BULK SPECIFIC GRAVITY AND DENSITY OF COMPAKTED ASPHALT MIXTURES USING AUTOMATIC VACUUM SEALING METHOD
AASHTO T 331

APPARATUS

[ ] Balance, sufficient capacity for sample, readable to 0.1 g or better, in accordance with AASHTO M 231
[ ] Rubber protective pad
[ ] Suspension apparatus
[ ] Center of balance pan
[ ] Suspension wire of smallest practical size
[ ] Holder and sample completely immersed
[ ] Water bath, equipped with an overflow outlet
[ ] Cushioned holder, having no sharp edges
[ ] Vacuum chamber
[ ] Pump capable of evacuating a sealed and enclosed chamber to 5 mm Hg (5 torr) vacuum in 60 s
[ ] Chamber large enough to seal samples of 6 in wide by 14 in. long by 6 in. thick
[ ] Sealing bar, located inside chamber, of sufficient length to fully seal small and large size bags
[ ] Automatically seals plastic bag and exhausts air back to chamber in controlled manner to ensure proper conformance of plastic bag to specimen
[ ] Air exhaust system calibrated to bring chamber to atmospheric pressure in 80 to 120 s after completion of vacuum operation
[ ] Latch to control chamber door opening
[ ] Vacuum gauge, capable of being placed inside of vacuum chamber, with a minimum range of 10 to 0 mm Hg (10 to 0 torr) and readable to a minimum of 1 mm Hg (1 torr)
[ ] Plastic bags
[ ] Small bag, minimum opening of 9.25 in. and maximum opening of 10.25 in. with a weight of less than 35 g
[ ] Large bag, minimum opening of 14.75 in. and maximum opening of 15.5 in. with a weight of 35 g or more
[ ] Will not adhere to asphalt film
[ ] Puncture resistant
[ ] Capable of withstanding sample temperatures of up to 158 °F
[ ] Impermeable to water
[ ] Contains no air channels for evacuation of air from bag
[ ] Minimum thickness of 0.004 in. and maximum thickness of 0.006 in.
[ ] Specimen sliding plates
[ ] Bag cutting knife or scissors
[ ] Drying oven, or vacuum chamber in accordance with ITM 572
[ ] Thermometer, ASTM 17F, range 66-80 °F with subdivisions of 0.2 °F, or electrical temperature measuring device having the same subdivisions
SPECIMENS

[ ] Diameter of cylindrically molded or cored specimens, or length of sides of sawed specimen, at least four times the maximum size of aggregate
[ ] Thickness of specimen at least one and one half times maximum size of the aggregate
[ ] Specimen not distorted or cracked
[ ] Specimen free of foreign materials, such as seal coat, tack coat, foundation material, soil, paper, or foil
[ ] Specimen does not have jagged edge or sharp aggregate

PROCEDURE -- INITIAL WEIGHT OF SPECIMEN IN AIR

Laboratory Prepared Specimen

[ ] Weight of specimen determined after specimen has cooled to room temperature at 77 ± 9°F (A). Lab molded specimens may be considered at room temperature after 2 hours of cooling under a fan.

Cores and Specimens Containing Moisture

[ ] Specimen dried to constant weight (Note 1) and weight determined (A). Samples may initially be dried overnight at 125 ± 5°F and then weighed at 2-hour drying intervals or vacuum dried according to AASHTO R79.

Note 1 -- Constant weight is defined as the weight at which further drying at 125 ± 5°F does not alter the weight by more than 0.05 percent

PROCEDURE -- SEALING SPECIMEN

[ ] Appropriate size bag selected.
[ ] For all 4 in. diameter samples, and samples with 6 in. diameter and less than 2 in. thickness, smaller bag used
[ ] For 6 in. diameter samples with greater than 2 in. thickness, larger bag used
[ ] Heat sealing bar temperature set according to manufacturer’s recommendations
[ ] Bag weighed and mass recorded
[ ] Bag placed inside vacuum chamber on top of specimen sliding plate
[ ] Bag gently opened and specimen, with the smoothest side on the bottom, placed in the bag on top of specimen sliding plate
[ ] Unsealed end of bag grabbed on each side at the unsealed end and gently pulled and centered over the seal bar, overlapping the bag at least 1 in.
[ ] Vacuum chamber allowed to remove air from chamber and bag. (Vacuum chamber automatically seals the bag once the air is removed)
[ ] Air exhausted into chamber until chamber door opens indicating atmospheric pressure within chamber
[ ] Sealed specimen removed from vacuum chamber and handled with extreme care to prevent puncturing the bag
PROCEDURE -- SPECIMEN WEIGHTS

[ ] Weight of the bag added to the dry weight of the specimen \((A)\) and recorded as the sealed specimen mass \((B)\)

[ ] Weight of sealed specimen in a water bath at \(77 \pm 2^\circ F\) determined \((E)\)

[ ] Duration of test from the lid opening after sealing and the time to placement of the specimen into the water bath does not exceed 1 minute

[ ] Specimen removed from bag and weighed \((C)\)

[ ] Weight of the specimen \((C)\) subtracted from the initial dry weight of the specimen \((A)\). Test is considered valid if less than 0.08 percent is lost or no more than 0.04 percent is gained. (A loss indicates sample material loss and a gain indicates a possible bag leakage problem)

[ ] Bulk Specific Gravity of sealed specimen calculated correctly to three decimal places (0.000) as follows:

\[
\text{Bulk Specific Gravity} = \frac{A}{[C + (B - A)] - E - \frac{B - A}{F}}
\]

where:
- \(A\) = initial dry weight of specimen in air, g
- \(B\) = calculated weight of the dry, sealed specimen, g
- \(C\) = final weight of specimen after removed from sealed bag, g
- \(E\) = weight of sealed specimen in water, g
- \(F\) = calculated apparent specific gravity of plastic sealing material at 77°F

NA - Not Applicable
\(X\) - Requires Corrective Action
\(\sqrt{\ }\) - Satisfactory

________________________________________________________________________
Acceptance Technician

________________________________________________________________________
INDOT          Date

Comments: ____________________________________________________________________
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