

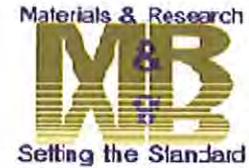
# Laboratory Qualification Manual

**2009**

**Laboratory**

**Qualification**

**Manual**



## Introduction

This manual has been developed to outline the process for qualifying a laboratory to perform testing for projects for the Nebraska Department of Roads or have funding or oversight by the FHWA and to provide a system to insure compliance with NDOR testing laboratory standards. Any laboratory not meeting the requirements set forth in this document is not qualified to perform laboratory services on such projects.

The following manual consists of procedures for the calibration of laboratory equipment along with calibration worksheets (where required) as pertaining to the following disciplines: Aggregate, Bituminous, PCC, Soils, and the associated laboratory equipment. The testers must be certified and perform tests as outlined in NDOR's QAP manual.

The qualification procedures will require either a *certificate*, *verification*, or *calibration* for the specified testing equipment.

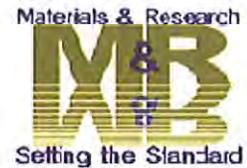
**Certificate:** A Certificate of Calibration are those received with the purchase of the standard test equipment that is used to calibrate or verify other equipment in the laboratory, or those received when an outside contractor calibrates testing equipment, or those received from the manufacturer when new equipment is purchased.

**Verification:** A verification is performed by the Laboratory and its technicians and is then reviewed by the NDOR Laboratory Representatives at regular intervals as identified in the procedures. Complete calibration and verification records shall be kept on file at all times.

**Calibration:** The subject laboratory equipment shall be calibrated by the NDOR laboratory representative.

The procedure for the qualification process is as follows:

- 1) The consultant/laboratory receives copy of this manual prior to NDOR's review.
- 2) The consultant/laboratory goes through each procedure for each equipment and test and assembles the proper documentation as defined in each procedure in this manual.
- 3) When all documentation is complete, contact the Assistant Materials and Research Engineer to schedule the qualification review at:



Nebraska Department of Roads  
Robert C. Rea, Assistant Materials and Research Engineer  
1400 Highway 2  
P.O. Box 94759  
Lincoln, NE 68509-4759  
[robert.rea@nebraska.gov](mailto:robert.rea@nebraska.gov)  
office (402) 479-3839  
cell (402) 326-9934  
fax (402) 479-3975

- 4) The qualification review will take approximately 2 days, in which the laboratory must have their Laboratory Contact working directly with the NDOR lab qualification review personnel throughout the review.

Certificates of Calibration and the verification documentation must be performed at the intervals specified by the procedures. Completed calibration and verification records shall be kept on file for review at any time.

If the laboratory or equipment does not meet the qualification requirements, the NDOR Laboratory Representative shall notify the Laboratory Contact. After notification, the laboratory equipment shall be corrected, replaced, or taken out of service. Documentation of the correction of the deficiencies shall be submitted to the NDOR Laboratory Representative within 30 days of notification, and the qualification process will resume.

It is the laboratories sole responsibility to maintain the equipment according to the procedures set forth in this manual and by any means they deem necessary over and above these procedures.

This procedure is for the sole purpose of defining a process to verify that a laboratory is qualified and is acceptable to perform testing for NDOR Projects operating under the umbrella of NDOR's approved testing laboratories standards for FHWA, State and Federally Funded Projects. This qualification is for the purposes stated previously and is provided 'as is' and any express or implied warranties including, but not limited to, certifications, verifications, or procedures are disclaimed. In no event shall NDOR, FHWA, or any entities be liable to the consultant/laboratory or to any third party for any direct, indirect, incidental, consequential, special, or exemplary damages or lost profit resulting from any use or misuse of this data, incorrect data or any data produced as a product of this manual.



EVALUATION OF CONTRACTORS LABORATORY

NEBRASKA DEPARTMENT OF ROADS

**LABORATORY**

Location of Lab.

Phone Number

E-Mail Address

Fax Number

*Inspected By*

Date Evaluated

Date Procedure Reviewed

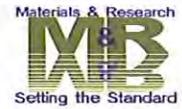
Lab Personnel

**REPORT ON LAB. TECHNIQUES**

**REPORT ON LABORATORY EQUIPMENT**



# Equipment Calibration and Verification Information



Date: 04/27/03

Revised:

All calibration and verification records shall be kept in the office of the Commercial Laboratory Supervisor.

Equipment - Requirement - Test Method	Certificate Verify Calibrate	Procedure Reference
<b>AGGREGATE EQUIPMENT</b>		
Stand, Funnel and Cylindrical Measure AASHTO T 304	Verify	Procedure No. 35
Conical Molds and Tampers - Critical Dimensions AASHTO T 84	Verify	Procedure No. 9
Sample Splitter AASHTO T 248	Verify	Procedure No. 60
<b>BITUMINOUS EQUIPMENT</b>		
Breaking Heads - Critical Dimensions AASHTO T 245	Verify	Procedure No. 28
Compression Testing Machines AASHTO T 245	Certificate	Outside Contractor
Ignition Oven AASHTO T 308	Verify	Procedure No. 38
Gyratory Compactor AASHTO T 312	Certificate	Procedure No. 37
Gyratory Molds and Ram Heads AASHTO T 312	Verify	Procedure No. 36
Marshall Molds AASHTO T 245	Verify	Procedure No. 3
Vacuum System AASHTO T 209	Calibrate	Procedure No. 23
Manual and Mechanical Compactors AASHTO T 245	Verify	Procedure No. 6 Procedure No. 6A
<b>PCC EQUIPMENT</b>		
Air Meters ASTM C 231	Verify	Procedure No. 61
Bearing Blocks - Planeness ASTM C 39	Verify	Procedure No. 11
Compression Machines ASTM C 39	Certificate	Outside Contractor
Moist Rooms/ Storage Tanks - Temp. & Humidity ASTM C 39	Verify	Procedure No. 62
Capping Material - Strength	Verify	Procedure No. 63
Unit Weight Measure ASTM C 138	Verify	Procedure No. 26

Equipment - Requirement - Test Method	Certificate Verify Calibrate	Procedure Reference
<b>SOILS EQUIPMENT</b>		
Grooving Tools - Critical Dimensions AASHTO T 89	Verify	Procedure No. 18
Liquid Limit Devices - Wear and Critical Dimensions AASHTO T 89	Verify	Procedure No. 18
Manual Hammers - Weight and Critical Dimensions AASHTO T 99 & T 180	Verify	Procedure No. 5 (T 99) Procedure No. 5A (T 180)
Mechanical Soil Rammers AASHTO T 99 & T 180	Verify	Procedure No. 22 (T 99) Procedure No. 22A (T 180)
Molds - Critical Dimensions/ Volume AASHTO T 99 & T 180	Verify	Procedure No. 2
Straightedges - Planeness of Edge AASHTO T 99 & T 180	Calibrate	Procedure No. 19
<b>MISCELLANEOUS EQUIPMENT</b>		
Balances, Scales & Weights (General Purpose) AASHTO T 208, T 216, T 265, T 296	Verify	Procedure No. 8
Ovens - Temperature Settings AASHTO T 208, T 216, T 265	Verify	Procedure No. 1
Mechanical Shakers - Sieving Thoroughness	Verify	Procedure No. 27
Sieves - Physical Condition	Verify	Procedure No. 25
Thermometers	Verify	Procedure No. 64



Date: 3-15-01  
Revised: 3-27-03

**Procedure for Verifying Funnel Stand Apparatus and  
100 ml Cylindrical Measure  
Procedure No. 35**

**Equipment Checked:** FUNNEL STAND APPARATUS AND 100 ml CYLINDRICAL MEASURE (AASHTO T 304)

**Purpose:** This procedure provide instructions for the checking the volume of the cylindrical measure and the critical dimensions of the funnel stand apparatus used in this test method.

