

2017 LABORATORY QUALIFICATION MANUAL

This manual has been developed to outline the process for qualifying Flexible Pavements Quality Control laboratories (permanent mix design labs and field laboratories) 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 and acceptance standards. Any laboratory not meeting the requirements set forth in this document is not qualified to perform laboratory testing services on such projects.

The following manual consists of procedures for the calibration of laboratory equipment along with documentation for the associated laboratory equipment. The test technicians must be certified or provisionally certified as required in NDOR's Materials Sampling Guide and Specifications

The qualification procedures will require either a certificate, verification, or calibration for the specified testing equipment, as defined below:

Certification: A certification 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 annually. Complete calibration and verification records shall be kept on file in the laboratory at all times.

Calibration: These calibration and measurement records must be performed by the contractor for review by NDOR Laboratory Representatives.

NOTE - All technician certifications, equipment certifications and calibrations from outside entities shall be scan/copied and placed in the attached file folder labeled "Certifications" with this Laboratory manual file folder.

The procedure for the qualification process is as follows:

- 1) The contractor/laboratory receives a copy of this manual prior to NDOR's review.
- 2) The contractor/laboratory goes through each procedure for all of their equipment and assembles the proper documentation as defined in each procedure in this manual.

- 3) When the lab is ready for on-site review, contact Jodi Paul in the Flexible Pavements Testing Laboratory (402) 479-3851 to schedule the on-site qualification. The completed manual including, certifications, verifications, including those from an outside source must be fully completed and electronically submitted by April 1st of each calendar year. All on-site reviews of the Contractor's Mix Design Laboratory may be performed up to 6 months prior to the full final submittal date. The April 1st requirement is in recognition that some of the annual calibration requirements are from outside entities, and the on-site inspection is likely to precede the Gyration, Scales, Thermometers etc.. Certifications and calibrations.
- 4) The on-site review will be performed at the Contractor's Mix Design Laboratory where a proficiency sample will be tested. All the other field laboratories must have this Qualification documentation completed as well, these field laboratories will be reviewed when Independent Assurance reviews are conducted.
- 5) In the event that equipment or test do not meet certification, calibration, or proficiency test tolerance and/or standards, the laboratory equipment shall be repaired, corrected, replaced, or taken out of service. Documentation of the corrective action taken for the deficiencies shall be documented in this manual within 30 days of either notification and findings by NDOR, or findings by the contractor as part of their laboratory QC program.

It is the Contractor's sole responsibility to maintain the equipment according to the procedures set forth in this manual and by any additional means that they deem necessary over and above these procedures to provide and strengthen a robust QC program.

This manual is intended to define a process to verify and document that a laboratory is qualified and is acceptable to perform testing for NDOR projects operating under the QA/QC testing program for NDOR approved testing laboratories standards for FHWA, State and Federally Funded Projects for Asphaltic Concrete. This qualification is for the purposes stated previously and is provided (as is) with no warranty, expressed or implied, including but not limited to: certifications, verifications, or procedures are disclaimed, and in no event shall NDOR, FHWA, or any entities be liable to the contractor/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 material. All procedures, spreadsheets, and references are for informational and educational use only, and shall not be reproduced for any other purpose than its intended use.

2017 EVALUATION OF CONSULTANTS LABORATORY

NEBRASKA DEPARTMENT OF ROADS

LABORATORY

Location of Lab.
Phone Number
E-Mail Address
Fax Number



Date Evaluated
Date Procedure Reviewed
Lab. Personnel

Inspected By

THIS TO BE COMPLETED BY NDOR LABORATORY REPRESENTATIVE

1. Condition of Laboratory Very good Good Fair Poor

2. Condition of Equipment Very good Good Fair Poor

3. Calibration I.D. Tags on Equipment Yes No
Remarks _____

4. Calibration Certificates Received Yes No
Remarks _____

5. Calibration of Equipment is Performed By. _____
Remarks _____

6. Certified to Test what Material
Asphalt Concrete Soil Aggregate

7. Received Technicians Testing Certificates Yes No
Site Manager
Remarks _____

8. Cooperation from Lab. Personnel
Very good Good Fair Poor
Remarks _____

9. Lab. Personnel Reviewed (1 Year I.A.)

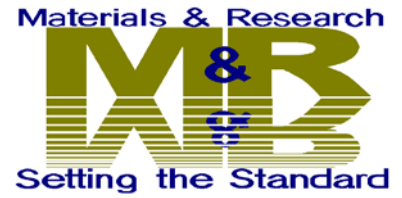
10. Lab. Personnel Reviewed (5 Year Certificate)

