

Test Procedure for

AGGREGATE QUALITY MONITORING PROGRAM



TxDOT Designation: Tex-499-A

Effective Date: **March 2024**

1. SCOPE

- 1.1 This test procedure provides information and requirements for the Department's Aggregate Quality Monitoring Program (AQMP). The AQMP comprises of aggregate quarries and pits that are actively supplying aggregate to Department construction or maintenance projects and demonstrates continuing quality and uniformity.
- 1.2 The AQMP produces the Bituminous and Concrete Rated Source Quality Catalogs. These catalogs list sources with rated values (ratings) for aggregate properties determined by laboratory testing. Ratings are determined from test results during the previous 2 yr. from the publication date of the catalogs. The Bituminous Rated Source Quality Catalog also publishes a Surface Aggregate Classification (SAC) for each source.
- 1.3 The AQMP allows the Department to use aggregates from rated sources without project specific testing for the tests listed in the catalog when the published ratings meet the project specifications. Each source listed in these catalogs must be verified to ensure all rated values meet the project material specification requirements.
- 1.4 The AQMP provides continuous quality assurance of aggregate products supplied to the Department. The program improves the efficiency of Department operations and participation is solely at the discretion of the Department.
- 1.5 This test procedure does not claim to address the safety concerns associated with its use. It is the responsibility of the user of this test procedure to establish the appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations before use.

2. RESPONSIBILITIES

- 2.1 Department—Materials & Tests Division (MTD)
 - 2.1.1 MTD is responsible for requesting Quality Monitoring (QM) samples from the Department Districts, ensuring laboratory testing for aggregate material properties, and publishing the Bituminous and Concrete rated source quality catalogs (BRSQC & CRSQC).
 - 2.1.1.1 QM samples are non-project specific samples that are sampled by the Districts and tested by MTD for material quality properties.
 - 2.1.2 Laboratory tests for concrete coarse aggregate includes the following.
 - 2.1.2.1 Coefficient of Thermal Expansion (CoTE), [Tex-428-A](#).
 - 2.1.2.2 Los Angeles Abrasion, [Tex-410-A](#).

- 2.1.2.3 Magnesium Sulfate Soundness, [Tex-411-A](#).
- 2.1.2.4 Micro-Deval Abrasion, [Tex-461-A](#).
- 2.1.3 Laboratory tests for *hot-mix asphalt or seal coat coarse aggregate* includes the following.
 - 2.1.3.1 Acid Insoluble Residue, [Tex-612-J](#).
 - 2.1.3.2 Los Angeles Abrasion, [Tex-410-A](#).
 - 2.1.3.3 Magnesium Sulfate Soundness, [Tex-411-A](#).
 - 2.1.3.4 Micro-Deval Abrasion, [Tex-461-A](#).
- 2.1.4 Laboratory test for *concrete fine aggregate* is the Acid Insoluble Residue, [Tex-612-J](#).
- 2.1.5 Laboratory tests for *microsurfacing aggregate* includes the following.
 - 2.1.5.1 Acid Insoluble Residue, [Tex-612-J](#).
 - 2.1.5.2 Magnesium Sulfate Soundness, [Tex-411-A](#).
- 2.1.6 Laboratory testing for *lightweight coarse aggregate* includes the following.
 - 2.1.6.1 Acid Insoluble Residue, [Tex-612-J](#).
 - 2.1.6.2 Dry Loose Unit Weight, [Tex-404-A](#).
 - 2.1.6.3 Freeze-Thaw Loss, [Tex-432-A](#).
 - 2.1.6.4 Los Angeles Abrasion, [Tex-410-A](#).
 - 2.1.6.5 Magnesium Sulfate Soundness, [Tex-411-A](#).
 - 2.1.6.6 Micro-Deval Abrasion, [Tex-461-A](#).
 - 2.1.6.7 Pressure Slaking, [Tex-431-A](#).
 - 2.1.6.8 Water Absorption, [Tex-433-A](#).
 - 2.1.6.9 Lightweight Aggregate is artificially produced expanded shale, clay, or slate that is produced by the rotary kiln method or naturally occurring aggregate and has a maximum unit weight of 65 lb./ft.³.
- 2.1.7 The Rigid Pavements and Concrete Materials Section of MTD is responsible for testing the Acid Insoluble Residue of aggregate and the CoTE of concrete aggregate.
- 2.1.8 The BRSQC and CRSQC are published at a minimum annually with rated source values (ratings) for the intended final product as tested in Sections 2.1.2., 2.1.3., 2.1.4., 2.1.5., and 2.1.6.
 - 2.1.8.1 Catalogs may be updated at any time at the discretion of MTD.
- 2.2 *Department—Districts*