- Inspection Equipment Required:**
1. Caliper
  2. Balance
  3. Thermometer
  4. Glass plate and grease

**Tolerances:** The equipment shall meet the tolerances specified in the test method AASHTO T 304.

**Procedure:** The first step is to calibrate the cylindrical measure. Apply a light coat of grease to the top edge of the dry empty cylinder measure. Weight the measure, grease and glass plate. Fill the measure with deionized water at the temperature of 18 to 24° C (64.4 to 75.2° F). Record the temperature of the water. Place the glass plate on the measure, being sure no air bubbles remain. Dry the outside of the measure and weigh the measure with the water and glass plate on top. Calculate the volume of the measure on the worksheet.

After calibrating the measure, place the measure on the funnel stand apparatus and check the critical dimensions. Check the dimensions with the tolerances specified in AASHTO T 304 test procedure.

**Verification Interval:**  
12 Months

**Report:** A copy must be retained in the Testing Facilities files for review.

# Uncompacted Void Content of Fine Aggregate

Procedure No. 35  
AASHTO T 304-08

Date: \_\_\_\_\_  
 Equipment Serial No.: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Calibration of 100 ml Cylindrical Measure

Weight of dry measure, grease and glass plate \_\_\_\_\_ (A)  
 Weight of measure fill w/ water and glass \_\_\_\_\_ (B)

B - A = \_\_\_\_\_ Net mass of water (M)

Temperature of water \_\_\_\_\_ (For density see ASTM C29) \_\_\_\_\_ Density of water (D)  
 Volume of Cylinder \_\_\_\_\_ ml  $V = 1000(M/D)$

### Cylinder Dimensions

Outside diameter \_\_\_\_\_ mm (41 mm approx.)  
 Inside diameter \_\_\_\_\_ mm (39 mm approx.)  
 Inside height \_\_\_\_\_ mm (86 mm approx.)  
 Outside height \_\_\_\_\_ mm

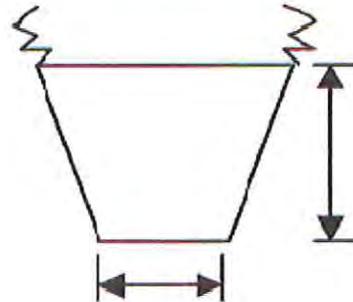
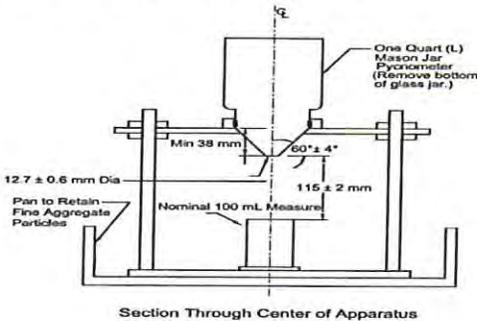
Density of Water			
Temperature			
°C	°F	kg/m <sup>3</sup>	lb/ft <sup>3</sup>
18.3	65	998.54	62.336
21.1	70	997.97	62.301
(23.0)	(73.4)	(997.54)	(62.274)
23.9	75	997.32	62.261
26.7	80	996.59	62.166

Difference between inside and outside height \_\_\_\_\_ mm (3.5 ± 0.4 mm)

### Funnel Stand Apparatus w/ Cylindrical Measure in Place

Funnel height \_\_\_\_\_ mm (Min. 38 mm)  
 Funnel opening \_\_\_\_\_ mm (12.7 ± 0.6 mm dia.)

From funnel opening to top of cylindrical measure \_\_\_\_\_ mm (115 ± 2 mm)





Date: 2-3-97

Revised:

**Procedure for Verifying Conical Molds and Tampers  
Procedure No. 9**

**Equipment Checked:** CONICAL MOLDS AND TAMPERS (AASHTO T 84)

**Purpose:**

This method provides instruction for checking the critical dimensions of the conical mold and the mass of the tamper used in this test procedure.

**Inspection Equipment Required:**

1. A scale or balance capable of weighing to 500 gram and readable to the nearest gram.
2. A caliper for measuring the inside diameter of the top and bottom of the cone and measuring the outside diameter of the tamper face. The caliper should be able to read to the nearest 0.1 mm.
3. A ruler for measuring the height of the cone and readable to the nearest 1.0 mm.

**Procedure:**

Using the requirements set forth in the AASHTO test method, check each of the dimensions of the cone and the mass of the tamper.

**Verification Interval:**

12 months

**Report:**

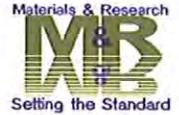
A copy must be retained in the Testing Facilities files for review.



# Specific Gravity and Absorption of Fine Aggregate

Procedure No. 9

AASHTO T 84-08



Date: \_\_\_\_\_

Location of Equipment: \_\_\_\_\_

Checked by: \_\_\_\_\_

Calibration Equipment Used: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Mold

Top inside diameter	Dia. # 1	_____	Dia. # 2	_____	(40 ± 3 mm)
Bottom Inside diameter	Dia. # 1	_____	Dia. # 2	_____	(90 ± 3 mm)
Height of mold	Ht. # 1	_____	Ht. # 2	_____	(75 ± 3 mm)
Thickness of metal	Thick. # 1	_____	Thick. # 2	_____	(0.8 mm Min.)

## Tamper

Weight of tamper	_____	grams	(340 ± 15 grams)
Diameter of the face	_____	mm	(25 ± 3 mm)

Is the face of the tamper flat?    Yes    \_\_\_\_\_    No    \_\_\_\_\_

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 4-22-09

Revised:

**Procedure for Verifying Mechanical Splitters**  
**Procedure No. 60**

Equipment Checked: MECHANICAL SPLITTERS (AASHTO T 248)

Purpose:

This method provides instructions for checking mechanical sample splitters used in AASHTO Test Method T 248.

Inspection Equipment Required:

1. Ruler.

Tolerance:

Sample splitters shall have an even number of equal width chutes, but not less than a total number of eight and twelve chutes for coarse and fine aggregate, respectively. The pouring pan shall have a width equal to or slightly less than the overall width of the assembly of the chutes. The Receptacle pans shall have a width slightly greater than the total width of the splitter chutes.

Procedure:

1. Measure the length of the divider with a ruler and record length and condition.
2. Measure the length of the pouring pan with a ruler and record length and condition.
3. Measure the length of the Receptacle pans with a ruler and record length and condition.

Verification Interval:

12 months

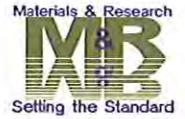
Report:

A copy must be retained in the Testing Facilities files for review.



# Sample Splitter

Procedure No. 60  
AASHTO T 248 - 02



Date : \_\_\_\_\_

Checked by: \_\_\_\_\_

Ident. No.: \_\_\_\_\_

Calibration Equipment Used: \_\_\_\_\_

## Splitter

Divider Width \_\_\_\_\_ Divider Condition \_\_\_\_\_

## Pouring Pan

Width \_\_\_\_\_ Condition \_\_\_\_\_

Number of Pans Checked \_\_\_\_\_

## Receptacle Pan

Width \_\_\_\_\_ Condition \_\_\_\_\_

Number of Pans Checked \_\_\_\_\_

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Date: 4-7-97

Revised:

**Procedure for Verifying Breaking Heads  
Procedure No. 28**

Equipment Checked: BREAKING HEAD (AASHTO T 245)

Purpose:

This procedure provides instructions for checking the critical dimensions of the breaking head used in this test method.

Inspection Equipment Used:

1. Steel rule capable of measuring to the nearest 1/16".
2. A steel straightedge at least 6" in length.
3. A round disk with a diameter of 4.0"

Procedure:

1. Place the steel straightedge across the flats of the breaking head and use the steel rule to measure the height of the bevel and the overall height of each half of the breaking head. All other dimensions can be accomplished with the rule with the exception of the radius of the head.
2. To check the radius of the breaking head place the round disk in the lower half of the head and place the top half on the disk. Note the fit of the two halves to the disk and also measure the gap between the two halves.
3. Record all dimensions on the worksheet as well as the condition of the unit.

