

# **Performance Graded Asphalt Binder Quality Control/Quality Assurance Program**

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Compiled by  
The North Carolina Department of Transportation  
Materials & Tests Unit

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## Revisions

See the website for the latest revision updates:

Click on <https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Method=MM-02-02#BINDER%20AND%20EMULSION%20QC/QA%20PROGRAMS>

then scroll down to “Binder and Emulsion QC/QA Programs” and click the document titled Binder Revisions.

## **I. GENERAL DESCRIPTION**

The Performance Graded Asphalt Binder (PGAB) Quality Control (QC)/Quality Assurance (QA) Program is designed to give producers/suppliers (henceforth designated as “producer”) more responsibility for controlling the quality of material they produce and to utilize the QC information they provide in the acceptance process by the North Carolina Department of Transportation (NCDOT). It requires producers to perform QC sampling, testing and record keeping on materials they ship for use by the NCDOT. In addition, the producer is required to participate in Independent Assurance (IA) sampling activities described in Section III (D). Also, it requires the NCDOT to perform QA verification sampling, testing and record keeping confirming the performance of the producer’s quality control plan. The types of samples and the lot sizes required will be described in detail later in this document. The word “lot” and “batch” will have the same meaning and are congruous throughout this document.

It is the intent of this program that acceptance or rejection of material be based on the total program. Therefore, a comparison of the QC sample, QA verification, and other sample data may be used by the NCDOT for acceptance or rejection of a lot of material.

Participation in this program does not relieve the producer of the responsibility of complying with all requirements of the *NCDOT Standard Specifications for Roads and Structures*. See Appendix X for a posting from the Federal Highway Administration.

## **II. PROGRAM REQUIREMENTS**

### **A. Basic Requirements**

The producer's facility must have an approved in-house QC PGAB plan that meets the requirements of AASHTO R 26 Section 9 (Standard Practice for Certifying Suppliers of Performance Graded Asphalt Binders) and must use an AASHTO re:Source (formerly AMRL) approved laboratory conforming to applicable sections of AASHTO R 18 (Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories). See Section II (C) for more details. The laboratory must maintain continuous accreditation.

Where modification of the asphalt binder is required to meet the specified grade, use a styrene butadiene styrene (SBS), styrene butadiene rubber (SBR), styrene butadiene (SB) polymer or other modifiers approved by NCDOT to modify the binder to meet the grade specified before delivery to the asphalt plant. Other polymers shall be pre-approved and listed by the Materials and Tests Unit. Air blown asphalt will not be permitted.

In-line blending is approved on a case-by-case basis and is not guaranteed to be approved. The approval process may take longer if the producer uses in-line blending.

### **B. QC Plan**

The program requires that the producer have a QC plan that meets the requirements of Section 9 of AASHTO R 26. This is a comprehensive standard complete with guidelines. A Northeastern Asphalt User's Producer's Group (NEAUPG) Model QC plan has been provided as a guide in

Appendix I (website). Appendix II has a reference to Section 1020 of the NCDOT Specifications (website).

**C. Approved Laboratory**

The program requires all testing of asphalt binder to be conducted at an AASHTO re:Source accredited laboratory conforming to the applicable sections of AASHTO R 18 that is qualified in the following procedures in Table 1 below. All equipment used at that laboratory is calibrated and maintained per AASHTO R 18. For information on how to become an accredited laboratory contact AASHTO or visit their website at <http://aashtoresource.org/>.

Table 1: Required Tests

<u>Test Description</u>	<u>Test Method Reference</u>
Flash Point (Cleveland Open Cup)(Degrees Centigrade)	AASHTO T 48
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G* sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (MPa)	AASHTO T 313

Bending Beam Rheometer (BBR) Slope (m-value)	AASHTO T 313
High End Temperature True Grade (°C)	AASHTO T 315
Specific Gravity @ 25 C (77 F)	AASHTO T 228
Specific Gravity @ 15.6 C (60 F)	AASHTO T 228

#### **D. Plant Approval Process**

The approval process requires the producer to email the State Materials Engineer at the NCDOT requesting that the plant be considered for acceptance into the program. The producer must identify the specific products that are to be produced. A copy of the producer's QC plan will be submitted to the State Materials Engineer for approval.