11. Testing Procedures Reviewed *Complete Asphalt Sample* Yes No
Remarks _____

12. Quality Assurance Manual Kept on File Yes No
Not Required

13. Laboratory AMRL Inspected Yes No

Remarks _____



**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

Date: Location of Equipment:
 Checked by: Equipment Serial No.:

CALIBRATING FAA CUP

TEMPERATURE CHART

Wt of Cup-Glass-Grease with Water	<input type="text"/>	<input type="text"/>
Wt of Cup-Glass-Grease	<input type="text"/>	<input type="text"/>
Net Mass of Water, (gm.)	<input type="text"/> (M)	<input type="text"/> (M)
Density of H2O kg/m3 (Take off Chart)	<input type="text"/> (D)	<input type="text"/> (D)
Volume of FAA Cup (nearest 0.1)	<input type="text"/> mL (V)	<input type="text"/> mL (V)

C	F	kg/m3	lb/ft3
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

Calculation $V = 1000 \frac{M}{D}$

Avg. of 2 **Avg of 2**

Apply a light coat of grease to top edge of the dry, empty cylindrical measure. Weigh the measure, grease, and glass plate. Fill the measure with freshly boiled, deionized water at a temperature of 18 to 24 degree C. Record the temperature of the water. Place the glass plate on the measure, being sure no air bubbles remain. Dry the outer surface of the measure and determine the combined mass of measure, glass plate, grease, and water by weighing. Following the final weighing, remove the grease, and determine the mass of the clean, dry, empty measure for subsequent tests.

AASHTO T 304-5 (8)

Cup Number	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Weight of Cup	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Volume of Cup	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

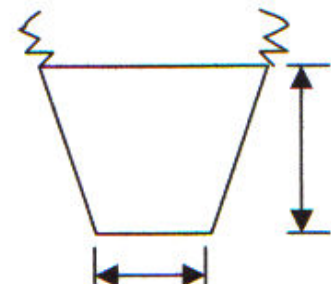
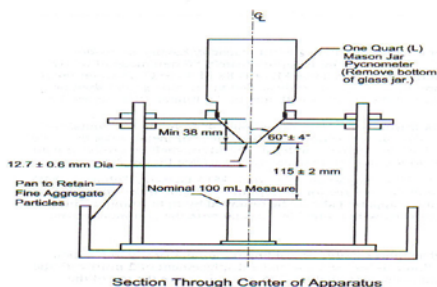
CYLINDER DIMENSIONS

Outside diameter	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	mm	(41 mm approx.)
Inside diameter	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	mm	(39 mm approx.)
Inside height	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	mm	(86 mm approx.)
Outside height	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	mm	
Bottom of Cylinder	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	mm	(Min. 6mm Thick)

Funnel Stand Apparatus w/ Cylindrical Measure in Place

Funnel height	<input type="text"/>	mm	(Min. 38 mm)
Funnel opening	<input type="text"/>	mm	(12.7 ± 0.6 mm dia.)

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



**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

Date : _____ LOCATION OF EQUIPMENT _____
Checked by: _____
Calibration Equipment Used: _____

Splitter - #1

Splitter Brand - _____
Divider Width _____ Divider Condition _____
Pouring Pan
Width _____ Condition _____
Number of Pans Checked _____
Receptacle Pan
Width _____ Condition _____
Number of Pans Checked _____

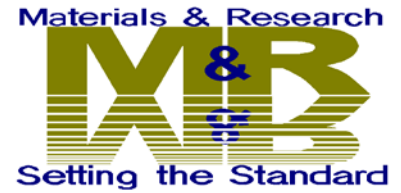
Splitter - #2

Splitter Brand - _____
Divider Width _____ Divider Condition _____
Pouring Pan
Width _____ Condition _____
Number of Pans Checked _____
Receptacle Pan
Width _____ Condition _____
Number of Pans Checked _____

