

# **LABORATORY QUALITY MANUAL**

**For**

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# QUALITY MANUAL FOR

( \_\_\_\_\_ )

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## **ORGANIZATION AND ORGANIZATIONAL POLICIES**

This section of the QM contains the following information:

1. The legal name and address of the laboratory.
2. The legal name and address (if different from item [1]) of the main office or owner company.
3. Any additional information to identify the organization with responsibility for the laboratory.
4. The ownership and management structure of the laboratory.
5. The organization chart of the laboratory, clearly showing relevant internal organizational components.

This form revised: \_\_\_\_\_ by: \_\_\_\_\_

Legal Name and Address: \_\_\_\_\_

\_\_\_\_\_

Main Office Address: \_\_\_\_\_

\_\_\_\_\_

Ownership: \_\_\_\_\_

Owner Office Address:  
(if different from above) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ownership/Management Structure: (show Organizational Chart on following page)

<b>Title/Position</b>	<b>Name</b>	<b>Other Affiliation</b>
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Chief Executive Officer (or equivalent)	_____	_____
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President	_____	_____
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Vice-President	_____	_____
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Vice-President	_____	_____
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	_____	_____
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## **LABORATORY / TECHNICAL STAFF**

This section of the QM contains the following information:

1. Position description(s) for each technical operational position shown on the organizational chart.
2. A brief biographical sketch of the person currently employed for each technical operational position shown on the organizational chart.
3. A description of the method(s) used to ensure all personnel are trained to perform tests conducted by this laboratory in accordance with standard procedures.
4. A description of the method(s) used to evaluate the competency of each staff member to perform tests conducted by this laboratory, to ensure all testing is performed in accordance with standard procedures.
5. A form summarizing and recording training and evaluation activities undertaken to comply with the procedures described in items (3) and (4).

*This form revised:* \_\_\_\_\_ *by:* \_\_\_\_\_

POSITION: \_\_\_\_\_

**JOB DESCRIPTION:**

**SUPERVISION EXERCISED / RECEIVED:**

**DUTIES:**

**QUALIFICATIONS:**

Education:

Certifications:

Experience:

This form revised: \_\_\_\_\_ by: \_\_\_\_\_

## TECHNICIAN TRAINING

### Center for Training Transportation Professionals

<b>CTTP - TECHNICIAN TRAINING RECORD</b>					
<b>Name</b>	<b>Training Cert. No.</b>	<b><i>Basic Aggregate</i></b>	<b><i>Soils</i></b>	<b><i>ACHM</i></b>	<b><i>PCC</i></b>

Insert copies of training certificates for above training following this page.

## TECHNICIAN QUALIFICATION PROGRAM

The Arkansas State Highway and Transportation Department (Department) has contracted with the University of Arkansas to conduct training for qualification of technicians at the Center for Training Transportation Professionals (CTTP).

Qualification of technicians is in four areas of materials testing: 1) Basic Aggregates; 2) Soils/Aggregate; 3) Hot Mix Asphalt; and 4) Portland Cement Concrete Testing. Before a technician may become qualified in Soils/Aggregate, Hot Mix Asphalt, and Portland Cement Concrete, the technician must first become qualified in Basic Aggregates. The Center address is:

Center for Training Transportation Professionals  
University of Arkansas at Fayetteville  
4190 Bell Engineering Center  
Fayetteville, Arkansas 72701  
(479) 575-3997  
Fax (479) 575-7639

Qualification includes a demonstration of proficiency by the technician and a written test covering the area of qualification. Upon acceptable completion of this program, the technician will be issued a statement of qualification showing the technician's area of qualification. Technicians must recertify every four years for Soils and Hot mix asphalt. Concrete recertification is required every five years.

The areas of qualification and the items included in each area are as follows:

### 1) Basic Aggregates

Sampling by Random Number	AHTD 465
Sampling of Aggregates	AASHTO T 2, AHTD 35
Reducing Field Samples Size	AASHTO T 248, AHTD 349
Moisture Content	AASHTO T 255, AHTD 348
Deleterious Materials	AHTD 302
Crushed Particles	AHTD 304
Particle Size Determination (Gradation)	AASHTO T 27, AHTD 305
Materials Finer Than #200 by Washing	AASHTO T 11
Fine Aggregate Specific Gravity	AASHTO T 84
Coarse Aggregate Specific Gravity	AASHTO T 85

### 2) Soils/Aggregate

Sampling Soils	AHTD 30
Dry Soil Preparation	AASHTO T 87, AHTD 35
Wet Soil Preparation	AASHTO T 146
Moisture Content of Soils	AASHTO T 265, AHTD 348
Moisture Using Calcium Carbide Tester	AASHTO T 217, AHTD 347
Particle Size Determination (Gradation)	AASHTO T 88, AHTD 352
Atterburg Limits	AASHTO T 89 & T 90 AHTD 353 & 354
Proctors & Coarse Particle Correction	AASHTO T 99, T 224, T 180, & T 272 AHTD 350, 356, 344, & 355
In-place Density & Moisture Determination Nuclear Methods	AASHTO T 310, AHTD 330



3) Asphalt Plant and Field Testing

Sampling by Random Number	AHTD 465
Sampling Bituminous Paving Mixtures	AASHTO T 168, ASTM D979
AC Content Determination by Nuclear Gauge	AASHTO T 287
Rice Theoretical Specific Gravity	AASHTO T 209
Bulk Specific Gravity	AASHTO T 166
Nuclear Density Determination	ASTM D 2950, AHTD 461
Volumetric Method	AASHTO MP 2
Percent Air Voids in Paving Mixtures	AASHTO T 269
Density Using Gyratory Compactor	AASHTO T 312
Asphalt Content by Nuclear Method	AHTD 449 & 449A
Resistance To Moisture Damage	AASHTO T 283
Mixture Conditioning of HMA	AASHTO PP 2
Volumetric Design for HMA	AASHTO PP 28