The NCDOT will review the producer's QC plan and if it is approved, an on-site inspection will be scheduled. This on-site inspection will verify that the producer's QC plan has been implemented and is being followed. This will include certification of sampling personnel. More information on sampling certification can be found in Section III (A).

If either the producer's QC plan or laboratory does not meet NCDOT requirements, the producer will be informed of the deficiencies in writing. Once the deficiencies have been addressed, the producer may again request approval.

The plant approval process will include taking source approval samples of each grade of binder the producer seeks to be approved to ship to NCDOT projects. The samples must meet NCDOT specifications. If the samples fail to meet NCDOT specifications, another site

visit will be scheduled to take a new source approval sample. When the producer seeks to be certified in another grade of binder after the initial plant certification, a new source approval sample must be taken for that grade.

#### **E. Certification for Participation in the QC/QA Program**

If the NCDOT has approved the producer's QC plan and the on-site inspection confirms that the initial program requirements have been met and a source approval sample has met specifications, NCDOT will certify the producer for participation in the program. Once approved, the terminal will be added to the NCDOT Approved Asphalt Suppliers and Products List, found in Appendix X.

At the end of each year, NCDOT will approve participation for the upcoming calendar year once a QC plan annual renewal form has been received and any necessary inspections are made. When changes are made to the QC Plan, the changes should be documented on a QC plan change request form that will be submitted with the amended QC plan. Random inspections may be conducted at any time by NCDOT to verify compliance with the program requirements. Failure to perform all the program requirements may result in a producer being removed from the program.

#### **F. Statement of Remediation**

If material out of specification or material that is not approved to ship by that producer is shipped, the NCDOT shall be immediately notified, and pavements (if any) constructed from the material may be rejected and removed from the site unless otherwise permitted by the

engineer in accordance with Article 105-3 of the Standard Specifications, CONFORMITY WITH PLANS AND SPECIFICATIONS.

### **III. SAMPLING AND TESTING PROCEDURES**

#### **A. Producer's QC**

The producer's QC samples are used by the producer to monitor the quality of material being produced and shipped. Materials will be sampled in accordance with AASHTO R 66 (Sampling Asphalt Materials) except that samples may be taken from a single valve near the bottom of the tank. Upon acceptance into this program, the producer's sampling personnel will be assessed for technical competence on sampling procedures by NCDOT. Assessments will be done at initial approval and at a minimum of 60-month intervals. A certificate will be issued by NCDOT to the person evaluated. In the event personnel are no longer employed by the producer, NCDOT shall be contacted to schedule an evaluation of any new employee(s) hired. See Appendix IV, Sampling Procedures, and Appendix VIII, Technician Training and Evaluation Record.

##### **1. Sampling for QC**

The following protocol will certify that the materials tested meet NCDOT specifications. In accordance with AASHTO R 66, except that samples may be taken from a single valve near the bottom of the tank, the producer's sampling personnel, will take a 1-quart samples in an appropriate sealed container. Retain samples will be taken in accordance with the producer's QC plan.

- One sample is for the producer's full compliance tests performed at the accredited lab.
- If a retain is required per the producer's QC Plan, the retain shall be stored in an appropriate temperature-controlled storage room at the facility that is kept between 40 degrees F (4.4 degrees C) and 100 degrees F (37.8 degrees C).
  - Both the sample taken for QC testing and the retain have the same batch number. The retain sample will be labelled QR-##### and the QC sample will be labelled QC-#####
  - The NCDOT will monitor the retain samples. The discard interval for retains will be no less than 90 days after the sampling date, unless otherwise agreed upon by the NCDOT.

The QC samples taken by the producer shall be labelled with information to identify the material and who sampled it on the sample container.

For more information on sequential batch numbers to be used for sample identification see Section III (B).

