



## OPERATING MANUAL

### Gilson *Aqua-Check* Moisture Tester MA-26X



Rev: 08/27/2015

## SAFETY INSTRUCTIONS

Review and completely understand the operating and safety instructions before using this unit.

### WARNING!

**The calcium carbide reagent used with this test must be handled with great care. When exposed to water, calcium carbide produces highly flammable or explosive acetylene gas.**

- Users must understand and follow local regulations and calcium carbide *Material Safety Data Sheet (MSDS)* guidelines and procedures regarding transportation, storage, handling and disposal.
- Users of this apparatus must read and understand the operating instructions in this manual.
- Testing must not be performed in confined spaces or in the vicinity of an open flame, lighted cigarettes, embers or any other potential source of ignition.
- When releasing the gas from the apparatus, take care to direct it away from the face and body.
- Care should be taken not to store, dispose of, or place the calcium carbide reagent where it may come into contact with water, because it will produce explosive acetylene gas.
- Any application not specifically covered in this manual will be considered improper use and will void the warranty.
- Testing excessively wet material, adding water to the testing chamber, or improper use of the equipment could cause pressures to exceed the safe level for the apparatus. This may damage the device and create an unsafe condition for the operator.
- Long sleeves, gloves, eye protection and dust masks should be worn when performing this test.

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## 1.0 UNPACKING & SET-UP:

**NOTE:** Each Gilson *Aqua-Check* is carefully inspected prior to packaging and shipment. Upon receipt of the shipment, immediately unpack and inspect the apparatus for signs of damage. Report damage immediately to the shipping company. Retain all shipping records and packing materials until proper operation is confirmed.

The complete MA-26 *Aqua-Check* Kit consists of the following components:

- Cast aluminum Sample Chamber Vessel with integral 0—20% Pressure Gauge
- 200 x 0.1g Electronic Balance for weighing of test specimens
- (2) 1.25in (32mm) Steel Pulverizing Balls
- Long-handled Reagent Scoop
- Large, coarse clean-out Brush
- Small, fine-bristle Brush
- Sample Cup
- Heavy-duty plastic Case

The MA-26X includes all of the components listed, except the Calcium Carbide Reagent\*. Any components or accessories are available individually from Gilson. Model numbers to order are listed separately in this manual.

*\*Calcium Carbide Reagent is available separately from Gilson as MAA-44 in a 10lb can.*

## 2.0 INTRODUCTION:

The Gilson *Aqua-Check* Moisture Tester is designed to measure the water (moisture) content of soils, aggregates, and other non-reactive materials. The *Aqua-Check* apparatus consists of an aluminum sample chamber vessel with integral pressure gauge, electronic balance for sample weighing, two steel pulverizing balls, and assorted brushes and containers as required for proper completion of the test.

Pulverized calcium carbide is used as a reagent, and reacts when combined with available water in the sample material to form acetylene gas. The increase of gas pressure in the sealed sample chamber is proportional to the water content, and is shown on the pressure gauge. The most accurate results are obtained when pressure gauge readings are correlated with data from oven-dry methods. When testing soils for example, ASTM Standard Test Method D 4944 provides a procedure to correlate *Aqua-Check* results directly with laboratory oven drying methods.

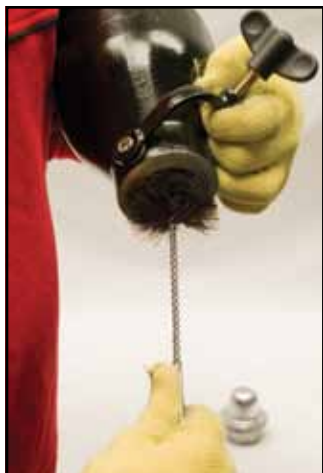


**MA-26X**

### 3.0 OPERATING INSTRUCTIONS:

**NOTE:** Following these procedures closely and consistently will increase the accuracy and repeatability of your test results.

**Step 1.** Use the dry, coarse-bristle brush to thoroughly clean all residue from the *Aqua-Check* vessel and chamber cap.



**Step 1: Cleaning residue from Vessel**



**Step 1: Cleaning residue from Chamber Cap**

**Step 2.** Select a representative sample of the test material. Cohesive materials that do not readily separate into individual particles, such as clay or silt soils, should be reduced by hand into small clumps.

**Step 3.** Referring to separate instructions for the electronic balance, set-up and zero the balance. Place the plastic sample cup on the balance and zero again. Carefully add small amounts of sample material to the cup until the balance shows the required 20g.

