
MASTER CTS

ASATEEN GROUP

CONTROLLED TECHNICAL EDITION

MASTER FLOK

Technical Data Sheet

Controlled DF-01 technical reference for governed specification, technical review, and evidence-based project use.

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1. Document Title

Field	Value
Document Title	MASTER FLOK Technical Data Sheet

2. Defined Terms and Abbreviations

Term / Abbreviation	Definition
CIR	Cold In-Place Recycling; road rehabilitation method in which existing pavement material is reprocessed in place to form a renewed road layer. Typical partial-depth range: approximately 50–100 mm.
Cold Recycling	Rehabilitation process in which existing pavement material is reused and reprocessed in a new road layer without conventional hot-mix asphalt production. Where applied as an in-place recycling method, it is typically partial-depth and may align with approximately 50–100 mm.
FDR / Full Depth Reclamation	Rehabilitation process in which asphalt layers and a substantial depth of the underlying road structure are reworked to form a renewed stabilised layer for continued pavement service. Typical depth range: approximately 100–300 mm.
RAP	Reclaimed Asphalt Pavement; processed material recovered from existing asphalt pavement layers for reuse in rehabilitation, recycling, or stabilised road-construction works. RAP is a material, not a fixed-depth method.
PAM	Technical polyacrylamide; organic polymer component used in the MASTER FLOK composition.
Cement-Treated Layer	Road layer in which aggregate, recycled road material, or soil is mixed with cement to develop improved structural performance.
Sub-Base	Structural layer placed between the subgrade and the base layer.
Base	Main structural pavement layer placed beneath the asphalt surfacing or wearing course.

3. Product Identity

Item	Description
Institutional Hierarchy	ASATEEN Group / MASTER CTS
Product Name	MASTER FLOK
Product Type	Polymer-mineral additive
Product Function	Additive for cement-treated systems
Main Use Areas	Soil strengthening and stabilization; cement-treated road-construction materials; cold recycling
Use Condition	For joint use with Portland cement

4. Product Description and Technical Overview

MASTER FLOK is a dry polymer-mineral additive supplied as a gray powder for use with Portland cement in cement-treated systems. It is used mainly in the construction of new roads and in the repair, rehabilitation, and strengthening of existing roads, including soil-cement stabilised subgrade, sub-base, and base layers and cold-recycling works beneath asphalt pavement systems. The product is not a standalone binder and is used to modify the structure and performance of the treated system.

5. Composition / Material Basis

Compared with cement-only methods and traditional methods, MASTER FLOK contributes to a more complex internal structure within the cement-treated material. This structural effect is associated with reduced brittleness, improved stress distribution, and improved resistance to moisture- and freeze-thaw-related degradation.

Item	Description
Material Basis	Polymer-mineral composition
Constituent Basis	Redispersible mineral powders and mineral fillers
Mineral Components	Activated silica, activated cement, calcium salts, and sodium salts
Organic Polymer Components	Modified lignin, carboxylic acids, naphthalenesulfonic acid, formaldehyde, and technical polyacrylamide (PAM) flocculants
Use with Cement	Yes
Functional Basis	Introduces flexible coagulation bonds from polymers and chemical bonds from mineral fillers in addition to cement stone bonds

6. Key Technical Properties

Property	Value
Appearance	Gray powder
Bulk Density	800–1200 kg/m ³
Moisture Content	≤ 2.0%
Sieve Residue (Mesh No. 0315)	≤ 1.0%
Solubility	Insoluble in water
Hydrophobic Behavior	Hydrophobic
Flammability	Non-flammable
Toxicity	Non-toxic
Compatibility	Compatible with Portland cement
Low-Temperature Storage / Transport	Suitable

7. Performance Characteristics

7.1 Comparative Performance Summary

Parameter / Tested System	Cement Only	Cement + MASTER FLOK	Observed Change
Setting Time — Start of Setting	2.8 h	7.3 h	Increased by 4.5 h
Setting Time — End of Setting	4.0 h	8.5 h	Increased by 4.5 h
28-Day Compressive Strength — Reclaimed Asphalt Pavement (RAP)	4.75–5.83 MPa	6.54–8.62 MPa	Increased by 33.2%–47.9% across tested RAP mixes
28-Day Compressive Strength — Crushed Gravel Base Material (0-20 mm)	5.91–8.57 MPa	7.66–15.61 MPa	Increased by 29.6%–82.1% across tested mixes
28-Day Compressive Strength — Fine Crushed Gravel Screenings (0-5 mm)	5.49–8.87 MPa	6.87–14.24 MPa	Increased by 25.1%–60.5% across tested mixes
28-Day Split Tensile Strength — RAP	0.53–0.67 MPa	0.88–1.25 MPa	Increased by 31.3%–135.8% across tested mixes
28-Day Tensile in Bending — RAP	1.07–1.35 MPa	1.19–2.59 MPa	Higher in two tested mixes; mix-specific variation in the third
28-Day Water Absorption — RAP	1.29%–2.51%	0.84%–1.36%	Reduced by 34.9%–56.0% across tested mixes

