



Wisconsin Department of Transportation



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TO: Consultant and Contractor Working For WisDOT

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**SUBJECT: Nuclear Gauge Policy for Operation on WisDOT Projects
Acceptance and QMP Density Testing**

In the year 2016 construction season, all nuclear density testing for improvement projects and all acceptance testing and sampling is required to be done by certified technicians. Certified samplers and testers is a FHWA requirement of CFR 23 part 637. Only the University of Wisconsin Platteville as part of the Highway Technician Certification Program (HTCP) offers the Nucdensitytec-I class.

Attached you will find policy information for the operation of ALL nuclear gauges on WisDOT administered projects, including WisDOT, consultant and contractor gauges. WisDOT has established a list of consultants and contractors gauges approved to perform nuclear testing on WisDOT administered projects. Consultants and contractors gauges must be on this list in order to perform nuclear gauge testing on WisDOT projects for the season. This list is established and will be maintained by the Quality Assurance Unit in central office and will be accessible to all WisDOT projects. This information is available on the WisDOT approved products web site at <http://www.dot.wisconsin.gov/business/engrserv/approvedprod.htm>. **To verify that we have the correct information for your company, you are required to submit the following information yearly:**

1. Current copy of your Wisconsin Agreement State License or Your Federal Nuclear Regulatory Commission (NRC) license and copy of your Reciprocity.
2. Copies of current 3 or 5 block calibration certificates conducted by manufacturer or calibration service for each gauge.
3. Company contact person, RSO or Safety Officer, (please update as changes occur). E mail address and cellular phone number if applicable.
4. Copies of the WisDOT block calibration test results for each gauge. The test blocks are located at 2841 Industrial Street, Wisconsin Rapids, WI 54495. To schedule an appointment please contact Mike Bohn 608-516-6359 or email at michael.bohn@dot.wi.gov

Please send this information to:

michael.bohn@dot.wi.gov

Wisconsin Department of Transportation
ATTN: WisDOT RSO
2841 Industrial Street
Wisconsin Rapids, WI 54495

Please contact the region Materials Section if you have any questions regarding the following information. If further assistance is needed, contact Mike Bohn, WisDOT Radiation Safety Officer, at (608) 243-5998 Office or (608) 516-6359 Cellular.

OPERATION OF NUCLEAR GAUGES ON WisDOT PROJECTS

To comply with DHS and Federal regulations, protect the safety of operators and the public, and maintain acceptable accuracy of measurement, all gauge operators will be required to comply with all DHS and WisDOT directives, rules and policies pertaining to nuclear testing operations. Such compliance will include, but not be limited to, the following items:

1. When an accident including a lost or stolen gauge, stuck source, damaged gauge or a gauge involved in a vehicle accident occurs, follow your emergency procedures including contacting the Radiation Safety Officer.
2. All accidents involving nuclear density gauges must be reported to the WisDOT RSO at (608) 243-5998 (work) or (608) 516-6359 (cell) and DHS at (608) 267-4797, during daytime hours or the 24 emergency number at (608) 258-0099. When using the 24-hour emergency number indicate this is a “radiological incident.”
3. For the reporting requirements see DHS 157.13(17) (b) 2 and DHS 157.32(1).
4. Authorized User Training will satisfy your license requirements.
5. Transportation of gauges will be in an approved, properly labeled and locked transport Type “A” case. A shipper Declaration of Dangerous Goods or a bill of lading will be properly displayed. When the gauge is not directly under direct supervision, the gauge must be locked in its transport case and protected by two separate physical barriers.
6. Evidence will be provided to ascertain that gauges maintain acceptable levels of calibration. All gauges used on WisDOT projects will have a documented three or five block calibration conducted by the manufacturer or calibration service within the last 12 months.
7. Storage of nuclear gauges will meet both WisDOT and DHS requirements.
8. All operators will wear an appropriate personally issued Thermo Luminescent Dosimeter or Film Badge, or OSL badge per DHS 157.25(2) (a) 6.

“NOTE” The operator need not wear a badge if their DHS Radioactive Materials License or NRC license excludes the use of testers using badges.

9. All companies must have available an appropriate radiation survey meter in accordance with DHS 157.05(3).

10. Survey meter must be calibrated annually by a licensed calibration facility.
11. All accidents or incidents involving nuclear gauges will be resolved in accordance with individual license requirements and/or with WisDOT and DHS policies and procedures.
12. Periodic review of nuclear density gauge operation and procedures will be conducted by WisDOT RSO, deficiencies will be discussed with the operator(s) and the operator(s) will take corrective actions.
13. The duration of density tests will be four (4) minutes for Troxler, CPN, Humboldt gauges and two (2) minutes in both the contact and the air gap position for Seaman gauges for quality assurance.

USE OF NUCLEAR GAUGES ON HMA

1. It is highly recommended that moisture density gauge used on WisDOT projects be checked out on WisDOT regional reference check blocks to ascertain their calibration is within 1.0 pound per cubic foot of our block values. Gauges will be warmed up if required in the manufacturer's guidelines. The regions have the ability to require gauges to be checked on their reference blocks prior to working on WisDOT projects.
2. The region and contractor will establish a reference site approved by both the department and contractor. Clearly marked out on a flat surface of concrete or asphalt or other material that will not be disturbed. Perform correlation monitoring with the QC, QV, and all back up gauges at the project reference site.
3. Conduct an initial 10 density tests using the gauge on the project reference site, and calculate the average value to establish the reference value for each gauge. Use the gauge reference value as a control to monitor the calibration of the gauge for the duration of the project.
4. Check the gauge on the project reference site a minimum of 1 test per day if paving.
5. If a single gauge reading on the reference site deviates more than 1.5 lb/ft^3 from the 10-test average for that gauge. The operator must investigate and conduct an additional 5 tests on the reference site. If the gauge does not fall within allowable tolerances contact WisDOT RSO and region contact person immediately.
6. On days that the QC, QA, or QV tester is performing tests for the project he or she must take a new standard count on the material being tested.
7. During testing, the gauge will always be set on a flat and level surface on the material being tested. A new standard must be taken on the grade before testing.

