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Proficiency Tests

Asphalt Plant Level I

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AASHTO R47 Reducing Samples of Hot-Mix Asphalt to Testing Size

Asphalt Plant Level II

AASHTO T30 Mechanical Analysis of Extracted Aggregates

AASHTO T166 Bulk Specific Gravity

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VTM - 102 Asphalt Content by Ignition *

AASHTO T312 Preparing & Determining Density of HMA Specimens by Gyratory Compactor **

AWARENESS/IMPORTANT



*No demonstration of "Oven Calibration Factor Procedure" required for Asphalt Plant Level II certification.

**No demonstration of "Preparation of Mixture - Lab Prepared Specimens" required for Asphalt Plant Level II certification.

SAMPLING OF HOT-MIX ASPHALT AT THE PLANT (R&B Specification 211)

1. Sample taken from the approximate center of the truckload? _____
2. Top 6 to 8 inches of material struck off to form proper sampling platform..... _____
3. Sampled using a flat square shovel, horizontally and 8-12 inches below the surface of the sampling platform? _____
4. Enough material sampled to produce one 4.5 kg sample for each party's AC content and gradation sample after quartering?
..... _____
5. Enough material sampled to produce one 12.5 kg sample for each party's volumetric sample? _____
6. Temperature determined and recorded? Max temperature for mix type being produced noted?..... _____

REDUCING SAMPLES OF HOT-MIX ASPHALT TO TESTING SIZE (R47)

From AMRL *Hot-Mix Asphalt Worksheets OSA.F34 HMA - 2 Revised 2013-02-12*

Equipment for **one** of the following methods:

Mechanical Splitter Method

1. Mechanical Splitter Type A _____

- (a) Designed so that the HMA field sample will flow smoothly and freely through the divider without restriction or loss of materials (See Figure 1).
- (b) Splitter has four equal width chutes.
- (c) Four appropriate sized containers.
- (d) Hopper with release handle.

2. Mechanical Splitter Type B? _____

- (a) No less than 8 equal sized openings.
- (b) The openings minimum width must be at least 50% larger than largest particle to be split.
- (c) Hopper or straightedge pan.

3. Approved Release Agent (such as non-stick cooking spray) if used, meets the following criteria? _____

- (a) Does not contain solvents.
- (b) Does not contain petroleum based products that affect binder properties. **Note to Assessors:** *Products such as WD-40 contain solvents and petroleum products, and are not acceptable for this test method.*

Quartering Method:

1. One of the following:

(a) Quartering template? _____

(1) Forms a cross forming 90 degree angles at juncture? _____

(2) Sufficient length (1.1 times the diameter of the flattened cone of HMA to be quartered)? _____

or (b) Straightedges? _____

2. Flat bottom scoop? _____

3. A large spatula, trowel, or piece of metal to be used as a straightedge? _____

4. Non-stick paper or heat resistant plastic? _____

5. Approved Release Agent (such as non-stick cooking spray) if used, meets the following criteria? _____

(a) Does not contain solvents.

(b) Does not contain petroleum based products that affect binder properties. **Note to Assessors:** *Products such as WD-40 contain solvents and petroleum products, and are not acceptable for this test method.*

Incremental Method

1. Flat bottom scoop? _____

2. Non-stick heavy paper or heat-resistant plastic? _____

3. Large spatulas, trowels, metal straightedges, or a 12-in drywall taping knife? _____

4. Hot plate, gloves, buckets, and cans? _____

COMMENTS (R47): (R47) AMRL *Hot-Mix Asphalt Worksheets OSA.F34 HMA - 3 Revised 2013-02-12*

REDUCING SAMPLES OF HOT-MIX ASPHALT TO TESTING SIZE (R47)

Mechanical Splitter Method: *for a large amount of material, Method A should be used whenever possible.*

1. **Optional:** Splitter and accessories heated, not to exceed 110°C as determined with a non-contact temperature device?
2. **Optional:** All surfaces coming into contact with HMA coated with approved release agent?
3. Mechanical Splitter Method (Type A)
 - (a) Field or laboratory sample placed in hopper avoiding sample segregation?
 - (b) Sample containers positioned to receive HMA?
 - (c) Release handle used dropping HMA through chutes?
 - (d) Samples taken from opposing corners for reintroduction into hopper?
 - (e) Split as many times as necessary for appropriate test?
4. Mechanical Splitter Method (Type B)
 - (a) Sample placed in hopper or straightedge pan?
 - (b) Uniformly spread edge to edge?
 - (c) Rate at which sample introduced allows free flow into sample containers?
 - (d) Steps repeated until sample size obtained?