## **2. Accessibility to Facility and Random Visits by NCDOT**

The above sampling rate does not preclude the NCDOT from taking additional random samples. Materials and work areas shall be accessible. The procedures and

times of inspection shall be agreed upon by the NCDOT and the producer's technically competent person who shall accommodate the NCDOT for said purpose.

### **3. Producer's Test Report**

See Appendix VI for a list of the minimum required information to be included on a PGAB test report. Table 1 in Section II (C) contains the required tests.

High End Temperature True Grade is required and any material that does not meet the required grading shall be noted on the test report as "DOES NOT MEET TRUE GRADING: Product not acceptable for use per the North Carolina Performance Graded Asphalt Binder Quality Control/Quality Assurance Program." More information about NCDOT High End Temperature True Grade requirement can be found in Section 3 of the program.

Samples shall be tested at the rate set forth in the producer's QC plan. Test results shall be submitted to the NCDOT as described in Section III (B)(2). No information on a test report shall contain whiteout used to neither obscure original information nor shall pencil be used anywhere on the report. If corrections are needed unused information should be x-ed or lined out with only one X or line and then initialed. If a corrected report is sent out after the original report it shall have the words "Corrected Report" or "Revised Report" clearly written on it.

Falsification of test results, documentation of observations, records of inspection, adjustments to the process, discarding of samples and/or test results, or any other

deliberate misrepresentation of the facts will result in revocation of the certified technician's authority to certify PGAB test results or reports for NCDOT.

#### **4. Consequences of Falsification of Test Results**

No payment will be made for all tonnage represented by falsified test(s) results or documentation. In addition, state and/or federal authorities may pursue legal action and remove the producer from the approved list.

#### **5. Notification of Product Failure**

This subject is addressed in Section 2.1 of the producer's QC plan on file at NCDOT.

#### **6. Standard Specifications**

The producer shall perform all sampling and testing in accordance with current specifications and procedures referenced in the *NCDOT Standard Specifications for Roads and Structures*.

### **B. Sample Identification and Record Keeping for All Producer Material**

It is critical that care be taken to properly label samples and record test data accurately.

Producer's QC material will be identified with seven-digit sequential batch numbers at the beginning of each thirty (30) day period during the year and whenever the material is added to. The first two digits of the batch ID will be the terminal ID. Skipping or repeating batch numbers when identifying material to be certified by the producer will not be permitted as this will create confusion in this process.

For retained samples, the batch number prefix shall contain an "R". For example, QC- becomes QR-. The word "Retain" should be entered into the remarks/comment field to ensure there is no confusion.

Product resampled by the sampling personnel shall have an "R" designation on the end.

EXAMPLE: If a terminal has the terminal ID: AT01 the first batch ID will be 0100001. The first QC sample taken from batch 0100001 will be QC-0100001 and the resample would be QC-0100001R. Any retain would be QR-0100001. Product sampled for IA-comparative shall begin with IA, for example, IA-0100001.

### **1. Bill of Lading Requirements**

An example bill of lading must be included with the QC plan. Furnish 2 copies with each shipment. Ensure both copies accompany the shipment and are delivered to the Engineer or their representative at the destination. The bill of lading must contain all necessary information to identify the material and meet the requirements of the Department of Agriculture and Consumer Services of the state that the asphalt terminal is located in. All bills of lading are required to have NCDOT batch numbers on them. Appendix XI must be accompanied with every BOL. If the information found on Appendix XI is included in the BOL, the producer does not have to attach this document to every BOL, too.

The NCDOT may request copies of BOLs be provided at any time to aid in tracking material.

## **2. Retention and Reporting of Data**

QC producer test data, Certificate of Analysis (COA) and Certificate of Compliance (COC) test data shall be retained by the producer for at least three (3) years and made available for review to the NCDOT and Federal Highway Administration (FHWA) upon request. Bill of Lading and Loading affidavits shall be retained by the producer for at least twenty-four (24) months and made available to the NCDOT upon request. Appendix VI has a list of the minimum required information to be included on a PGAB test report or COA. Quality Control COA's or COC's and/or PGAB test reports shall include the NCDOT batch number identification and be emailed to [AsphaltQCQA@ncdot.gov](mailto:AsphaltQCQA@ncdot.gov) within the first 15 days of the following month. No faxing of test reports is permitted.

