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an economical move towards
Green Power


UniashTM
A PRODUCT OF MAA RANKINI ENTERPRISES



Introduction

Fly ash is derived from the combustion of fossil coal used for energy production. Fly ash is basically Pulverized fuel ash extracted from flue gases by any suitable process such as by cyclone separator or electro-static precipitator. The main applications of fly ash are with particular reference to disposal as well as to civil engineering, chemical industries, agricultural, environmental and soil stabilization. Fly ash can be used as substitute for materials and it remains a potential low-cost adsorbent for the future. From the review of various applications of fly ash it can be concluded that fly ash is very good alternative to conventional activated carbon and can replace activated carbon in many processes in order to minimize the cost.

Fly ash is a burnt and powdery derivative of inorganic mineral matter that generates during the combustion of pulverized coal in the thermal power plant. The burnt ash of the coal contains mostly silica, alumina, calcium and iron as the

major chemical constituents. Depending on the burning temperature of coal, the mineral phases in crystalline to non-crystalline structures such as quartz (SiO_2), mullite ($3\text{Al}_2\text{O}_3, 2\text{H}_2\text{O}$), hematite (Fe_2O_3), magnetite (Fe_3O_4), wustite (FeO), metallic iron, orthoclase ($\text{K}_2\text{O}, \text{Al}_2\text{O}_3, \text{SiO}_2$) and fused silicates usually occur in the burnt coal ash. Silica and alumina account for about 75 to 95 % in the ash. The classification of thermal plant fly ash (as per ASTM C 618) is considered based on reactive calcium oxide content as class-F (less than 10 %) and class-C (more than 10 %). Low-lime fly ash (Class F) is the prime variety generated in India, although significantly smaller volumes of high-lime fly ash (Class C) are also available in country. The calcium bearing silica and silicate minerals of ash occur either in crystalline or non-crystalline structures and are hydraulic in nature; they easily reacts with water or hydrated lime and develop pozzolanic property.

Uniash™

is basically a derived high quality Fly ash also known as pozzolan; a fine grey powder similar to cement, which is low in lime content, and possesses in itself modest or no cementitious properties. It reacts chemically with calcium hydroxide at ordinary temperatures to form insoluble compounds possessing cementitious properties.

Uniash is derived by modern techniques with stringent quality control to meet International standards, which promises to add improved properties & economical solutions for various applications.

Uniash is a product of **Maa Rankini Enterprises** which serves to several industries with supply of materials such as Fly ash, Coal & Sand etc.

Complying Standard Specification
American standard (ASTM C618),
British Standard (BS 3892),
European standard (EN 450),
and Indian standard (IS 3812).



An economical move towards Green Power

Concrete produced with Uniash allows clients and contractors the opportunity to use a product that is the backbone of green building.

Uniash replaces cement in the concrete mix design by reducing the amount of required cement. This ultimately reduces CO₂ emissions as when cement is manufactured, 1 ton of CO₂ is produced for every ton of cement.

Uniash also reduces the amount of waste being sent to landfills. Fly ash not used in concrete or other beneficial ways is disposed of in landfills and collection ponds across the country.

In addition, products with Uniash have both a lower initial cost and lower ultimate cost due to the reduced need for repairs and replacement.



Green Durable Infrastructure



Saving Energy, Time, Money



Efficient & Cleaner Energy Production



Water Conservation



Efficient Waste Management



Clean Transportation



Improved Agricultural Land



Uniash™ in Concrete

Uniash is the most consistent component of the concrete composite, creating a reliable product that provides cost-savings to our customers while increasing the strength and durability of the concrete. Uniash is a sustainable building product that can contribute to LEED certified building projects.

Uniash as a Component

Economical

Uniash in the mix, replaces Portland cement, producing big savings in concrete materials costs.

Corrosion Protection

Uniash improves corrosion protection when mixed with concrete. By decreasing concrete permeability, Uniash reduces the rate of ingress of water and corrosive chemicals; therefore protecting steel reinforcements from corrosion.

Better Workability, Pumpability and Reduced Bleeding & Segregation

Uniash fineness and spherical shape make even of them an affective filler in improving the rheological behaviour of fresh cementitious mixture, increasing its workability (slump) and pumpability, while reducing the risk of bleeding and component segregation during concreting.