- 2.2.1 Sample aggregate stockpiles at the requested producer's quarry or pit that are approved for active Department construction or maintenance projects with a valid CSJ.
- 2.2.1.1 Sampler must be an authorized representative of the Department and currently certified in [Tex-400-A](#).
- 2.2.1.2 Sample in accordance with [Tex-400-A](#) sampling procedure for aggregate from completed stockpiles using a front-end loader. When a front-end loader is not available, sample in conformance with the sampling procedure for aggregate from completed stockpiles using a shovel.
- 2.2.1.3 Sample aggregate in the presence of a representative of the aggregate producer.
- 2.2.1.4 Allow the producer to take a split sample of the sampled aggregate from each stockpile sampled.
- 2.2.1.5 Producer is any business or individual that manufactures a product and seeks to supply it to the Department or Contractors of the Department.
- 2.2.2 Oven or air-dry samples that are in canvas bags when there is excessive moisture before delivery or shipping to prevent the formation of mold.
- 2.2.3 Deliver or ship the containers or bags of aggregate to MTD with detailed information provided from the Material Identification Form 202 to include the producer's name, quarry or pit name, sample date, sampler's name, specification item, material description, number of bags or containers, and project information when applicable.
- 2.2.4 Notify MTD when sources become inactive or are no longer supplying aggregate to the Department.
- 2.2.5 Provide any information and details pertaining to production or quality concerns to MTD.
- 2.3 *Producers*
- 2.3.1 Designate an onsite representative to witness the sampling from each stockpile at the source location.
- 2.3.1.1 It is recommended to obtain a split sample from each stockpile sampled.
- 2.3.2 Promptly communicate with MTD when there is a change of ownership, quarry or pit location, or designated quality control personnel.
- 2.3.3 Maintain current contact information with MTD to include, but not limited to, email address, phone number, mailing address, and name of contact personnel.
- 2.3.4 Promptly provide quality control testing results to MTD when requested.
- 2.4 *AQMP Sampling Frequency and Responsibility*
- 2.4.1 Sampling frequency for individual quarries is at the discretion of MTD.
- 2.4.1.1 Frequency will be biannually at a minimum.
- 2.4.1.2 Frequency may be increased at the discretion of MTD.
- 2.4.2 MTD may request QM samples at any time.

3. ELIGIBILITY CRITERIA

- 3.1 Currently producing and supplying aggregate for a Department construction or maintenance project that meets the minimum specification requirements.
- 3.2 Production from the quarry or pit represents a single source.
- 3.3 Approved sources may include naturally blended aggregates when the component materials originate from within the quarry or pit.
- 3.4 A history of laboratory test results from a minimum of four Department project samples within the past 2 yr. for the same product from different production dates.
- 3.4.1 The sampling dates for the project samples must be a minimum of 30 days apart. The aggregate sampled must represent new material produced since the last sampling date.
- 3.5 When aggregate sources are located outside of Texas, the Department must have access to aggregate stockpiles located in Texas to sample.
- 3.6 The Department may perform an inspection of the quarry at any time.
- 3.7 Expansion of approved sources must meet the following criteria:
- 3.7.1 Promptly communicate with MTD and provide at a minimum a map and mining plan for the area of interest.
- 3.7.2 Consideration applies for adjacent properties only which border the current location of the approved source.
- 3.7.3 Area consists of similar material characteristics and test results as the approved source.
- 3.7.4 Stockpile the aggregate produced for acceptance only at one location within the quarry or pit for sampling.

4. PROCESS FOR THE ADDITION OF AGGREGATE SOURCES

- 4.1 Complete the following required documents and provide them to MTD.
- 4.1.1 The Department's Producer-Quarry Information form obtained from MTD.
- 4.1.2 Map detailing the source location and driving directions from the Department's District Office to the quarry or pit.
- 4.1.3 Global positioning system (GPS) coordinates of the quarry or pit, and
- 4.1.4 Aerial or topographic map of the source location showing the property lines.
- 4.1.5 Quality control testing plan that accurately describes the tests performed, frequency of each test, and at least 3-mo. of quality control testing results to ensure the quality control testing plan is being followed.
- 4.1.6 Estimated annual production of aggregate for Department construction and maintenance projects.
- 4.1.7 Additional information may be requested by MTD.