7.2 Fresh-Mixture Performance

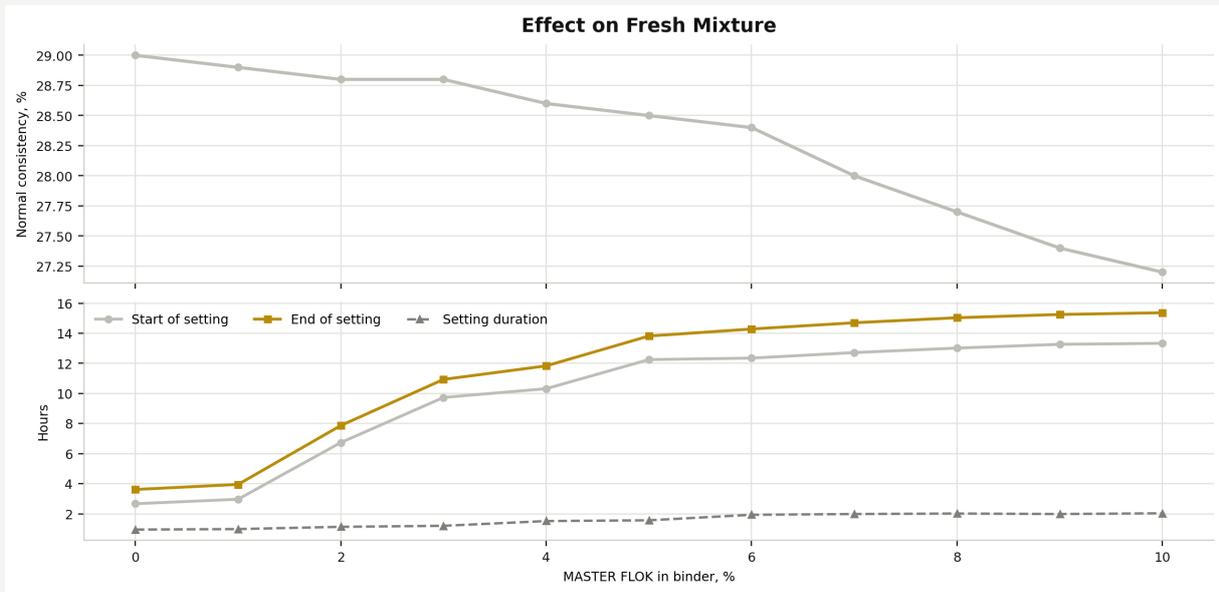
Parameter	Quantified Result
Start of Setting	Increased from 2.8 h to 7.3 h
End of Setting	Increased from 4.0 h to 8.5 h
Normal Consistency Across Dosage Series	Reduced from 29.0% at 0% MASTER FLOK in binder to 27.2% at 10% MASTER FLOK in binder
Start of Setting Across Dosage Series	Increased from 2:40 at 0% to 13:20 at 10%
End of Setting Across Dosage Series	Increased from 3:37 at 0% to 15:22 at 10%
Setting Duration Across Dosage Series	Increased from 0:57 at 0% to 2:02 at 10%
Mixture Mobility	Increased
Compactability	Increased
Water Demand	Reduced
Sensitivity of Achieved Density to Moisture Deviation During Compaction	Reduced

7.3 Setting Time

System	Start of Setting, h	End of Setting, h
Cement	2.8	4.0
Cement + MASTER FLOK	7.3	8.5

7.4 Effect on Fresh Mixture

Interpretation note. Increasing MASTER FLOK content in the binder reduced normal consistency and extended both the start and end of setting. Across the tested dosage series, start of setting increased from 2:40 to 13:20, while end of setting increased from 3:37 to 15:22.