Environment friendly contributing LEED Points

Uniash is an environmentally-friendly solution that meets or exceeds performance specifications. Fly ash can contribute to **LEED** (Leadership in Energy and Environmental Design) points.

The other benefits of using Uniash

Concrete in its **hardened state** exhibits improved performance with Uniash:

Reduced Heat of Hydration

The pozzolanic reaction between Uniash and lime generates less heat, resulting in reduced thermal cracking when fly ash is used to replace a percentage of Portland Cement/Concrete.

Greater Strength with Time

Uniash increases strength of concrete over time, continuing to combine with free lime.

Decreased Permeability

Increased density and long-term pozzolanic action of fly ash, which ties up free lime, results in fewer bleed channels and decreases permeability.

Reduced Efflorescence

Uniash chemically binds free lime and salts that can create efflorescence. The lower permeability of concrete with Uniash can help to hold efflorescence-producing compounds inside the concrete.

Increased Durability

The lower permeability of concrete with Uniash also helps keep aggressive compounds on the surface, where destructive action is lessened. Concrete with Uniash is also more resistant to attack by sulfate, mild acid, and soft water.

Reduced alkali silica reactivity

Uniash combines with alkalis from cement that might otherwise combine with silica from aggregates, thereby preventing destructive expansion.

Uniash in concrete creates a lubricating action when concrete is in its **plastic state**, which helps in:

Increased Workability

Concrete is easier to place with less effort, responding better to vibration to fill forms more completely.

Reduced Slump Loss

More dependable concrete allows for greater working time, especially in hot weather.

Reduced Bleeding

Fewer bleed channels decreases porosity and chemical attack. Bleed streaking is reduced for architectural finishes. Improved paste to aggregate contact results in enhanced bond strengths.

Increased Ease of Pumping

Pumping requires less energy; longer pumping distances are possible.

Improved Finishing

Sharp, clear architectural definition is easier to achieve, with less worry about in-place integrity.

Reduced segregation

Improved cohesiveness of Uniash concrete reduces segregation that can lead to rock pockets.

Resistance to sulphate attack

Concrete with Uniash are resistance to sulphate attacks. Uniash concrete is more resistant to sulphate attack due to continuous reaction between fly ash and leached out lime, which continue to form additional C-S-H gel. This C-S-H gel fills in capillary pores in the cement paste, reducing permeability and ingress of sulphate ions.

Reduction in drying shrinkage and creep

Uniash helps to reduce drying shrinkage & creep effect in concrete.

Cold weather resistance

Concrete with Uniash exhibit better performance in cold weather than ordinary concrete.

Reduces Problem of cracks

Cracks can be reduced to a great extent when Uniash is used in concrete.

Good carbonation Resistant

When fly ash is available in concrete; it reduces availability of surplus lime by way of pozzolanic reaction, reduces permeability and as a result improves resistance of concrete against carbonation phenomenon.

UniashTM in Cement Production

Replacing cement with fly ash reduces Green House Gas (GHG) emissions such as carbon dioxide. Production of one tonnage of cement emits one tonnage of CO₂. According to the International Energy Agency, cement production alone accounts for 7 % of total global CO₂ emissions. Replacement of cement with fly ash also reduces the emission of other common air pollutants such as NO_x and SO_x, associated with cement production by same proportion. Apart from this, cement substitution with fly ash saves natural resources such as limestone and coal, which are used for the manufacturing of cement.