Verification Interval:

12 months

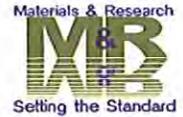
Report:

A copy must be retained in the Testing Facilities file for review.



# Breaking Head

Procedure No. 28  
AASHTO T 245 -97



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Inspected by: \_\_\_\_\_  
 Calibration Equipment: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Lower Half of Breaking Head

Bevel height	1. _____ in.	2. _____ in.
Bevel width	1. _____ in.	2. _____ in.
Bevel Length	1. _____	2. _____ in.
Total height	_____ in.	Width _____ in.
Is radius OK?	Yes _____	No _____

## Upper Half of Breaking Head

Bevel height	1. _____ in.	2. _____ in.
Bevel width	1. _____ in.	2. _____ in.
Bevel length	1. _____ in.	2. _____ in.
Total height	_____ in.	Width _____ in.
Is radius OK?	Yes _____	No _____

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 3-13-01  
Revised: 5-16-01

**Procedure for Verifying Ignition Oven  
Procedure No. 38**

Equipment Checked: IGNITION OVEN (AASHTO T 308-08)

Purpose: This procedure provides instructions for calibrating the ignition oven balance.

Inspection Equipment Required:  
1. 8000 gram calibration mass.

Tolerance: The equipment checked shall meet the tolerances specified in the test method listed above.

Procedure:  
1. For calibrating the ignition oven balance, follow the Preventive Maintenance and Servicing Manual procedure.

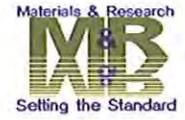
Verification Interval:  
12 months

Report: A copy must be retained in the Testing Facilities files for review.



# Ignition Oven

Procedure No. 38  
AASHTO T 308-08



Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Equipment Serial Number: \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Calibration Equipment Used: \_\_\_\_\_  
\_\_\_\_\_

## Scale

Verification weight \_\_\_\_\_ grams



Date: 3-13-01

Revised: 3-21-05

**Procedure for Verifying Gyrotory Compactors  
Procedure No. 37**

Equipment Checked: GYRATORY COMPACTOR ( AASHTO T 312-08)

Purpose:

This procedure provides for calibrating the gyrotory ram pressure, angle of gyration, gyration frequency and LVDT.

Inspection Equipment Required:

1. Calibration kit, including equipment to verify and calibrate the pressure and angle.

Tolerance:

The equipment checked shall meet the tolerance specified in the equipment owners manual.

Procedure:

The procedure for calibrating the gyrotory compactor is located in the Manual of Operation and Maintenance for Troxler Model 4140 and 4141. All other gyrotories are calibrated by an outside source and will require certification documents from those companies.

Verification Interval:

12 months

Report:

A copy of the Certificate of Calibration must be retained in the Testing Facilities files for review.



Date: 3-13-01  
Revised: 2-3-03

**Procedure for Verifying Gyrotory Molds and Ram Heads**  
**Procedure No. 36**

Equipment Checked: GYRATORY MOLDS AND RAM HEADS (AASHTO T 312)

Purpose:

This procedure provides instructions for checking the critical dimensions of the molds and the heads used in this test method.

Inspection Equipment Required:

1. Calipers or steel rule capable of measuring to 0.01 millimeters.
2. Surface Comparator.
3. Rockwell Hardness Tester.
4. Bore gauge.

Procedure:

1. Measure and record the inside diameter of the mold to the nearest 0.01 mm. Rotate the mold 90 degrees and measure and record the inside diameter again. Perform this procedure at the maximum wear position.
2. Measure and record the height of the mold to the nearest millimeter. Repeat this procedure at intervals of 90 degrees around the mold.
3. Measure the diameter of the mold bottoms at intervals of 90 degrees around the plate.
4. Check the smoothness of the molds and bottom plate surfaces that are in contact with the specimen. Use a surface comparator. (Follow owners manual)
5. Check the Rockwell Hardness of the molds and bottom plates with a Rockwell Hardness tester. (Follow owners manual)

**Note: Only new molds need the hardness tested.**

Verification Interval:

12 months

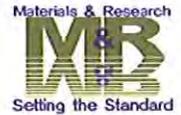
Report:

A copy must be retained in the Testing Facilities files for review.



# Gyratory Molds and Ram Heads

Procedure No. 36  
AASHTO T 312-08



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Molds

Mold #	_____	_____	_____	_____
Inside dia. (mm) (149.90 - 150.0 mm)	1. _____ 2. _____ 3. _____			
Height (mm) (@ least 250 mm)	1. _____ 2. _____	1. _____ 2. _____	1. _____ 2. _____	1. _____ 2. _____
Wall Thickness	1. _____ 2. _____ 3. _____			
Smoothness (1.60 um or smoother)	_____	_____	_____	_____
Rockwell Hardness (min. C48)	_____	_____	_____	_____

## Base Plate

Base plate dia.(mm)	1. _____ 2. _____	1. _____ 2. _____	1. _____ 2. _____	1. _____ 2. _____
Smoothness	_____	_____	_____	_____
Rockwell Hardness	_____	_____	_____	_____
Ram head smoothness	_____	_____	_____	_____

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 2-3-97

Revised:

<p style="text-align: center;"><b>Procedure for Verifying Marshall Molds</b> <b>Procedure No. 3</b></p>
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Equipment Checked: MARSHALL MOLDS (AASHTO T 245)

Purpose:

This procedure provides instructions for checking the critical dimensions of the molds used in this test method.

Inspection Equipment Required:

1. Calipers capable of measuring an inside diameter of 4 in. and readable to 0.001 in.

Tolerance:

The diameter of the molds checked shall meet the dimensional tolerances specified in the applicable test method listed above.

Procedure:

1. Measure and record the inside diameter of the mold to the nearest 0.001 in. Rotate mold 90 degrees and measure and record again.
2. Turn the mold over and repeat Step 1.
3. Measure and record the height of the mold, less its collar to the nearest 0.1 in. Repeat this procedure at intervals of 90 degrees around the mold and record.

Verification Interval:

12 months

Report:

A copy must be retained in the Testing Facilities files for review.

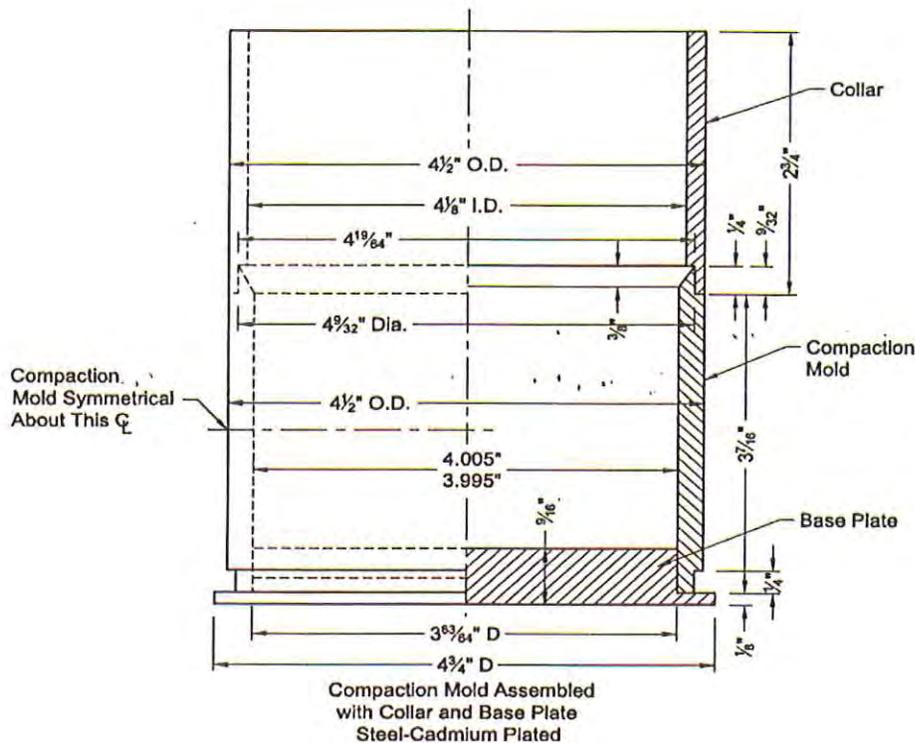
# Verifying Marshall Molds

Procedure No. 3  
AASHTO T 245-97

Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration equipment used: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Molds