4) Portland Cement Concrete Testing

Sampling Freshly Mixed Concrete	AASHTO T 141
Making and Curing of Cylinder	AASHTO T 23
Slump of Hydraulic Cement Concrete	AASHTO T 119
Air Content	AASHTO T 152
Unit Weight of Freshly Mixed Concrete	AASHTO T 121

## **PERIODIC TECHNICIAN COMPETENCY REVIEW**

All materials technicians shall be trained prior to performing test procedures. The following training procedure shall be followed for each test:

1. The trainee shall have access to the latest copy of the applicable test specification.
2. A qualified technician shall demonstrate the test procedure.
3. The laboratory supervisor shall observe the trainee and document his/her ability to perform the test procedure.
4. Technician performance shall be reviewed at 6-month intervals.
5. The supervisor shall record the test demonstrated, the date of review, and performance results.
6. If an unsatisfactory result is recorded for a test method, the supervisor shall review the test method and repeat the evaluation.

(See table on following page)



## **LABORATORY EQUIPMENT**

This section of the Quality Manual contains the following information:

1. An inventory of major sampling, testing, calibration, and verification equipment associated with the test methods employed by the testing laboratory.
2. A copy of the manufacturer's instructions pertaining to the test equipment listed in item (1), if available, or a reference to the location of such documents.
3. A description of procedures used regarding all calibration and verification of equipment.
4. In-house procedures used for calibration and verification of equipment.
5. A description of equipment used in performing tests that requires calibration or verification. Included with the description is all pertinent information regarding the calibration/verification items, calibration/verification procedures and intervals, and equipment used in such procedures. Calibration worksheets/records pertaining to each item of equipment follow the equipment description page.

(See table on following page).













IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING SIEVES

Item: Sieves

Purpose:

This method provides instructions for checking the physical condition of laboratory test sieves ranging in size from 75 mm (3 in.) to 0.075 mm (No. 200).

Inspection Equipment Required:

1. A caliper readable to 0.01 mm (Use for No. 4 sieve and coarser.)

Tolerance:

Sieves shall meet the physical requirements specified in AASHTO M 92.

Procedure:

(Step 1 applies only to sieves having openings greater than or equal to 4.75 mm)

1. Select approximately 30 openings (or all square openings if less than 30), in segments of 3 or 4 openings along a 45-degree line. Measure and record both dimensions of each sieve opening.
2. Inspect the general condition of the sieve. Check the frame and solder joints for cracks or holes (check for pin holes in the finer sieves).
3. Make sure the sieve has an appropriate label.
4. Check for tightness of the wires on each individual sieve.

## Sieve Calibration Worksheet

Equipment ID: \_\_\_\_\_  
 Manufacturer: \_\_\_\_\_  
 Model #: \_\_\_\_\_  
 Serial #: \_\_\_\_\_  
 Location: \_\_\_\_\_

Date: \_\_\_\_\_  
 Performed by: \_\_\_\_\_  
 Next Calibration Due: \_\_\_\_\_  
 Last Calibration: \_\_\_\_\_

Calibration Item: Verify physical condition of sieve and critical dimensions for sieves larger than #4 (4.75 mm)

Calibration Procedure: In-House Procedure # \_\_\_\_\_

Calibration Equipment: Digital Calipers

Comment On:

Frame: \_\_\_\_\_  
 Joints: \_\_\_\_\_  
 Cloth: \_\_\_\_\_  
 Tightness: \_\_\_\_\_  
 Other: \_\_\_\_\_

1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

Requirement (according to AASHTO M 92) = \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial By: \_\_\_\_\_

## WIRE CLOTH SIEVE INSPECTION REPORT

Date: \_\_\_\_\_ Verified by: \_\_\_\_\_

Sieve Sizes	mm (Millimeters)		Condition		Quantity
	Minimum	Maximum			
75 mm (3")	72.8	77.2	Good ___	Replace ___	
62.5 mm (2 1/2 ")	61.1	64.9	Good ___	Replace ___	
50 mm (2")	48.5	51.5	Good ___	Replace ___	
37.5mm (1 1/2 ")	36.4	38.6	Good ___	Replace ___	
31.3mm(1 1/4 ")	30.5	32.6	Good ___	Replace ___	
28 mm (1 1/8 ")			Good ___	Replace ___	
25mm (1")	24.2	25.8	Good ___	Replace ___	
19 mm (3/4 ")	18.4	19.6	Good ___	Replace ___	
5/8 "	15.5	16.5	Good ___	Replace ___	
12.5 mm (1/2 ")	12.11	12.89	Good ___	Replace ___	
9.5 mm(3/8 ")	9.2	9.8	Good ___	Replace ___	
4.75 mm (# 4)	4.6	4.9	Good ___	Replace ___	
# 8			Good ___	Replace ___	
#10			Good ___	Replace ___	
# 16			Good ___	Replace ___	
# 20			Good ___	Replace ___	
# 30			Good ___	Replace ___	
# 40			Good ___	Replace ___	
# 50			Good ___	Replace ___	
# 80			Good ___	Replace ___	
# 100			Good ___	Replace ___	
# 200			Good ___	Replace ___	
Dust Receiver			Good ___	Replace ___	

The table is for sieve openings in mm (millimeters). On the identification plate of some sieves the sieve opening will be in microns. To convert microns to mm (millimeters): multiply the number of microns by 0.001.

