

## **ND T 312 - PREPARING AND DETERMINING DENSITY OF HOT MIX ASPHALT (HMA) SPECIMENS BY MEANS OF THE SUPERPAVE GYRATORY COMPACTOR**

Conduct this procedure according to ND T 312.

Consult the current edition of AASHTO for procedure in its entirety and equipment specification and details.

### **SCOPE**

This test is used to prepare specimens for determining the mechanical and volumetric properties of Hot Mix Asphalt (HMA) using the Superpave gyratory compactor. The specimens simulate the density, aggregate orientation, and structural characteristics obtained in the actual roadway when proper construction procedure is used in the placement paving mix.

### **REFERENCED DOCUMENTS**

NDDOT 5, Sampling and Splitting Field Verification Hot Mix Asphalt (HMA) Samples

AASHTO T 312, Preparing and Determining Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor

### **APPARATUS**

Gyratory Compactor  
Molds  
Thermometers  
Paper disks  
Oven  
Spoon  
Pans  
Funnel  
Fan  
Balance  
Extrusion jack

### **TEST SPECIMEN**

Material used to prepare at least three specimens is obtained from behind the paver as outlined in NDDOT 5.

**PROCEDURE:**Mixture Preparation:

Immediately prior to the time the HMA is ready for compaction, turn on the power to your compactor for the warm up period recommended by the manufacturer.

Next verify the settings on the compactor and, if you are using a computer to record your data, enter your header information.

The mold, base plate, and funnel should be preheated in an oven at 200° to 300°F (93° to 149°C) for 30 to 60 minutes. This will prevent the asphalt mix from sticking to molds during the compaction process and sticking in the funnel during sample preparation.

Heat the asphalt mixture in an oven at  $270 \pm 5^\circ\text{F}$  ( $132 \pm 3^\circ\text{C}$ ).

Compaction Procedure:

When the asphalt mixture reaches  $270 \pm 5^\circ\text{F}$  ( $132 \pm 3^\circ\text{C}$ ), remove the heated mold and base plate from the oven and place a paper disk in the bottom of the mold.

Mix the entire sample, approximately 4700 g, to be compacted with a heated spoon and then carefully put the sample in a funnel. With the funnel, place all the mixture into the mold in one lift.

With a heated spoon or spatula level the mix in the mold and place a paper disk on the top. Load the mold into the compactor and center the loading ram.

Set the pressure, angle setting, and gyrations per minute. Push the start button on the compactor and wait for the compaction process to finish.

When completed, retract the loading ram and remove the mold assembly from the compactor.

The specimens can be removed immediately from the mold after compaction for most HMA mixes. In order to insure the specimen does not get damaged, a cooling period of 5 to 10 minutes in front of a fan may be necessary.

Remove the specimen with an extrusion jack. Remove the paper disks from the top and bottom of the specimen.

**Procedures for "Pine" brand portable gyratory compactors vary from the procedure listed above.**

Place the mold in the machine using the mold tongs, rotating clockwise to the

stops before starting the test. If it is in the correct position, you will be able to see a mold pin in the middle of the retainer cylinder port.

Place the base plate in the mold, beveled side facing down, place paper filter on top, place the funnel on top of mold and pour mix into mold.

Place second filter paper on leveled mix then second base plate beveled side up.

Before closing the compaction chamber, make certain the ram is fully retracted and the gyratory head is parked. Close the machine and clamp it into place. Set the pressure, angle setting, and gyrations per minute. Push the start button on the compactor and wait for the compaction process to finish.

When the compaction process is complete, the gyratory head and hydraulics automatically shut off. At this point the specimen may be extruded from the mold.

The funnel cap is used to hold the mold down in the compaction chamber as the ram pushes the specimen out of the mold. Press the UNLOAD function key twice. The ram pushes the specimen up and out of the mold. Press the Reverse function key to assure that the gyratory head is parked properly. Remove top paper, carefully unclamp and remove the funnel cap. Move the specimen to a nearby flat surface and remove bottom paper. Press the RESET button to lower the ram.

## **NOTES**

Before testing, the gyratory compactor should be calibrated periodically for pressure, height, angle, and rotation to make sure compactor is within specifications.

## **CALIBRATION**

A calibration check of the equipment should be performed annually as a minimum, or whenever damage or repair occurs.