Mold #	_____	_____	_____	_____
Inside diameter(in.)	1. _____	1. _____	1. _____	1. _____
	2. _____	2. _____	2. _____	2. _____
	3. _____	3. _____	3. _____	3. _____
Height(in.)	1. _____	1. _____	1. _____	1. _____
	2. _____	2. _____	2. _____	2. _____
Wall Thickness(in.)	1. _____	1. _____	1. _____	1. _____
	2. _____	2. _____	2. _____	2. _____
	3. _____	3. _____	3. _____	3. _____





Date: 2-3-97  
Revised: 5-20-97

**Procedure for Verifying Vacuum System Pressure  
Procedure No. 23**

Equipment Checked: VACUUM SYSTEM (AASHTO T 209)

Purpose: This method provides instructions for checking the pressure developed by vacuum pumps for the Rice Test.

Procedure:

1. Connect the vacuum pump to the vacuum chamber.
2. Place a manometer in series between the pump and the vacuum chamber being sure all connections are tight.
3. Start the pump and allow it to run for at least 5 minutes to allow the system to stabilize.
4. Record the vacuum attained and the serial numbers of pump and manometer being used.

Verification Interval:  
12 months

Report: A copy must be retained in the Testing Facilities files for review.



# Verifying Vacuum System Pressure

Procedure No. 23  
AASHTO T 209-08



Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Calibration Equipment Used: \_\_\_\_\_  
\_\_\_\_\_

## Vacuum System

Manometer #	_____	_____	_____
Pump #	_____	_____	_____
Pump serial #	_____	_____	_____
Vacuum pressure obtained (25.0 - 30.0 mm hg)	_____	_____	_____

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 2-3-97  
Revised: 3-16-05

**Procedure for Verifying the Rammer Weight and Drop Height of  
Manual and Mechanical Compactors  
Procedure No. 6**

Equipment Checked: MANUAL AND MECHANICAL COMPACTORS (AASHTO T 245)

Purpose:

This method provides instructions for checking the rammer weight and drop height of the manual and mechanical compactors.

Inspection Equipment Required:

1. Hammer and punch for removing the spring pins which hold the upper collar on the rammer guide rod.
2. Wrench for removing the upper guide rod holder.
3. Balance, capacity of 10 kg and readable to the nearest 1.0 gram.
4. Ruler capable of measurement to the nearest 1.0 mm.

Tolerance:

The mass and drop height of the rammer shall meet the requirements set forth in test method AASHTO T 245.

Procedure:

1. Measure and record the rammer drop height to the nearest 1.0 mm.
2. Using the required tools remove the hammer from the guide rod.
3. Weigh only the rammer and record the weight to the nearest gram.
4. On multiple rammer type compactors mark each rammer with some form of identification for future inspections.
5. Record the rammer identification and its weight.

Verification Interval:

- 36 month - Manual
- 36 month - Mechanical

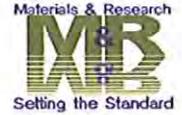
Report:

A copy must be retained in the Testing Facilities files for review.



# Manual and Mechanical Compaction Hammers

Procedure No. 6  
AASHTO T 245 - 97



Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Checked by: \_\_\_\_\_

## Manual Compaction Hammers

Compaction hammer #	_____	_____	_____
Drop height	_____	_____	_____
Weight of slide rammer only	_____	_____	_____
Total weight of hammer	_____	_____	_____

## Mechanical Compaction Hammers

Compaction hammer #	_____	_____	_____	_____
Drop height	_____	_____	_____	_____
Weight of slide rammer only	_____	_____	_____	_____
Total weight of hammer	_____	_____	_____	_____

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 5-20-97

Revised:

**Procedure for Calibration of Mechanical Compactors  
Procedure No. 6A**

Equipment Checked: MECHANICAL COMPACTOR (AASHTO T 245)

Purpose:

This method provides instructions for checking the calibration of the mechanical compactor.

Inspection Equipment Required:

1. Scale conforming to the requirements of AASHTO M 231 and equipped with a suspension apparatus and water bath for weighing a specimen in water and air.
2. Oven or hot plate for heating the specimen prior to compacting.
3. Mixing equipment and support equipment for blending all of the components of the test mix.
4. Hand compaction hammer meeting the requirements set forth in AASHTO T 245.

Procedure:

1. Mix a 3/4" to 3/8" nominal size asphaltic concrete batch of 7400 grams minimum.
2. Produce three compacted specimens following the procedure set forth in AASHTO T 245 using the mechanical compactor.
3. Produce three compacted specimens following the procedure set forth in AASHTO T 245 using the manual hammers.
4. Determine the bulk specific gravity of each compacted specimen per AASHTO T 166 and record the results.
5. Average the three specific gravity result from the manual hammer and the mechanical compactor. Record the two averages.
6. Determine if the average bulk specific gravity from the mechanical compacted specimens is within  $\pm 5\%$  of the average bulk specific gravity obtained from the manual compacted specimens.

Verification Interval:

36 months

Report:

A copy must be retained in the Testing Facilities files for review.



# Calibration of Mechanical Compactors

Procedure No. 6A  
AASHTO T 245 - 97



Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Serial No. of Mechanical Compactor: \_\_\_\_\_  
Checked by: \_\_\_\_\_

## Manual Compacted Specimens

Number of blows per side \_\_\_\_\_

Bulk specific gravity of manual compacted specimens

1. \_\_\_\_\_  
2. \_\_\_\_\_      **Average** \_\_\_\_\_  
3. \_\_\_\_\_

## Mechanical Compacted Specimens

Number of blow per side \_\_\_\_\_

Bulk specific gravity of mechanical compacted specimens

1. \_\_\_\_\_  
2. \_\_\_\_\_      **Average** \_\_\_\_\_  
3. \_\_\_\_\_

Is the average bulk specific gravity obtained from the mechanical prepared specimens within  $\pm 5\%$  of the average bulk specific gravity from the manual prepared specimens?

Yes \_\_\_\_\_ No \_\_\_\_\_

Percentage difference between mechanical and manual \_\_\_\_\_

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 2-3-97  
Revised: 6-30-08

<p style="text-align: center;"><b>Procedure for Calibrating Pressure Air Meter - Type B</b> <b>Procedure No. 61</b></p>
---

Equipment Checked: Pressure Air Meter - Type B (ASTM C 231)

Purpose: This method provides instructions for calibrating Pressure Air Meter - Type B.

Procedure: The procedures performed for calibrating Pressure Air Meter shall be in accordance with the meter type being employed. Refer to ASTM C 231, A1. CALIBRATION OF APPARATUS.

There are varying versions of Pressure Air Meters on the market. It may be necessary to follow the manufacturers instructions on calibrating the air meter if ASTM procedures do not apply to meter being calibrated.

Verification Interval:  
12 months

Report: A copy must be retained in the Testing Facilities files for review.



# Pressure Air Meter - Type B

Procedure No. 61

ASTM C 231 - 04



Date: \_\_\_\_\_

Inspected by: \_\_\_\_\_

Air Meter No.: \_\_\_\_\_

Initial Reading: \_\_\_\_\_

Reading

Checked at 5% \_\_\_\_\_

Checked at 10% \_\_\_\_\_

Checked at 15% \_\_\_\_\_

Condition of Equipment: \_\_\_\_\_  
\_\_\_\_\_

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 2-3-97

Revised:

**Procedure for Verifying Bearing Blocks and Retainers**  
**Procedure No. 11**

Equipment Checked:                      BEARING BLOCK (ASTM C 39)      RETAINERS (ASTM C 1231)

Purpose:

This method provides instruction for checking the planeness of the bearing blocks and retainers of the compression testing machine as described in ASTM C 39 and ASTM C 1231.