Submission of certified test data to the NCDOT shall also be done by populating the spreadsheet shown in Appendix IX. By the 15<sup>th</sup> of each month, the previous month's data must be emailed to [AsphaltQCQA@ncdot.gov](mailto:AsphaltQCQA@ncdot.gov). No signature is required on this spreadsheet, but the data will be cross-checked with the COAs received.

### **C. Quality Assurance (QA) and Sampling and QC/QA Results Evaluation**

The QA samples taken by the NCDOT M&T asphalt field technician, or other qualified individuals, are used by the NCDOT to accept the quality of material being produced and shipped. Materials will be sampled in accordance with AASHTO R 66, Sampling Asphalt Materials, except that samples shall be taken from a single valve near the bottom of the tank.

## **1. Verification Sampling by QA Personnel**

The NCDOT shall take verification samples, random and independent of QC samples, of PGAB to test for program compliance. The NCDOT will visit each asphalt binder producer that has material for NCDOT projects at a minimum of once every two months. QA samples will be taken of all material available during a site visit. Additional samples may be taken at the discretion of the NCDOT. The producer may draw a sample at the same time as a QA is taken to hold for possible testing, but it should never be used as a required QC sample as it is not taken at random.

QA samples have the same batch number as the last QC sample taken by the producer.

The QA verification sample will be tested by the NCDOT in accordance with the latest version of AASHTO M320 and test for the high temperature true grade per NCDOT specifications.

## **2. Accessibility to Facility**

The above sampling rate in Section III (C)(1) does not preclude the NCDOT from taking additional random samples. Materials and work areas shall be accessible to the NCDOT, materials and work areas that are not made accessible to the NCDOT shall result in the terminal being either suspended or placed inactive until access is granted. The procedures and times of inspection shall be coordinated by the NCDOT and the producers' technically competent person who shall accommodate the NCDOT for said

purpose. However, the NCDOT reserves the right to make random or unannounced inspections.

### **3. QC Sample and QA Verification Sample Results Evaluation**

The following are definitions that may/may not be industry standard but will be used by the NCDOT in this program.

- Batch – a representative quantity of PGAB that has an NCDOT batch number assigned to it. Batch numbers will change every 30 days and whenever new material is added to the preexisting batch.
- Restricted shipping status – the terminal cannot ship any of the approved product(s) of concern until a NCDOT representative collects a sample, completes testing, and reviews the producer’s certified signed test report for compliance.
- Set of QC results - all the QC test results for one grade of PGAB during the QA inspection interval as described in this section.
- Verification – QA sample taken for verification of quality control’s testing.
- High End Temperature True Grade - high temperature grading result is determined from DSR-original and DSR-RTFO. The lower of the two results is reported as the high-end temperature true grade. The result must be within 5.9C above the grade designation to be considered passing. For example, a PG-64-22 must have a high-end temperature true grade between 64.0C and 69.9C to be passing.

For each batch of a grade tested, the set of results for a PGAB sample grade must meet the latest version of AASHTO M 320 specifications and classify as that PGAB grade per the High-End Temperature True Grade test to limit the risk to DOT on projects. In the event the material fails specifications or grades at a temperature beyond the high-end temperature true grade, the AASHTO re:Source lab shall contact the terminal personnel immediately to avoid shipments. If a batch number was already assigned by the terminal before testing, a test report must be issued immediately and the responsible lab must place a comment on the test report that states, "Does not meet specifications or true grading: Product not acceptable for use per the North Carolina Performance Graded Asphalt Binder QC/QA Program." Submit the report to [asphaltQCQA@ncdot.gov](mailto:asphaltQCQA@ncdot.gov). The responsible terminal employee must also notify the NCDOT personnel in the producer's QC plan of the product failure immediately. For additional information for material that deviates from specifications, see Section III (C.4).