**NOTE:** If the moisture content of the material is expected to exceed 20%, a 10g sample should be used, but the value read on the gauge must then be doubled. It is also possible to obtain better resolution of drier materials (<10%) by doubling the sample size and halving the gauge reading.



**Step 3: Sample material at 20g**

**Step 4.** Place the prepared and weighed sample into the *Aqua-Check* vessel. For cohesive samples as described above, also place the two steel pulverizing balls into the vessel.



**Step 4: Placing sample into vessel**



**Step 4: Placing steel Pulverizing Balls into vessel**

**Step 5.** Using the Long-Handled reagent Scoop, add at least two full scoops of calcium carbide reagent to the Chamber Cap.

**NOTE:** Make sure you have read and understand the Material Safety Data Sheet (MSDS) included with each container of calcium carbide reagent.



**Step 5: Adding calcium carbide reagent to Chamber Cap**

**Step 6.** Holding the *Aqua-Check* vessel horizontally, place the chamber cap on the end of the chamber. Position the black dot on the cap so that it will be facing away from your body when the pressure is released. Move the stirrup into place over the cap and tighten the top screw to seal the chamber. Use care during this step not to mix the reagent and sample before the chamber is sealed.



**Step 6: Placing Chamber Cap on the end of the chamber**



**Step 6: Tightening the top screw to seal the chamber**

**Step 7.** Agitating the sample:

- a. **Without Pulverizing Balls:** Hold the *Aqua-Check* vertically with the gauge facing down and agitate vigorously for 5—10 seconds. Turn the *Aqua-Check* around, and with the gauge facing up agitate again for 5—10 seconds. Tap the sides so that the sample falls into the chamber cap. This process should be repeated for 1—3 minutes, or until the gauge reading in Step 8 has stabilized.
- b. **With Pulverizing Balls:** Hold the *Aqua-Check* horizontally and use an orbital motion to spin the balls around inside the chamber, pulverizing the sample. Agitate for 20 seconds and rest for 20 seconds, repeating the process at least three times. Periodically check the position of the gauge indicator. Continue the agitation cycle until the indicator has stabilized. Some highly plastic clays may require 3 minutes or more of agitation.



**Step 7b:** Using an orbital motion to spin the balls around inside the chamber

**Step 8.** Read the pressure gauge at eye level while holding the vessel horizontally. Wait for the indicator needle to stop moving. The gauge reads directly in percent water content of wet weight. Accuracy may be improved by establishing a correction chart as shown in ASTM D 4944.



**Step 8:** Reading the pressure gauge at eye level

**Step 9.** Taking great care that the black dot on the chamber cap is facing away from your face and body, slowly loosen the top screw to vent pressurized gas from the vessel.



**Step 9:** Loosening top screw to vent pressurized gas

**Step 10.** Place the used sample/reagent mixture and residue in an open dry container and dispose of in accordance with local regulations or Section 13 of the MSDS. Use the coarse bristle brush to clean the vessel and prepare for the next test.

