MOISTURE TESTER

MODEL LA-3405

FORNEY

FIVE SIMPLE RULES BEFORE TESTING

1. The body or cap, which ever is being used for the material, is perfectly clean and contains no active absorbent from a previous test.
2. The material is truly representative of the bulk and carefully weighted.
3. The material and the absorbent are kept separate until the cap is tightly secured to the body.
4. The material has been thoroughly prepared – ground or pulverized or mixed with sand (if necessary) so that the absorbent can act feely on the material.
5. Make sure the Steel Ball Pulverizers are used when testing Clays, Soils, etc. (See Steel Ball Pulverizers).

You will note that importance is attached to the necessity for accurate weighing, yet a slight error will not affect the result so seriously as it would in the Standard Oven Test.

For Example: If you were testing 10g of material by the Oven Method, and weighed it two-tenths of a gram too little, that shortage would be equivalent to 2% moisture content, but using the Moisture Tester method a shortage of two tenths of a gram, due to the careless weighting, is only equivalent in error to the moisture content actually contained in those two-tenths of a gram. Testing 10g of material with the gauge indicating % moisture, an error in weighing of two-tenths of a gram would be one-fiftieth of 5%; equivalent to 0.1% - one-twentieth of the error you would have made in the Oven Test.

PREPARING THE MATERIAL FOR TESTING WITH STEEL BALL PULVERIZERS

For use when testing clays, soils or some coarse materials. Put two 11/4" dia. Steel balls into the body of the Vessel with the absorbent.

In place of the normal mixing and shaking instructions, mix as follows: Hold Vessel vertically, so that the material to be tested, which is in the cap falls into the Vessel body. Then holding Vessel horizontally, rotate it approximately 10 seconds so that the pulverizers are "put into orbit" around inside circumference.

Rest for approximately 20 seconds. Repeat the rotate-test cycle until the result is constant (usually within 3 minutes).

CORRECTION FACTOR

It is necessary to emphasize that the tester will give consistent results on any material and can easily be calibrated against any other method of moisture determination. Many materials contain other volatile matter in addition to water so that results may be lower than oven drying figures. If the difference is carefully noted in a series of comparative tests the correction factor required can easily be established.

To prevent loss of the gas, material and the absorbent must not come into contact with one another until the tester has been sealed by tightening the top screw on the cap. (It is important that this be done with the vessel horizontal as in "Seal the Vessel" on Directions for Use.)

Points to keep in mind when testing

The chemical action of the absorbent produces gas. The amount of gas depends on the amount of water in the material.

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PROPORTIONAL METHOD HIGH MOISTURE CONTENTS

To obtain a higher reading than indicated on the gage, weigh out only half of the Standard Weight and proceed to test the material in the usual way.

BUT

When reading the gauge, DOUBLE the percentage indicated, e.g. if the gauge reads 18%, the moisture content is 18% multiplied by 2 equating 36%. A smaller portion can be tested if your material is either very wet or of high value

LOW MOISTURE CONTENTS

Two or more complete weighings can be tested at once, and the result divided by the number of weighings, e.g. 2 weighings: result on gauge 1.8% moisture content equals 1.8% divided by 2 equaling 0.9%.

TEMPERATURE

Testing instrument should be used in a room temperature approximately 70deg. F (20deg. C). If used below 60deg. F ignore the first and possibly seconds tests. If the instrument is hot from previous testing, careful brushing out will allow it to cool.

WARM MATERIALS

Sometimes materials have to be tested when warm – as from Drying Plants. These can be tested immediately while still warm, or placed in a sealed container from testing when convenient.

LIQUIDS AND PASTES

1. First measure the sample to be tested
2. Have DRY sand available
3. Add the dry sand to the liquid or paste in the scale pan and mix thoroughly so that the sand "absorbs" the liquid or the paste.
4. Quantity of sand used within reason does not affect the result. Usually three to four absorbent scoops of sand are sufficient, but use a little more if necessary.
5. The sand must be quite dry. Test it if there is any doubts.

CLAYS, SOILS AND SOME COARSE MATERIALS

Use the Pulverizers Method

THE TEST PROCEDURE

1. Cleaning

Make sure that the inside of the body and cap are clean and free from residues of any previous test.

2. Prepare the Material

Prepare the material for test as follows:

- **Sands and fine powders** – no preparation necessary.
- **Coals, coke, ores and mineral concentrate** – grind or pulverize before weighing or use steel ball method.
- **Clays, soils and other coarse materials** – use steel ball method.
- **Aggregates**, - no preparation necessary.

3. Weigh the Material

Using the scale provided, weigh out the Standard Weight (20g.)

4. Put in the Material

5. Add Absorbent/Reagent

Take two full scoops of Absorbent/Reagent and place in cap. For bulky materials use 3-5 scoops to ensure adequate coverage.

6. Seal the "Vessel"

Hold the Vessel horizontal to prevent mixing of sample and Absorbent/Reagent before the instrument is sealed. Place cap in position. Bring stirrup around and tighten top screw.

7. Mix

With dial facing down shake the Vessel vigorously for 5 seconds, then quickly turn so that the dial is facing up. Tap the body to ensure that contents fall into cap. Stand or hold in this position for 1 minute. Repeat this for second and third mix at 1 minute intervals.

8. Take Reading

Once more, shake Vessel and with the Vessel horizontal (with gage dial facing you at eye level) take the reading.

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9. Finally

Slowly release the pressure holding Vessel away from body contact, with the directional release arrow pointing away from the operator and empty contents. Clean out Vessel and cap thoroughly with brush provided.