Note: *Unlike C702, the half of the split sample normally regarded as trash may be set aside for reduction in size for other tests.*

Quartering Method

1. Sample placed on a hard, non-stick, clean, level surface?
2. Approved release agent, non-stick paper, or heat resistant plastic may be used to make surface non-stick?
3. Sample mixed to uniformity by turning over four times?
4. Mixed using flat bottom scoop or by alternately lifting each corner of the paper or plastic and pulling toward the opposite corner?
5. During the last turning, entire sample formed into conical pile by depositing each scoopful on top of previous one or by lifting two opposite corners of the paper or plastic?
6. Pile flattening into uniform thickness and diameter by pressing down on the apex?
7. Diameter approximately four to eight times the thickness?
8. A visual check is done to ensure that the material is homogenous?
9. Flattened mass divided into four quarters using quartering template or straightedges?
10. Quartering template pressed down until it has complete contact with surface?
11. Two diagonally opposite quarters selected as "quartered" material?
12. Steps repeated until sample size obtained?

Incremental Method

1. Sample placed on a hard, non-stick, clean level surface covered with non-stick paper, heat resistant plastic, or another suitable material?
2. Sample mixed to uniformity by turning over four times?
3. Mixed using flat bottom scoop or by alternately lifting each corner of the paper or plastic and pulling toward the opposite corner?
4. During the last turning, entire sample formed into conical pile by depositing each scoopful on top of previous one or by lifting two opposite corners of the paper or plastic?
5. A visual check is done to ensure that the material is homogenous?
6. Paper or plastic grasped and material is rolled into a cylindrical roll (loaf) and top of loaf flattened?
7. Paper pulled so that at least ¼ of the length of the loaf is off of the edge of the counter and the portion overhanging the counter sliced off and placed in a container?

- or A straightedge used to slice off approximately $\frac{1}{4}$ of the loaf and material placed in a container? _____
- 8. Additional material removed as needed to obtain test size? _____

COMMENTS (R47): (R47) *AMRL Hot-Mix Asphalt Worksheets OSA.F34 HMA - 4*
Revised 2013-02-12

Mechanical Analysis of Extracted Aggregate

AASHTO T30 (1998)

1. Equipment

- a. Nest of Sieves: upper sieve No. 10 or 16 (2.00 or 1.18mm) sieve.
lower sieve a No. 200 (0.075mm) sieve _____
- b. Oven or hot plate capable of maintaining $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$) _____
- c. Balance capable of weighing to 0.1% of sample mass _____
- d. Woven wire- cloth sieves conforming requirements of M 92 _____

2. Procedure

- a. Sample consisting of all aggregate after extraction _____
- b. Minimum mass of mix sample based on nominal maximum size _____
- c. Sample placed in container and covered with water _____
- d. Wetting agent added _____
- e. Contents agitated vigorously _____
- f. Wash water poured through nest of sieves
Washing continued until wash water is clear _____
- g. Material placed in pan _____
- h. Material dried to constant mass at $230 \pm 9^{\circ}\text{F}$ _____
- i. Material weighed to nearest 0.1 percent _____
- j. Material sieved on specified sieve sizes _____
 - j.1. Sieving continued until not more than 0.5 percent by mass of total
sample passes a given sieve in 1 minute _____
- k. Each fraction of aggregate weighted _____
- l. Summation of aggregate mass check total washed dry mass within 0.2
percent? _____

Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens

AASHTO T166 - 00 Method A

1. Equipment

a. Balance and Suspension:

1. Conforms to M231 for class required for principle sample mass of samples tested _____
2. Suspension from center of balance pan _____
3. Suspension wire of smallest practical size _____
4. Holder and sample completely immersed _____
5. No trapped air bubbles exist under specimen _____
6. Can determine constant mass of specimen to 0.1 percent _____

b. Water Bath:

1. Equipped with overflow outlet _____
2. Deep enough to completely immerse holder and sample _____

c. Room Temperature:

1. Room temperature $77 \pm 9^\circ\text{F}$ ($25 \pm 5^\circ\text{C}$). _____

2. Procedure

- a. Molded specimens cooled to room temperature and weighed. _____
- b. Mass of dry sample in air determined in grams. _____
- c. Sample immersed in water bath. _____
 - c.1. Immersed for 4 ± 1 minutes _____
 - c.2. Water at $77 \pm 1.8^\circ\text{F}$ ($25 \pm 1^\circ\text{C}$) _____
 - c.3. Specimen water height recorded for each specimen _____
- d. Sample removed and blotted with damp towel _____
- e. Saturated surface-dry mass determined _____
- f. Percent water absorbed determined to be less than 2 percent _____
- g. Bulk specific gravity calculated $A/(B-C)$ _____
- h. Bulk specific gravity reported to nearest 0.001 _____

Maximum Specific Gravity of Bituminous Mixtures

AASHTO T209

1. Flask or bowl calibrated _____
 - a. Bowl weighed suspended in water after 10 ± 1 minutes _____
2. Sample obtained by splitting or quartering _____
3. Mass of sample as follows (samples larger than the capacity of the container may be divided into suitable increments, tested and the results averaged).