Inspection Equipment Required:

1. Steel rule, caliper. Depth gauge (optional)
2. Feeler gauge.

Tolerance:

The critical dimensions shall meet the requirements set forth in ASTM C 39 and ASTM C 1231.

Procedure:

The units shall be checked and any deviation from the requirement shall be repaired prior to placing the unit back in service.

Verification Interval:

12 months

Report:

A copy must be retained in the Testing Facilities files for review.



# Compression Machine Bearing Block Planeness and Retainers



Procedure No. 11  
ASTM C 39 - 05 & ASTM C 1231 - 08a

Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Equipment Serial No. \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Calibration Equipment Used: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Upper Bearing Blocks

Diameter 1. \_\_\_\_\_ 2. \_\_\_\_\_  
Is the block face plane? Yes \_\_\_\_\_ No \_\_\_\_\_

If not, note the amount of wear. \_\_\_\_\_  
\_\_\_\_\_

## Lower Bearing Blocks

If lower bearing block is round, note the diameter.  
Diameter 1. \_\_\_\_\_ 2. \_\_\_\_\_  
Is the block face plane? Yes \_\_\_\_\_ No \_\_\_\_\_

If not, note the amount of wear. \_\_\_\_\_  
\_\_\_\_\_

## Retainers

Retainer Diameter \_\_\_\_\_ Surface Condition \_\_\_\_\_ (Good, Fair or Poor)  
Retainer Diameter \_\_\_\_\_ Surface Condition \_\_\_\_\_ (Good, Fair or Poor)

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 4-23-09

Revised:

**Procedure for Verifying Moist Room & Water Storage Tanks**  
**Procedure No. 62**

Equipment Checked: Moist Room & Water Storage Tanks

Purpose:

This method provides requirements for moist rooms and water storage tanks where concrete specimens are stored.

Inspection Equipment Required:

1. A calibrated thermometer either Fahrenheit or Celsius graduated in 1.0° increments having a range which includes the temperature range to be checked.
2. Or a certified Digital temperature measuring device.
3. A sling psychrometer or other moisture measuring device.

Tolerance:

The equipment must meet the tolerances specified in test method ASTM C 511. Moist Rooms & water storage tanks shall have a temperature of  $23.0 \pm 2.0$  C. (69.8 - 77.0 F). Moist rooms shall have a humidity of not less than 95%.

Procedure:

Check the temperature of the rooms and tanks with a thermometer or digital temperature measuring device. Record the results on the verification worksheet. If a recorder is hooked up in the moist room or to the tank record that result also on the worksheet. Check the humidity of the moist room with a sling psychrometer or other moisture measuring device. Record the result on the verification worksheet. If a recorder is hooked up to monitor the humidity in the moist room record that reading also on the verification worksheet. Visually inspect the tank to see if it is saturated with calcium hydroxide. (11.36g/1gl)

Verification Interval:

12 months

Report:

A copy must be retained in the Testing Facilities files for review.





Date:

Revised:

**Procedure for Verifying Compressive Strength for Capping Compound  
Procedure No. 63**

Material Checked: CAPPING COMPOUND

Purpose: This method provides instructions for checking the strength of capping compound.

- Inspection Equipment Required:
1. A calibrated concrete compression machine.
  2. A heated pot for heating the capping compound.
  3. Cube molds.
  4. A verified thermometer for checking the temperature of heated capping compound.
  5. Straightedge and feeler gauge.

- Tolerance:
1. Cylinder strength of 500 to 7000 psi requires 5000 minimum psi for mortar.
  2. Cylinder strength above 7000 requires compressive strength not less than the cylinder.
  3. Average thickness of the cap at 500 to 7000 psi shall not exceed 1/4 inch.
  4. Average thickness of the cap above 7000 psi shall not exceed 1/8 inch.

- Procedure:
1. Plug in mortar pot and check molten sulfur contents to verify temperature range of 265 - 290 °F.
  2. Stir contents.
  3. Lightly coat three cube molds with oil.
  4. Using ladle, fill molds with sulfur to the top of filling hole. Wait 15 minutes and refill to top.
  5. After cubes have become hard, strip from molds without breaking off knobs formed by the filling hole in the cover plate.
  6. Remove sharp edges and fins from the cubes. Also remove the oil.
  7. Check planeness of cubes to within 0.002 of an inch.
  8. Test for strength not less than 24 hours after molding.
  9. Test for compressive strength in accordance to C 109.

Verification interval:  
Receipt of a new lot

Report:  
A copy must be retained in the Testing Facilities files for review.



# Compressive Strength for Capping Compound



Procedure No. 63

ASTM C 617 - 98 & ASTM C 109 - 07

Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Sulfur Manufacturer \_\_\_\_\_  
 Shipment Date \_\_\_\_\_  
 Date Cube Made \_\_\_\_\_  
 Date Cube Broke \_\_\_\_\_

Maximum permissible range between 2 specimens, 7.6% (average)  
 Maximum permissible range between 3 specimens, 8.7% (average)

Cube #1 Load \_\_\_\_\_  
 Cube #2 Load \_\_\_\_\_  
 Cube #3 Load \_\_\_\_\_  
  
 Average \_\_\_\_\_  
  
 Strength average / 4 \_\_\_\_\_

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 4-20-09

Revised:

**Procedure for Verifying Unit Weight Measure  
Procedure No. 26**

Equipment Checked: UNIT WEIGHT MEASURE (ASTM C 138)

Purpose:  
This directive gives guidance for the calibration of unit weight measures used in Aggregate and Portland Cement Concrete Labs.

Inspection Equipment Required:

1. A thermometer capable of being read to the nearest 1.0 degree F.
2. A piece of glass large enough to cover the entire top of the measure being calibrated.
3. A scale capable of weighing the yield measure, glass, and the water within to the nearest 0.01 lbs.

Procedure:  
Follow the procedure set forth in ASTM C 29, Section 8.

Verification Interval:  
12 months

Report:  
A copy must be retained in the Testing Facilities files for review.



# Unit Weight Measure

Procedure No. 26

ASTM C 138 - 08



Date: \_\_\_\_\_

Inspected by: \_\_\_\_\_

Identification No.: \_\_\_\_\_

Weight of Measure and Glass: \_\_\_\_\_ (A)

Total Weight with Water: \_\_\_\_\_ (B)

Net Mass of Water (B-A): \_\_\_\_\_ (M)

Temperature of Water: \_\_\_\_\_ (For Density see ASTM C 29)

Density of Water: \_\_\_\_\_ (D)

Volume: \_\_\_\_\_ V = 1000 (M/D)

Density of Water			
Temperature			
°C	°F	kg/m <sup>3</sup>	lb/ft <sup>3</sup>
15.6	60	999.01	62.366
18.3	65	998.54	62.336
21.1	70	997.97	62.301
(23.0)	(73.4)	(997.54)	(62.274)
23.9	75	997.32	62.261
26.7	80	996.59	62.216
29.4	85	995.83	62.166

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 2-3-97  
Revised: 3-12-01

**Procedure for Verifying Liquid Limit Devices And Grooving Tools**  
**Procedure No. 18**

Equipment Checked: LIQUID LIMIT DEVICE AND GROOVING TOOL (AASHTO T 89)

Purpose:  
This method provides instructions for checking the liquid limit device and grooving tool used in this test.

Inspection Equipment Required:

1. Caliper capable of reading to nearest 0.01 mm.
2. Dial micrometer.

Tolerance:  
The critical dimensions shall meet the requirements set forth in AASHTO T 89.