Example: On the identification plate of a #16 sieve - the openings indicated are 1190 microns.  
 $(1190 \times 0.001) = 1.19 \text{ mm}$

A #16 sieve Minimum allowable opening = 1.135 mm  
 Maximum allowable opening = 1.225 mm

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR CALIBRATION OF  
SCALES OR BALANCES  
**(AASHTO M 231)**

Purpose:

This procedure provides instructions for checking the accuracy of scales and balances.

Inspection Equipment

1. Standard Weight Set of sufficient mass to reach 90% of scales capacity.
2. A level is required to check the scale's level position, if one is not built into the unit.

Procedure:

1. Turn electronic scales on allowing for a warm up of approximately 30 minutes.
2. Ensure that the scale base is seated on all comers and is level. (NOTE: Some leveling devices are located under the scale pan.
3. Be aware of *excessive* air movement during the calibration process. Document if air movement appears to be excessive.
4. Check for Off-Center Error. Measure this effect by placing the load (90 % of capacity) at various positions on the pan and observe any differences in indication. The difference between the lowest and the highest indication is the maximum Off-Center Error, which should be within the accuracy range listed for the class of scale being checked.
5. Set the zero point and the full-scale indication. Place weights on the pan in increasing increments as indicated on calibration form. Observe and record the indications. The difference at any point is the inaccuracy.

## SCALE OR BALANCE VERIFICATION

MANUFACTURER: \_\_\_\_\_ MODEL#: \_\_\_\_\_

INVENTORY#: \_\_\_\_\_ CLASS OF SCALE: \_\_\_\_\_

MAXIMUM CAPACITY: \_\_\_\_\_ SMALLEST DIVISION: \_\_\_\_\_

Off-Center Error: Center-Front: \_\_\_\_\_ Right: \_\_\_\_\_ Center: \_\_\_\_\_

Center-Back: \_\_\_\_\_ Left: \_\_\_\_\_

GRAMS	SCALE READING	VERIFIES
0.5(.0011 lb.)		Yes ____ No ____
1(.0022 lb.)		Yes ____ No ____
2(.0044 lb.)		Yes ____ No ____
3(.0066 lb.)		Yes ____ No ____
5(.011 lb.)		Yes ____ No ____
10(.022 lb.)		Yes ____ No ____
20(.044 lb.)		Yes ____ No ____
30(.066 lb.)		Yes ____ No ____
50(.110 lb.)		Yes ____ No ____
100(.220 lb.)		Yes ____ No ____
200(.440 lb.)		Yes ____ No ____
300(.660 lb.)		Yes ____ No ____
500(1.102 lb.)		Yes ____ No ____
1000(2.205 lb.)		Yes ____ No ____
2000(4.409 lb.)		Yes ____ No ____
5000(11.02 lb.)		Yes ____ No ____
10000(22.05 lb.)		Yes ____ No ____
15000(33.07 lb.)		Yes ____ No ____
20000(44.09 lb.)		Yes ____ No ____

VERIFIED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

*NOTE CHECK OFF-CENTER ERRORS OF ELECTRONIC SCALES BY PLACING WEIGHT THAT IS APPROXIMATELY 90% OF SCALE CAPACITY NEAR THE CENTER AND AT EACH CORNER.*

## SCALE OR BALANCE CALIBRATION

GENERAL PURPOSE BALANCES AND SCALES			
CLASS PRINCIPAL SAMPLE WEIGHT READABILITY ACCURACY			
G2	2 kg or less	0.1g	0.1 g or 0.1 %
G5	Over 2 kg thru 5 kg	1g	1g or 0.1%
G20	Over 5 kg thru 20 kg	5g	5g or 0.1%
G100	Over 20 kg	20g	20g or 0.1 %

ACCEPTANCE TOLERANCES FOR DIFFERENT CLASSES OF SCALES			
CLASS G2		CLASS G5	
TEST WEIGHT	TOLERANCE RANGE	TEST WEIGHT	TOLERANCE RANGE
0.5	0.6-04	2	3. 0-1 .0
1	1.1-0.9	3	4.0-2.0
2	2.1-1.9	5	6.0-4.0
3	3.1-2.9	10	11.0-9.0
5	5.1-4.9	20	21.0-19.0
10	10 .1- 9.9	30	31.0-29.0
20	20.1-19.9	50	51.0-49.0
30	30.1-29.9	100	101.0-99.0
50	50.1-49.9	200	201.0-199.0
100	100.1-99.9	300	301.0-299.0
200	200.2-199.8	500	501.0-499.0
300	300.3-299. 7	1000	1001.0-999.0
500	500.5-499.6	2000	2002.0-1998.0
1000	1001.0-999.0	5000	5005.0-4995.0
2000	2002.0-1998.0		

CLASS G20	
TEST WEIGHT	TOLERANCE RANGE
10	15.0-5.0
20	25.0-15.0
30	35.0-25.0
50	55.0-45.0
100	105.0-95.0
200	205.0-195.0
300	305.0-295.0
500	505.0-495.0
1000	1005. 0-995.0
2000	2005.0-1995.0
5000	5005.0-4995. 0
10000	10010.0-9990
15000	15015.0-14985.0
20000	20020.0-19980.0

CLASS G100	
TEST WEIGHT	TOLERANCE, RANGE
30	50.0-10.0
50	70.0-30.0
100	120.0-80.0
200	220.0-180.0
300	320.0-280'0
500	520.0-480.0
1000	1020.0-980.0
2000	2020.0-1980.0
5000	5020. 0.-4980.0
10000	10020.0-9980.0
15000	15020.0-14980 0
20000	20020.0-19980.0

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING OVENS

Item: Oven

Purpose:

This method provides instructions for verifying the settings on general-purpose ovens.