Splitter - #3

Splitter Brand - _____
Divider Width _____ Divider Condition _____
Pouring Pan
Width _____ Condition _____
Number of Pans Checked _____
Receptacle Pan
Width _____ Condition _____
Number of Pans Checked _____

Remarks: _____



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

Equipment Checked:

IGNITION OVEN (AASHTO T 308)

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:

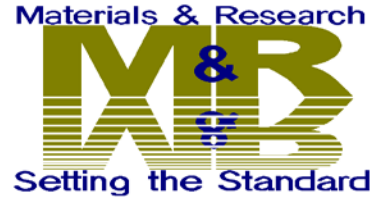
12 months

Report:

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



IGNITION OVEN
CERTIFICATE OF VERIFICATION
Procedure No. 38
AASHTO T 308



DATE -

EQUIPMENT VERIFIED -

EQUIPMENT SERIAL NUMBER -

METHOD USED FOR ACCEPTANCE - Refer to Operator's Manual
(To Span Calibrate the Balance)

CALIBRATION EQUIPMENT USED -

VERIFICATION WEIGHTS - 1000 gm
(Read-out on Ignition Oven) 3000 gm
 5000 gm
 8000 gm

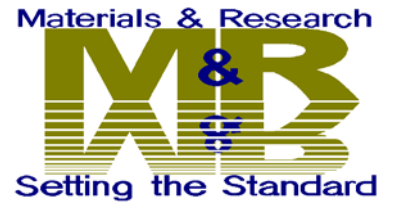
EQUIPMENT CHECKED BY -

LOCATION OF EQUIPMENT -

This certificate is issued for the aforementioned equipment and certifies that the equipment has been checked and found to comply with the requirements set forth in the method listed above. In order for this equipment to remain in service it must be recertified on the following date and must comply with the latest methods listed at that time.

NEXT CALIBRATION DUE -

Remarks



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

Equipment Checked

GYRATORY COMPACTOR (AASHTO T 312)

Purpose:

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

Inspection Equipment Required:

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

Tolerance:

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

Procedure:

The procedure for calibrating the gyratory compactor is located in the Manual of Operation and Maintenance for Troxler Model 4140 and 4141. All other gyratories 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.



Gyratory Compactor
Procedure No. 37
AASHTO T 312



GYRATORY COMPACTOR CALIBRATION

LABORATORY NAME			
LOCATION OF LABORATORY			
TYPE OF GYRATORY		MODEL OF GYRATORY	
SERIAL NUMBER		CALIBRATION KIT USED	
CALIBRATION PERFORMED BY		CALIBRATION KIT LAST CALIBRATED	
		DAVE-2 CALIBRATION KIT LAST CALIBRATED	
COMPANY I.D. TAG #		COMPACTOR LAST CALIBRATED	

1 PRESSURE CALIBRATION

Date

System Load Cell kPa

Calibration Load Cell kPa

TOLERANCE -- 3 Percent or +/- 18 kPa

2 ANGLE CALIBRATION

Date

Measured Internal Angle Deg.

Pressure 600 kPa

MOLDS USED			Avg.	Tolerance
	TOP	BOTTOM		
Internal Angle			0	1.16 +/- .02

External Angle (If Measured) Deg.
1.25 +/- .02

Mold Size 150 mm

3 HEIGHT CALIBRATION

Date

Actual mm

Pressure kPa

Daily File Kept y/n

Measured mm

Mold Size 150 mm

4 ROTATION CALIBRATION

Date

Target 30.0 RPM

Performed as manufacturers recommendation.

Measured RPM

5 MAINTENANCE

Follow manufacturers recommended schedule of maintenance. (Includes vacuuming, degreasing, lubricating, and inspecting for loose or worn parts)

Kept Clean y/n Well Greased y/n

OTHER MAINTENANCE PERFORMED -

REMARKS

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 60 degrees and measure and record the inside diameter again. Perform this procedure at the top, bottom and maximum wear position.
2. Measure and record the height of the mold to the nearest millimeter. Repeat this procedure at intervals of 120 degrees around the mold.
3. Measure the diameter of the mold bottoms at intervals of 60 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.
6. Measure and record the diameter gyrotory ram at intervals of 120 degrees to the nearest millimeter.

