

Instacem™

HIGH
PERFORMANCE CEMENT



WE INVENT AND OFFER NEXT
GENERATION MATERIALS

- Quick Setting

- Curing Free

- High early strength

- Can set in low temperature



CHEMICALLY ENGINEERED HIGH PERFORMANCE CEMENT

Instacem™ is high performance cement based on new generation microcrystalline technology with many superior properties over Portland cement and complying with American standard ASTM C 1600. Unique properties are achieved by careful selection and processing of raw materials and blending with proprietary additives.

WHY INSTACEM™

The primary advantage of Instacem™ is its "Quick setting and Curing Free" nature.

Concretes, grouts and mortars made with Instacem™ can be formulated to achieve compressive strengths excess of 20 MPa or 3000 psi in as little as 4 hours. It is possible to attain desired 28 day strength in 24 hrs. "Quick Return to Service - RTS in few Hrs"

Inherent chemistry of Instacem™ makes it to "set in low temperatures"

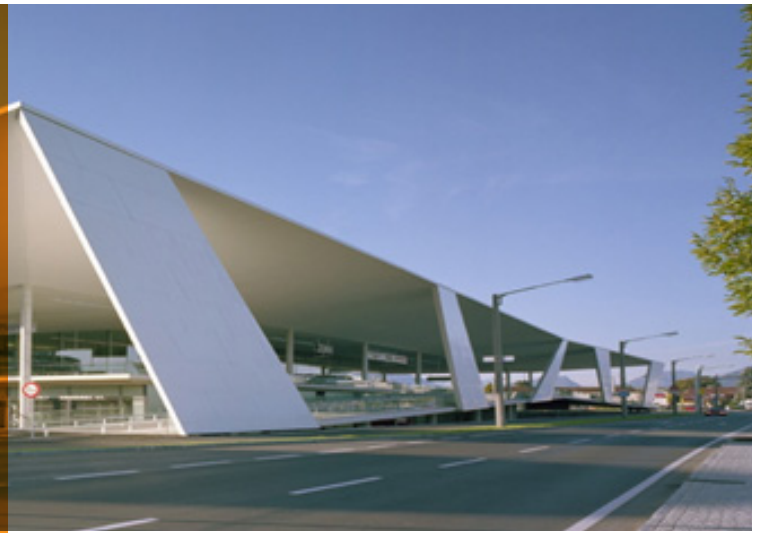
It is less permeable to water and superior resistant to chemicals. Makes it an ideal choice to use in constructions and repair where return to service and durability are of primordial importance.

HOW IT WORKS

Faster dissolution and precipitation of constituents present in Instacem™ results in the quicker formation of micro fine crystals which fills the pore structure thereby increasing the density of the matrix and reducing permeability. The crystals thus formed are enrobed by the Aluminate, Carbonate and Silicate phases making it stable and more durable.

HOW TO USE

In the same way as Portland cement and hence easy adoption



INVENTION BACKGROUND

Although Portland cement has been successfully used for many years, it is not without limitations. Some of the common problems associated with Portland cement products are slow strength gain, cracking due to drying shrinkage, porosity and need of water curing, susceptible to attack by chemicals, Alkali Silica Reaction, difficulty to set in low temperature, etc.

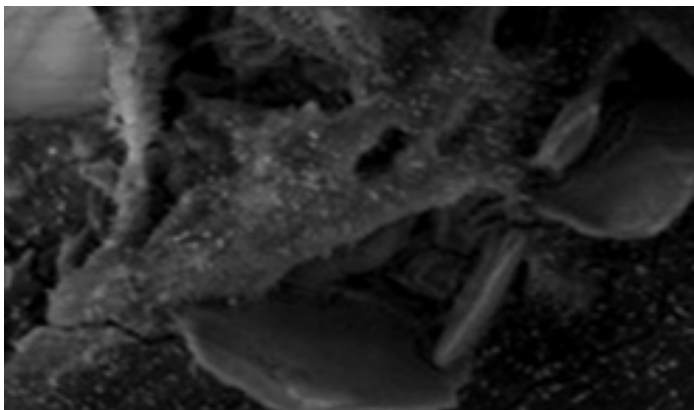
The quest for high performance cement drove our efforts in R&D that resulted in Instacem™