Inspection Equipment Required:

1. A calibrated thermometer graduated in 1.0 °C increments having a range that includes the temperature range to be checked.
2. A brass thermometer well to retain heat while the door is open. This is not required for ovens that provide accommodations for a thermometer that can be read without opening the oven door.

Tolerance:

Ovens shall be capable of maintaining a constant temperature range listed in the appropriate test methods.

Procedure:

1. Place the thermometer inside the brass well or in the thermometer well provided by the oven allowing temperature readings external to the oven. At least two inches of the thermometer tip shall protrude into the oven.
2. Take the first reading at least one hour after closing the oven (the oven should remain undisturbed during this time).
3. Take at least three consecutive readings that are approximately 30 minutes apart.
4. If a reading is outside the specified range, adjust the temperature of the oven and begin step three again.
5. The oven is deemed acceptable if all three consecutive readings are within the specified tolerance.

Ovens shall be calibrated at a minimum of three temperatures: typical target temperature (°F), typical target plus 20 °F, and typical target minus 20 °F. This requirement may be waived for ovens that are to remain at a constant temperature.



# OVEN VERIFICATION

INVENTORY #: \_\_\_\_\_ MANUFACTURER: \_\_\_\_\_

MODEL#: \_\_\_\_\_

MINIMUM TEMPERATURE: \_\_\_\_\_ MAXIMUM TEMPERATURE: \_\_\_\_\_

SET TEMPERATURE	THERMOMETER READINGS		
	30 MIN.	60 MIN.	90 MIN.

NOTE: Allow oven to stabilize 1/2 hour with each temperature change.

Comments:

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

Verified By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING THERMOMETERS

Item: Thermometer

Purpose:

This method provides instructions for checking the accuracy of laboratory thermometers.

Inspection Equipment Required:

1. NIST traceable calibration thermometer(s) containing the range of the thermometer to be tested.
2. Water Bath
3. Brass thermometer wells

Tolerance:

Thermometers shall meet the tolerances specified in the applicable test method. If no tolerance is specified, then the thermometer shall be accurate to  $\pm 1$  °C.

Procedure:

TEMPERATURES BELOW 200 °F:

1. Select five temperatures in the range of the thermometer to be tested.
2. Prepare a water bath at the selected temperatures.
3. Place the calibration thermometer and the thermometer to be tested in the water bath and let set for 15 minutes.
4. Record the temperature of both thermometers.
5. Repeat for additional temperatures.

TEMPERATURES ABOVE 200 °F:

1. Prepare an oven or ovens at the selected temperatures.
2. Place the calibration thermometer and the thermometer to be tested in the brass thermometer well inside the oven and let set for 20 minutes.
3. Record the temperature of both thermometers.
4. Repeat for additional temperatures.

Note: It may be necessary to prepare both a water bath and an oven in order to test the range of the thermometer.



IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING CONICAL MOLD AND TAMPER

Item: Mold and Tamper used in AASHTO T-84

Purpose:

This method provides instructions for checking the critical dimensions of sand cone and tamper used in the above test method.

Inspection Equipment Required:

1. Calipers readable to 0.01 mm.
2. Balance, 500 g capacity, readable to 0.1 g.
3. Ruler readable to 1mm.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

CONE

1. Measure the inside diameter at the top of the cone to the nearest 1 mm by taking two readings 90-degrees apart using the ruler. Record the results.
2. Invert the cone and repeat Step 1.
3. Place the cone on a flat glass surface. Measure and record the depth of the cone using the ruler.
4. Using the calipers, measure the thickness of the cone to the nearest 0.1 mm by taking 2 reading 90-degrees apart at the top of the cone and 2 readings 90-degrees apart at the bottom of the cone. Record all results.

TAMPER

1. Measure and record the diameter of the tamping face to the nearest 1 mm by taking two readings 90-degrees apart using the ruler.
2. Determine and record the mass of the tamper to the nearest 0.1 g.

# Cone and Tamper Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the cone and tamper

Calibration Procedure: In-House Procedure #

Calibration Equipment: Digital Calipers, Scale CL1, and ruler read. to 1 mm.

Top Inside Diameter of Cone: \_\_\_\_\_ Tolerance = 40 +/- 3 mm

Bottom Inside Diameter of Cone: \_\_\_\_\_ Tolerance = 90 +/- 3 mm

Height of Cone: \_\_\_\_\_ Tolerance = 75 +/- 3 mm

Thickness of Cone: \_\_\_\_\_ Tolerance = at least 0.8 mm

Diameter of tamper face: \_\_\_\_\_ Tolerance = 25 +/- 3 mm

Mass of tamper: \_\_\_\_\_ Tolerance = 340 +/- 15 g

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING SIEVE SHAKERS

Item: Sieve Shaker

Purpose:

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

Inspection Equipment Required:

1. Sieves (3/4", 1/2", #4, #8, #16, #50, #100)
2. Balance, readable to 0.1 g.
3. Pan

Tolerance:

Sieve shakers shall sieve thoroughly such that after one minute of continuous hand sieving, not more than 0.5% by mass of total original sample passes any sieve.