8. During tests, the following minimum distances of a gauge will be maintained
 - a) Pavement construction joints > 20 feet
 - b) Operator > 3 feet
 - c) Bystanders > 15 feet
 - d) Equipment, manholes, etc.> 15 feet
 - e) Other nuclear devices > 30 feet
 - f) Unrestricted edge of pavement > 1.5 feet
 - g) Restricted edge of pavement > 1 foot
9. During testing, the gauge will always be set on a flat surface, with the longest dimension of the gauge parallel to the edge of the pavement. Mark out gauge outline and show direction of source.
10. The duration of density tests will be four (4) minutes for Troxler, CPN, Humboldt gauges and two (2) minutes in both the contact and the air gap position for Seaman gauges for quality assurance.
11. Record on the pavement the lot number, test #, and the % compaction for all acceptance and verification tests.

Documentation:

The following data will be recorded using WisDOT data work sheets.

-  Standard Block Data – Density Standard, Moisture Standard
-  New Density & Moisture Standard Must Be Taken Every Day There Is Placement Of HMA Material That Requires Density Testing.
-  Density Count, Moisture Counts or Contact, Air Gap
-  Total / Wet Density or Bulk Density
-  % Compaction
-  Manufacture Name and Serial Number
-  Operators Name
-  Mix Design Number and Target Number (Gmm) X 62.24

USE OF NUCLEAR GAUGES ON SOILS, BASE COURSES, ETC.

1. It is highly recommended that moisture density gauge used on WisDOT projects be checked out on WisDOT regional reference check blocks to ascertain their calibration is within 1.0 pound per cubic foot of our block values. Gauges will be warmed up if required in the manufacturer's guidelines.
2. The region and contractor will establish a project reference site approved by both the department and the contractor. Clearly marked out on a flat surface of concrete or asphalt or other material that will not be disturbed during the duration of the project. Perform correlation monitoring with the QC and QV, and all back up gauges at the project reference site.
3. Conduct an initial 10 density tests using a gauge on the project reference site and calculate the average value to establish a reference value. Use the reference value as a control to monitor the calibration of the gauge for the duration of the project.
4. Check the gauge on the project reference site a minimum of 1 test per day during placement of all material placed within the 1 to 1 slopes on project and compare to the reference value. Maintain the reference site test data for each gauge at an agreed location.
5. If a single gauge reading on the reference site deviates more than 1.5 lb/ft^3 from the 10-test average for that gauge. The operator must investigate and conduct an additional 5 tests on the reference site. If the gauge does not fall within allowable tolerances contact WisDOT RSO and Region contact person immediately.
6. If the department supplies a ValiDator II for the established project reference site conduct an initial 5 density tests at the depth that will be tested in the field. Use the gauge reference value as a control to monitor the calibration of the gauge for the duration of the project. Check each gauge on the project ValiDator II a minimum of one test per day at each testing location during placement of materials on the project. Calculate the difference between the gauge's daily test result and its reference value. Investigate if a daily test result is not within 1.0 lb/ft^3 of its reference value. Conduct 5 additional tests at the reference site once the cause of deviation is corrected. Calculate and record the average of the 5 additional tests. Remove the gauge from the project if the 5-test average is not within 1.0 lb/ft^3 of its reference value.
7. On days that the QC, QA, or QV tester is performing tests for the project he or she must take a new standard count on the material being tested.
8. During tests, the following minimum distances of a gauge will be maintained from:
 - a) Operator > 3 feet
 - b) Bystanders > 15 feet minimum
 - c) Equipment, manholes, etc.> 15 feet
 - d) Other nuclear gauges > 30 feet

9. The gauge will be placed on a prepared surface with no more than 1/16" void and only native material used as filler.
10. Position the gauge handle to the appropriate test location in either **BS, 2", 4", 6" or 8"** depth. Test will not exceed the depth of the compacted layer.
11. After each test the operator must dig up the material below the gauge and check for voids, cobbles and or organics that could change test results.
12. The duration of density tests will be four (4) minutes for Troxler, CPN, Humboldt and Seaman gauges with direct transmission. For Seaman gauges using backscatter the duration will be (2) minutes in both the contact and the air gap position.
13. If the gauge needs to have a moisture bias for a specific soils the gauge operators needs to conduct 2 random test locations for that soils type. After each moisture/density gauge test has been completed the material directly below the gauge will be retained and a 1 point proctors will be run at its natural moisture. Compare average natural moistures to the gauge moisture reading and if necessary compute moisture bias.
14. All proctor tests will have a minimum of 4 or 5 points 2 ascending and 2 descending and 1 at or near the optimum the moisture curve.

Documentation:

The following data must be recorded on all WisDOT project data work sheets:

-  Standard Block Data – Density Standard, Moisture Standard
-  Density Count, Moisture Counts or Contact, Air Gap
-  Total / Wet Density or Bulk Density
-  Dry Density or Bulk Density Dry
-  Moisture # and Moisture %
-  Proctor Number and Target Number
-  Pit Number, Grading area, Soils Classifications, Elevation
-  % Compaction
-  Manufacture Name and Serial Number
-  Operators Name