Procedure:

1. Check all the critical dimensions for the liquid limit device's brass cup and the grooving tool. A picture of the apparatus and the necessary points to measure with the tolerances are printed in the AASHTO test procedure T 89.
2. Where the cup comes in contact with the base, a small indentation will be made. Measure the depth of this indentation using the vertical dial micrometer to the nearest 0.01 in.
3. Check the rim of the cup for excessive wear, which will cause it to become sharp rather than a milled flat surface. Rejection is at the inspector's judgment.
4. Turn the crank slowly and note if the cup wobbles on the rise. Also check that the cup is fastened to the cam follower with mechanical rather than a welded connector.
5. Check the inside of the cup for excessive wear, which will create a groove in the cup. Rejection is based on the judgment of the inspector.

Verification Interval:  
12 months

Report:  
A copy must be retained in the Testing Facilities file for review.





Date: 2-3-97  
Revised: 2-28-05

**Procedure for Verifying Manual Compaction Hammers  
Procedure No. 5 & 5a**

Equipment Checked: MANUAL HAMMER (AASHTO T 99 & T 180)

Purpose:  
This method provides instructions for checking the critical dimensions of the proctor hammer.

Inspection Equipment Used:

1. Calipers readable to 0.001 inch.
2. Tape measure readable to 1/16 inch.
3. Balance, capacity 5 kg., readable to 1 gram.

Tolerance:  
Equipment shall meet the dimensional tolerances specified in the above test.

Procedure:

1. Measure and record the diameter of the rammer face determined by taking two readings 90 degrees apart using the calipers.
2. Pull up the handle, measure and record the drop height of the hammer. Determine this height inside the guide sleeve using the tape measure.
3. Remove the hammer from the guide sleeve. Determine and record its mass to the nearest 1 gram.
4. Measure and record the diameters of the vent holes near the end of the hammer.

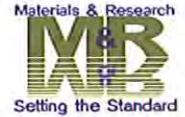
Verification Interval:  
12 months

Report:  
A copy must be retained in the Testing Facilities files for review.



# Manual Rammer

Procedure No. 5  
AASHTO T 99-08



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Hammer Number: \_\_\_\_\_  
 Checked By: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Manual Rammer

Is the face flat?	Yes	_____	No	_____	
Diameter of the face	Dia. # 1	_____	Dia. # 2	_____	( $\geq 1.985$ in.)
Drop height of the rammer		_____		( $12 \pm 0.06$ in.)	
Rammer Mass		_____		( $2495 \pm 9$ grams)	

## Diameter of Vent Holes

Top # 1	_____	Top # 2	_____	Top # 3	_____	Top # 4	_____
Bott. # 1	_____	Bott. # 2	_____	Bott. # 3	_____	Bott. # 4	_____

**Specification:** Min. 9.5mm or 3/8 in. Dia.

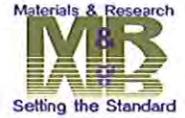
Note: Height may be impractical to adjust. Adjustments would have to be made with the height of the material that is being compacted.

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# Manual Rammer

Procedure No. 5a  
AASHTO T 180 - 01



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Hammer Number: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment: \_\_\_\_\_

## Manual Rammer

Is the face of the rammer flat?      Yes \_\_\_\_\_      No \_\_\_\_\_  
 Diameter of the face.      Dia. # 1 \_\_\_\_\_      Dia. # 2 \_\_\_\_\_      ( **$\geq 1.985$  in.**)  
 Drop height of rammer.      \_\_\_\_\_      ( **$18 \pm 0.06$  in.**)  
 Rammer mass.      \_\_\_\_\_      ( **$4536 \pm 9$  grams**)

## Diameter of Vent Holes

Top # 1 \_\_\_\_\_      Top # 2 \_\_\_\_\_      Top # 3 \_\_\_\_\_      Top # 4 \_\_\_\_\_  
 Bott. # 1 \_\_\_\_\_      Bott. # 2 \_\_\_\_\_      Bott. # 3 \_\_\_\_\_      Bott. # 4 \_\_\_\_\_

**Specification:      Min. 9.5mm or 3/8 in. Dia.**

Note: Height may be impractical to adjust. Adjustments would have to be made with the height of the material that is being compacted.

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 2-3-97  
Revised: 3-1-05

**Procedure for Verifying Mechanical Soil Rammers  
Procedure No. 22 & 22a**

Equipment Checked: MECHANICAL SOIL RAMMER (AASHTO T 99)(AASHTO T 180)

Purpose:  
This method provides instructions for checking the critical dimensions and masses required in the test method for this piece of equipment

- Inspection Equipment Required:
1. Outside caliper with a 2 in. capacity readable to 0.001 in.
  2. A hand rammer meeting the requirements of the AASHTO Test Method being checked (T 99 or T 180)
  3. A scale meeting AASHTO M 231 for Class G-2 and Class G-20.
  4. A drying oven capable of maintaining a temperature not to exceed 140° F.

Tolerance:  
The dimensions and masses shall meet the requirements set forth in the AASHTO Test Method being checked (T 99 or T 180).

- Procedure:
1. Use the caliper to measure the diameter of the rammer face at two locations 90 degrees apart and record.
  2. Using the edge of the ruler check to see if the face of the rammer is flat and record.
  3. Calibrate the mechanical rammer by using the procedure set forth in ASTM D 2168.

Verification Interval:  
12 months

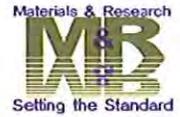
Report:  
A copy must be retained in the Testing Facilities files for review.



# Mechanical Soil Rammer

Procedure No. 22

AASHTO T 99 - 01



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Hammer Number: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_

## Mechanical Rammer (AASHTO T 91)

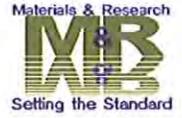
Is the face of the rammer flat?	Yes _____	No _____	
Diameter of the face.	Dia. # 1 _____	Dia. # 2 _____	( $\geq 1.985$ in.)
Drop height of rammer.	_____	( $12 \pm 0.06$ in.)	
Rammer mass.	_____	( $2495 \pm 9$ grams)	

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# Mechanical Soil Rammer

Procedure No. 22a  
AASHTO T 180 - 01



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Hammer Number: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Mechanical Rammer (AASHTO T 180)

Is the face of the rammer flat?	Yes	_____	No	_____	
Diameter of the face.	Dia. # 1	_____	Dia. # 2	_____	( $\geq 1.985$ in.)
Drop height of rammer.		_____		( $18 \pm 0.06$ in.)	
Rammer mass.		_____		( $4536 \pm 9$ grams)	

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 2-3-97

Revised:

**Procedure for Verifying Compaction Molds  
Procedure No. 2**

Equipment Checked:                    COMPACTION MOLDS (AASHTO T 99, T 180)

Purpose:

This method provides instructions for checking the critical dimensions of the molds used in this test.

Inspection Equipment Required:

1. Calipers capable of measuring an inside diameter of 4 in. and readable to 0.001 in.
2. Calipers capable of measuring an outside height of 6 in. and readable to 0.001 in. checked (T 99 or T 180)

Tolerance:

Molds shall meet all dimension requirements set forth in the applicable test method listed above.

Procedure:

1. Measure and record the inside diameter of the mold to nearest 0.001 in. Rotate mold 90 degrees and repeat the procedure. Turn the mold over and repeat.
2. Measure and record the height of the mold less its collars to the nearest 0.001 in. Repeat this procedure at intervals of 90 degrees around the mold and record.

Verification Interval:

12 months

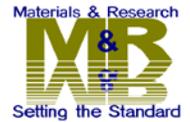
Report:

A copy must be retained in the Testing Facilities files for review.