Verification Interval:

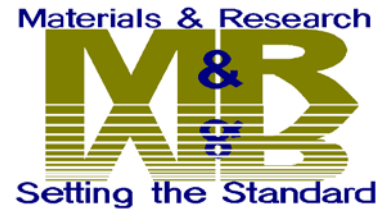
12 months

Report:

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



Gyratory Molds
Procedure No. 36
AASHTO T-312



GYRATORY MOLD CALIBRATION	
DATE ----	NEXT CALIBRATION DATE -

LOCATION OF EQUIPMENT -- _____
 EQUIPMENT CHECKED BY -- _____

METHOD USED FOR ACCEPTANCE -- AASHTO Designation: ANNEX A
 Section 4.2 Specimen Molds including Note 2 that follows.

CALIBRATION EQUIPMENT USED -- S-22 MICROFINISH COMPARATOR SURFACE FINISH
 SCALE AND DIGITAL CALIPERS
 CYLINDER BORE GAUGE #FOW72-646-200
 5-6" ME-5000 Digital 3 Point Bore Gauge

New molds inside diameter 149.90 to 150.00 mm. In-service molds inside diameter shall not exceed 150.2

GYRATORY MOLD #1	A Reading	B Reading	C Reading	Average	Pass / Fail
Wall Thickness - (7.5 mm thickness min.)				0.00	
1. Top Inside Diameter - (149.90 to 150.00 mm)				0.00	
3. Bottom Inside Diameter - (149.90 to 150.00 mm)				0.00	
2. Middle Maximum Wear of Mold @ 115mm				0.00	
Height of Mold - (250 mm minimum)				0.00	
Base Plate				0.00	
GYRATORY MOLD #2	A Reading	B Reading	C Reading	Average	Pass / Fail
Wall Thickness - (7.5 mm thickness min.)				0.00	
1. Top Inside Diameter - (149.90 to 150.00 mm)				0.00	
3. Bottom Inside Diameter - (149.90 to 150.00 mm)				0.00	
2. Middle Maximum Wear of Mold @ 115mm				0.00	
Height of Mold - (250 mm minimum)				0.00	
Base Plate				0.00	
GYRATORY MOLD #3	A Reading	B Reading	C Reading	Average	Pass / Fail
Wall Thickness - (7.5 mm thickness min.)				0.00	
1. Top Inside Diameter - (149.90 to 150.00 mm)				0.00	
3. Bottom Inside Diameter - (149.90 to 150.00 mm)				0.00	
2. Middle Maximum Wear of Mold @ 115mm				0.00	
Height of Mold - (250 mm minimum)				0.00	
Base Plate				0.00	
GYRATORY MOLD #4	A Reading	B Reading	C Reading	Average	Pass / Fail
Wall Thickness - (7.5 mm thickness min.)				0.00	
1. Top Inside Diameter - (149.90 to 150.00 mm)				0.00	
3. Bottom Inside Diameter - (149.90 to 150.00 mm)				0.00	
2. Middle Maximum Wear of Mold @ 115mm				0.00	
Height of Mold - (250 mm minimum)				0.00	
Base Plate				0.00	

Mold #	1	2	3	4
--------	---	---	---	---

SURFACE FINISH OF MOLDS-- (1.60 um or smoother)			
ROCKWELL HARDNESS (min. C48, One time only)			



**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

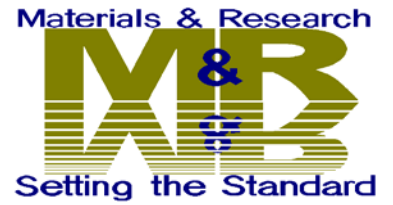
Report:

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



VERIFYING VACUUM SYSTEM PRESSURE

Procedure No. 23
AASHTO T 209



Date: _____

Location of Equipment: _____

Checked by: _____

Calibration Equipment Used: _____

NOTE: IF A DIGITAL MANOMETER IS USED AN ANNUAL STANDARDIZATION IS REQUIRED.