Procedure:

1. Prepare a well-graded aggregate sample of adequate size based on nominal maximum aggregate size as described in AASHTO T-27.
2. Record the mass of the total sample.
3. Sieve the sample for 7 minutes.
4. Hand-sieve each sieve for one minute, tapping the sieve against the opposite hand 150 times during the minute.
5. Record the mass of the material that passes the sieve during one minute of hand sieving.
6. Calculate the percent passing during hand sieving.

# Sieve Shaker Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify thoroughness of sieve shakers

Calibration Procedure: In-House Procedure #

Calibration Equipment: Sieves, Scale CL1, pan

Original Mass of Sample: \_\_\_\_\_

After Hand Sieving:

	Mass Passing	Percent Passing
3/4"	_____	_____
1/2"	_____	_____
#4	_____	_____
#8	_____	_____
#16	_____	_____
#50	_____	_____
#100	_____	_____

Tolerance: No sieve shall have greater than 0.5% passing by total mass of sample.

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

Initial  
By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING MECHANICAL SPLITTER

Item: Mechanical Splitter

Purpose:

This method provides instructions for checking the critical dimensions of a mechanical sample splitter.

Inspection Equipment Required:

1. Calipers or a ruler readable to 1 mm.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

FINE AGGREGATE SPLITTER

1. Count the number of openings. There should be an even number of chutes, numbering at least 12.
2. Measure and record the width of each chute. Chutes should be at least 50% larger than the maximum aggregate size used in the splitter.

COARSE AGGREGATE SPLITTER

1. Count the number of openings. There should be an even number of chutes, numbering at least 8.
2. Measure and record the width of each chute. Chutes should be approximately 50% larger than the maximum aggregate size used in the splitter



# Mechanical Splitter Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the mechanical splitter

Calibration Procedure: In-House Procedure #

Calibration Equipment: Ruler, readable to 1 mm.

Number of Chutes: \_\_\_\_\_

Tolerance = even number  
at least 8 for coarse, 12 for fine

Chute Opening: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Tolerance = approx. 50% larger than  
largest aggregate size

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

Initial  
By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING GYRATORY MOLDS and PLATES

Item: Gyratory Molds and Plates

Purpose:

This method provides instructions for verifying the dimensions on gyratory molds and plates.

Inspection Equipment Required:

1. Accepted calibrated digital calipers reading to 0.01 mm having a range which includes the dimensions to be checked.
2. Cleaning supplies.

Tolerance:

Molds and plates shall be of the required range as listed in the appropriate test methods.

Procedure:

1. Clean all surfaces.
2. Measure the inside diameter of the mold at four approximately equally spaced locations. Record and average the four observations.
3. Measure the wall thickness of the mold at four approximately equally spaced locations. Record and average the four observations.
4. Measure the height of the mold at four approximately equally spaced locations. Record and average the four observations.
5. Measure the diameter of each plate at four approximately equally spaced locations. Record and average the four observations.
6. The molds and plates are deemed acceptable if all of the average measurements the specified tolerance.

If any of the results are outside the specified tolerance, contact the equipment manufacturer.

# Gyratory Mold Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Items: Wall Thickness, Height, Inside Diameter

Calibration Procedure: In-House Procedure #

Calibration Equipment: Digital Calipers

Wall Thickness (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	>7.5
Pass/Fail:	_____

Height (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	>250
Pass/Fail:	_____

Inside Diameter (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	149.90-150.00
Pass/Fail:	_____

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

# Pine Top and Bottom Plates Verification Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_

Next  
Calibration  
Due: \_\_\_\_\_  
Last  
Calibration: \_\_\_\_\_

Calibration Items: Plate Diameter

Calibration Procedure: In-House Procedure #

Calibration Equipment: Digital Calipers

Top Plate Diameter (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	149.50-149.75
Pass/Fail:	_____

Bottom Plate Diameter (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	149.50-149.75
Pass/Fail:	_____

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

# Troxler Bottom Plates Verification Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Items: Plate Diameter

Calibration Procedure: In-House Procedure #

Calibration Equipment: Digital Calipers

Bottom Plate Diameter (mm)	
Meas. 1	_____
Meas. 2	_____
Meas. 3	_____
Meas. 4	_____
Avg:	_____
Acc. Range:	149.50-149.75
Pass/Fail:	_____

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

# Pine Gyrotory Compactor Calibration Worksheet

Equipment ID: \_\_\_\_\_  
 Manufacturer: \_\_\_\_\_  
 Model #: \_\_\_\_\_  
 Serial #: \_\_\_\_\_  
 Location: \_\_\_\_\_

Date: \_\_\_\_\_  
 Performed by: \_\_\_\_\_  
 Next Calibration Due: \_\_\_\_\_  
 Last Calibration: \_\_\_\_\_

Calibration Items: Angle, Speed, Pressure, Height

Calibration Procedure: Follow manufacturer's instructions

Calibration Equipment: Calibration kit with appropriate compactor

<b>Ram Pressure (kPa)</b>	
<u>Proving Ring Reading</u>	
Target:	_____
Actual:	_____
% Difference:	_____
Target:	_____
Actual:	_____
% Difference:	_____
Tolerance:	<u>+/-3%</u>
Pass/Fail:	_____

<b>Tilt Angle (deg.)</b>	
<u>Angle Jig Reading</u>	
Left:	_____
Right:	_____
Difference:	_____
Acc. Range:	<u>0.1083-0.1118</u>
Angle:	_____
Acc. Range:	<u>1.23 - 1.27</u>
Pass/Fail:	_____

<b>Height (mm)</b>	
<u>6" Block</u>	
Target:	_____
Actual:	_____
Acc. Range:	<u>+/- 0.05</u>
Pass/Fail:	_____