EDGE OVER PORTLAND CEMENT

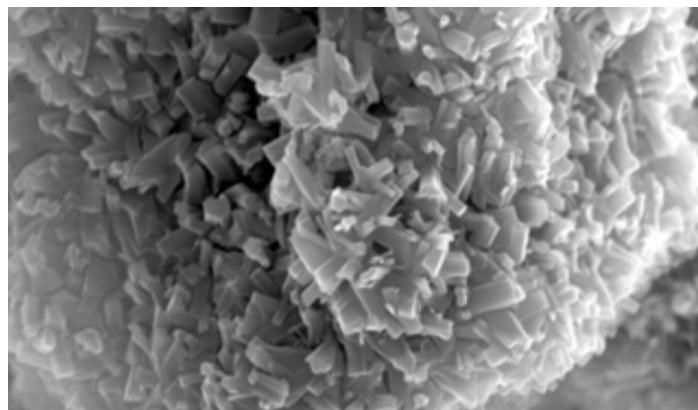
Property	OPC	Instacem™
Setting	Slow	Fast
Strength Gain	Slow	Quick
Shrinkage	High	Almost zero
Water Curing	Required	None
Free Calcium Hydroxide	Present	None
Microstructure	Porous	Dense
Water permeability	High	Low
Bond Strength	Low	High

RESEARCH BACKGROUND

Instacem™ is a patent pending technology invented by world renowned scientist at which is supported by a independent research lab involved in R&D of innovative technologies in the areas of alternative binders having zero cement, high performance cements, advanced coatings, innovative building materials, effective utilization of industrial by products and hazardous waste stabilization has state of art material science laboratory, pilot plants and team of scientist and engineers. It has many other inventions like Clinker free slag cement, Clinker free fly ash cement, Advanced Geopolymer, permanent anticorrosive coating, alternative to gypsum board, etc.



TYPICAL MICROSTRUCTURE OF PORTLAND CEMENT



TYPICAL MICROSTRUCTURE OF INSTACEM

TECHNOLOGY BRIEFING

Instacem™ is a viable alternative to Portland cement with several advantages due to its different hydration chemistry and microstructure. The following are the key properties of our Instacem™ hydraulic binder :

✓ QUICK SETTING AND NO WATER CURING

Formation of binding phase is much faster due to instant dissolution and precipitation of ingredients and the final hydration product of Instacem™ is different which does not require water curing.

✓ RAPID STRENGTH GAIN

The additives present in Instacem™ increases the dissolution and precipitation rate of its components thereby achieving a faster strength gain.

✓ DECREASED WATER PERMEABILITY

Owing to its unique particle size distribution of Instacem™ the final products formed are dense which decreases the water penetration into Instacem™ substantially.

✓ INCREASED BOND STRENGTH

The additives present in Instacem™ reduce the surface tension thereby increasing its wetting characteristics providing better bonding results than Portland cement.

✓ NON-SHRINK

Because of its ability to bound extra water in its microstructure, Instacem™ does not shrink. The higher rate of strength gain allows Instacem™ to overcome any tension stresses resulting from evaporation. This notably decreases shrinkage and cracks associated with it.

✓ CAN SET IN LOW TEMPERATURE

Instacem™ hydration reaction is exothermic which means heat is created during its setting which prevents the water from freezing and allowing it to set faster at lower temperatures up to +10°C.

Hence Instacem™ is an ideal choice over Portland cement for quick construction, repair and disaster management in low temperature region.

✓ THIXOTROPIC

Instacem™ is ideal binder to manufacture spray on cement, thin set tile adhesives and specialty coatings because of its ability to connect quickly when left undisturbed there by achieving the gel strength very fast

✓ DURABILITY

Absence of tri Calcium Aluminate and the nature of Instacem™ to bind the chloride ions make it resistant to sulfates and chlorides.

Instacem's unique formula provides excellent protection for embedded and reinforcing steel due to its low permeability and particularly its high chloride resistance, and the ability of its crystals to react with thin layers of iron oxide rust to form stable phases, which in turn increases the steel's passivity, consequently eliminating corrosion.