VACUUM SYSTEMS 1-3

System No.	1	2	3
Manometer Type			
Pump Type			
No. of Moisture Traps			
Micro Valve Installed	Yes/No	Yes/No	Yes/No
Vacuum/ Bowl or Flask			
Bowl Calibrated	Monthly Y/N	Monthly Y/N	Monthly Y/N
Wire Mesh on Lid Opening	Yes/No	Yes/No	Yes/No
Water Bath	Heater & Overflow Y/N	Heater & Overflow Y/N	Heater & Overflow Y/N
Vibrating Shaker Table	Yes/No	Yes/No	Yes/No
Scale Used (Type)			
System Location			
Vacuum Pressure Obtained (25.0-30.0mm Hg.)			
	mm Hg	mm Hg	mm Hg

VACUUM SYSTEMS 4-6

System No.	4	5	6
Manometer Type			
Pump Type			
No. of Moisture Traps			
Micro Valve Installed	Yes/No	Yes/No	Yes/No
Vacuum/ Bowl or Flask			
Bowl Calibrated	Monthly Y/N	Monthly Y/N	Monthly Y/N
Wire Mesh on Lid Opening	Yes/No	Yes/No	Yes/No
Water Bath	Heater & Overflow Y/N	Heater & Overflow Y/N	Heater & Overflow Y/N
Vibrating Shaker Table	Yes/No	Yes/No	Yes/No
Scale Used (Type)			
System Location			
Vacuum Pressure Obtained (25.0-30.0mm Hg.)			
	mm Hg	mm Hg	mm Hg

Remarks: _____

**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.

General Purpose Scales

Procedure No. 8
Class G2

Date: _____

Location of Scale: _____

Inspected By: _____

Calibration Weights: _____

Scale No.: _____

Manufacturer: _____

Scale Capacity: _____

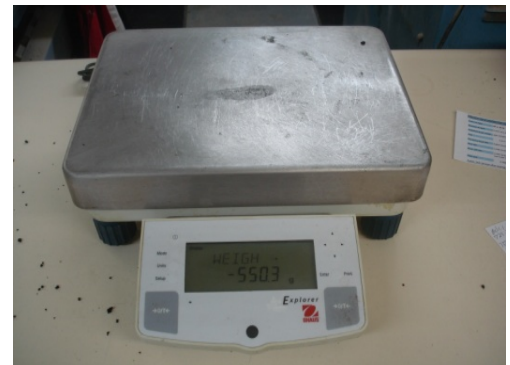


Test Point	Accuracy Required	Accuracy
1000 g	1.0 g	_____
2000 g	2.0 g	_____
3000 g	3.0 g	_____
8000 g	8.0 g	_____

Scale No.: _____

Manufacturer: _____

Scale Capacity: _____



Test Point	Accuracy Required	Accuracy
1000 g	1.0 g	_____
2000 g	2.0 g	_____
3000 g	3.0 g	_____
8000 g	8.0 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
1000 g	1.0 g	<input style="width: 100%;" type="text"/>
2000 g	2.0 g	<input style="width: 100%;" type="text"/>
3000 g	3.0 g	<input style="width: 100%;" type="text"/>
8000 g	8.0 g	<input style="width: 100%;" type="text"/>

Scale No.:

Manufacturer:

Scale Capacity:



Test Point	Accuracy Required	Accuracy
1000 g	1.0 g	<input style="width: 100%;" type="text"/>
2000 g	2.0 g	<input style="width: 100%;" type="text"/>
3000 g	3.0 g	<input style="width: 100%;" type="text"/>
8000 g	8.0 g	<input style="width: 100%;" type="text"/>

Remarks:

**Procedure for Verifying Ovens
Procedure No. 1**

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.