<b>Speed (Gyrations/min.)</b>	
<u>10 Gyrations</u>	
Target Time:	_____
Actual Time:	_____
Acc. Range:	<u>+/- 0.3 sec</u>
Pass/Fail:	_____

Roller Clearance: Left \_\_\_\_\_  
 Back \_\_\_\_\_  
 Right \_\_\_\_\_  
 Zero Position OK? \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Initial: \_\_\_\_\_

## Troloxer Gyrotory Compactor Calibration Worksheet

Equipment ID: \_\_\_\_\_  
 Manufacturer: \_\_\_\_\_  
 Model #: \_\_\_\_\_  
 Serial #: \_\_\_\_\_  
 Location: \_\_\_\_\_

Date: \_\_\_\_\_  
 Performed by: \_\_\_\_\_  
 Next Calibration Due: \_\_\_\_\_  
 Last Calibration: \_\_\_\_\_

Calibration Items: Angle, Speed, Pressure, Height

Calibration Procedure: Follow manufacturer's instructions

Calibration Equipment: Calibration kit with appropriate compactor

<b>Ram Pressure (kPa)</b> <u>Load Cell Reading</u>
Target: _____
Actual: _____
% Difference: _____
Tolerance: <u>+/-3%</u>
Pass/Fail: _____

<b>Tilt Angle (deg.)</b> <u>Angle Reading</u>
Angle: _____
Acc. Range: <u>1.23 - 1.27</u>
Pass/Fail: _____

<b>Height (mm)</b> <u>6" Block</u>
Target: _____
Actual: _____
Acc. Range: <u>+/- 0.05</u>
Pass/Fail: _____

<b>Speed (Gyrations/min.)</b>
Target Gyr: _____
Actual Time: _____
Acc. Range: <u>+/- 0.5 sec</u>
Pass/Fail: _____

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR PERFORMING LEAK TEST ON NUCLEAR GAUGES

Item: Nuclear Gauges

Purpose:

This method provides instructions for performing a leak test on nuclear gauges.

Inspection Equipment Required:

1. Leak test kit from Troxler.

Tolerance:

The leak test results should report less than 0.005 uCi (185 Bq).

Procedure:

1. Get out the yellow kit, which is stored in Office of Laboratory Supervisor
2. Obtain one envelope for each nuclear device. The envelope should contain filter paper, plastic bag, and adhesive label.
3. Go to the nuclear device.
4. On the filter paper, record the following WITH A PENCIL!!!!:
  - Model number of device, serial number of device, date of leak test
5. Moisten the filter paper with Radiac Wash.
6. Use tongs and wood dowel to wipe the designated areas of the device.  
(This is usually a black box area beneath the control panel of the device.)  
Make sure to wipe with the side of the filter paper where numbers are written!
7. Allow the filter paper to dry.
8. Place the filter paper in the plastic bag.
9. Fill out all information on triplicate form.
10. Retain the customer copy for records.
11. Staple the left edge of the triplicate form to the plastic bag containing the filter paper.  
(The form should be on top.)
12. Send the leak test form and sample to Troxler at the address on the addressed envelope.
13. Record testing dates in equipment files and in AASHTO records (QM).



IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING FINE AGGREGATE ANGULARITY APPARATUS

Item: Fine Aggregate Angularity Apparatus

Purpose:

This method provides instructions for checking the critical dimensions of a fine aggregate angularity apparatus.

Inspection Equipment Required:

1. Digital calipers readable to 0.01 mm.
2. Straightedge.

Tolerance:

Equipment shall meet the dimensional tolerances specified in AASHTO T-304.

Procedure:

CYLINDRICAL MEASURE

1. Measure and record the inside diameter of the cylinder.
2. Measure and record the inside height of the cylinder.
3. Measure and record the thickness of the bottom of the cylinder.

FUNNEL

1. Measure and record the inside diameter of the opening of the funnel.
2. Measure and record the inside height of the funnel, using the straightedge to identify a plane from which to measure.

FUNNEL STAND

Measure and record the vertical distance between the funnel opening and the top of the cylinder.

GLASS PLATE

1. Measure and record the width of the glass plate.
2. Measure and record the length of the glass plate.
3. Measure and record the thickness of the glass plate.

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING PROPORTIONAL CALIPERS

Item: Proportional Calipers

Purpose:

This method provides instructions for checking the critical dimensions of proportional calipers used in the determination of flat and elongated particles.

Inspection Equipment Required:

1. Digital calipers readable to 0.01 mm.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

1. Set the device to the appropriate max:min ratio, usually 5:1.
2. Measure and record the width of the minimum opening and the maximum opening.
3. Repeat for at least four additional opening widths

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING DIGITAL CALIPERS

Item: Digital Calipers

Purpose:

This method provides instructions for verifying the accuracy of digital calipers used in the calibration of laboratory equipment.

Inspection Equipment Required:

1. Gage blocks accurate to 0.01 mm.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test methods.

Procedure:

1. Measure gage blocks at a variety of dimensions.
2. Measure and record the caliper measurement.
3. Record the known dimension of the gage block.
4. Repeat for a minimum of three measurements.

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING PROCTOR HAMMERS

Item: Proctor Hammer

Purpose:

This method provides instructions for checking the critical dimensions of the proctor hammers.

Inspection Equipment Required:

1. Calipers readable to 0.02 mm.
2. Tape measure readable to 1mm.
3. Balance, capacity 5 kg, readable to 1 g.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

1. Measure and record the diameter of the rammer face determined by taking two reading 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 g.  
Measure and record the diameters of the vent holes near the end of the hammer.

