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TECHNICAL GUIDES

Wet Screening vs Dry Screening: Process Selection Guide for Aggregate Plants

Compare wet and dry screening for aggregates. Water requirements, fines recovery, and ROI analysis for 100-300 TPH Indian aggregate plants.

Author: Sivabalan Selvarajan

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The choice between wet and dry screening fundamentally shapes aggregate plant design, operating costs, and product quality. Wet screening handles moisture and clay contamination that defeats dry processes, while dry screening eliminates water management complexity and enables year-round operation in all climates. This guide provides the technical framework for selecting the optimal screening approach based on material characteristics, product requirements, and site constraints.

Process Comparison Overview

FACTOR	DRY SCREENING	WET SCREENING
Water Requirement	None	1.5-4 m³/tonne processed
Clay Handling	Poor (>3% clay problematic)	Excellent (removes clay)

FACTOR	DRY SCREENING	WET SCREENING
Dust Generation	Significant (requires suppression)	Minimal
Fines Recovery	Complete	Requires settling/classification
Capital Cost	Lower	Higher (water system required)
Operating Cost	Lower (no water)	Higher (pumping, treatment)
Cold Weather	Year-round operation	Freezing issues below 5°C
Product Moisture	Ambient (1-3%)	Higher (8-15% without dewatering)

When to Use Dry Screening

Ideal Conditions

- Feed moisture <4%
- Clay/silt content <3%
- No river sand or wet pit material
- Dry climate with minimal rainfall
- Water scarcity or high water costs
- Cold climate operations

Dry Screening Optimization

CHALLENGE	SOLUTION	IMPLEMENTATION
Near-size blinding	Ball deck cleaning	Rubber balls between decks
Moisture spikes	Covered stockpiles	Prevent rain absorption
Dust control	Fog suppression	Fine mist at discharge points
Static buildup	Grounding	Conductive screen media

When to Use Wet Screening

Ideal Conditions

- Clay content >5%
- Feed moisture >6%
- River sand or wet pit operations
- Concrete-grade aggregate production
- Silica sand processing
- Adequate water supply available

Wet Screening System Components

COMPONENT	FUNCTION	SIZING FACTOR
Spray Bars	Material washing	50-100 L/min per meter width
Collection Sump	Water recovery	5-10 min retention
Slurry Pump	Transfer to classification	2x screen water flow
Hydrocyclone/Classifier	Fines recovery	Match to fines production rate
Thickener	Water clarification	Based on settling rate

Hybrid Approaches

Dry Primary, Wet Final

- Scalp and crush dry
- Wash final product only
- Reduces water consumption 60-70%
- Suitable for moderate clay content

Seasonal Switching

- Wet screening in monsoon (high moisture feed)
- Dry screening in summer (low moisture feed)
- Requires dual system capability

Water Balance Calculation

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Wet Screening Water Requirement:
- Spray water: 1.5-2.5 m³/tonne
- Classification makeup: 0.5-1.0 m³/tonne
- Evaporation loss: 0.2-0.4 m³/tonne
- Product moisture loss: 0.1-0.2 m³/tonne
Total: 2.3-4.1 m³/tonne fresh water

With 80% recirculation:
Fresh water requirement: 0.5-0.8 m³/tonne
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Economic Comparison (200 TPH Plant)

COST ELEMENT	DRY SCREENING (₹/T)	WET SCREENING (₹/T)
Screen media wear	₹2-3	₹3-5
Energy (pumping)	₹0	₹4-8
Water	₹0	₹2-5 (with recirculation)
Dust suppression	₹1-2	₹0
Maintenance labor	₹1-2	₹3-5
Total Operating	**₹4-7**	**₹12-23**

Conclusion

Dry screening is economically superior when material characteristics permit. Wet screening becomes necessary when clay content, moisture levels, or product quality requirements exceed dry process capabilities. Many operations benefit from hybrid approaches that apply wet processing only where needed, minimizing water consumption while achieving required product quality.

Topics: #Aggregate Processing #Vibrating Screens #sand washing

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