NESANS

TECHNICAL GUIDES

Vibrating Feeder Speed Control: Match Feed Rate to Crusher Demand Automatically

Implement automatic feeder speed control for optimal crusher loading. VFD setup, PID tuning, and integration with crusher controls.

Author: Sivabalan Selvarajan

Published: May 10, 2026

Reading Time: 6 minutes

Aggregate testing for IS 383 compliance is the foundation of quality control in concrete and construction aggregate production. Non-compliant material can result in rejected loads, customer complaints, structural failures, and legal liability. Understanding essential quality control tests, their significance, and proper sampling protocols ensures consistent compliance while minimizing testing costs. This comprehensive guide covers the critical tests every aggregate producer must perform to meet IS 383:2016 requirements.

IS 383:2016 Overview

Scope and Applicability

IS 383:2016 specifies requirements for coarse and fine aggregates from natural sources for concrete:

CATEGORY	MAXIMUM SIZE	APPLICATION
Coarse aggregate	40mm, 20mm, 12.5mm, 10mm	Concrete, base courses
Fine aggregate (Zone I)	4.75mm	Concrete with low w/c ratio
Fine aggregate (Zone II)	4.75mm	General concrete work
Fine aggregate (Zone III)	4.75mm	Concrete with higher w/c ratio
Fine aggregate (Zone IV)	4.75mm	Plastering, finishing

Key Compliance Requirements

Critical parameters for IS 383 compliance:

- Particle size distribution (grading)
- Flakiness and elongation indices
- Aggregate impact value
- Aggregate crushing value
- Soundness (sodium/magnesium sulphate)
- Alkali-aggregate reactivity
- Deleterious materials content

Essential Physical Tests

Sieve Analysis (IS 2386 Part 1)

Sieve analysis determines particle size distribution—the most fundamental aggregate property:

Test procedure summary:

1. Obtain representative sample (minimum 5 kg for coarse, 1 kg for fine)
2. Dry sample to constant mass
3. Sieve through stack of standard sieves
4. Weigh material retained on each sieve
5. Calculate percentage passing each sieve

IS 383 grading limits for coarse aggregate (20mm nominal):

SIEVE SIZE	PERCENTAGE PASSING
25.0mm	100
20.0mm	85-100
12.5mm	—
10.0mm	0-20
4.75mm	0-5

Flakiness Index (IS 2386 Part 1)

Measures percentage of particles whose thickness is less than 0.6× their mean dimension:

Significance:

- Flaky particles break easily under load
- Affect workability of concrete
- Reduce aggregate interlock

IS 383 limit: Maximum 25% for concrete aggregate, 15% for wearing courses.

Elongation Index (IS 2386 Part 1)

Measures percentage of particles whose length exceeds 1.8× their mean dimension:

Combined index: Flakiness + Elongation Index should not exceed 30% for quality concrete aggregate.

Aggregate Impact Value (IS 2386 Part 4)

Measures resistance to sudden impact—critical for concrete subjected to dynamic loads:

Test procedure:

1. Fill cylindrical cup with aggregate (10-12.5mm size)
2. Apply 15 blows with standard hammer

3. Sieve through 2.36mm sieve
4. Calculate percentage passing as AIV

IS 383 limits:

APPLICATION	MAXIMUM AIV
Concrete wearing surfaces	30%
Other concrete	45%

Aggregate Crushing Value (IS 2386 Part 4)

Measures resistance to gradual compressive load:

Test procedure:

1. Fill cylindrical mold with aggregate (10-12.5mm size)
2. Apply 40-tonne load gradually over 10 minutes
3. Sieve through 2.36mm sieve
4. Calculate percentage passing as ACV

IS 383 limits:

APPLICATION	MAXIMUM ACV
Concrete wearing surfaces	30%
Other concrete	45%

Chemical and Durability Tests

Soundness Test (IS 2386 Part 5)

Assesses aggregate resistance to weathering through accelerated sulfate attack:

Procedure:

1. Immerse aggregate in saturated sodium or magnesium sulfate solution
2. Dry and immerse for specified cycles (typically 5)

3. Sieve to determine loss of material

IS 383 limits:

SOLUTION	MAXIMUM LOSS
Sodium sulfate	12%
Magnesium sulfate	18%

Alkali-Aggregate Reactivity (IS 2386 Part 7)

Tests potential for deleterious reaction between aggregate and cement alkalis:

Tests available:

- Petrographic examination (screening)
- Mortar bar test (expansion measurement)
- Chemical test (dissolved silica)

IS 383 requirement: Aggregates showing potential reactivity shall not be used unless corrective measures employed.