# Standard Proctor Hammer Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the proctor hammer

Calibration Procedure: In-House Procedure #

Calibration Equipment: Calipers, tape measure, and Scale CL1.

Diameter of Rammer Face: _____	Tolerance = 50.80 +/- 0.25 mm
Drop Height of Hammer: _____	Tolerance = 305 +/- 2 mm
Mass of Hammer: _____	Tolerance = 2.495 +/- 0.009 kg
Vent Hole Diameters: _____	Tolerance = approx. 3/8 inch

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_

## Modified Proctor Hammer Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the proctor hammer

Calibration Procedure: In-House Procedure #

Calibration Equipment: Calipers, tape measure, and Scale CL1.

Diameter of Rammer Face: _____	Tolerance = 50.80 +/- 0.25 mm
Drop Height of Hammer: _____	Tolerance = 457 +/- 2 mm
Mass of Hammer: _____	Tolerance = 4.536 +/- 0.009 kg
Vent Hole Diameters: _____	Tolerance = approx. 3/8 inch

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING PROCTOR MOLDS

Item: Soil Molds used in AASHTO T-99 and AASHTO T-180

Purpose:

This method provides instructions for checking the critical dimensions of 100 mm (4-in.) and 150 mm (6-in.) molds used in soil testing.

Inspection Equipment Required:

1. Calipers, capable of measuring the height and inside diameter of the molds and readable 0.01 mm.

Tolerance:

The height and 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 0.01 mm. Rotate the mold 90-degrees (1/4 turn) and measure and record the inside diameter again.
2. Turn the mold over and repeat Step 1.
3. Measure and record the height of the mold to the nearest 0.01 mm. Rotate the mold 90-degrees (1/4 turn) and measure and record the height again.
4. Measure and record the height of the collar to the nearest 1 mm. Rotate the collar 90-degrees (1/4 turn) and measure and record the height again.
5. Measure and record the inside diameter of the collar to the nearest 0.01 mm. Rotate the collar 90-degrees (1/4 turn) and measure and record the inside diameter again.

# 4" Proctor Mold Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the proctor mold

Calibration Procedure: In-House Procedure #

Calibration Equipment: Calipers

Top Inside Diameter of Mold: \_\_\_\_\_ Tolerance = 101.60 +/- 0.41 mm

Bottom Inside Diameter of Mold: \_\_\_\_\_ Tolerance = 101.60 +/- 0.41 mm

Height of Mold: \_\_\_\_\_ Tolerance = 116.43 +/- 0.13 mm

Height of Collar: \_\_\_\_\_ Tolerance = approx. 60 mm

Inside Diameter of Collar: \_\_\_\_\_ Tolerance = 101.60 +/- 0.41 mm

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_



# 6" Proctor Mold Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the proctor mold

Calibration Procedure: In-House Procedure #

Calibration Equipment: Calipers

Top Inside Diameter of Mold: \_\_\_\_\_ Tolerance = 152.40 +/- 0.66 mm

Bottom Inside Diameter of Mold: \_\_\_\_\_ Tolerance = 152.40 +/- 0.66 mm

Height of Mold: \_\_\_\_\_ Tolerance = 116.43 +/- 0.13 mm

Height of Collar: \_\_\_\_\_ Tolerance = approx. 60 mm

Inside Diameter of Collar: \_\_\_\_\_

Pass/Fail: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING THE LIQUID LIMIT DEVICE  
AND GROOVING TOOL

Item: Liquid Limit Device, Grooving Tool, and Gage

Purpose:

This method provides instructions for checking the critical dimensions of a liquid limit device, grooving tool, and gage.

Inspection Equipment Required:

1. Digital calipers readable to 0.01 mm.
2. Straightedge.

Tolerance:

Equipment shall meet the dimensional tolerances specified in AASHTO T-89.

Procedure:

LIQUID LIMIT DEVICE

1. Measure the diameter of the cup and calculate the radius. Record the radius of the cup.
2. Measure and record the thickness of the cup.
3. Measure and record the depth of the cup using a straightedge to identify a plane from which to measure.
4. Measure and record the distance from the cup at the cam follower to the base.
5. Measure and record the thickness of the base.
6. Measure and record the length of the base.
7. Measure and record the width of the base.

GROOVING TOOL

1. Measure and record the thickness of the curved end.
2. Measure and record the thickness of the cutting edge.
3. Measure and record the width of the curved end.

GAGE

1. Measure and record the depth of the gage.
2. Measure and record the width of the gage.
3. Measure and record the length of the gage.

## Liquid Limit Device and Grooving Tool Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify critical dimensions of the Liquid Limit Device Grooving Tool, and Gage

Calibration Procedure: In-House Procedure #

Calibration Equipment: Calipers, balance reading to 0.1 g, and ruler reading to 1 mm.

Diameter of Cup:	Tolerance = 54 +/- 2 mm
Radius of Cup = (dia./2): _____	
Thickness of Cup: _____	Tolerance = 2 +/- 0.1 mm
Depth of Cup: _____	Tolerance = 27 +/- 1 mm
Cup to Base (at cam follower): _____	Tolerance = 47 +/- 1.5 mm
Thickness of Base: _____	Tolerance = 50 +/- 5 mm
Length of Base: _____	Tolerance = 150 +/- 5 mm
Width of Base: _____	Tolerance = 125 +/- 5 mm
Grooving Tool Thickness: _____	Tolerance = 10 +/- 0.1 mm
Width of Cutting Edge of Tool: _____	Tolerance = 2 +/- 0.1 mm
Width of Grooving Tool: _____	Tolerance = 13.5 +/- 0.1 mm
Depth of Gage: _____	Tolerance = 10 +/- 0.2 mm
Width of Gage: _____	Tolerance = 10 +/- 0.2 mm
Length of Gage:	Tolerance = At least 15.9 mm

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING VACUUM SYSTEMS

Item: Vacuum system used in AASHTO T-209

Purpose:

This method provides instructions for checking the vacuum pressure.

