

Concrete Property Suite of Tests

Level B Suite of Tests (recommended)



Interstate and primary U.S. or state highway routes that carry significant volumes of freight. Major urban intersections. Alternative routes that result in extensive delays (economic impact). Primary routes to special event centers that carry very high peak traffic loads.

Mixture Property			Project Stage		
Test Name	Test Procedure(s)	Proposed Testing Frequency (minimum 1 per day)	Mixture Design/Proportioning	Pre-Construction Mixture Verification	Quality Control
Workability					
Combined Grading: Coarseness and Workability Factors, 0.45 Power Curve, and Percent Retained on Individual Sieves	ASTM C 136 / AASHTO T 27	every 1,500 yd ³	✓	✓	✓
Aggregate Moisture Content	ASTM C 566 / AASHTO T 255	every 1,000 yd ³	✓	✓	✓
Slump and Loss of Workability	ASTM C 143 / AASHTO T 119	every 500 yd ³	✓	✓	✓
Vibrator Monitoring	manufacturer's recommendations	continuous automated monitoring			✓
Strength Development					
Microwave Water Content	AASHTO T 318	every 500 yd ³	✓	✓	(optional) AASHTO T 318 or strength testing
Heat Signature (calorimetry)	<i>MCO Testing Guide</i> pages 67-69	at each project stage noted	✓	✓	
Set Time	ASTM C 403	at each project stage noted	✓	✓	
Concrete Strength (3 and 7 day)	ASTM C 39 / AASHTO T 22 ASTM C 78 / AASHTO T 97 ASTM C 293 / AASHTO T 177	every 500 yd ³	✓	✓	(optional) AASHTO T 318 or strength testing
Air Entrainment					
Unit Weight	ASTM C 138 / AASHTO T 121	every 500 yd ³	✓	✓	✓
Air Content	ASTM C 231 / AASHTO T 152 ASTM C 173 / AASHTO T 196	every 500 yd ³	✓	✓	✓
Hardened Air Properties	ASTM C 457 or equivalent image analysis procedure	at each project stage noted	✓		

FOR MORE INFORMATION

Mixture Property			Project Stage		
Test Name	Test Procedure(s)	Proposed Testing Frequency (minimum 1 per day)	Mixture Design/Proportioning	Pre-Construction Mixture Verification	Quality Control
Permeability					
Permeable Voids (boil test)	ASTM C 642	at each project stage noted	✓	✓	
Shrinkage					
HIPERPAV	MCO Testing Guide page 93	two stress-strength analyses per day (a.m. & p.m.)	✓	✓	✓
Other Properties					
Optional for all Project Levels: Strength-Maturity Relationship for Early Opening to Traffic	ASTM C 1074 / AASHTO T 325	(optional) place two sensors every day (a.m. & p.m.)		✓ (optional) develop strength-maturity relationship	✓ (optional)
Material Incompatibilities	<i>Identifying Incompatible Combinations of Concrete Materials: Volume II-Test Protocol</i>	at each project stage noted	✓	✓	perform whenever air void property or early stiffening issues arise
Alkali-Silica Reactivity	agency material prequalification ASTM C 1260 ASTM C 1293 ASTM C 1567 / AASHTO T 303	n/a			
Aggregate Durability	agency material prequalification ASTM C 666 / AASHTO T 161	n/a			

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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the view of Federal Highway Administration or Iowa State University.

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