Often the grouts based on OPC rely on hydrogen or other gas formation to expand the grout during the gel phase in order to compensate for the shrinkage. The problem of hydrogen embrittlement of reinforcing steel that may arise due to the use of OPC based grouts are completely eliminated by using grouts made of Instacem because of its non shrinking nature.

In summary Instacem™ advantage includes low shrinkage, low permeability, rapid strength gain, curing benefits, sulfate resistance, ability to resist chloride penetration and long term durability.

TESTING


S.No	Physical Requirements	OPC 43 Grade (In accordance to IS 8112: 1989)	Rapid Hardening Hydraulic Cement (In accordance to ASTM c1600)	Instacem™
1	Fineness (cm ² /g)	2250	N/A	> 4000
2	Autoclave (%)	0.8 Max	0.8 Max	0.027
3	Setting Time (Minutes)			
	Initial Setting	30 Min	10	15
	Final Setting	600 Max	45	25
4	Compression Strength (MPa)			
	4 Hrs	N/A	N/A	14
	1 Day	N/A	17	27.5
	3 Day	23	N/A	36
	7 Day	33	28	44
	28 Day	43	35	48

CHLORIDE PERMEABILITY

Instacem™ concrete	376 coulombs
Portland cement concrete	2900 coulombs

When tested as per ASTM C 1202 for chloride penetration, concretes made using Instacem™ with a water/cement ratio of 0.5 shows excellent performance indicating that Instacem™ is ideal for construction in marine and corrosive atmospheres.

THIRD PARTY VALIDATION


CIVIL-AID

Ref: CIVIL-AID-CEMENT:BL/2006(a)/4/2016 August 5, 2016
Test order dated: 23.4.16

M/s EKO Tech4 Trans Pvt. Ltd.
#28, Cauvery Nagar
Sirangam, Trichy - 6

FINAL TEST REPORT ON PHYSICAL PROPERTIES OF CEMENT


Source of sample	: Sample supplied by the Customer
Customer's Reference	: Letter dated 23.4.16
Brand/Grade*	: Not furnished
Type*	: Not furnished
Sample Identification*	: Instacem (Grey)
Project*	: Not furnished
Condition of sample	: Satisfactory
Period of Test	: 26.4.2016 to 24.5.2016 and 4.7.2016 to 1.8.2016
Technical Reference	: IS 4031 (Part 3 to 6) 1988 (Reaffirmed 2014) IS 4031 (Part 2) -1999 (Reaffirmed 2013)

Sl. No.	Test Conducted	Results
1.	CONSISTENCY	32.9 %
2.	INITIAL SETTING TIME	15 Minutes
3.	FINAL SETTING TIME	25 Minutes
4.	COMPRESSIVE STRENGTH:	
	a) 4 hours (average of three results)	14.0 MPa
	b) 24 ± 1h (average of three results)	27.5 MPa
	c) 72 ± 1h (average of three results)	36.0 MPa
	d) 168 ± 2h (average of three results)	44.5 MPa
	e) 672 ± 4h (average of three results)	48.0 MPa
5	FINENESS (by Blaine's air permeability method)	415 m ² /kg
6	SOUNDNESS (by Autoclave expansion method)	0.027 %

* As furnished by the customer

Note: 1. The results relate only to the items tested.
2. Report shall not be reproduced except in full, without the written approval of the lab.
3. Any corrections invalidate this report.


for **CIVIL-AID TECHNOCLINIC PVT. LTD.**


Radhakrishna
Manager - Lab

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CIVIL-AID

Ref: CIVIL-AID-SPL:BL/2006/4/2016 Date: 8.6.2016
Test Order dated: 23.4.16

M/s EKO TECH 4 TRANS PVT LTD
28, Cauvery Nagar, Sirangam
Trichy - 620 006

TEST RESULTS ON ELECTRICAL INDICATION OF CONCRETE'S ABILITY TO RESIST CHLORIDE ION PENETRATION (RCPT)

Source of sample	: Sample supplied by the customer
Customer's Reference	: Letter dated 23.4.16
UIN	: 160011673
Period of test	: 6.6.16 to 8.6.16
Condition of sample	: Satisfactory
Technical reference	: ASTM C 1202-03

Sl. No.	Identification	Total Charge passed (Coulombs)
1	Instacem (Grey) / DOC 6.5.16	376.0
2	Instacem (White) / DOC 6.5.16 (Average of two test results)	236.0
3	Eco-Cem / DOC 6.5.16 (Average of two test results)	720.0


Requirement as per ASTM C-1202-03, Table 1, Chloride ion penetrability based on charge passed.