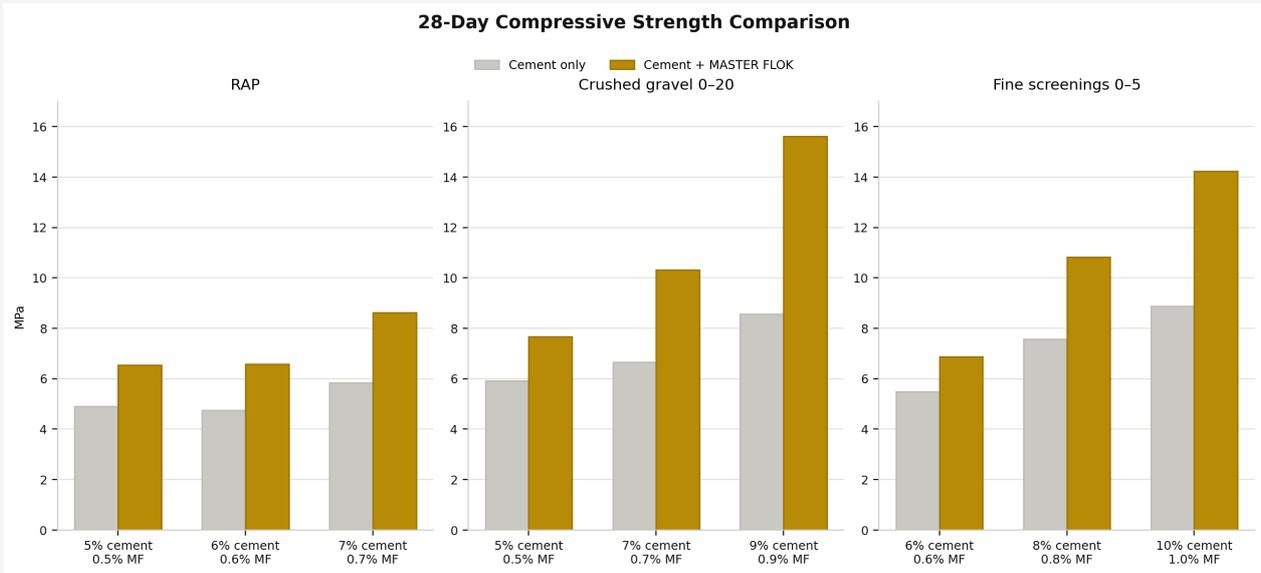


MASTER FLOK in Binder, %	Normal Consistency, %	Start of Setting	End of Setting	Setting Duration
0	29.0	2:40	3:37	0:57
1	28.9	2:58	3:57	0:59
2	28.8	6:44	7:52	1:08
3	28.8	9:44	10:56	1:12
4	28.6	10:19	11:50	1:31
5	28.5	12:15	13:49	1:34
6	28.4	12:21	14:17	1:56
7	28.0	12:43	14:42	1:59
8	27.7	13:01	15:02	2:01
9	27.4	13:16	15:15	1:59
10	27.2	13:20	15:22	2:02

7.5 Effect on Hardened Material

Parameter	Series	Without MASTER FLOK	With MASTER FLOK	Change
28-Day Compressive Strength — Reclaimed Asphalt Pavement (RAP)	1	4.91 MPa	6.54 MPa	+33.2%
28-Day Compressive Strength — Reclaimed Asphalt Pavement (RAP)	2	4.75 MPa	6.58 MPa	+38.5%
28-Day Compressive Strength — Reclaimed Asphalt Pavement (RAP)	3	5.83 MPa	8.62 MPa	+47.9%
28-Day Compressive Strength — Crushed Gravel Base Material (0-20 mm)	1	5.91 MPa	7.66 MPa	+29.6%
28-Day Compressive Strength — Crushed Gravel Base Material (0-20 mm)	2	6.66 MPa	10.32 MPa	+55.0%
28-Day Compressive Strength — Crushed Gravel Base Material (0-20 mm)	3	8.57 MPa	15.61 MPa	+82.1%
28-Day Compressive Strength — Fine Crushed Gravel Screenings (0-5 mm)	1	5.49 MPa	6.87 MPa	+25.1%
28-Day Compressive Strength — Fine Crushed Gravel Screenings (0-5 mm)	2	7.58 MPa	10.82 MPa	+42.7%
28-Day Compressive Strength — Fine Crushed Gravel Screenings (0-5 mm)	3	8.87 MPa	14.24 MPa	+60.5%
28-Day Split Tensile Strength — Reclaimed Asphalt Pavement (RAP)	1	0.53 MPa	1.25 MPa	+135.8%
28-Day Split Tensile Strength — Reclaimed Asphalt Pavement (RAP)	2	0.55 MPa	1.24 MPa	+125.5%
28-Day Split Tensile Strength — Reclaimed Asphalt Pavement (RAP)	3	0.67 MPa	0.88 MPa	+31.3%
28-Day Tensile in Bending — Reclaimed Asphalt Pavement (RAP)	1	1.07 MPa	2.48 MPa	+131.8%
28-Day Tensile in Bending — Reclaimed Asphalt Pavement (RAP)	2	1.11 MPa	2.59 MPa	+133.3%
28-Day Tensile in Bending — Reclaimed Asphalt Pavement (RAP)	3	1.35 MPa	1.19 MPa	-11.9%
28-Day Water Absorption — Reclaimed Asphalt Pavement (RAP)	1	2.51%	1.36%	-45.8%
28-Day Water Absorption — Reclaimed Asphalt Pavement (RAP)	2	2.48%	1.09%	-56.0%
28-Day Water Absorption — Reclaimed Asphalt Pavement (RAP)	3	1.29%	0.84%	-34.9%