# Compaction Mold

Procedure No. 2  
AASHTO T 99 & T 180



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Mold Number: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_

## Mold Measurements

### 4 inch Molds

Diameter, Inches <b>( 4.000 ± 0.016 )</b>	Height, Inches <b>( 4.584 ± 0.005 )</b>
Dia. # 1 _____	Ht. # 1 _____
Dia. # 2 _____	Ht. # 2 _____
Dia. # 3 _____	Ht. # 3 _____
Dia. # 4 _____	Ht. # 4 _____
Ave. Diameter, in. _____	Ave. Height, in. _____

### 6 inch Molds

Diameter, Inches <b>( 6.000 ± 0.026 )</b>	Height, inches <b>( 4.584 ± 0.005 )</b>
Dia. # 1 _____	Ht. # 1 _____
Dia. # 2 _____	Ht. # 2 _____
Dia. # 3 _____	Ht. # 3 _____
Dia. # 4 _____	Ht. # 4 _____
Ave. Diameter, in. _____	Ave. Height, in. _____

Computed Volume, cu, Inches \_\_\_\_\_  
 Computed Volume, cu, Feet \_\_\_\_\_  
 Computed Volume, cu Cm. \_\_\_\_\_

Computed Volume, cu, Inches \_\_\_\_\_  
 Computed Volume, cu, Feet \_\_\_\_\_  
 Computed Volume, cu Cm. \_\_\_\_\_

Note: A mold that fails to meet manufacturing tolerances after continued service may remain in use provided those tolerances are not exceeded by more that 50 percent; and the volume of the mold, calibrated in accordance with T 19M/T 19 for Unit Mass of Aggregate, is used in the calculations.

Optional: Volume Determination according to T 19M/T19

	<u>1st Trial</u>	<u>2nd Trial</u>	<u>3rd Trial</u>
Weight of base plus mold filled with water	_____	_____	_____
Weight of base plus empty mold	_____	_____	_____
Weight of water to fill mold	_____	_____	_____
Average weight of water to fill mold	_____		
Volume determination according to AASHTO T 19M/T 19 Density of Water	_____		

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 4-12-07  
Revised: 10-17-08

<p><b>Procedure for Verifying Straightedges</b> <b>Procedure No. 19</b></p>
---

Equipment Checked: STRAIGHTEDGE (AASHTO T 99, T 180)

Purpose:  
This method provides instructions for checking the steel straightedge used in AASHTO Test Methods T 99 and T 180.

Inspection Equipment Required:  
1. Ruler.  
2. Feeler gauge.

Tolerance:  
The critical dimensions shall meet the requirements set forth in AASHTO T 99 and T 180.

Procedure:  
1. Measure the length with a ruler and record.  
2. Place the straightedge so that the beveled edge is down on a flat surface and using a 0.01 in. thickness gauge, try to pass the gauge between the edge of the unit and the flat surface. If the gauge can be slipped between the unit and the flat surface the straightedge shall have to be repaired.

Verification Interval:  
12 months

Report:  
A copy must be retained in the Testing Facilities files for review.



# STEEL STRAIGHTEDGE USED IN AASHTO T 99, T 180

Procedure No. 19  
AASHTO T 99 - 01, T 180 - 01



Date: \_\_\_\_\_  
 Location of Equipment: \_\_\_\_\_  
 Checked by: \_\_\_\_\_  
 Calibration Equipment Used: \_\_\_\_\_  
 \_\_\_\_\_

## Steel Straightedge

Serial Number: \_\_\_\_\_

Is unit made of hardened steel?	Yes	_____	No	_____
Is the unit at least 10 inches in length?	Yes	_____	No	_____
Is one edge beveled?	Yes	_____	No	_____
Is the edge plane to within 0.01 inch per 10 inches of length?	Yes	_____	No	_____

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Date: 2-3-97

Revised:

**Procedure for Verifying Scales, Balances and Balance Weights  
Procedure No. 8**

Equipment Checked: SCALES AND BALANCES (AASHTO M231)

Purpose:

This method provides instructions for checking the accuracy sensitivity of scales, balances balance weights used in all labs.

Inspection Equipment Required:

1. Calibrated weights with certificates.
2. Powder free gloves designed for handling these weights.

Tolerance:

All AASHTO and ASTM tests requiring the use of scales and or balances have in their procedures a list of requirements for the weighing devices. It will be up to the inspector to check these requirements when checking and verifying this equipment.

Procedure:

Each balance or scale will have its own worksheet. Choose the appropriate worksheet for the balance or scale to be verified. Check the equipment through the entire range on the worksheet. It is recommended to calibrate the balance before verifying. Follow the owners manual for this procedure.

Lab balance weights used only for verification purposes shall be verified against calibrated weights.

Verification Interval:

12 months

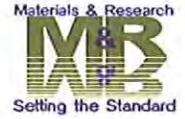
Report:

A copy for each scale or balance must be retained in the Testing Facilities files for review.



# Balance Weights

Procedure No. 8  
AASHTO M 231 Table 4



Date : \_\_\_\_\_  
Serial No.: \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Material: \_\_\_\_\_  
Scale No.: \_\_\_\_\_  
Calibration Equipment: \_\_\_\_\_  
\_\_\_\_\_

## Balance Weights

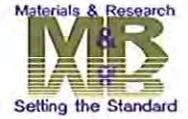
Weight	Accuracy			
5000g	.80g	_____	_____	_____
2000g	.40g	_____	_____	_____
1000g	.25g	_____	_____	_____
500g	.20g	_____	_____	_____
200g	.10g	_____	_____	_____
100g	.07g	_____	_____	_____
50g	.04g	_____	_____	_____
20g	.02g	_____	_____	_____
10g	.015g	_____	_____	_____
5g	.010g	_____	_____	_____
2g	.006g	_____	_____	_____
1g	.004g	_____	_____	_____

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# Analytical Balances

Procedure No. 8  
1200g Capacity or Less  
Class C



Date: \_\_\_\_\_  
Inspected By: \_\_\_\_\_  
Calibration Weights: \_\_\_\_\_  
Scale Serial No.: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Scale Capacity: \_\_\_\_\_

<u>Test Point</u>	<u>Accuracy Required</u>	<u>Accuracy</u>
50 g	.02 g	_____
100 g	.02 g	_____
200 g	.02 g	_____
300 g	.02 g	_____
400 g	.02 g	_____
500 g	.02 g	_____
600 g	.02 g	_____
700 g	.02 g	_____
800 g	.02 g	_____
900 g	.02 g	_____
1000 g	.02 g	_____
1100 g	.02 g	_____
1200 g	.02 g	_____

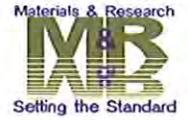
Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# General Purpose Scales

Procedure No. 8

Class G2



Date: \_\_\_\_\_  
 Location of Scale: \_\_\_\_\_  
 Inspected By: \_\_\_\_\_  
 Calibration Weights: \_\_\_\_\_  
 Scale No.: \_\_\_\_\_  
 Manufacturer: \_\_\_\_\_  
 Scale Capacity: \_\_\_\_\_

Test Point	Accuracy Required	Accuracy
50 g	.2 g	_____
100 g	.2 g	_____
200 g	.2 g	_____
300 g	.3 g	_____
400 g	.4 g	_____
500 g	.5 g	_____
1000 g	1.0 g	_____
2000 g	2.0 g	_____
3000 g	3.0 g	_____
4000 g	4.0 g	_____
5000 g	5.0 g	_____
6000 g	6.0 g	_____
7000 g	7.0 g	_____
8000 g	8.0 g	_____
9000 g	9.0 g	_____
10000 g	10.0 g	_____
11000 g	11.0 g	_____
12000 g	12.0 g	_____
13000 g	13.0 g	_____
14000 g	14.0 g	_____
15000 g	15.0 g	_____
16000 g	16.0 g	_____

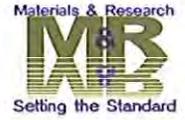
Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# General Purpose Scales

Procedure No. 8

Class G300 Special (Over 40 LB)



Date: \_\_\_\_\_  
Location of Scale: \_\_\_\_\_  
Inspected By: \_\_\_\_\_  
SN of Calibration Weights: \_\_\_\_\_  
Scale No.: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Scale Capacity: \_\_\_\_\_

<u>Test Point</u>	<u>Accuracy Required</u>	<u>Accuracy</u>
10 lb	.5 lb	_____
20 lb	.5 lb	_____
30 lb	.5 lb	_____
40 lb	.5 lb	_____
50 lb	.5 lb	_____
60 lb	.6 lb	_____
90 lb	.9 lb	_____
120 lb	1.2 lb	_____
150 lb	1.5 lb	_____
180 lb	1.8 lb	_____
210 lb	2.1 lb	_____
240 lb	2.4 lb	_____
270 lb	2.7 lb	_____
300 lb	3.0 lb	_____

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 2-3-97  
Revised: 6-30-08

<b>Procedure for Verifying Ovens Procedure No. 1</b>
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Equipment Checked: DRYING OVENS

Purpose: This method provides instructions for checking drying ovens used in the laboratory.