#### **4. Corrective Action by the Producer and NCDOT on QC and QA Verification Samples**

##### **a. QC Sample Test(s) Fail Specifications by Any of the Producer's Labs**

For a QC sample tested by any of the producer's accredited testing facilities, where the sample does not meet specifications, once it has been determined that proper sampling and testing procedures were used, the producer will stop shipment and immediately notify the NCDOT.

The producer will conduct a formal investigation and take corrective action. The corrective action taken shall be documented by the producer and all findings, which include test reports with comments, will be sent to the NCDOT immediately via email to [asphaltQCQA@ncdot.gov](mailto:asphaltQCQA@ncdot.gov).

Once the investigation concludes and any corrective action implemented, normal sampling and testing procedures are resumed at the discretion and approval of NCDOT. QC sampling may be increased per the direction of the NCDOT.

b. QA Sample Test(s) Fail Specifications by the NCDOT Laboratory

For a sample that does not meet specifications when tested by the NCDOT M&T Laboratory, once it has been determined that proper sampling and testing procedures were used, the NCDOT will immediately notify the asphalt terminal personnel and instruct them to stop further shipment of that batch number to NCDOT projects. The producer and NCDOT will agree on the corrective action taken before shipment of the grade in question can resume. The NCDOT will collect samples of the corrected material.

Succeeding batch numbers shall be tested by the producer's lab in accordance with the producer's QC plan. QC and QA sampling may be increased per the direction of the NCDOT.

c. Consequences of Providing Failing Material to NCDOT

If the material fails to meet NCDOT specifications for any test performed, the material is not acceptable and will be subject to Section II (F) of this written program.

**D. Independent Assurance (IA) – Comparative**

The Independent Assurance (IA) comparison program evaluates the qualified sampling and testing personnel and testing equipment.

**1. Comparative Sampling for IA**

The producer shall take samples for each of the accredited labs that they use for certifying PGAB. The terminal will take IA-comparison samples of PGAB twice per year.

The NCDOT will notify the terminal when an IA is to be taken.

Samples shall be taken at the same time (back-to-back) and do not need to be physically split from a container.

The samples must be taken independent of the regular QC testing and cannot count towards quality compliance testing. The seven-digit batch ID will remain the same as the last QC sample taken for that month, but the sample ID will start with "IA". For more information on sequential batch numbers to be used for sample identification see Section III (B).

- Samples designated with an "A" are always the producer's sample. "A" has a unique NCDOT batch number designated IA-#####. Each of the producer's accredited labs

receives an “A” sample. The sequence “A1, A2, A3, ...” may be used. The sample can also be designated as IANC-#####.

- “B” is for NCDOT and has the same batch number as “A” but begins with “IA-“. A HiCAMS number will be assigned at the QA laboratory.

The samples will be tested by the NCDOT and by the producer’s designated AASHTO accredited laboratory in accordance with AASHTO M 320, unless otherwise specified by the NCDOT.

Failure to submit the samples requested by NCDOT will result in the terminal being placed on restricted shipping status until the samples are received. Repeated failures to send the samples in the requested sequence will result in the terminal being placed on inactive status. Certified signed test reports for IA-comparative sample(s) results, rechecks or resample requests for out of precision results, shall be submitted to [AsphaltQCQA@ncdot.gov](mailto:AsphaltQCQA@ncdot.gov) within 15 days of the following month. Failure to submit the test reports will result in the terminal being placed on restricted shipping status until the test reports are received. Repeated failures to send the tests report in the allotted time will result in the terminal being placed on inactive status. Reporting of the IA test results by the producer to DOT shall be in accordance with Section III(A)(3) and Appendix VI.

The producer will furnish and affix a label to each container itself, not on the lid, with the following information to identify the material.