7.6 28-Day Compressive Strength Comparison

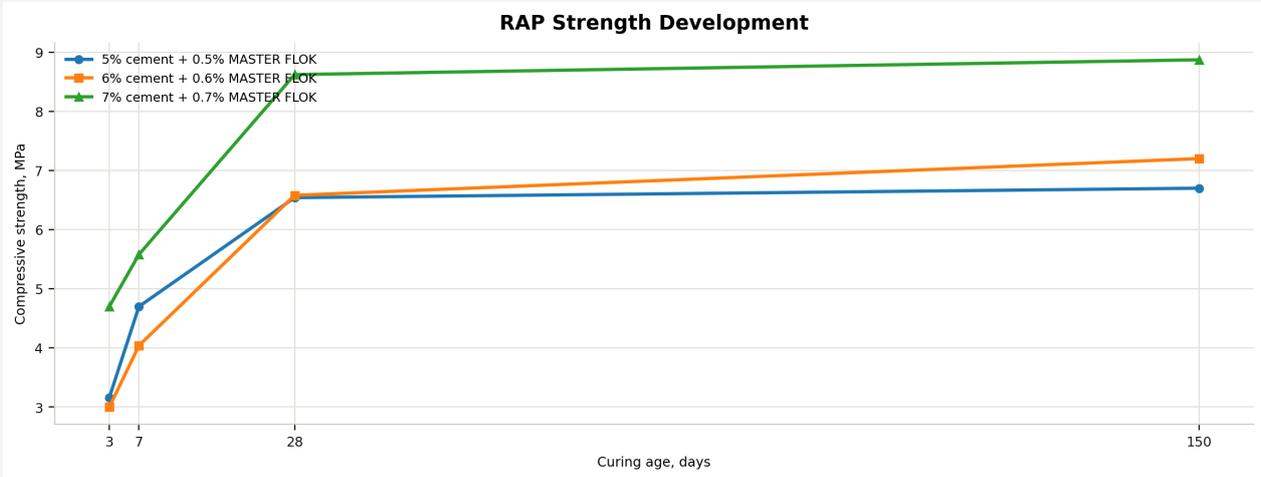


Interpretation note. Across the tested material families, mixes containing MASTER FLOK achieved higher 28-day compressive strength than cement-only mixes. The observed increase ranged from 25.1% to 82.1%, with the highest uplift recorded in the crushed gravel base material 0–20 mm series.

Material Family	Cement Dosage	MASTER FLOK Dosage	Cement Only, MPa	Cement + MASTER FLOK, MPa	Strength Increase
Reclaimed Asphalt Pavement (RAP)	5%	0.5%	4.91	6.54	33.2%
Reclaimed Asphalt Pavement (RAP)	6%	0.6%	4.75	6.58	38.5%
Reclaimed Asphalt Pavement (RAP)	7%	0.7%	5.83	8.62	47.9%
crushed gravel base material 0-20 mm	5%	0.5%	5.91	7.66	29.6%
crushed gravel base material 0-20 mm	7%	0.7%	6.66	10.32	55.0%
crushed gravel base material 0-20 mm	9%	0.9%	8.57	15.61	82.1%
fine crushed gravel screenings 0-5 mm	6%	0.6%	5.49	6.87	25.1%
fine crushed gravel screenings 0-5 mm	8%	0.8%	7.58	10.82	42.7%
fine crushed gravel screenings 0-5 mm	10%	1.0%	8.87	14.24	60.5%