Inspection Equipment Required:

1. NIST Traceable residual manometer or secondary vacuum gauge.
2. Water vapor trap.
3. Hoses, connectors, tools, misc.

Tolerance:

Equipment shall be capable of applying the vacuum specified in the applicable test method.

Procedure:

1. Connect the gauges and/or manometer to the system with the trap in-line between the system and the gauges.
2. Make sure all connections are air-tight.
3. Open the number of lines normally used in testing and read and record the pressure indicated on the gauges and/or on the manometer.

# Vacuum Gauge Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify pressure readings  
Calibration Procedure: In-House Procedure #  
Calibration Equipment: NIST Traceable Residual Manometer or secondary vacuum gauge.

Pressure:	
Primary Gauge/Manometer Rdg. (A)	Sec. Gauge/Man. Rdg. (B)

Acceptable Range: 3.7 +/- 0.3 kPa

Pass/Fail: \_\_\_\_\_

Comments:

Initial By: \_\_\_\_\_

IN-HOUSE PROCEDURE # \_\_\_\_\_

PROCEDURE FOR VERIFYING TIMERS

Item: Timer

Purpose:

This method provides instructions for checking the accuracy of timing devices.

Inspection Equipment Required:

1. Timer, readable to 0.1 sec., having a verified accuracy within the tolerance listed in appropriate test methods.

Tolerance:

Equipment shall meet accuracy requirements specified in the applicable test method.

Procedure:

1. Hold the calibrated timer in one hand and the timer to be checked in the opposite hand.
2. Start the timers simultaneously by pressing the "start" buttons at the same time.
3. Allow the timers to run for at least 15 minutes then stop the timers simultaneously. Record the time indicated by both timers.
4. Record the difference between the two timers. Calculate and record the percent accuracy.

$$\% \text{ accuracy} = \frac{(A - B)}{B} \times 100$$

where A = reading on lab timer (sec)

B = reading on standard timer (sec)

# Timer Calibration Worksheet

Equipment ID: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Location: \_\_\_\_\_

Date: \_\_\_\_\_  
Performed by: \_\_\_\_\_  
Next Calibration Due: \_\_\_\_\_  
Last Calibration: \_\_\_\_\_

Calibration Item: Verify time readings  
Calibration Procedure: In-House Procedure #  
Calibration Equipment:

Time:	
Control Timer Rdg. (A)	Test Timer Rdg. (B)

Calculate % Accuracy:

$$\% \text{ Accuracy} = \frac{(A - B)}{B} \times 100 = \underline{\hspace{2cm}}$$

Comments:

Initial By: \_\_\_\_\_

## **TEST RECORDS AND REPORTS**

This section of the QM contains the following information:

1. A description of the methods used to produce test records and reports, including methods to check and amend reports.
2. Typical data sheets (test report forms) used for all tests covered by the Quality Manual and performed by the laboratory.
3. Samples of completed forms for all tests covered by the Quality Manual.
4. Proficiency Sample test results for methods covered by the accreditation of the laboratory.
5. Sample log containing date, sample ID, project number, description, and remarks concerning the condition of the sample.



## **PROFICIENCY SAMPLE TEST RECORDS**

Test records for each test method covered in the AMRL Proficiency Sample Program are included in this section of the Quality Manual, maintained by the Laboratory Supervisor.

Test results for the AMRL Proficiency Sample Program shall be reported to the administrator of the program by the date indicated for the sample. Copies of the report shall be placed in the Quality Manual after review by the Laboratory Manager.

Proficiency sample test records will be maintained in the Quality Manual for a period of not less than three years. When a proficiency sample test record is more than three years old, it may then be transferred to the historical file.

## **DATA SHEETS**

Sample data sheets for each test method covered in this manual are included in this section. Blank sheets are maintained and available from the Laboratory Manager.

## **SAMPLE REPORTS**

Sample report sheets for test methods covered in this manual are included in this section. Complete project reports are maintained in designated locations, as determined by the Laboratory Manager or the appropriate Area Specialist.

## **SAMPLE LOG**

A sample log of samples received by the laboratory is included in this section. Comments concerning the date of receipt, sample ID, project number, sample description, and remarks regarding the condition of the sample when received are noted on the following pages. Additional information may be available from the Laboratory Manager.

## SUBCONTRACTING

A complete listing of outside sources utilized by the laboratory is included in this section. This listing contains services provided for equipment calibration and verification, equipment rental, training, and testing services (as applicable). Each entry contains the name of the company and/or individual providing the service, address, phone number, and comprehensive description of the services provided by that company or individual. When applicable, proof of pertinent CTPP certifications held by such companies or individuals are included.

<b>Equipment Calibration</b>		
Name	Address / Phone #	Services Provided

<b>Equipment Rental</b>		
Name	Address / Phone #	Equipment Provided*

\*For multiple items, an equipment inventory listing may be more appropriate.

<b>Testing Services</b>		
Lab/Technician Name Laboratory Address	Services Provided	CTTP Certification #

<b>Training / Other</b>		
Name	Address / Phone #	Services Provided