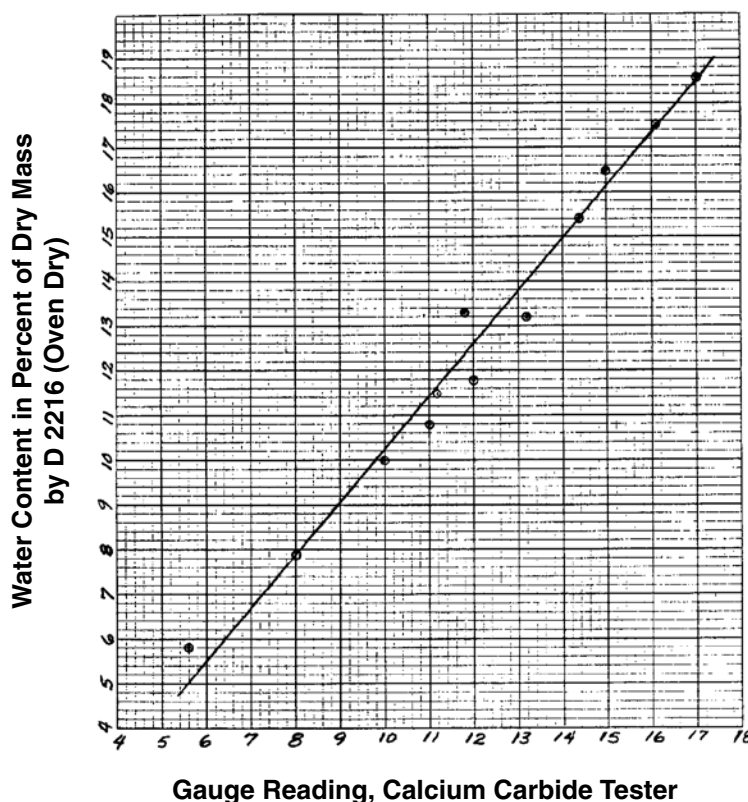


## 4.0 ACCURACY:

When testing soils, it is recommended that the procedures in ASTM D 4944, *Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method* be followed. This will insure accurate and reliable results. For optimum accuracy with most materials, the *Aqua-Check* results should be correlated with oven-dry tests for each material as shown in this summary. This simple procedure is outlined in detail in D 4944.

1. Select several samples of the material to be tested having a wide range of water content.
2. Carefully Divide each sample into two representative specimens.
3. Taking care to not lose moisture during handling, run a test on one specimen in the *Aqua-Check*, and record the gauge reading. Oven dry the other specimen according to the procedure and calculate the percent moisture.
4. Plot the oven-dry moistures on a graph vs. the gauge readings and draw a best-fit curve through the points. A wide scatter in the points may indicate operation errors or that the material is not suitable for this comparison.
5. When testing, find the point on the graph where the gauge reading intersects the correlation curve and record that value as the corrected percent.

**Typical Calibration Curve  
Calcium Carbide Tester**



Exceptionally cool or warm ambient temperatures may cause fluctuations in test results. Repeated testing or hot weather may heat up the vessel body, and show test results that are artificially high. Allow the vessel to cool down before further testing. In cold weather, it may help to run two or three tests in rapid succession to warm up the vessel.

The maximum recommended particle size is 3/4in (20mm). Some test methods may have a smaller size limit.



## 5.0 TROUBLESHOOTING:

GILSON <i>AQUA-CHECK</i> TROUBLESHOOTING			
Low Readings	High Readings	Possible Cause	Solution
X	X	Testing procedure errors	Review instructions and procedures.
X	X	Incorrect sample weights	Check balance operation and re-zero.
X	X	Errors in corrected values	Change in material type. Repeat correlation procedure with new material.
X		Insufficient agitation	Some cohesive materials may require 3 minutes or more. Use steel pulverizing balls.
X		Insufficient quantity of reagent	Add an additional scoop of reagent.
X		Ineffective reagent	Replace with fresh MAA-44 reagent.
X		Premature contact between reagent and specimen	Insure vessel is held horizontal when mating with cap.
X		Insufficient sample preparation	Break cohesive material into finer sizes and use pulverizing balls.
X		Inadequate pressure seal	Check and clean chamber cap gasket. Inspect vessel, cap and stirrup for damage or cracks. Replace gasket if necessary.
X	X	Defective gauge	Gauge needle should rest at zero and move smoothly. Replace if defective.
X		Low temperature	Run two or three test cycles to warm up vessel.
	X	High temperature	Allow vessel to cool off.
	X	Moisture inside vessel prior to testing	Insure vessel and cap are completely dry before testing.
X	X	Gauge reading error	Hold vessel horizontally at eye level when reading gauge.
X		Residue from previous tests	Use included coarse-bristle brush to clean vessel thoroughly between tests.

For help with operation or technical issues, **E-mail: [techsupport@gilsonco.com](mailto:techsupport@gilsonco.com)** or **Call: 800.444.1508!**

## 6.0 ACCESSORIES:

GILSON <i>AQUA-CHECK</i> ACCESSORIES	
Description	Model
Calcium Carbide Reagent, 10lb can <sup>1</sup>	MAA-44
<i>Aqua-Check</i> 0—20% Pressure Gauge	MAA-45
Electronic Balance, 200 x 0.1g	AD-25
1.25in (32mm) Steel Balls, pkg. 2	MAA-47
Long-Handle Reagent Scoop	MAA-48
Large, Coarse-Bristle Clean-Out Brush	MAA-51
Small, Fine-Bristle Brush	MAA-50
Sample Cup	MAA-52
Heavy-Duty Waterproof Plastic Case	MAA-46

<sup>1</sup> Due to shipping restrictions, additional reagent is sold in 10lb (4.5kg) cans. Material from these larger cans can be used to replenish smaller containers for field use.



**MAA-47**



**MAA-48**

To order any of these items, visit us at **[globalgilson.com](http://globalgilson.com)** or call **800.444.1508!**