7.7 Reclaimed Asphalt Pavement (RAP) Strength Development

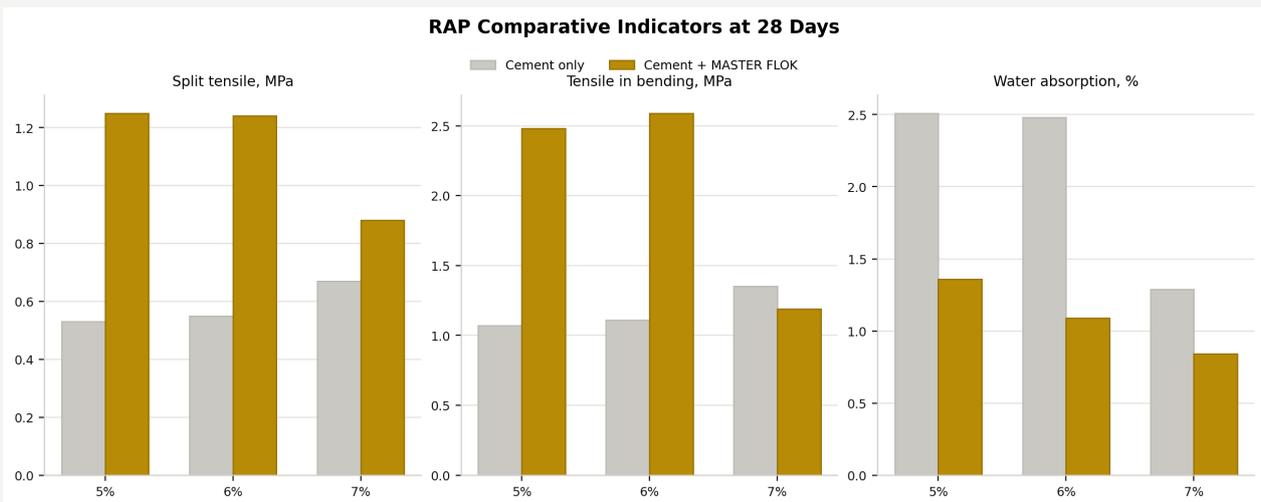
Interpretation note. In the tested RAP mixes containing MASTER FLOK, strength increased from the early-age values at 3 days and 7 days to the higher values recorded at 28 days and 150 days. The highest 28-day value in this series was 8.62 MPa, increasing to 8.87 MPa at 150 days.



Mix	3 Days, MPa	7 Days, MPa	28 Days, MPa	150 Days, MPa
5% cement + 0.5% MASTER FLOK	3.16	4.70	6.54	6.70
6% cement + 0.6% MASTER FLOK	3.00	4.04	6.58	7.20
7% cement + 0.7% MASTER FLOK	4.70	5.58	8.62	8.87

7.8 Reclaimed Asphalt Pavement (RAP) Comparative Indicators at 28 Days

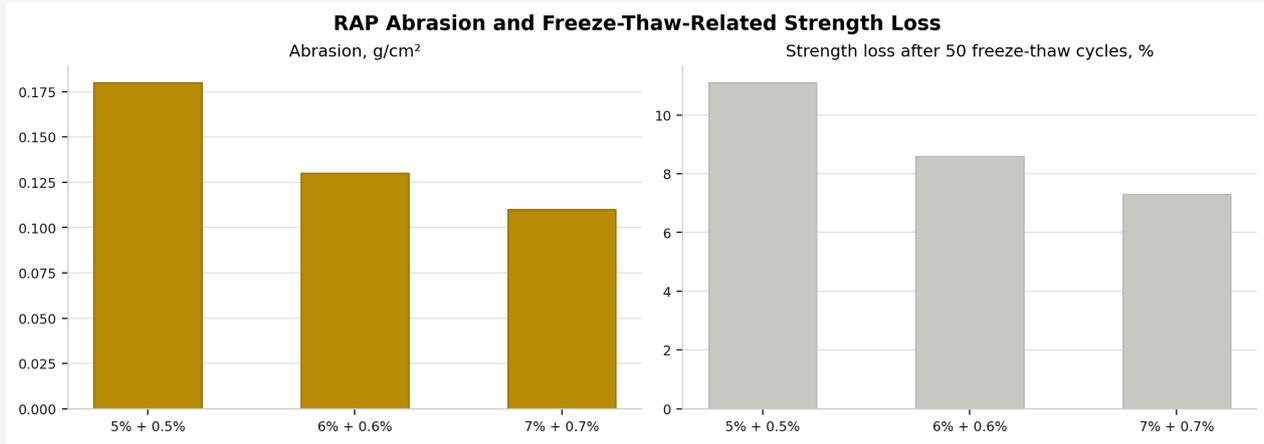
Interpretation note. In the tested RAP mixes, MASTER FLOK increased split tensile strength and reduced water absorption across all three series. Tensile in bending was higher in two mixes, with one series showing a lower value than the cement-only reference.