- 4.1.8 The information requested in Sections 4.1.1 – 4.1.7 may be requested again if the quarry changes its name, is sold, or leased to a separate entity. In addition, official documentation is required for any change of status of the source such as a bill of sale or transfer, or company letter with the name change and signature.
- 4.2 Supply aggregate from the source to a Department construction or maintenance project. The District will begin sampling stockpiles designated for the project to approve them for use.
- 4.2.1 Approval is on a stockpile-by-stockpile basis until the source is added to the Aggregate Quality Monitoring Program (AQMP).
- 4.2.2 These samples are referred to as project samples. They are sampled from aggregate stockpiles that are designated for a specific Department project. The stockpile may be at the quarry, plant, or roadway.
- 4.3 Upon completion of MTD testing four project samples from Section 4.2, that are sampled at least 30 days apart (Section 3.4), MTD reviews all information and test results to determine if additional testing is necessary.
- 4.4 When additional testing is necessary, MTD will contact the Department District and aggregate producer.
- 4.5 MTD determines the rated values (ratings) for all the tests performed from the aggregate source as described in Article 6., "Source Removal and Reinstatement."
- 4.6 The aggregate producer and Department Districts are notified of the product's addition to the AQMP with the ratings. The online catalog will be updated at the next publication.
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5. RATED SOURCE VALUES AND SURFACE AGGREGATE CLASSIFICATION (SAC)

- 5.1 Rated source values (ratings) are aggregate quality material properties determined from laboratory test results (Section 2.1). The ratings include the following.
- 5.2 RSLA—Rated Source Los Angeles Abrasion.
- 5.3 RSSM—Rated Source Soundness Magnesium.
- 5.4 RSSM is determined for bituminous products of hot-mix asphalt and surface treatment (seal coat).
- 5.5 RSMD—Rated Source Micro-Deval.
- 5.6 CA-RSAI—Coarse Aggregate Rated Source Acid Insoluble.
- 5.7 FA RSAI—Fine Aggregate Rated Source Acid Insoluble.
- 5.8 CoTE—Coefficient of Thermal Expansion
- 5.9 Pressure Slake of Lightweight Aggregate.
- 5.10 Freeze Thaw of Lightweight Aggregate.
- 5.11 Absorption of Lightweight Aggregate.
- 5.12 Dry Unit Weight of Lightweight Aggregate.
- 5.13 Ratings are determined using test results from the four most recent samples which meet the requirements of Section 3.4 and this Specification. These samples may include QM and project samples.
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- 5.13.1 Ratings will use the maximum individual test result value from Section 2.1, with exception to the Acid Insoluble, which will use the smallest value.
- 5.13.2 The ratings will only be determined from MTD test results.
- 5.14 The Surface Aggregate Classification (SAC) is determined and published for all approved sources listed on the Bituminous Rated Source Quality Catalog (2.1.7).
- 5.14.1 The SAC is based on the test results from Section 2.1. Aggregates rated as SAC A have an acid insoluble of 55 or greater. Aggregates rated as SAC B have an acid insoluble less than 55.
- 5.15 Sources will receive numerical ratings on the published catalogs when they meet specification requirements.
- 5.15.1 Ratings exceeding specification requirements will be given a numerical value and marked with an asterisk.
- 5.15.1.1 Four additional test samples that are sampled at least 30 days apart and which meet specification requirements will be required to remove the asterisk. These test samples may be from sampling quality monitoring or project samples.

6. SOURCE REMOVAL AND REINSTATEMENT

- 6.1 Sources may be deemed as inactive and removed from the Aggregate Quality Monitoring Program (AQMP) when not supplying aggregate for quality monitoring samples to the Department for more than a year.
- 6.2 Rated source values (ratings) for each material property listed in the Bituminous and Concrete Rated Source Quality Catalogs (Section 2.1) must meet the specification requirements for the intended final product.
- 6.2.1 Numerical ratings will be posted for any material property that does not meet the relevant material specification requirements with an asterisk (*).
- 6.2.1.1 Specifications for the Bituminous Rated Source Quality Catalog refers to Item 302, "Aggregates for Surface Treatments (Seal Coat)," Item 341, "Dense-Graded Hot-Mix Asphalt," and Item 350, "Microsurfacing."
- 6.2.1.2 The relevant minimum material specifications for the Concrete Rated Source Quality Catalog refers to Item 360, "Concrete Pavement" and Item 421, "Hydraulic Cement Concrete."
- 6.3 Sources with ratings that all do not meet the applicable specification requirements are eligible to be removed from the program.
- 6.3.1 Test results that do not meet specification requirements, MTD will retest using additional aggregate from the same sample received or request the Department District to sample additional aggregate.
- 6.3.1.1 Two additional tests will be performed and the median from the total of three test results will be used for reporting.
- 6.3.2 When the median test result does not meet specification requirements, an aggregate sample from the same sample received will be evaluated by performing a petrographic analysis. This analysis includes a material identification of the sample with a source comparison of previous samples.
- 6.3.2.1 Material identification will determine the mineralogy of the aggregate source using multiple microscope techniques. This analysis will also include the review of the geology of the quarry location using the latest United States Geological Survey (USGS) maps.

- 6.3.2.2 Material identification will also be performed for the previous aggregate sample that was tested. The information and results are evaluated to determine if there was a change in the geology of the quarry to potentially cause any variation between the test results.
- 6.4 Sources will be reinstated into the program after a minimum of 3 mo. of production and supplying aggregate to Department construction or maintenance projects.
- 6.4.1 Sampling and testing during this time are required and will be applicable for reinstatement. Samples must be sampled at least 30 days apart and meet specification requirements.
- 6.5 MTD may partner with the District and producer to implement a temporary quality control plan from sources that do not maintain continued quality and uniformity of aggregate produced.
- 6.6 Reinstatement on the AQMP requires re-establishing a satisfactory project sample test history and meeting the AQMP acceptance criteria stated in Article 4., "Process for the Addition of Aggregate Sources," and Article 5., "Rated Source Values and Surface Aggregate Classification (SAC)."
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7. REPORTING OF RATED SOURCE VALUES

- 7.1 Materials & Tests Division publishes the AQMP rated source values (ratings) in the [Bituminous Rated Source Quality Catalog](#) and the [Concrete Rated Source Quality Catalog](#).
- 7.2 When any of the ratings change in a new publication of the catalogs, the effective date of the catalog and the date of shipment of aggregate are significant dates.
- 7.2.1 Material shipped on or after the effective date of the catalog will have the new ratings.
- 7.2.2 Material shipped before the effective date of the catalog will have the ratings published in the previous catalog.
- 7.2.3 The Department may add new sources or reinstate sources to the AQMP provided they meet the program requirements and at the discretion of MTD.
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8. EXAMPLE RATED SOURCE VALUE (RATINGS) CALCULATIONS

- 8.1 Table 1 is a list of test results from five *Bituminous* aggregate samples tested MTD. These samples were from the same quarry from five different stockpiles that were individually produced more than 30 days apart from each other.

Table 1
Example Bituminous Coarse Aggregate Results

Sample Number	LA Abrasion	Magnesium Soundness HMAC	Magnesium Soundness ST	Micro-Deval	Acid Insolubility
1	20	21	20	25	53
2	18	20	17	24	61
3	23	17	15	21	66
4	22	26	19	28	56

8.2 Using the rating selection criteria from Article 5., “Rated Source Values and Surface Aggregate Classification (SAC),” the rated source values (ratings) for the test results listed in Table 1 are shown in Table 2. The test results in Table 1 that are used to determine the ratings are in bold print.

Table 2
Rated Values from Example Bituminous Coarse Aggregate Results

SAC	RSLA	RSSM HMAC	RSSM ST	RSMD	RSAI
B	23	26	20	28	53

8.3 Table 3 is a list of test results from five Concrete aggregate samples tested by MTD. These samples were from five different stockpiles that were individually produced more than 30 days apart from each other.

Table 3
Example Concrete Coarse Aggregate Results

Sample Number	LA Abrasion	Magnesium Soundness	Micro-Deval	Acid Insolubility	CoTE
1	31	15	20	91	4.5
2	33	18	17	94	4.4
3	29	12	15	95	4.8
4	31	14	19	90	4.4

8.4 Using the rating selection criteria from Article 5., “Rated Source Values and Surface Aggregate Classification (SAC),” the ratings for the test results listed in Table 3 are shown in Table 4. The test results in Table 3 that are used to determine the ratings are in bold print.

Table 4
Rated Values from Example Concrete Coarse Aggregate Results

RSLA	RSSM	RSMD	RSAl	CoTE
33	18	20	90	4.8

9. ARCHIVED VERSIONS

Archived versions are available.