year grain crop. The grain is cleaned using a mechanical cleaning device (typically a Carter Day Dockage machine) and further hand-sieved and cleaned as necessary. The grain sample is mixed using a Boerner Divider (a device used to mix and separate grain samples) to ensure

homogeneity, and then the grain is evaluated. Evaluation of the sample to ensure that it is adequate for use as a field sample involves a comparison of a grain sample moisture, which is determined using the air oven method, to a grain sample moisture, which is determined using the laboratory standard grain moisture meters. (The laboratory must have one laboratory standard moisture meter for each type of moisture meter used in the State.) The grain sample air oven moistures compared to the laboratory standard meter moistures must not exceed a difference of 0.5 % moisture to be approved for use as field samples. Samples that pass this evalu-ation are stored in the refrigerator for future use as field-testing samples.

Tips

- Ensure that enough samples are collected for each type of grain. Some grains may not pass the evaluation criteria for comparison of air oven moisture to laboratory standard meter moisture.
- Grain samples should be cleaned thoroughly. Bugs and other foreign material may affect the moisture stability of the field grain sample and test weight results.
- Once grain samples have been tested to determine they are appropriate for use as field samples, they should be stored in appropriately sealed glass gallon jars.
- Grain samples must be stored in the refrigerator between 1.5 °C and 7 °C (35 °F and 45 °F). Grain must not be frozen.

Retesting Grain Samples for Use as Field Grain Samples

When ready to use, the grain samples that are appropriate for field-testing are removed from the refrigerator and allowed to equilibrate to room temperature before sample containers are opened. This prevents condensation on the grain. The grain samples are mixed in a Boerner Divider three times. The sample is then retested for moisture using the air oven and retested for moisture on the laboratory standard meters to ensure that the sample still meets the criteria. (The difference between the air oven moisture and meter cannot exceed 0.5 %.) The samples are then divided into field samples typically 2 to 3 (1 pint or 1 quart) grain samples of the same lot with a high moisture content and 2 to 3 (1 pint or 1 quart) grain samples of the same lot with a low moisture content for each grain type (wheat, soybeans, corn, etc.). A set of these grains is issued to the inspector for testing.

Tip

- Consider using three (1 pint or 1 quart) samples per moisture level (high and low), one sample of which will be used as a back up to verify other moisture reading and will not be opened unless it is necessary. The back-up sample may be used if there are concerns with the validity of the moisture content of the other two samples.

Field Inspection and Testing Grain Moisture Meters

Meters must be inspected to ensure they meet the requirements of HB 44. A minimum test of a grain moisture meter consist of tests with samples (typically 1 pint or 1 quart) which need not exceed three for each grain or seed for which the device is used and with samples having at least two different moisture content values (high and low moisture

content) within the operating range of the device. If applicable, test the test weight per bushel indications with at least the lowest moisture samples. Three samples of the same moisture level from the same lot of grain should be issued for each grain type and moisture level. The samples are typically stored in a portable refrigerator until needed. About two hours before use, the samples are removed from the refrigerator and placed in coolers to allow the grain to stabilize to ambient temperature. During this time the grain is shaken several times for homogeneity. One high and low sample of each grain type are run through the meters 3 times each, and an average of each high and low sample moisture is calculated and compared to the air oven moisture values of the grain to determine if it meets the tolerances of HB 44.

Tips

- Each sample must not be used for more than 24 drops (18 drops for
- high moisture corn and soybeans). Samples may begin to deteriorate after this point.
- Test your high moisture samples first so that they can be returned to containers and placed in storage to prevent loss of moisture.