Mix	Split Tensile, MPa	Tensile in Bending, MPa	Water Absorption, %
5% cement only	0.53	1.07	2.51
5% cement + 0.5% MASTER FLOK	1.25(+135.8%)	2.48(+131.8%)	1.36(-45.8%)
6% cement only	0.55	1.11	2.48

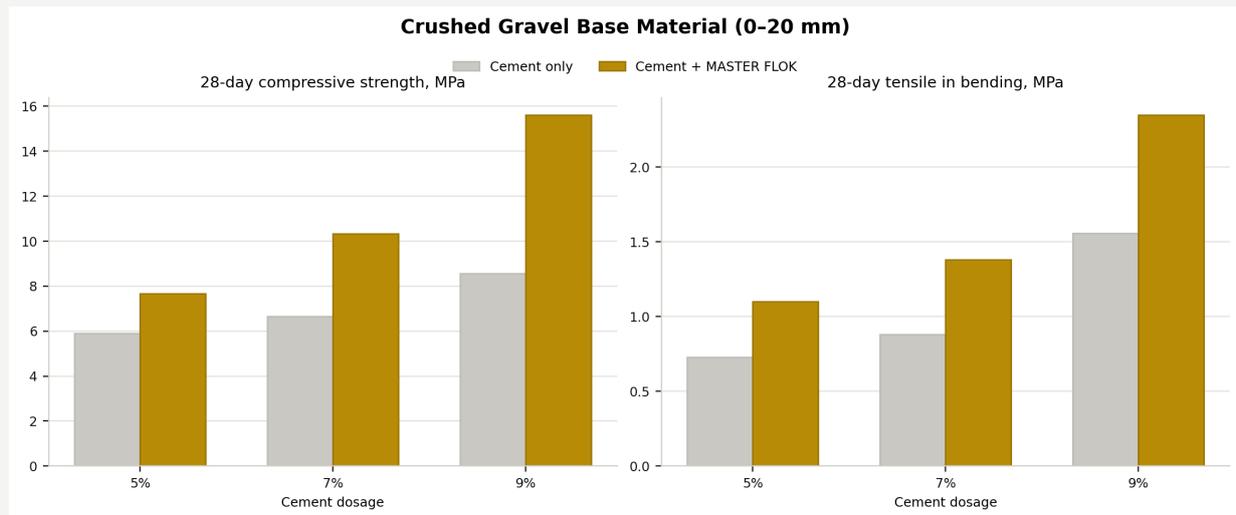
Mix	Split Tensile, MPa	Tensile in Bending, MPa	Water Absorption, %
6% cement + 0.6% MASTER FLOK	1.24(+125.5%)	2.59(+133.3%)	1.09(-56.0%)
7% cement only	0.67	1.35	1.29
7% cement + 0.7% MASTER FLOK	0.88(+31.3%)	1.19(-11.9%)	0.84(-34.9%)

7.9 Reclaimed Asphalt Pavement (RAP) Abrasion and Freeze-Thaw-Related Strength Loss



Mix	Abrasion, g/cm²	Reduction in Compressive Strength After 50 Freeze-Thaw Cycles, %
5% cement + 0.5% MASTER FLOK	0.18	11.1
6% cement + 0.6% MASTER FLOK	0.13	8.6
7% cement + 0.7% MASTER FLOK	0.11	7.3