Largest Particle Size		Minimum Sample Size (g)	
2 in	(50 mm)	6000	_____
1-1/2 in	(37.5 mm)	4000	_____
1 in	(25 mm)	2500	_____
3/4 in	(19 mm)	2000	_____
1/2 in	(12.5 mm)	1500	_____
3/8 in	(9.5 mm)	1000	_____
No. 4	(4.75 mm)	500	_____

4. Particles of sample separated _____
5. Care used not to fracture mineral fragments _____
6. After separating, fine aggregate particles not larger than $\frac{1}{4}$ in (6.3 mm) _____
7. Sample at room temperature _____
8. Bowl weighed in air _____
9. Sample placed in flask or bowl and weighed _____
10. Water at approximately 77°F (25°C) added to cover sample _____
11. Vacuum increased until manometer reads 27.75 ± 2.25 mm Hg _____
12. Entrapped air removed using partial pressure for 15 ± 2 minutes _____
13. Container and contents agitated vigorously by mechanical device or manual shaking at intervals of 2 minutes _____
14. Release of entrapped air facilitated by addition of wetting agent. (optional) _____
15. Release of vacuum by increasing pressure at a rate not exceeding 8 kPa per second _____
16. Bowl and contents immersed in water for 10 ± 1 minutes _____
17. Weight recorded _____
18. Maximum specific gravity calculated and reported to nearest 0.001.
Max. specific gravity = $(C-A) / (C-A)(D-B)$ _____

Percent Air Voids in Compacted Specimens

AASHTO T269

1. Bulk specific gravity determined according to AASHTO T166
2. Maximum specific gravity determined according to AASHTO T209
3. Percent air voids calculated in accordance with the following:

$$\text{Percent air voids} = 100 \times (1 - (G_{mb} / G_{mm}))$$

Ignition Method

Virginia Test Method 102 (VTM-102)

1. Ignition Oven Calibration Factor Procedure

2. Sample Preparation

a. If necessary, mixture warmed in pan ($221 \pm 9^\circ\text{F}$) to constant weight _____

b. Sample obtained by splitting or quartering _____

c. Size of Sample

Nominal Maximum Aggregate Size	Minimum Sample Mass in grams	
1-1/2 in	4000*	_____
1 in	3000*	_____
3/4 in	2000	_____
1/2 in	1500	_____
3/8 in	1200	_____
No 4	1200	_____

* Sample may be split and results combined using weighted average

d. Sample baskets tared and weight recorded _____

e. Sample divided into equal portions for top and bottom basket _____

f. Baskets set in drip pan when loading and care taken not to lose fines _____

g. Sample spread with heated spatula into thin even lift _____

3. Determination of Asphalt Content by Ignition Method

a. Furnace preheated to 538°C (1000°F) _____

b. Correction factor for specific gravity entered _____

c. Sample weight entered and recorded to nearest gram _____

d. Initial sample weight entered and verified in furnace controller _____

e. Sample loaded into furnace and total weight (including baskets) verified prior to initiation of test _____

f. Proper safety equipment worn when loading sample _____

g. Sample removed promptly when audible stable indicator indicates constant weigh achieved _____

- h. Proper safety equipment worn when removing sample _____
- i. Sample allowed to cool to room temperature in safety enclosure _____
- 4. Gradation Determination _____
 - a. Entire contents of sample baskets and drip pan emptied into flat pan, sample baskets cleaned into flat pan with a wire brush _____
 - b. Sample weight determined to nearest 0.1 percent (1 gram for sample sizes greater than 1000 grams) for gradation _____
 - c. Gradation analysis performed in accordance with AASHTO T30 _____

Standard Method for Preparing & Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor

AASHTO T 312 (Was AASHTO TP 4)

1. Gyrotory Compactor
 - a. One from approved list _____
2. Molds
 - a. Inside diameter 149.90 to 150.00 mm _____
 - b. At least 250 mm high _____
 - c. Walls at least 7.5 mm thick _____
3. Ram and base plate faces
 - a. Ground flat _____
 - b. Diameter of 149.50 to 149.75 mm _____
4. Balance - G5 readable to 1 gram _____
5. Forced draft oven thermostatically controlled to $\pm 3^{\circ}\text{C}$ _____
6. Thermometers armored, glass or dial-type with metal stems _____
7. Verification of calibration (following items checked periodically)
 - a. Ram pressure _____
 - b. Angle of gyration _____
 - c. Gyration frequency _____
 - d. LVDT or other continuous height recorder _____
 - e. Mold dimensions _____
 - f. Plate faces _____
 - g. Oven temperature _____
8. Preparation of Apparatus
 - a. Main power switch turned on for required warm up period

- b. Angle, pressure and gyration level set _____
- c. Bearing surfaces lubricated per manufacturer's instruction _____
- 9. Preparation of Mixture – Lab Prepared Specimens *(Not required for Level I)* _____
- 10. Preparation of Mixture - Field prepared samples
 - a. Loose mix brought to compaction temperature by uniform heating _____
- 11. Compaction of Specimens
 - a. Mold, base plate, and upper plate (when required) removed from oven and paper disk placed on bottom of mold _____
 - b. Mixture placed in mold in one lift, leveled and paper disk and upper plate (when required) added _____
 - c. Mold loaded into compactor and compaction started. (recorded to nearest 0.1 mm) _____
 - d. Compactor shuts off when completed _____
 - e. Mold removed and specimen extruded _____
 - f. Paper disks removed _____
 - g. Specimens conform to height requirements of 115 ± 5 mm _____

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