



Wisconsin Department of Transportation

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Jim Doyle
Governor

Frank J. Busalacchi
Secretary

Division of Transportation Systems Development
Bureau of Technical Services - Truax Center
3502 Kinsman Blvd.
Madison, WI 53704
Telephone: 608-246-3246
FAX: 608-246-4669

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TO: Consultant and Contractor Working For
WisDOT

FROM: Steven W. Krebs, PE
Chief Quality Management Engineer

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

In the year 2010 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 nucdensity tec-1 class.

Attached you will find policy information for the operation of ALL Nuclear Moisture /Density Gauges on WisDOT administered projects, including all consultant and contractor gauges. WisDOT has established a list of consultants and contractors approved to perform nuclear testing on WisDOT administered projects. Consultants and contractors must be on this list in order to perform nuclear gauge testing on WisDOT projects. This list is established and will be maintained by the Quality Assurance Unit in central office and will be accessible to all WisDOT districts. Prior to each construction season, and following any calibration of the gauge, the contractor must perform calibration verification for each gauge using the reference blocks located in the department's central office materials laboratory. To obtain information or schedule a time to perform calibration verification, contact the department's Radiation Safety Officer at the Materials Management Section, 3502 Kinsman Blvd., Madison, WI 53704 Telephone: 608-243-5998 Cell 608-516-6359

This information is available on the WisDOT Materials Tracking web site at www.infosite4u.com.

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.
3. Copy of current calibration of company's radiation survey meter.
4. Company contact person, RSO or Safety Officer, (please update as changes occur).
5. E-mail address if applicable

Please send this information to: WisDOT

Div. Transp. Infrastructure Devel. Truax Center
ATTN Robert Schiro
3502 Kinsman Blvd.
Madison WI 53704-2507

The approved list will only have the gauges that have been verified and passed the blocks in central office. If further assistance is needed, contact Robert L. Schiro, WisDOT Radiation Safety Officer, at (608) 243-5998 Office (608) 516-6359 Cellular.

OPERATION OF NUCLEAR GAUGES ON WisDOT PROJECTS

To comply with DHFS and Federal regulations, protect the safety of operators and the public, and maintain acceptable accuracy of measurement, all gauge operators shall be required to comply with all DHFS and WisDOT directives, rules and policies pertaining to nuclear testing operations. Such compliance shall 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 DHFS 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 HFS 157.13(17)(b) 2 and HFS 157.32(1).
4. Authorized User Training shall satisfy your license requirements.
5. Transportation of gauges shall be in an approved, properly labeled and locked transport Type "A" case. A shipper Declaration of Dangerous Goods or a bill of lading shall be properly displayed. When the gauge is not directly under direct supervision, the gauge must be locked in it's transport case and protected by two separate physical barriers.
6. Evidence shall be provided to ascertain that gauges maintain acceptable levels of calibration. All gauges used on WisDOT projects shall 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 shall meet both WisDOT and DHFS requirements.
8. All operators shall wear an appropriate personally issued Thermo Luminescent Dosimeter or Film Badge, or OSL badge per HFS 157.25(2)(a) 6.
9. All companies must have available an appropriate radiation survey meter in accordance with HFS 157.05(3).

10. Survey meter must be calibrated annually by a licensed calibration facility.
11. All accidents or incidents involving nuclear gauges shall be resolved in accordance with individual license requirements and/or with WisDOT and DH&FS 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) shall take corrective actions.
13. The duration of density tests shall 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. The Region may require the moisture density gauge used on WisDOT projects be checked out on WisDOT Regional calibration / reference check blocks to ascertain their calibration is within 1 pound per cubic foot of our block values. Or the contractor can use their own reference block if checked and approved by the department. Gauges shall 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 or contractor will establish a reference site approved by the department. Clearly marked out on a flat surface of concrete or asphalt or other material that will not be disturbed. Perform correlation monitoring with the QA, QV, and all back up gauges at the project reference site. The region may require a project reference site on projects.
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 shall 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 shall 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 shall 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 shall 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 shall be recorded using WisDOT data work sheets.

- .  Reference Site / Block Data (Daily Nuclear Calibration Check)
- .  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. The Region may require the moisture density gauge used on WisDOT projects be checked out on WisDOT Regional calibration / reference check blocks to ascertain their calibration is within 1 pound per cubic foot of our block values. Or the contractor can use their own reference block if checked and approved by the department. Gauges shall 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 or contractor will establish a project reference site approved by the department. 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, QA, 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/ft³ 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 tests, the following minimum distances of a gauge shall be maintained from:
 - a. Operator > 3 feet
 - b. Bystanders > 15 feet minimum
 - c. Equipment, manholes, etc. > 15 feet
 - d. Other nuclear gauges > 30 feet
8. The gauge shall be placed on a prepared surface with no more than 1/16" void and only native material used as a filler.
9. Position the gauge handle to the appropriate test location either **BS, 2", 4", 6" or 8"** depths. Test shall not exceed the depth of the compacted layer.
10. 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.

11. The duration of density tests shall be four (4) minutes for Troxler, CPN, Humboldt and Seaman gauges with direct transmission. For Seaman gauges using backscatter the duration shall be (2) minutes in both the contact and the air gap position.
12. If the gauge needs to have a moisture biases for a specific soils the gauge operators needs to conduct 5 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 shall be run at its natural moisture. Compare average natural moistures to the gauge moisture reading and if necessary compute moisture bias.

Documentation:

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

- .  Reference Site / Block Data
- .  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