ARIZ 412b
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(4 Pages)

DENSITY OF COMPACTED BITUMINOUS MIXTURES - NUCLEAR METHOD

(An Arizona Method)

SCOPE

1. (a) This method is used to determine the in-place density of compacted layers of bituminous mixtures by use of nuclear apparatus.

(b) This test method involves hazardous materials, operations, and equipment. This test method does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this test method to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

(c) Safety procedures for operation, transport and storage of nuclear gauges shall be in accordance with the manufacturer's recommendations and the applicable regulations of the Arizona Radiation Regulatory Agency (ARRA).

APPARATUS

2. The apparatus shall consist of the following:

(a) Moisture/Density Nuclear gauge capable of determining densities by the backscatter method. Calibration of the gauge shall be performed in accordance with AASHTO T310, Annexes A1, A2 and A3, on an annual basis.

(b) Reference standard block or test stand to obtain standard counts for moisture and density which are used to check the gauge stability.

(c) Nuclear gauge transport case and labels which comply with A.R.R.A. Regulations.

(d) Charging cord, if applicable.

(e) Radiation exposure badge (if required by license .with A.R.R.A.)

(f) Information packet for the nuclear gauge which shall contain the following items:

(g) Moisture/Density Calibration Tables (if required), and a standard count log book.

(h) Manufacturer's Gauge Operation Manual for the nuclear gauge.

(i) Applicable documentation necessary to meet requirements of ARRA for gauge safety.

(j) Blank test forms for use on the applicable nuclear gauge.

(k) Calculator for necessary computations.

(l) Miscellaneous equipment including watch, pencils, writing paper, ruler, eraser, clip board, and hand cart as required.

GAUGE STABILITY CHECK

3. A density standard count and moisture standard count shall be taken at the beginning of each day of testing at the project where the field density testing is to be performed. The gauge stability check shall be performed as follows:

(a) Place the reference standard block on any asphalt, concrete, compacted aggregate or similar surface which is dry and level. The reference standard block should be at least at least 15 feet away from any large object, or vehicle, and at least 50 feet away from another nuclear gauge.

(b) Seat the nuclear gauge on the reference block in accordance with the gauge operation manual. It is very important that the gauge is seated properly on the standard reference block.

(c) Remove the lock on the source handle and make sure the source handle is in the safe or stored position (the top notch on the index rod).

(d) Turn the gauge on (in standby power condition) and allow it to warm-up, if necessary, for the recommended time as given in the gauge operation manual.

(e) After the warm-up period, take a standard moisture count and a standard density count in accordance with the gauge operation manual.

(f) Record the moisture and density standard counts in the proper columns of the standard count log book along with the appropriate additional information, such as date, time, temperature, and location.

(g) Return the gauge to the standby power condition. The gauge should be left in the standby mode for subsequent testing.

(h) Determine if the standard counts are within the limits for normal operation in accordance with the gauge operation manual. This is usually done by comparing the standard counts to the average of the four previous standard counts or utilizing an internal statistical test which is available on some gauges. Additional standard counts may be necessary if initially the gauge does not appear to be operating properly. If the gauge does not meet the normal operating parameters as specified by the Standard Count procedure in the gauge operation manual, the gauge should not be used for testing. It should be sent in for servicing to determine the problem.

NOTE: Some gauges will store standard counts for later use in calculations performed by the gauge itself. The most recent standard counts will usually be stored automatically over pre-existing standard counts

(i) On a weekly basis, compare the average of the four most recent standard counts with the average of four standard counts immediately after gauge calibration or at least three months previous, whichever is shorter. If the accumulative shift in standard count exceeds 2% for moisture or 3% for density, the nuclear gauge should be recalibrated.

PROCEDURE

4. (a) At each location to be tested, two one-minute readings shall be obtained by taking the first reading and recording the wet density to the nearest 0.1 lb. per cu./ft. then rotating the gauge 180° (making sure that the gauge is set in the same footprint as the first reading) and taking another reading and again recording the wet density to the nearest 0.1 lb. per cu./ft. The two reading are then averaged.

(b) Normally the preparation of the surface for taking readings at each location shall not include the removal of any material for the purpose of making it more

smooth, except that particles which are completely unattached and merely lying loose on top of the compacted and bound mixture shall be brushed away. Not more than one pound of dry fine sand (minus #10 material) shall be spread over each location and then scraped away with a straightedge so that the mixture is visible over the majority of the surface.

PRECAUTIONS

5. (a) Except when actually in use performing tests, the gauge and its accessories are to be kept within the A.R.R.A. (Arizona Radiation Regulatory Agency) approved carrying case, to protect it from damage and to provide better radiation shielding for persons in its vicinity