PG Grade: _____	Rep. Qty. _____ Tons
Date / Time Taken: __/__/__ : __am / pm (Circle one)	
NCDOT#: QC- / IA- / IANC- _____ (Circle one)	
Facility: AT _____	
Tank/Car#: _____	
ID: ____ (A=Prod/Supp, B=Retain/NCDOT)	
Sampled By: (PRINT) _____	
Sampler's Signature: _____	

In general, this label is like the information that is on NCDOT's self-adhesive labels, Appendix III, that will be used on the sample containers for the QA verification sample identification.

## 2. IA – Comparative Sample Results Evaluation

The following are definitions that may/may not be industry standard but will be used by the NCDOT in this program.

- Batch – a representative quantity of PGAB that has an NCDOT batch number assigned to it.
- Set of IA results - all the IA test results for one grade of PGAB during the inspection interval of twice per year as described in this section.
- Verification – sample taken for verification of quality control's testing.

For the batch of a grade tested by the producer, the set of IA results are compared to the corresponding NCDOT IA sample to precision statements in Table 3.

**3. Table 3 – Acceptable Range of Two Test Results**

<b>Test</b>	<b>(D2S%) *</b>	<b>Test Method Reference:</b>
Rotational Viscosity (Pa-s)	10.5	AASHTO T 316
Original Binder: G*/sin delta (kPa)	10.2	AASHTO T 315
RTFO/TFO Residue: G*/sin delta (kPa)	16.8	AASHTO T 315
PAV Residue: G* sin delta (kPa)	27.4	AASHTO T 315
BBR Creep Stiffness (Mpa)	15.7	AASHTO T 313
BBR Slope -m value	5.8	AASHTO T 313

\*Note: D2S% values subject to change and is defined as the difference between two individual test results expressed as a percent of average.

**4. Corrective Action and Investigation by the Producer and NCDOT on IA – Comparative Samples**

a. Deviation from Precision Requirements in Table 3

For deviations from the precision statements in Table 3, the NCDOT will notify the authorized quality control representative described in the producer’s QC plan. IA samples will be resampled by the producer in accordance with Section III (D)(1), except the NCDOT will receive two IA samples. Both parties will repeat testing and if they are in range of method reproducibility limits, results are reported.

If the reproducibility is not acceptable from the second set of test results and the producer’s AASHTO re:Source lab has not received proficiency sample scores of two or lower on the applicable tests, then a retain from NCDOT will be sent to a mutually acceptable AASHTO re:Source accredited laboratory. If the results from the referee

(third-party lab) are not within the reproducibility in Table 3 when compared to the highest and lowest of the three lab values, an investigation will be made to determine the cause of the discrepancy. The NCDOT will allow no more than 45 calendar days for the producer to submit documentation that will complete the investigation. After that period, action may be taken which could include removal from the approved list. The investigation will include but is not limited to a review of the sampling procedures, the equipment used in the production and the testing of the material, the test results, and the testing procedures of the technician. If the cause is determined to be improper sampling or testing procedures by the producer or the NCDOT, the appropriate approved individual will be notified. If the problem continues, the individual's approval may be revoked. If the cause is determined to be in the producer's testing equipment or handling of the material, the producer shall take corrective action. If this problem continues, the producer's approval to provide material to NCDOT may be revoked. The producer will document the corrective action taken with a copy sent to NCDOT. If the cause is determined to be in the NCDOT's sampling and testing equipment, the NCDOT will take corrective action.

- Responsibility for payment to the third-party lab belongs to the producer unless results show that NCDOT's results were beyond the reproducibility limits (Table 3).

If the third party's results indicate failing material from the referee sample, shipments from that batch will be discontinued and/or rejected. Once the

investigation concludes and any corrective action implemented, normal testing procedures are resumed.

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## **Appendix I: Example Model Performance Graded Binder Quality Control Plan**

**See the website for the latest updates:**

Click on <https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Method=MM-02-02#BINDER%20AND%20EMULSION%20QC/QA%20PROGRAMS>

then scroll down to “Binder and Emulsion QC/QA Programs” and click the document titled Binder Program NEAUPG Model Plan.