Charge passed (Coulombs)	Chloride Ion penetrability
> 4000	High
2000 - 4000	Moderate
1000 - 2000	Low
100 - 1000	Very low
< 100	Negligible

* As furnished by the customer.

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DINESH H.T.
Manager - Lab

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PRODUCT FORMULATION MATRIX

Instacem™ is ideal cement for manufacturing unique quick setting and curing free products with superior properties. With the inbuilt performance additives, it is very easy to formulate a wide range of products by just blending with the required sand and aggregates – An ideal choice for Construction Chemical and Premixed Products Manufacturers

	Typical Products	Suggested Mix Ratios Instacem™ : Sand : 20 mm Aggregate By Weight	Typical Properties	
			Setting Time	Compressive Strength
	Instant concrete	1:2:2	IST (mts) : 25 FST (mts) : 60 RTS: 3 Hrs	3 Hr Strength: 15 MPa 1 Day Strength: 25 MPa 28 Days Strength: 40 MPa
	Spray on cement /Shotcreteing	1:2.5	IST (mts) : 25 FST (mts) : 60 RTS: 3 Hrs	3 Hr Strength: 15 MPa 1 Day Strength: 25 MPa 28 Days Strength: 40 MPa
	Low Temperature concreting (Ambient < 20 C)	1:2:2	IST (mts) : 45 FST (mts) : 75 RTS: 4Hrs	3 Hr Strength: 15 MPa 1 Day Strength: 25 MPa 28 Days Strength: 40 MPa
	Rapid setting structural mortar	1:1	IST (mts) : 25 FST (mts) : 45 RTS: 3 Hrs	3 Hr Strength: 15 MPa 1 Day Strength: 25 MPa 28 Days Strength: 50MPa
	Quick setting Plaster	1:4	IST (mts) : 60 FST (mts) : 90 RTS: 4Hrs	4Hr Strength: 7MPa 1 Day Strength: 15MPa 28 Days Strength: 20 MPa
	Fast Setting Floor Screeds	1:2	IST (mts) : 45 FST (mts) : 90 RTS: 4Hrs	4Hr Strength: 10MPa 1 Day Strength: 20MPa 28 Days Strength: 30 MPa
	General Purpose Grouts	1:1	IST (mts) : 25 FST (mts) : 60 RTS: 3 Hrs	3 Hr Strength: 15 MPa 1 Day Strength: 25 MPa 28 Days Strength: 40 MPa

IST- Initial Setting time, FST – Final Setting time, RTS- Return to Service

PRODUCT FORMULATION MATRIX

Application	Relevant appealing property of Instacem™						
	Quick strength Gain	Non Shrink	No Water Curing	Increased Bond Strength	Decreased Chloride Permeability	Increased Sulfate Resistance	Decreased water Permeability
Tile adhesives and Grouts							
Instant concretes							
Rapid setting mortars							
Fast setting Floor screeds							
Sprayed concrete /Shotcrete							
Mining applications							
Plasters and mortars							



APPLICATIONS

CONSTRUCTION

Instacem™, a single value added product for multiple applications at construction site. Comparing to Portland cement, Instacem™ volume requirement may be less at a project site due to its utilization for selective critical works alone where the labor and time savings are possible. But the end cost savings to the builders will be unmatched when worked out and it actually simplifies many activities. Some of the potential utilization areas of Instacem™ are...