- Inspection Equipment Required:
1. A calibrated thermometer either Fahrenheit or Celsius graduated in 1.0° increments having a range which includes the temperature range to be checked.
  2. A thermometer well to retain heat while the oven door is open.
  3. A clothes pin to hold the thermometer in such a manner as to enable the operator to read the scale easily.

Tolerance: Drying ovens shall be capable of maintaining a constant temperature range listed in the appropriate test methods.

- Procedure:
1. Place the thermometer inside the well with the clothes pin attached to the thermometer. Position the thermometer on the shelf where the samples are normally dried.
  2. Take the first reading at least 1 hour after closing the oven (oven should remain undisturbed).
  3. Take as many readings as necessary to determine if the temperature range is within the specified tolerance (three consecutive readings, taken no less than 1/2 hour apart, within the tolerance allowed are adequate).
  4. Adjust the temperature of the oven if an observed reading is outside the tolerance specified (allow at least 1/2 hr. for the temperature to stabilize between each adjustment. Return to step 3).

Verification Interval:  
12 months

Report: A copy must be retained in the Testing Facilities files for review.



# Drying Ovens

Procedure No. 1



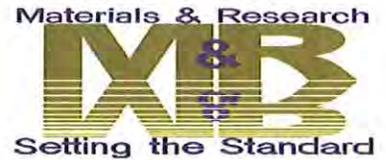
Date: \_\_\_\_\_  
Inspected by: \_\_\_\_\_  
Oven Serial No.: \_\_\_\_\_  
Oven Manufacturer: \_\_\_\_\_  
Inspection Thermometer: \_\_\_\_\_

**( $\pm 9^{\circ}\text{F}$  or  $\pm 5^{\circ}\text{C}$ )**

Temp. Reading 1. \_\_\_\_\_  
Temp. Reading 2. \_\_\_\_\_  
Temp. Reading 3. \_\_\_\_\_

Adjusted Temp. Reading if Necessary:

Temp. Reading 1a. \_\_\_\_\_  
Temp. Reading 2a. \_\_\_\_\_  
Temp. Reading 3a. \_\_\_\_\_



Date: 9-7-97

Revised:

**Procedure for Verifying Mechanical Sieve Shakers  
Procedure No. 27**

Equipment Checked: MECHANICAL SIEVE SHAKER (AASHTO T 27)

Purpose:

This method provides instructions for checking the sieving efficiency of mechanical sieve shakers.

Inspection Equipment Required:

1. A scale capable of weighing to the nearest 0.1 gram.
2. An oven for drying the sample to a constant weight.
3. Sieves of sufficient diameter and screen openings so as not to cause overloading of any one screen.
4. Sample splitter.

Procedure:

1. Dry the sample to a constant weight.
2. Split the dried sample so as to provide at least 500 grams of fine aggregate or 2500 grams of coarse aggregate.
3. Place the prepared and weighed sample in the sieve nest and place on the shaker.
4. Shake the sample for 5 minutes and remove.
5. Hand shake each sieve over a pan for one minute and weigh the material passing and record the weight for each sieve,
6. Total the weight of the material passing for all of the sieves in the nest and record. The total passing from hand shaking in step 5 shall not exceed one half of one percent of the total weight of the sample used.
7. If the weight exceeds the requirement in #6, increase the time on the shaker and repeat the test until the requirement is met.
8. When checking shaker which have adjustable shaking speeds it may be necessary to adjust the speed as well as the time in order to meet the requirements.

Verification Interval:

12 months

Report:

A copy must be retained in the Testing Facilities files for review.





Date: 3-7-97  
Revised: 3-12-01

**Procedure for Verifying Sieves  
Procedure No. 25**

Equipment Checked: SIEVES (AASHTO M 92)

Purpose: This method provides instructions for visually checking sieves used in the laboratory.

Inspection Equipment Required:

1. A method for providing a lighted background when viewing the sieve screen.
2. A magnifier for close examination of the sieve screen.

Tolerance: The sieves examined shall meet the requirements set forth in AASHTO M 92.

Procedure:

1. Check each sieve tag for the proper designation and standard opening size. This designation shall be in metric dimensions and in the case of older sieves the English and metric dimensions shall be both on the tag.
2. Check the frame for excessive wear along the rim and for looseness between the top and bottom halves.
3. Check the screen for loose wires, bowed screens, torn screens, creases in the screen, broken screen wires, and deformation of the screen openings. These items are normally visible with the naked eye when viewed against a lighted background. The use of a magnifier will aid when viewing the finer screens.

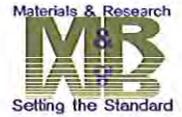
Verification Interval:  
12 months

Report: A copy must be retained in the Testing Facilities files for review.



# Wire Cloth Sieves for Testing Purposes

Procedure No. 25  
AASHTO M 92 - 05



Date: \_\_\_\_\_  
Location of Equipment: \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Calibration Equipment Used: \_\_\_\_\_

## Sieves

Lab Identification						
Diameter of Frame						
Screen No.						
Frame Condition						
Screen Condition						
Label Condition						

Lab Identification						
Diameter of Frame						
Screen No.						
Frame Condition						
Screen Condition						
Label Condition						

Lab Identification						
Diameter of Frame						
Screen No.						
Frame Condition						
Screen Condition						
Label Condition						

Lab Identification						
Diameter of Frame						
Screen No.						
Frame Condition						
Screen Condition						
Label Condition						

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Date: 4-27-09

Revised:

**Procedure for Verifying Thermometers**  
**Procedure No. 64**

Equipment Checked: Thermometers

Purpose:

This method provides instructions for checking thermometers used in the laboratory and in the field.

Inspection Equipment Required:

1. A calibrated thermometer either Fahrenheit or Celsius graduated in 1.0° increments having a range which includes the temperature range to be checked. A calibrated digital temperature measuring device is also acceptable.

Tolerance:

The tolerance for mercury thermometers is plus or minus one scale division of that thermometer. Tolerance for spirit filled thermometers is plus or minus 1% of the total range for that thermometer. Tolerance for dial thermometers is plus or minus one scale division. Digital thermometers such as Oaktrons & Taylors used most commonly in water baths and in ovens have a tolerance of plus or minus 3.6 degrees.

Procedure:

Verify lab or field thermometers against a calibrated thermometer. Check each thermometer at two points if possible. Using water to perform the checks would be the best method. It does not have to be a commercially made water bath. It could be as simple as using a bucket and adding hot water. A piece of Plexiglas with drilled holes works well when placed over a water bath. Clothes pins or other clips can be used to hold the thermometers in place while performing the check. Alternative methods may be used to achieve results.

Verification Intervals:

12 months

Report:

A copy must be retained for each thermometer tested and kept in the Testing Facilities files for review.



# Thermometer

Procedure No. 64

ASTM E 77 - 07



Date: \_\_\_\_\_

Checked By: \_\_\_\_\_

Calibration Equipment Used: \_\_\_\_\_  
\_\_\_\_\_

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
Standard Thermometer Temperature Reading (°F or °C)	Laboratory Thermometer Temperature Reading (°F or °C)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks:	

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
Standard Thermometer Temperature Reading (°F or °C)	Laboratory Thermometer Temperature Reading (°F or °C)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks:	

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
Standard Thermometer Temperature Reading (°F or °C)	Laboratory Thermometer Temperature Reading (°F or °C)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks:	