**Appendix II: NCDOT Section 1020**

See the website for the latest updates:

Click on <https://connect.ncdot.gov/resources/Specifications/Pages/2018-Specifications-and-Special-Provisions.aspx> then scroll down to select the latest Standard Specifications heading.

**Appendix III: Example Label for Sample Identification**

PG Grade: _____	Rep. Qty. _____	Tons _____
Date / Time Taken: __/__/____: __am / pm (Circle one)		
NCDOT#: QA- / IA- / IANC- / QC- _____ (Circle one)		
Facility: AT _____		
Tank/Car#: _____		
ID: ____ (A=Prod/Supp, B=Retain/NCDOT)		
Sampled By: (PRINT) _____		
Sampler's Signature: _____		

The Batch number for North Carolina will be designated as "QA-#####" or "IA-#####" or "QC-#####" or "IANC-#####" on the label.

#### **Appendix IV: Sampling Procedures**

To reduce the number of variables that affect the correlation between QC and QA verification samples and IA comparative samples, it is important that all samples be obtained following procedures outlined in the *Standard Specifications*, or as outlined in this program.

Each producer will describe in detail the sampling and testing procedures used at the facility in the producer's QC plan including the qualifications of sampling and testing personnel.

Samples taken by NCDOT during facility visits will be taken in the same manner as the QC or IA samples taken at the plant.

## Appendix V: Testing Procedures

The following is a partial reference list of common test names used in this manual and their corresponding ASTM or AASHTO designations. This list is not intended to be all inclusive, nor is it intended to be a list of all tests required for certification of the products and materials produced using this program.

### QC Tests

<i>Test Description</i>	<i>Test Method Reference</i>
Flash Point (Cleveland Open Cup)(Degrees Centigrade)	AASHTO T 48
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G* sin delta (kPa) Delta (degrees)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
Direct Tension (DTT) Failure strain (%)	AASHTO T 314
High End Temperature True Grade (°C)	AASHTO T 315
Specific Gravity @ 25 C (77 F)	AASHTO T 228
Specific Gravity @ 15.6 C (60 F)	AASHTO T 228

### QA Verification Tests

<i>Test Description</i>	<i>Test Method Reference</i>
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G* sin delta (kPa)	AASHTO T 315

	Delta (degrees)	
Bending Beam Rheometer (BBR) Creep Stiffness (Mpa)		AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value		AASHTO T 313
High End Temperature True Grade (°C)		AASHTO T 315

Appendix V: Testing Procedures (Continued)

**Independent Assurance (IA) Tests**

<i>Test Description</i>	<i>Test Method Reference</i>
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G* sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (MPa)	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
High End Temperature True Grade (°C)	AASHTO T 315

## Appendix VI: QC Verification Test Report Forms

Each Producer will submit copies to NCDOT of all final QC verification test report forms, COA's, and COC's used with the Producer's QC plan or with this QC/QA plan.

Test reports, including IA, shall contain at a minimum the following information:

- A. Certifying statement with signature on the test report or COC/COA. This statement must read as follows:  
"By providing this data under my signature, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of test results, in any manner, has occurred."
- B. Name and address of the testing laboratory.
- C. The facility or terminal who owns the sample.
- D. Unique report identification number and/or title and the date issued.
- E. Sample Identification, including the NCDOT North Carolina batch number.
- F. Description, identification, and condition of the test sample.
- G. Date and time the sample was taken.
- H. Sampled By.
- I. Tank or car number.
- J. Grade of asphalt that is being tested.
- K. Date of receipt of the test sample.
- L. Date(s) of test completion.
- M. Identification of the standard test method used and a notation of all known deviations from the test method.
- N. Test results and other pertinent data required by the standard test method.
- O. Identification of any test results obtained by a subcontractor and the name of the subcontractor.
- P. Name of the person(s) accepting technical responsibility for the test report.
- Q. Technician's name
- R. Technician's Signature.
- S. Certifying statement that the material meets AASHTO specifications.
- T. Certifying statement that the material DOES NOT MEET SPECIFICATIONS OR TRUE GRADING when a high temperature true grade is performed and is out of range or other deviation from specifications. See Section III (C)(3).