Residential and commercial

- Rapid foundation in water table high area
- Quick concealing of electrical and plumbing pipes, can be painted in few hours
- Quick fixing of gates and grills
- Quick anchoring of posts and polls
- Instant concreting needs, access ramps, staircases and Quick reworks
- Curing free plastering in access difficult area and exteriors of high rise buildings

Industrial

- Quick Industrial flooring
- Fast track construction expansion program
- Faster foundation, anchoring and installation of equipment

Construction of effluent treatment plant, sewage treatment plant, water treatment plant and drains with better chemical resistance and durability

RENOVATION

Over time, buildings and structures degrade and require refurbishment in order to extend their design life or improve their appearance. By using Instacem™ for repair, life of the structures can be substantially increased by solving the complex material related problems like bonding, shrinkage, corrosion protection of rebar, etc. – Ideal for renovation of industries, retail shops, malls and commercial buildings with quick return to service and related commercial advantages.

INFRASTRUCTURE REPAIR

Most of the case, return to service (RTS) time by using Instacem™ is less than 4 hours and hence become ideal for the following applications where RTS and performance are crucial

- Full depth concrete panel repair in roads
- Instant repair of Railway platform, Tunnels, Manholes, Industrial floors, Parking area, access ramp, staircase, etc
- Rapid repair of essential infrastructures like sewage treatment plant, water treatment plant, storm water, drainage, cannels, etc

WATERPROOFING

Instacem™ when combined with any latex polymer solution becomes an ideal solution for water proofing because of the formation of interlocking crystals which forms a mat thereby preventing the penetration of water – better than Portland cement combination with latex polymer.

Floor screeds made using Instacem™ are less water permeable comparing to Portland cement based screed and hence ideal for usage in water tight areas like Bath room flooring, Sunken area, Water tank and Sump



DISASTER MANAGEMENT

World has become more vulnerable to natural disasters like Floods, cyclones, earthquakes and landslides. Under such circumstances Instacem™ becomes extremely useful in building of temporary shelters or creating quick access paths and moving massive amount of people to the shelter.

It is also very useful binder for quick repair of infrastructures like roads, bridges, water tanks, hospitals, airports, seaports, etc to bring back the mobility and essential services very quickly which is beyond the functional range of Portland cement.

DEFENSE

Time is of great importance when repairing spalls, cracks and craters caused by enemy fire on military airfields. Instacem™ a quick setting cement having multiutility is a very useful material for defense to achieve multiple tasks where time or environmental conditions are critical and high performance is essential. Some of the defense applications are

- Instant repair of airport taxiway
- Tunnel advancement
- Quick anchoring of posts and fencing
- Fast track construction and concrete repair at low temperature region
- Rapid renovation of hospitals, shelters, water storage tanks and essential infrastructures
- Emergency and rapid construction of bunkers, tunnels, trenches, watch towers and defense infrastructures ...

PRECAST

Instacem™ is ideal for repair of precast products and manufacturing due to its faster strength gain, non-shrink and curing free nature.

It is also useful for quickly grouting and installing the precast structures at construction site

CONSTRUCTION CHEMICAL MANUFACTURING

Apart from the products which can be easily manufactured by just blending with sand and aggregates as listed in product formulation matrix, we can also help the construction chemical manufacturers to develop many more quick setting and curing free products using Instacem™ with different additives like polymers, defoamers, retarders, accelerators, etc. Some of the products are Micro concrete, Tile adhesives, Tile grouts, Anchoring grouts...

BUILDING MATERIAL

Instacem can be used to manufacture a range of building materials starting from low cost roof tile to high cost noise insulation panels because of its characteristic to accommodate wide range of filler materials without compromising on its core properties like quick setting and high early strength.

Instacem™

COST BENEFITS

Having Instacem™ in a project and using it for specific application translates to completing a job with suitable tools and reaping related benefits

Eventhough Instacem™ is marginally expensive than Portland cement on a first-cost basis it actually leads to lots of cost savings and convenience when worked out on end to end cost.

Cost savings comes from factors like curing elimination, equipment rental minimization and huge time saving due to rapid return to service or quickly getting ready for further process like painting, coating etc.

For a contractor or owner, the value of time for a repair delay that results in a late opening of a parking garage, an airport runway or a retail center is often much greater than the premium paid for Instacem™. On many jobs, bonuses offered for getting a job done on time or project completed earlier is money well spent.....

Instacem™

For Products & Technology License

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Ecomaterials invents and offer innovative technologies to its clients enabling them to develop products of the future and achieve competitive edge and enhanced market position