Deleterious Materials

IS 383 limits various harmful constituents:

MATERIAL	TEST METHOD	MAXIMUM LIMIT
Clay lumps	IS 2386 Part 2	1.0%
Coal and lignite	IS 2386 Part 2	1.0%
Soft particles	IS 2386 Part 2	5.0%
Materials passing 75µm	IS 2386 Part 1	3% (crushed), 5% (uncrushed)
Organic impurities	IS 2386 Part 2	Darker than standard color

Fine Aggregate (Sand) Specific Tests

Zone Classification

Fine aggregate is classified into zones based on gradation:

SIEVE SIZE	ZONE I	ZONE II	ZONE III	ZONE IV
10mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600µm	15-34	35-59	60-79	80-100
300µm	5-20	8-30	12-40	15-50
150µm	0-10	0-10	0-10	0-15

Fineness Modulus

Single number characterizing overall fineness:

Calculation: Sum of cumulative percentages retained on standard sieves (150µm through 10mm) divided by 100.

Typical values:

- Zone I (coarse): 3.4-3.8
- Zone II (medium): 2.6-3.4
- Zone III (fine): 2.1-2.6
- Zone IV (very fine): 1.5-2.1

Bulking of Sand

Moisture causes sand to bulk (increase in volume)—critical for volumetric batching:

Test procedure:

1. Measure loose volume of moist sand

2. Saturate and measure volume
3. Calculate bulking percentage

Typical bulking: 20-30% at 4-6% moisture content.

Sampling Procedures

Representative Sampling

Test results are only as good as the sample. IS 2430 specifies sampling requirements:

Minimum sample sizes:

NOMINAL SIZE	MINIMUM MASS FOR TESTING
40mm	50 kg
20mm	25 kg
10mm	10 kg
Fine aggregate	10 kg

Sampling Locations

LOCATION	METHOD	CONSIDERATIONS
Stockpile	Multiple points at different heights	Avoid segregated surface material
Conveyor belt	Cross-cut at regular intervals	Most representative method
Truck load	Multiple points after spreading	Sample across full width
Rail car	Grid pattern across surface	Sample at multiple depths

Sample Reduction

Reduce large samples to test portions using:

- **Riffle splitter:** Mechanical division into equal portions
- **Quartering:** Manual division after coning and flattening

- **Incremental sampling:** Taking small portions from multiple locations

Testing Frequency

Routine Production Control

TEST	RECOMMENDED FREQUENCY	PURPOSE
Sieve analysis	Daily or every 500 tonnes	Gradation control
Moisture content	Each shift (sand)	Batch adjustment
Visual inspection	Continuous	Contamination, color change
Flakiness index	Weekly or every 2000 tonnes	Shape quality

Periodic Quality Verification

TEST	RECOMMENDED FREQUENCY	TRIGGER FOR ADDITIONAL TESTING
Impact value	Monthly or quarry face change	New source material
Crushing value	Monthly or quarry face change	Customer complaint
Soundness	Quarterly	Weathering concerns
Alkali reactivity	New source only	Geographic area change

Laboratory Setup Requirements

Essential Equipment

EQUIPMENT	PURPOSE	APPROXIMATE COST
Sieve set with shaker	Gradation analysis	₹50,000-1,50,000
Weighing scales (0.1g accuracy)	All tests	₹30,000-80,000
Drying oven	Moisture determination	₹40,000-1,00,000

EQUIPMENT	PURPOSE	APPROXIMATE COST
Impact value apparatus	AIV test	₹80,000-1,50,000
Crushing value apparatus	ACV test	₹1,50,000-3,00,000
Flakiness gauge	Flakiness index	₹15,000-30,000
Elongation gauge	Elongation index	₹15,000-30,000

Record Keeping and Documentation

Test Records

Maintain comprehensive records including:

- Date and time of sampling
- Sample identification and source
- Test method used
- Test results with units
- Comparison to specification limits
- Technician name and signature
- Any observations or anomalies

Certification Requirements

IS 383 compliance certification should include:

- Source identification
- Grade/size designation
- All relevant test results
- Statement of conformity to IS 383
- Test laboratory accreditation
- Date of testing

Conclusion

IS 383 compliance testing is essential for aggregate producers supplying the construction industry. The combination of physical tests (gradation, flakiness, impact, crushing), chemical tests (soundness, alkali reactivity), and material composition analysis ensures aggregate quality and structural performance. Implement systematic sampling procedures to ensure test results represent actual production. Establish appropriate testing frequencies based on production volume and variability. Maintain thorough documentation for quality assurance and customer confidence. Regular testing is not just a compliance requirement—it is the foundation of product quality that protects both producer and end user.

Topics: #Automation #VFD #Vibratory Feeder #feed control

NESANS
www.nesansindia.in
SF No 20/1, Eachanary Madukkarai Road, Coimbatore, TN 641024
+91 9578 799 755