**Appendix VIII: Federal Highway Administration Poster**

The most recent version of the FHWA poster can be found here labeled “NOTICE Federal-Aid Project” Poster:

<https://connect.ncdot.gov/business/Ethics%20Documents/Required%20Posters.pdf>

This document must be displayed on site in the asphalt terminal office and/or Producer’s laboratory if product is furnished to NCDOT.

## **APPENDIX IX: Spreadsheet for PGAB Test Data for Submitting to NCDOT**

A copy of the monthly summary spreadsheet will be provided by the NCDOT upon request. The monthly summary spreadsheet must contain the following columns in this order:

- Sampled date
- Test completed date
- Batch ID
- Test comment
- Sample status
- Material Description
- Type/Item/Grade
- Sampled By
- Sampled From
- Sample Location Details
- Facility Name
- Producer Name
- RV @ 135C
- RV @ 165C
- DSRO @ 58C
- DSRO @ 64C
- DSRO @ 70C
- DSRO @ 76C
- DSR RTFO @ 58C
- DSR RTFO @ 64C
- DSR RTFO @ 70C
- DSR RTFO @ 76C
- DSR PAV @ 31C
- DSR PAV @ 28C
- DSR PAV @ 25C
- DSR PAV @ 22C
- DSR PAV @ 19C
- DSR PAV @ 16C
- DSR PAV @ 13C
- BBR @ -12C, S
- BBR @ -12C, m-value
- BBR @ -18C, S
- BBR @ -18C, m-value
- BBR @ -24C, S
- BBR @ -24C, m-value
- DTT @ -12C, strain
- DTT @ -18C, strain
- DTT @ -24C, strain

- Jnr @ 3.2
- Percent loss/gain @ 163C
- High end Temp True Grade
- Reported By
- Tested By
- Specific Gravity @ 15.6C
- Specific Gravity @ 25C
- DSR PAV Phase Angle for DSR  $G \cdot \sin(\delta)$  5,001 to 6,000 kPa
- Delta Tc

## **APPENDIX X: NCDOT Approved Binder and Emulsion Suppliers and Products**

The current version of the NCDOT Approved Suppliers and Products can be found here:

<https://connect.ncdot.gov/resources/Materials/MaterialsResources/Asphalt%20Products%20for%20NC.pdf>

## **APPENDIX XI: Bill of Lading NCDOT Supplier and Transporter Certifications Standard**

### **Attachment**

The displayed file in this Appendix may not be current and is meant to be a reference. Contact the NCDOT Materials and Tests Unit with any questions about this document. If the information found on this document is included in the BOL, the producer does not have to attach this document to every shipment.

**Attachment #1: (ATTACH TO EACH SHIPPING TICKET TO N. CAROLINA)**

Asphalt Materials Bill of Lading Supplier's and Transporter's Certification for North Carolina per Section 1020.

Supplier: SUPPLIER NAME< CITY< STATE< TERMINAL ID

Terminal: ADDRESS  
CITY< STATE< ZIP

Date: \_\_\_\_\_

Bill of Lading #: \_\_\_\_\_

NCDOT Project# \_\_\_\_\_ PO# \_\_\_\_\_

\*\*\*\*\*

**NCDOT Supplier's Certification:**

This is to certify that this shipment of \_\_\_\_\_ gallons/liters or tons/metric tons of \_\_\_\_\_ grade asphalt including \_\_0\_ gallons/liters of \_\_\_\_\_ NA\_\_\_ anti-strip meets all requirements of NC Department of Transportation specifications.

Signed: \_\_\_\_\_

Authorized Representative of Supplier

*Extracted from Section 1020: "When no anti-strip additive is included with the load, the supplier shall indicate zero (0) in the gallons field and "NA" in the anti-strip field on the above certification."*

\*\*\*\*\*

End of program document.