A "NEGATIVE" READING

If the "needle" does not move on the gage, then proceed as follows:

10. Make sure that the Absorbent has been put into the tester.
11. Make sure there is moisture in the material.
12. Try another test with three times the Standard Weight of material.
13. If all the above fail, obtain a sample of material, together with full details and send it to us.

A "LOW" READING

If your result is below your sure knowledge of your normal percentages please consider the following possibilities:

1. Excessive shaking on materials with moisture contained in cellular structures.
2. Material not correctly weighed and lighter than the Standard Weight.
3. Vessel too cold, will "Warm Up" with further tests.
4. Absorbent and material have been in contact before sealing the instrument, thereby allowing the gas to leak away and not work on the gauge. (See "Seal the Vessel" on Directions for Use.)
5. Rubber ring may be worn/cap is not securely closed.
6. Material not correctly prepared or Absorbent not mixing fully with the material. Pour out onto a sheet of paper, and examine. If required, use Pulverizers (Steel Ball Method.)
7. The Absorbent my be only semi-active, due to long storage or expose to the atmosphere. This sometimes happens through falling to replace the lid on the can after each test. Check for lighter color of Absorbent at the top of the can, and dispose of this non-active Absorbent. Try using 2 or 3 scoops or Absorbent.
8. Not cleaning the cap of body after each test. The material would commence working with any active Absorbent not removed after a previous test.
9. If using the "Proportional Method" (see Data Card), forgetting to multiply the reading on the gage.
10. **SPECIAL CASE:** Volatile Matter in the material is generally recognized by the odor when testing in the laboratory oven. This is indicated as moisture by the Standard Oven Method. The Forney Moisture Tester only reacts with water and if compared with the Oven Test will read lower if Volatile Matter is present. You can establish a correction factor after a series of tests as mentioned on the Data Card (Correction Factor.)
11. Very bulky material may require more than 1 scoop of Absorbent to give a full coverage.

A "HIGH" READING

If your test shows a higher reading than your sure knowledge of your percentages, please consider the following possibilities:

1. Material not accurately weighted.
2. Reading the gauge when this is not in the horizontal position (See "Taking Reading" on the Directions for Use Card.)
3. Frequent and repeated tests without allowing the Instrument to cool between tests. Carefully brushing out will allow the instrument to cool sufficiently.
4. Does the "needle" return to zero after releasing the gas? If not the instrument must be re-calibrated.
5. If using the "Proportional Method" (see Data Card), forgetting to divide the reading on the gauge.
6. The Vessel has not been shaken long enough to cool the gases before reading the results.

A "VERY SLOW" READING

This sometimes happens with "difficult" materials. The material itself may give a naturally slow chemical reaction, and the "needle" rises only gradually. Proceed thus:

1. Grind or pulverize the material more finely, or otherwise improve the method of preparation.
2. Use Pulverizers (Steel Ball Method.)

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CONVERSION CHART

Civil Engineering and certain other trades sometimes require Moisture Content expressed as a percentage of Dry Weight.

Use this chart for conversion.

TESTER READING	
W.W.%	D.W.%
1.0 -	1.0
2.0 -	2.1
3.0 -1	3.2
4.0 -	4.3
5.0 -	5.4
6.0 -	6.5
7.0 -	7.6
8.0 -	8.7
9.0 -	9.8
10.0 -	11.0
10.5 -	11.7
11.0	12.3
11.5	13.0
12.0	13.6
12.5	14.2
13.0	14.9
13.5	15.6
14.0	16.3
14.5	16.9
15.0	17.6
15.5	18.3
16.0	19.0
16.5	19.7
17.0	20.4
17.5	21.2
18.0	21.9
18.5	22.7
19.0	23.4
19.5	24.2
20.0	25.0

TESTER READING	
W.W.%	D.W.%
20.5	25.8
21.0	26.5
21.5	27.4
22.0	28.2
22.5	29.0
23.0	29.8
23.5	30.7
24.0	31.5
24.5	32.4
25.0	33.3
25.5	34.2
26.0	35.3
26.5	36.0
27.0	36.9
27.5	37.9
28.0	38.8
28.5	39.8
29.0	40.8
29.5	41.8
30.0	42.8
30.5	43.9
31.0	44.9
31.5	45.9
32.0	47.0
32.5	48.1
33.0	49.2
33.5	50.3
34.0	51.5
34.5	52.6
35.0	53.8

TESTER READING	
W.W.%	D.W.%
35.5	55.0
36.0	56.2
36.5	57.4
37.0	58.7
37.5	60.0
38.0	61.2
38.5	62.6
39.0	63.9
39.5	65.2
40.0	66.6
40.5	68.0
41.0	69.4
41.5	70.9
42.0	72.4
42.5	73.8
43.0	75.4
43.5	76.9
44.0	78.5
44.5	80.1
45.0	81.8
45.5	83.4
46.0	85.1
46.5	86.9
47.0	88.6
47.5	90.6
48.0	92.3
48.5	94.1
49.0	96.0
49.5	98.0
50.0	100.0

The reaction which occurs in your tester, during the test procedure produces acetylene gas (the pressure of which provides the reading) and a mild alkali calcium hydroxide (hydrated or slaked lime.)

After testing, empty the contents of the tester into a disposable container or bag and when convenient empty the container onto open ground.

Spread the remains thinly and allow any unreacted carbide to decompose (oxidize) on exposure to the air. This decomposition can be accelerated by the addition of water sprayed onto the powder, provided this is done well away from buildings, or flammable substances.

Please do not empty the contents into a waste bin.

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