Ovens
 Procedure No. 1
 AASHTO T-208, T-216, T-265, T-296



Date - _____ Inspected by: _____
 Location of Equipment - _____
 Calibration Equipment Used - _____

Oven #1

Manufacturer _____
 Model No. _____
 Serial No. _____

Oven Set Point _____ F Temperature Reading
 20 min. _____
 40 min. _____
 60 min. _____

(230+/- 9 Degrees F or 110 +/- 5 Degrees C)

Remarks _____

Oven #2

Manufacturer _____
 Model No. _____
 Serial No. _____

Oven Set Point _____ F Temperature Reading
 20 min. _____
 40 min. _____
 60 min. _____

(230+/- 9 Degrees F or 110 +/- 5 Degrees C)

Remarks _____

Oven #3

Manufacturer _____
 Model No. _____
 Serial No. _____

Oven Set Point _____ F Temperature Reading
 20 min. _____
 40 min. _____
 60 min. _____

(230+/- 9 Degrees F or 110 +/- 5 Degrees C)

Remarks _____

Oven #4

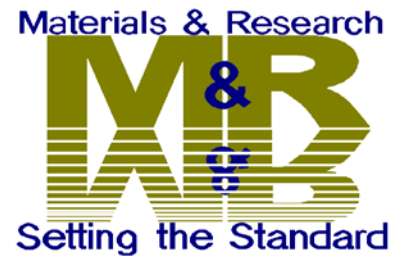
Manufacturer _____
 Model No. _____
 Serial No. _____

Oven Set Point _____ F Temperature Reading
 20 min. _____
 40 min. _____
 60 min. _____

(230+/- 9 Degrees F or 110 +/- 5 Degrees C)

Remarks _____

Remarks _____



**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:

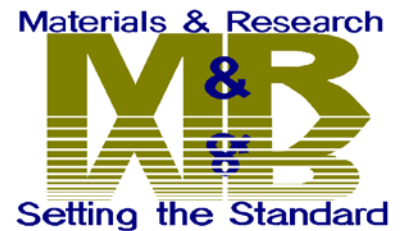
1. Dry the sample to a constant weight.
2. Split the dried sample so as to provide at least 500 grams of fine aggregate or 2500 grams of coarse aggregate.
3. Place the prepared and weighed sample in the sieve nest and place on the shaker.
4. Shake the sample for 5 minutes and remove.
5. Hand shake each sieve over a pan for one minute and weigh the material passing and record the weight for each sieve,
6. The material passing from hand shaking in Step 5 shall not exceed 0.5% 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.



**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:

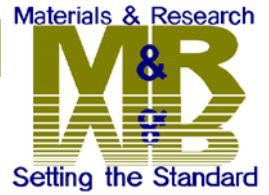
A copy must be retained in the Testing Facilities files for review.



Wire Cloth Sieves for Testing Purposes

Procedure No. 25

AASHTO M 92



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: _____



**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:

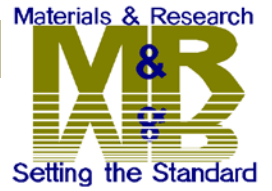
A copy must be retained for each thermometer tested and kept in the Testing Facilities files for review.



Thermometer

Procedure No. 64

ASTM E 77



Date: _____

Checked By: _____

Calibration Equipment Used: _____

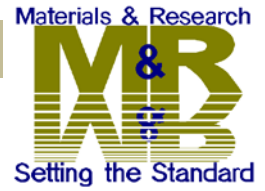
Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
Standard Thermometer Temperature Reading (°F or °C)	Laboratory Thermometer Temperature Reading (°F or °C)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
Maximum scale allowed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



Thermometer



Procedure No. 64

ASTM E 77

Date: _____

Checked By: _____

Calibration Equipment Used: _____

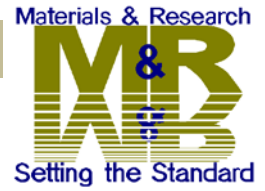
Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
Standard Thermometer Temperature Reading (°F or °C)	Laboratory Thermometer Temperature Reading (°F or °C)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
Maximum scale allowed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



Thermometer



Procedure No. 64

ASTM E 77

Date: _____

Checked By: _____

Calibration Equipment Used: _____

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
<p style="text-align: center;">Standard Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>	<p style="text-align: center;">Laboratory Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks: _____	

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
<p style="text-align: center;">Standard Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>	<p style="text-align: center;">Laboratory Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks: _____	

Standard Thermometer Serial No. _____	Laboratory Thermometer Serial No. _____
ASTM No. _____	ASTM No. _____
<p style="text-align: center;">Standard Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>	<p style="text-align: center;">Laboratory Thermometer Temperature Reading (°F or °C)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>
Maximum scale allowed in accordance with ASTM E-1. _____	
Remarks: _____	