

**OHD L-45
METHOD OF TEST FOR
DETERMINING THE SPECIFIC GRAVITY AND UNIT WEIGHT
OF COMPACTED BITUMINOUS MIXTURES USING THE CORELOK™ APPARATUS**

1. **SCOPE.** This method of test covers the procedures for determining the bulk specific gravity and unit weight of specimens of compacted bituminous mixtures, as defined in the Standard Definitions of Terms Relating to Density and Specific Gravity of Solids, Liquids, and Gases (AASHTO M 132).
 - A. This method may be used as an alternative to AASHTO T 275, "Standard Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens," for testing specimens when Method A or Method B of OHD L-14, "Method of Test for Determining the Specific Gravity and Unit Weight of Compacted Bituminous Mixtures", identifies samples with more than 2.0 percent water absorption or when those samples contain open or interconnected air voids as determined in those methods.
2. **TEST SPECIMENS.** As described in AASHTO T 166, "Standard Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens."
3. **APPARATUS.** The additional apparatus shall consist of the following:
 - A. CoreLok™ Apparatus, an automatic vacuum sealing apparatus for sealing specimens as described in the procedural section.
4. **PROCEDURE.**
 - A. This procedure may be used after Method A of OHD L-14 or concurrently with Methods A or B of OHD L-14 in those cases where the percent water absorbed exceeds 2.0 percent or when specimens contain open or interconnected air voids as defined in those methods.
 1. Bring the specimen to room temperature at $77^{\circ} \pm 9^{\circ}$ F ($25^{\circ} \pm 5^{\circ}$ C).
 2. Record the specimen initial weight to the nearest 0.1 gram (E).
 3. Seal the specimen in the CoreLok™ in a calibrated bag.
 - (a). The vacuum pump should run for 45 seconds.
 - (b). Set the sealing bar timer to a setting that ensure complete sealing. A setting of 4 is generally adequate for most bags. The bag should not be stretched or burned. This would indicate a setting too high.
 - (c). Place specimen into the appropriately sized bag. Specimens of 4 inches (100mm) and 6 inches (150mm) diameter and less than 2" (50mm) in height typically only require a small bag. The large bag may be required should the specimen exceed these dimensions.
 - (d). Grip the specimen with one hand while holding the bag in the other and slip the specimen into the bag. There should be near one inch of slack between the specimen and the back end of the bag. Gently position bag and specimen onto the sliding plate. The smoother side of the specimen should rest on the sliding plate to reduce the chance of punctures in the bag. Filler plates may need to removed or added. Use as many filler plates as possible but do not force the lid down or allow the lid to touch the specimen.
 - (e). Position the sealed specimen in the vacuum chamber to overlap the open end on the sealing bar by at least one inch. Check the bag to ensure no wrinkles along the sealing bar.

- (f) Close the lid. Hold down firmly for two to three seconds. The vacuum pump will start, the pump timer red indicator will light, and the cycle will begin. Shortly after the vacuum begins, stop holding the lid down as it will stay closed on its own at that point. As the automatic cycle begins the vacuum gauge needle will move up to 28 to 30 inches of mercury mark. A minimum of 10 TORR is required. The vacuum should be verified with a calibrated vacuum gauge twice a year. The bag will appear to puff up and this is normal. When the seal bar indicator light comes on the seal bar raises up, pinches the bag shut and heat seals it. Once sealed, the de-vac valve opens and air reenters the chamber. Since the inside of the bag is still evacuated, the atmospheric pressure outside the bag will collapse it tightly around the specimen.
- (g) Carefully remove the sample from the chamber. Pull gently on the plastic to ensure that the bag is tightly conformed to the sample. A loose bag indicates an air leak and the process must be redone.
4. Carefully weigh the sealed specimen in air and record to nearest 0.1 gram . Take care not to puncture the bag during this process.
5. Within two minutes after sealing, immerse the sealed specimen in the water bath at $77^{\circ} \pm 2^{\circ} \text{ F}$ ($25^{\circ} \pm 1^{\circ} \text{ C}$) until the weight stabilizes. The plastic is easily punctured so, care must be taken to ensure no punctures occur during this process. A vinyl coated specimen holder for the water bath is generally provided with the CoreLok™ apparatus. Do not allow the bag to touch the sides of the water bath. The bag and specimen must be completely immersed in water. Record the immersed weight (C) to the nearest 0.1 gram.
6. Remove the sealed specimen from the water bath and remove the plastic bag. Care should be taken to not damage the specimen during bag removal. Weigh the specimen and compare to the initial weight. Consider the test invalid and repeat the test should more than one gram of weight be gained or more than 3 grams be lost. A mass loss may indicate a testing error.
7. Record the dry weight from Methods A or B air weight of OHD L-14 as applicable to the nearest 0.1 gram as (A).
8. Record the bag volume correction (CV) to nearest 0.001 as specified from the bag manufacturer (Instrotek, <http://www.instrotek.com>) for each shipment of bags. The manufacturer will supply a bag correction CV value or formula appropriate for those calibrated and approved bags. The formula for CV determinations are shown in the following steps below. Use the most current correction as given by the manufacturer.

The CV for bags ≥ 35 grams (B-E) is:

$$CV = 0.8596 - 0.00166 \frac{A}{B - E}$$

Where:

- CV* = Bag Volume Correction
A = Dry weight of specimen in air
B = Sealed weight in air
E = Initial weight of specimen

The CV for bags < 35 grams is:

$$CV = 0.8121 - 0.000566 \frac{A}{B - E}$$

9. Compute and record the specimen bulk specific gravity (G_{mb}). Round and report the value to the nearest 0.001.

$$G_{mb} = \frac{A}{(B - C) - \frac{(B - E)}{CV}}$$

Where:

- G_{mb} = Specimen Bulk Specific Gravity
 C = Sealed specimen weight in water

NOTE: The Bulk Specific Gravity of a lab-molded specimen is commonly referred to as the Lab-molded Specific Gravity. The Bulk Specific Gravity of a roadway core is commonly referred to as the Core Specific Gravity.

5. CALCULATIONS.

- A. Calculate the unit weight in kg per m³ or lbs per ft³ (pcf) as follows (round and report to the nearest whole number):

$$Unit\ Weight = G_{mb} \times 1000$$

or

$$Unit\ Weight = G_{mb} \times 62.4$$

Revision Date	Revision Description
12/05/2003	On Page 2 of 3, step 8. Underneath the formula for CV, revised B = Sealed weight in water to B = Sealed weight in air.
8/09/2007	In section 1.A., corrected the title of OHD L-14 by deleting "Using the CoreLok™ Apparatus." In sections 1.A. and 4.A., changed "2.00 percent water absorption" to "2.0 percent water absorption." In section 4.A., changed "Methods A or C of OHD L-14" to "Methods A or B of OHD L-14."
10/24/08	In section 1.A., changed "Method A or Method C of OHD L-14" to "Method A or Method B of OHD L-14." Minor formatting changes throughout the document.