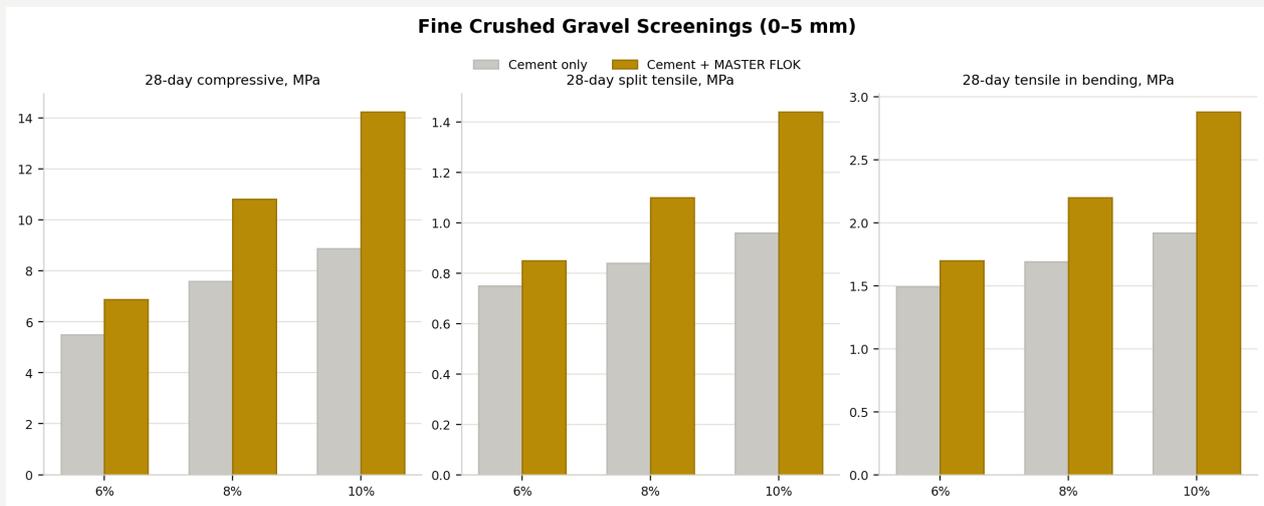
7.10 Crushed Gravel Base Material (0-20 mm)



Mix	28-Day Compressive Strength, MPa	28-Day Tensile in Bending, MPa	Early Strength Development
5% M500 cement only	5.91	0.73	—

Mix	28-Day Compressive Strength, MPa	28-Day Tensile in Bending, MPa	Early Strength Development
5% M500 cement + 0.5% MASTER FLOK	7.66(+29.6%)	1.10(+50.7%)	3-day: 3.66 MPa 7-day: 4.54 MPa
7% M500 cement only	6.66	0.88	—
7% M500 cement + 0.7% MASTER FLOK	10.32(+55.0%)	1.38(+56.8%)	3-day: 6.37 MPa 7-day: 8.57 MPa
9% M500 cement only	8.57	1.56	—
9% M500 cement + 0.9% MASTER FLOK	15.61(+82.1%)	2.35(+50.6%)	3-day: 9.87 MPa 7-day: 13.45 MPa

7.11 Fine Crushed Gravel Screenings (0-5 mm)



Mix	28-Day Compressive, MPa	28-Day Split Tensile, MPa	28-Day Tensile in Bending, MPa	Early Strength Development
6% M400 cement only	5.49	0.75	1.49	—
6% M400 cement + 0.6% MASTER FLOK	6.87(+25.1%)	0.85(+13.3%)	1.70(+14.1%)	3-day: 4.66 MPa 7-day: 5.54 MPa
8% M400 cement only	7.58	0.84	1.69	—
8% M400 cement + 0.8% MASTER FLOK	10.82(+42.7%)	1.10(+31.0%)	2.20(+30.2%)	3-day: 8.45 MPa 7-day: 9.87 MPa
10% M400 cement only	8.87	0.96	1.92	—
10% M400 cement + 1.0% MASTER FLOK	14.24(+60.5%)	1.44(+50.0%)	2.88(+50.0%)	3-day: 9.82 MPa 7-day: 10.99 MPa

7.12 Tested System Envelope

Tested Material Family	Cement Range	MASTER FLOK Range	Strongest Observed Result
Reclaimed Asphalt Pavement (RAP)	5–7%	0.5–0.7%	28-day compressive strength up to 8.62 MPa
crushed gravel base material (0-20 mm)	5–9%	0.5–0.9%	Strength increase up to 82.1%; 28-day compressive strength up to 15.61 MPa
fine crushed gravel screenings (0-5 mm)	6–10%	0.6–1.0%	28-day compressive strength up to 14.24 MPa

7.13 Field Engineering Implications

Observed Result	Field Meaning
Start and end of setting extended by 4.5 h	More time for transport, spreading, leveling, and compaction before hardening
28-day compressive strength increased across all tested material families	More structurally capable cement-treated layer within the tested systems
RAP water absorption reduced by 34.9%–56.0%	Lower moisture uptake in the tested RAP systems
RAP split tensile strength increased by 31.3%–135.8%	Stronger tensile response in the tested RAP systems
Freeze-thaw-related strength loss in RAP reported at 7.3%–11.1%	Supports improved durability assessment for cyclic exposure within the tested RAP systems

