

CITY OF COLUMBUS, OHIO

SUPPLEMENT 1057 LOADED WHEEL TESTER ASPHALT MIX RUT TESTING METHOD

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1057.01 Description. Follow this procedure for preparation and testing of asphalt mix samples a Loaded Wheel Tester.

1057.02 Equipment.

1. 6000 gram scale, 0.1 gram
2. Bowls, spoon, spatula, bullet nose rod
3. Hot plate or burner
4. 3 inch x 3 inch x 15 inch (75 mm x 75 mm x 380 mm) beam mold or gyratory mold
5. Controlled box or room to maintain 105 °F – 115 °F, +/-2 °F (40.5 °C – 46 °C, +/- 1°C)
6. Compression machine that achieves and maintains a 100,000 lb. (445,000 Newton) load, suitable rolling compaction tool or gyratory compactor
7. Loaded Wheel Tester that can test one to three beams in a single run or two to four gyratory specimens in a single run. The device is to be based upon the method developed at the Georgia DOT.
8. 2 ovens
9. 100 psi (5171 mm Hg) air supply
10. Dial gauge and template (automated reading is acceptable provided the manual equipment is available for use and results are initially calibrated with the manual equipment).

1057.03 Sample Preparation (Beams). Individual samples are to be batched to meet actual laboratory density at the optimum asphalt binder content from the JMF. Heat the aggregate, binder and molds to 275 – 350 °F (135° - 175 °C). Two ovens may be necessary to heat molds and aggregate higher than the binder. Compaction temperature need not comply with the JMF compaction temperature since the objective is to obtain density within a specified range, but must be less than 325 °F (165 °C) for non-polymer binder and 350 °F (175 °C) for polymer binder. After mixing, if necessary, reheat the sample to 275° - 350° F in compliance with the

above temperatures. Place the mix in three equal layers into the mold to avoid segregation and spade the sample 30 times with a bullet nose rod. Place filter paper on top of beam and quickly place in the loading machine. Apply and release a chosen load 4 times. Use a load of 60,000 to 90,000 lbs (267,000 to 400,000 Newtons) and keep the same load for all loading of the sample. Next apply the load and allow to remain for 6 minutes. Minor hits or vibration of the mold under load is acceptable but should be noted. Remove load and top plates and allow beam to cool to at least 100 °F (38 °C). Extrude beam from mold or disassemble mold. Measure the bulk density of the beam using City Supplement 1036. Ensure a beam density of 92 - 94% of the maximum specific gravity for 4.0% design air void mixes or 93 - 95% of the maximum specific gravity for 3.5% design air void mixes for continuation of testing. Place beam on a full length flat plate to prevent beam deformation. Cure the beam overnight (12 hour minimum) in the test chamber at the test temperature before testing.

As an alternate to the above method of using a press a rolling compactor may be used.

1057.04 Sample Preparation (Gyratory). Same as above except the mix is placed in the gyratory mold in one batch as directed by Asphalt Institute SP-2 procedures. Compact the specimens the number of gyrations needed to meet the bulk density requirements described above.

1057.05 Loaded Wheel Testing Procedure.

1. Assure stable box or room temperature. (120 °F for non polymer binder mixes. 130 °F for all heavy surface and high stress mixes)
2. Load samples in the frame so that ½ inch (12.5 mm) of the sample is exposed above the frame top.
3. Check hose and cylinder air or static weight settings [100 psi (5171 mm Hg) hose pressure and cylinder pressure or weight to achieve 115 lb (52.2 kg) Wheel Load].
4. Take an initial reading after 5 cycles in the five middle reading slots (beam) or two locations for each specimen at least 1.5 inch (38 mm) in from the specimen circumference (gyratory). This is the 0 point.
5. Take readings at 5, 500, 1000 and 8000 cycles.
6. Record total deformation per sample as that from 5 to 8000 cycles.

1057.06 Test Results. Test a minimum of two samples. Two sample runs within 0.04 inch (1.0 mm) of each other is acceptable for calculating an average final result. Three sample runs within 0.06 inch (1.5 mm) of each other is acceptable for calculating an average final result. Should one of the three sample runs be outside the tolerance use then two sample runs for the final result. Show the third sample run result.

1057.07 Acceptance. Deformation less than 0.20 inch (5.0 mm) is considered passing for most mixes. Deformation less than 0.12 inch (3.0 mm) is considered passing for high stress area mixes.

1057.08 Data Collection. Record all pertinent data used for preparation and from testing of the samples on forms similar to those attached. Send all worksheets if requested.

1057.10 Beam Deformation Readings.

#1 Beam

# Cycles	A	B	C	D	E	Average	Increment. Def.	Cum. Def.
5							0	0
500								
1000								
8000								
							Total	

#2 Beam

# Cycles	A	B	C	D	E	Average	Increment. Def.	Cum. Def.
5							0	0
500								
1000								
8000								
							Total	

#3 Beam

# Cycles	A	B	C	D	E	Average	Increment. Def.	Cum. Def.
5							0	0
500								
1000								
8000								
							Total	

Remarks: