



INDIANA DEPARTMENT OF TRANSPORTATION Division of Materials and Tests

Directive 202

Aggregate Quality and Verification Samples

This Directive details the procedures that the Department will follow to obtain and test aggregate quality samples and aggregate verification samples. The Department has two programs (Indiana Test Methods, ITMs) that broadly define aggregate acceptance procedures:

- ITM 203, which is directed at aggregate quality properties such as durability and soundness, and
- ITM 211, which is directed at aggregate production properties, such as gradation and deleterious.

This directive will detail procedures to obtain samples to classify aggregates and determine quality in accordance with ITM 203, and procedures to obtain verification samples to verify properties covered in both ITM 203 and ITM 211.

Aggregate Quality Samples (ITM 203)

Aggregate quality samples will be obtained at the aggregate source. These are also referred to as source samples in ITM 203. Source samples are obtained in conjunction with ledge samples for crushed stone sources requesting initial Department approval, gravel sources requesting initial Department approval, and all sources after initial Department approval. Aggregate quality samples will be used to determine aggregate quality approval and will be communicated to the source on the Summary of Production Quality Letter.

Aggregate Verification Samples (ITM 203 and ITM 211)

Aggregate quality is accepted by aggregate quality samples as defined above, and aggregate production properties such as gradation are accepted by the CAPP program in accordance with ITM 211. Aggregate verification samples will be used to verify that the aggregates meet specifications in sampling situations not covered by those two programs.

SAMPLING AND PROCEDURES

Aggregate quality samples will be obtained at the stone, gravel, or slag source. Samples are required to be obtained by the procedure designated in ITM 207. Follow the Aggregate Quality

Sample Target Weights and Aggregate Gradation Sample Target Weights Tables below for approximate target sample weights.

Aggregate verification samples will be obtained at the aggregate source, asphalt or concrete plant, or jobsite, depending on the situation.

Point-of-use (POU) samples are a type of verification sample obtained at the last opportunity prior to incorporation into the end use, at the asphalt or concrete plant, or jobsite. Other verification samples may be obtained at the aggregate source.

Aggregate Quality Sample Target Weights Table

The table below gives the approximate target sample weight when obtaining quality samples. Sampling will be in accordance with ITM 207. The sample can be split into multiple bags to ease the weight for the sampler.

MATERIAL	SAMPLE SIZE
No. 2 Coarse Aggregate	220 lb
No. 5 Coarse Aggregate*	220 lb
No. 57 Coarse Aggregate*	225 lb
No. 8 Coarse Aggregate*	110 lb
No. 9 Coarse Aggregate*	70 lb
No. 11 Coarse Aggregate	50 lb
No. 12 Coarse Aggregate	50 lb
No. SC16 Coarse Aggregate	50 lb
No. 53 Coarse Aggregate*	270 lb
No. 73 Coarse Aggregate*	120 lb
All Fine Aggregate	25 lb

* Additional coarse particles can be taken from the outer edges of the pile to supplement components for LA, Micro-Deval and Soundness testing etc. **This sample is not used for gradation testing.**

Aggregate Gradation Sample Target Weights Table

The table below gives the approximate weight of original samples in accordance with ITM 207. The sample can be split into multiple bags to ease the weight for the sampler. This sample weight is for gradation only. If obtaining samples for any other tests, refer to the Aggregate Quality Sample Target Weights Table above.

MATERIAL	SAMPLE SIZE
No. 2 Coarse Aggregate	110 lb
No. 5 Coarse Aggregate	110 lb
No. 57 Coarse Aggregate	112 lb
No. 8 Coarse Aggregate	55 lb
No. 9 Coarse Aggregate	35 lb
No. 11 Coarse Aggregate	25 lb
No. 12 Coarse Aggregate	25 lb
No. SC16 Coarse Aggregate	25 lb
No. 53 Coarse Aggregate	135 lb
No. 73 Coarse Aggregate	60 lb
All Fine Aggregate	25 lb

Verification Sample Procedures

- 1) POU sampling at an asphalt or concrete plant:
 - a) Department staff will obtain POU verification samples at the asphalt or concrete plant. Samples are required to be obtained by the procedure designated in ITM 207.

Note: If, from visual inspection, it is obvious that the stockpile will not comply with gradation or quality specifications due to contamination from other products or other issues, verification samples will still be taken. In addition, the district will notify either the asphalt engineer or concrete engineer at the Department's Division of Materials and Tests (M&T) that the stockpile appears to be contaminated and out of specification and the asphalt engineer or concrete engineer will investigate.

- b) Tests will be performed on the sample as defined in the sample frequency section of this directive.
 - c) If the POU verification sample results are outside of specification limits (failed), the District Geologist or District Testing Engineer will notify the asphalt or concrete plant of the failure. No further action will be taken towards the asphalt or concrete plant. The district will provide a summary of POU results and notify either the asphalt engineer or concrete engineer if there are repeat POU verification failures at a plant.
 - d) After a POU verification failure, a follow up sample of the same aggregate size, type, and ledge combination will be taken from the stockpile at the originating aggregate source. The same tests will be performed as on the original POU sample.
 - e) If the follow up sample fails, a second sample will be obtained from the same stockpile and tests performed only on the tests that failed.
 - f) If the second sample also does not comply with specifications for gradation or quality, the stockpile will be deemed to be in noncompliance. The Aggregate Source shall immediately decertify the stockpile and mark the stockpile for commercial use only. The Department will conduct further investigation as necessary.
 - g) All POU verification sample test results, both passing and failing, will be shared with the asphalt or concrete plant and the originating aggregate source.
- 2) Verification samples from aggregate source:
- a) Department staff will obtain verification samples at the aggregate source. Samples are required to be obtained by the procedure designated in ITM 207.
 - b) Tests will be performed on the sample as defined in the sample frequency section of this directive.
 - c) If the verification sample results are outside specification limits (failed), a second sample will be obtained from the same stockpile and tests performed only on the tests that failed.
 - d) If the second sample also does not comply with specifications for gradation or quality, the stockpile will be deemed to be in noncompliance. The Aggregate Source shall immediately decertify the stockpile and mark the stockpile for commercial use only. The Department will conduct further investigation as necessary.
 - e) All verification test results, both passing and failing, will be shared with the aggregate source.
- 3) Aggregates purchased by Maintenance units will be sampled from the stockpile at the unit.

- 4) Aggregates delivered to Department contracts are required to be sampled at the last convenient point before the material is incorporated into the work.

In all cases, verification samples will represent material used in Department work.

SAMPLE FREQUENCY

The frequency of sampling is determined by the category and subcategory classifications of the aggregates. Categories I, II, and III are assigned to crushed stone sources, and category GS is assigned to sources supplying gravel, natural sand, manufactured sand from sand and gravel, or slag products.

Source Production Quality

Table II of ITM 203 lists the frequencies and aggregate sizes for source production quality samples.

Unless there are extenuating circumstances, all active aggregate sources are required to have stockpiles of all required sizes available for sampling as noted in Table II of ITM 203 and the most recent Summary of Production Quality Letter. Failure to have a material available for sampling will result in possible removal of the quality rating of that material for the aggregate source.

Source production quality samples will have the following tests performed by location:

District Lab Performs:

- a. Gradation
- b. Decant
- c. Los Angeles Abrasion
- d. Bulk Specific Gravity and Absorption (coarse agg only)
 - This test is not required for size 53s and 73s
- e. Deleterious
- f. Organic Impurity (fine agg only)

M&T Lab Performs:

- a. Soundness
- b. Micro-Deval
- c. Bulk Specific Gravity and Absorption (fine agg only)

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Aggregate Verification

Aggregate verification samples will be defined as one of two types:

- Gradation Only, or
- Complete.

The following tests will be performed on each type per location:

Samples for Gradation Only

District Lab Performs:

- a. Gradation
- b. Decant

Samples Subject to Complete Testing

District Lab Performs:

- a. Gradation
- b. Decant
- c. Los Angeles Abrasion
- d. Bulk Specific Gravity and Absorption (coarse agg only)
 - This test is not required for size 53s and 73s.
- e. Deleterious
- f. Organic Impurity (fine agg only)

M&T Lab Performs:

- a. Soundness
- b. Micro-Deval
- c. Bulk Specific Gravity and Absorption (fine agg only)

Frequency of aggregate verification testing will be as determined by District Testing.

SAMPLE SUBMITTAL

If soundness testing is required, the sample will be submitted to the M&T for soundness testing only. The soundness test will be the water freeze-and-thaw test unless otherwise specified.

If Micro-Deval testing is required, the sample will be submitted to the M&T.

All samples should be entered on the tracking spreadsheet.

When the material originates from a source in another district, the originating district is contacted to prevent duplicate sampling.

Fine Aggregate

Components for soundness testing will be processed by size by the district and submitted in plastic bags. When the aggregate is processed, the weight of aggregate

will be recorded on each bag and the weight for each individual sieve range will meet the following requirements:

Sieve Sizes	All Fine Aggregate
Passing 3/8 in – Ret No. 4	150 ± 10 g
Passing No. 4 – Ret No. 2.36	150 ± 10 g
Passing No. 2.36 – Ret No. 1.18	150 ± 10 g
Passing No. 1.18 – Ret No. 30	150 ± 10 g
Passing No. 30 – Ret No. 50	150 ± 10 g

An additional 25 lb. of material will be sent to M&T for the additional fine aggregate tests.

Coarse Aggregate

For Soundness Testing:

Coarse aggregate samples for soundness testing will be processed by size by the district and submitted in plastic bags. When the aggregate is processed, the weight of aggregate will be recorded on each bag and the weight for each individual sieve range will meet the following requirements:

Sieve Sizes	#2	#5 (QA #5)	#57	#8 (QA #8)	#9 (QA #9)
Passing 2 1/2 in - Ret 2 in.	3300 ± 300				
Passing 2 in - Ret 1 1/2 in	2300 ± 200				
Passing 1 1/2 in - Ret 1 in	1300 ± 50	1300 ± 50	1300 ± 50		
Passing 1 in - Ret 3/4 in	800 ± 30	800 ± 30	800 ± 30	1800 ± 30	
Passing 3/4 in - Ret 1/2 in	970 ± 10	970 ± 10	970 ± 10	970 ± 10	970 ± 10
Passing 1/2 in - Ret 3/8 in		430 ± 5	430 ± 5	430 ± 5	430 ± 5
Passing 3/8 in - Ret No. 4		400 ± 5	400 ± 5	400 ± 5	400 ± 5

* Weights are in grams

Sieve Sizes	#11 (QA #11)	#12 (QA #12)	SC 16	#53	#73
Passing 2 1/2 in - Ret 2 in.					
Passing 2 in - Ret 1 1/2 in					
Passing 1 1/2 in - Ret 1 in				1300 ± 50	
Passing 1 in - Ret 3/4 in				800 ± 30	1800 ± 30
Passing 3/4 in - Ret 1/2 in				970 ± 10	970 ± 10
Passing 1/2 in - Ret 3/8 in	1300 ± 10			430 ± 5	430 ± 5
Passing 3/8 in - Ret No. 4	400 ± 5	400 ± 5	400 ± 5	400 ± 5	400 ± 5

* Weights are in grams

If less than 5 percent of the total sample mass is retained on any of the sieve sizes specified, that size will not be tested. This applies to both Standard Spec and QA sizes. SC11 and SC12 will follow standard sizes #11 and #12, respectively.

At least one bag of each material will be retained at the district until all quality testing has been completed and the test data issued in report form.

For Micro-Deval Testing:

Coarse aggregate samples for Micro-Deval testing will be processed by size by the district and submitted in plastic bags. The weight of aggregate will be recorded on each bag and the weight for each individual sieve range will meet the following requirements:

Sieve Sizes	#9 (QA #9)	#11 (QA #11)	#12 (QA #12)	SC16
Passing 3/4 in -Ret 5/8 in	500 ± 10			
Passing 5/8 in -Ret 1/2 in	500 ± 10			
Passing 1/2 in -Ret 3/8 in	1000 ± 50	1000 ± 50		
Passing 3/8 in -Ret 1/4 in		500 ± 10	1000 ± 50	1000 ± 50
Passing 1/4 in -Ret No. 4		500 ± 10	1000 ± 50	1000 ± 50

* Weights are in grams

Aggregate sizes #53 and #73 will not require bulk specific gravity testing.

ACCEPTANCE CRITERIA

Gradation samples from the aggregate source will be compared to the control limits as established for that product in the aggregate source QCP. Gradation samples from the asphalt or concrete plant will be compared to standard specifications limits or QA product specification limits as defined in the aggregate source QCP.

REPORTS

Tests conducted by the district will be reviewed by the District Geologist and entered into SiteManager or AASHTOWare Project and the tracking spreadsheet upon completion.

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