7.14 Calculated Performance Gain Summary

Performance Metric	Cement Only	Cement + MASTER FLOK	Calculated Change	Tested Context
Start of setting	2.8 h	7.3 h	+160.7%	Cement system
End of setting	4.0 h	8.5 h	+112.5%	Cement system
28-day compressive strength	—	—	+25.1% to +82.1%	Across tested material families
RAP split tensile strength	0.53–0.67 MPa	0.88–1.25 MPa	+31.3% to +135.8%	RAP mixes
RAP water absorption	1.29–2.51%	0.84–1.36%	-34.9% to -56.0%	RAP mixes
RAP tensile in bending	1.07–1.35 MPa	1.19–2.59 MPa	Mix-specific variation	RAP mixes

8. Application Areas

Application Area	Description
Cement-Treated Road Bases and Pavement Layers	Construction of pavement bases and layers using local, recycled, or marginal materials treated with cement
Cold Recycling	Recycling of existing pavement structures to achieve target strength criteria
Strengthening / Profile Correction	Strengthening and profile correction of existing pavement layers
Subgrade Stabilization	Stabilization of weak or frost-susceptible subgrade soils
Concrete Production	Use as an advanced additive during concrete manufacturing
Railway Infrastructure	Sub-ballast protective layers
Oilfield Development	Intra-field roads, helipads, and heavy-duty runways
Military Infrastructure	Specialized tactical pavements and border mobility roads
Waste Processing	Encapsulation of industrial drill cuttings into structural soil concrete
Airfield Applications	Applicable in airfield pavement works where specified

8.1 New Road Construction and Existing Road Rehabilitation

Use Case	Role of MASTER FLOK
New road construction	Improves the performance of cement-treated base, sub-base, and stabilized layers used in new pavement structures
Existing road repair / rehabilitation	Supports cold recycling, strengthening, and profile correction of existing road layers
Weak subgrade treatment	Improves the engineering response of stabilized weak or frost-susceptible subgrade soils

8.2 Typical Treatment Ranges

Application	Range
Recycling of existing pavement structures	Approximately 20 cm to 40 cm
Strengthening and profile correction of existing pavement layers	Approximately 15 cm to 20 cm
Stabilization depth for weak or frost-susceptible subgrade soils	Approximately 40 cm to 200 cm

9. Application Method / Usage Guidance

Item	Description
Use Principle	Use jointly with Portland cement in cement-treated systems
Binder Role	Additive / modifier only; not a standalone binder
Controlled Dosage	0.4–0.8% additive
Example Mix for Reinforced RAP Base	RAP 100% + Cement (M400) 6% + MASTER FLOK 0.6% + Water 1.5%
Iraqi Reading of Rehabilitation Context	For Iraqi road-rehabilitation reading, this example aligns most closely with cold-recycled or reclaimed road-material treatment within a cement-stabilised layer process
Natural Moisture of RAP	2.0% by weight
Optimum Moisture of RAP + Cement + MASTER FLOK Mixture	3.5% by weight
Water Addition Required to Reach Optimum Moisture	1.5% by weight
Mass Share of Binder in RAP	9.5%
Material Preparation Requirements	Soils and granular materials should be free of oversized gravel, oversized particles, and organic matter, with moisture adjusted to optimum levels prior to homogeneous mixing
Worker Handling (PPE)	Use respiratory protection and protective eyewear during loading to avoid inhalation of mineral dust
Practical Effect	Extended setting time increases the available transport and compaction window before hardening

9.1 Recommended Field Verification

Field Check	Purpose
Moisture control	Confirm the mix is near optimum moisture before compaction
Compaction control	Verify that the required field density is achieved
Trial section	Validate field workability, dosage, and compaction sequence before full production
Strength testing	Confirm project-specific performance of the cement-treated system
Material uniformity	Verify homogeneous mixing and additive distribution through the treated layer

10. Packaging and Storage

Item	Description
Packaging Format	Jumbo bag
Packaging Type	Flexible Intermediate Bulk Container (FIBC)
Pack Size	1000 kg
Shelf Life	24 months
Storage Conditions	Store in original hermetically sealed packaging, on elevated pallets, in dry conditions

11. Referenced Test Methods / Standards

Referenced Method	Brief Relevance
ASTM D1557-12	Moisture-density / compaction reference
ASTM C109/C109M-21	Compressive strength of cement mortar
ASTM C191-19	Setting time by Vicat apparatus
ASTM D559	Wetting and drying durability reference
AASHTO T99/T180	Soil compaction reference methods
ASTM C192/C192M-19	Making and curing laboratory specimens

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