NESANS

COMPLIANCE & STANDARDS

IS 383:2016 Zone 2 Sand Production: Complete Technical and Testing Guide

Produce IS 383:2016 Zone 2 compliant sand. Gradation requirements, testing methods, crusher settings for concrete-grade M-Sand.

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IS 383:2016 Zone II sand represents the gold standard for concrete production in India—the gradation that delivers optimal workability, strength, and durability. Yet many manufactured sand plants struggle to consistently produce Zone II compliant material, instead oscillating between coarser Zone I and finer Zone III sand that commands lower prices and faces market resistance. This guide provides the complete technical framework for achieving consistent Zone II production, from feed material analysis through equipment selection, process optimization, and quality control protocols.

The difference between a plant that consistently produces premium Zone II sand and one that generates off-spec material often lies in understanding the fundamental relationship between crushing parameters, classification efficiency, and gradation control. Zone II compliance isn't accidental—it's engineered through precise control of every process stage.

Understanding IS 383:2016 Zone Classifications

Zone Gradation Requirements

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

Why Zone II Commands Premium Prices

PROPERTY	ZONE II ADVANTAGE	MARKET IMPACT
Workability	Optimal water demand, good flow	Preferred by RMC plants

PROPERTY	ZONE II ADVANTAGE	MARKET IMPACT
Strength	Balanced particle packing	Consistent cube results
Water Demand	15-18% lower than Zone III	Reduced cement requirement
Bleeding	Minimal compared to coarser zones	Better surface finish
Price Premium	₹200-400/tonne over Zone I/III	Higher margins

Critical Parameters for Zone II Production

Crusher Selection Impact

CRUSHER TYPE	TYPICAL PRODUCT DISTRIBUTION	ZONE II SUITABILITY	NOTES
Cone Crusher	Coarse-biased, less fines	Moderate—tends Zone I	Needs VSI finishing
HSI (Impact)	Moderate fines generation	Good with proper settings	Higher wear costs
VSI (Rock-on-Rock)	Excellent fines control	Best for Zone II	Requires proper feed gradation
VSI (Rock-on-Anvil)	High fines generation	Tends Zone III/IV	Use for coarse feed correction

VSI Operating Parameters for Zone II

PARAMETER	ZONE II TARGET	EFFECT OF INCREASE	EFFECT OF DECREASE
Rotor Speed (RPM)	1200-1500	More fines (toward Zone III)	Coarser (toward Zone I)
Feed Rate	70-85% of rated	Coarser product	Finer product
Cascade Ratio	15-25%	More fines, better shape	Coarser, more wear
Feed Size (-10mm)	Optimal at 6-10mm	Coarser with larger feed	Excessive fines with small feed

Classification System Design

Air Classification vs. Wet Classification

METHOD	CUT POINT ACCURACY	WATER REQUIREMENT	FINES RECOVERY	CAPITAL COST
Air Classifier	±5% at 150µm	None	Excellent	₹30-50 lakhs
Hydrocyclone	±8% at 75µm	3-5 m³/t	Good with thickener	₹40-60 lakhs
Spiral Classifier	±15% at 150µm	2-4 m³/t	Moderate	₹20-30 lakhs
Dewatering Screen	±10% at 150µm	1-2 m³/t	Limited	₹25-40 lakhs

Recommended Classification Circuit for Zone II

1. **Primary Classification:** Vibrating screen at 4.75mm to remove oversize
2. **Secondary Classification:** Air classifier or hydrocyclone at 150µm
3. **Fines Return:** Controlled blending of 150µm minus material
4. **Final Screening:** Verification screen before stockpile

Process Control for Consistent Gradation

Online Monitoring Parameters

PARAMETER	MONITORING METHOD	CONTROL ACTION	RESPONSE TIME
VSI motor load	Ammeter/PLC	Adjust feed rate	Immediate
Product moisture	Moisture sensor	Adjust classifier	5-10 minutes
Fines percentage	Online particle analyzer	Adjust rotor speed	10-15 minutes
Fineness Modulus	Lab sieve analysis	Process adjustment	30-60 minutes

Fineness Modulus Targets

ZONE	FM RANGE	TARGET FOR ZONE II	ACCEPTABLE VARIATION
Zone I	3.0-3.5	N/A	N/A
Zone II	2.6-3.0	2.7-2.9	±0.15
Zone III	2.1-2.6	N/A	N/A
Zone IV	1.5-2.1	N/A	N/A

Quality Control Protocol

Testing Schedule

TEST	FREQUENCY	STANDARD	ZONE II LIMITS
Sieve Analysis	Every 2 hours	IS 2386 Part 1	All sieves within Zone II
Fineness Modulus	Every 2 hours	Calculated from sieve	2.6-3.0
Material Finer than 75µm	Every shift	IS 2386 Part 1	Maximum 15% (crusite)
Organic Impurities	Daily	IS 2386 Part 2	Lighter than standard
Bulk Density	Weekly	IS 2386 Part 3	1450-1650 kg/m³

Corrective Actions Based on Test Results

DEVIATION	PROBABLE CAUSE	CORRECTIVE ACTION
Too coarse (FM >3.0)	Low VSI speed, high feed rate	Increase speed, reduce feed
Too fine (FM <2.6)	High VSI speed, excessive fines return	Reduce speed, adjust classifier
Excess 150µm minus	Classifier inefficiency	Check classifier settings
Deficient midsize	Feed gradation issue	Adjust upstream crushing

Equipment Maintenance for Consistent Output

VSI Wear Parts Impact on Gradation

COMPONENT	WORN CONDITION EFFECT	REPLACEMENT INDICATOR
Rotor Tips	Coarser product, reduced capacity	>10mm wear from new
Anvil Ring	Coarser product, poor shape	Visible groove wear >15mm
Feed Tube	Uneven product, vibration	Oval wear >5mm
Wear Plates	Chamber buildup issues	Holes or breakthrough

Conclusion

Consistent Zone II sand production requires integrated control of crushing parameters, classification efficiency, and quality monitoring. Plants that master these elements command premium prices and preferred supplier status with RMC plants. The investment in proper equipment and process control returns through higher product value and reduced rejection rates. Zone II compliance isn't a target—it's an ongoing process of measurement, control, and continuous improvement.

Topics: #Compliance #IS 383 #M-Sand

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