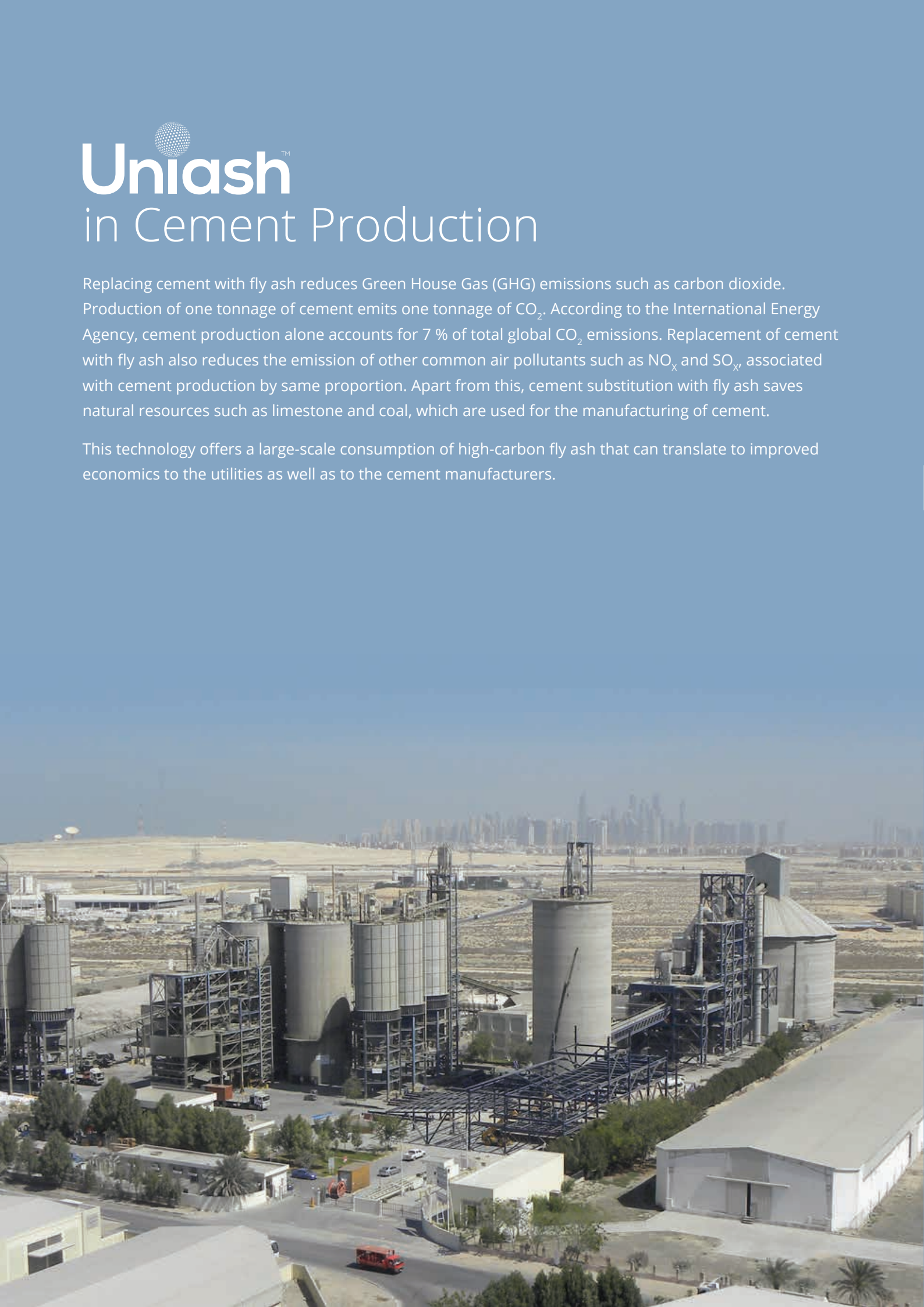
This technology offers a large-scale consumption of high-carbon fly ash that can translate to improved economics to the utilities as well as to the cement manufacturers.



UniashTM in Mortar

Based on the results of the investigation conducted on Uniash mortars made with various level of cement replacement and cured for various curing period up to 90 days, following results can be observed:

- The rate of gain in strength of Uniash mortar specimens is observed to be lower than the corresponding OPC mortar.
- Uniash mortar provides satisfactory or higher strength as compared with OPC mortar.
- Uniash mortar mix having various cement replacement level up to 50% exhibited satisfactory results for both compressive and tensile strength.
- The optimum Uniash content is observed to be 40% of cement. Uniash mortars with 40% cement replacement shows around 14% higher compressive strength than OPC mortar after 90 days curing. The corresponding increase in tensile strength is reported to be around 8%.
- Use of high volume Uniash in any construction work as a replacement of cement, provides lower impact on environment (reduce CO₂ emission) and judicious use of resources (energy conservation, use of by-product)
- Use of Uniash reduces the amount of cement content as well as heat of hydration in a mortar mix. Thus, the construction work with fly ash concrete becomes environmentally safe and also economical.





Uniash[™] for Roads

Uniash can be used for construction of road and embankment. This utilization has many advantages over conventional methods.

- Saves top soil which otherwise is conventionally used.
- Avoids creation of low lying areas (by excavation of soil to be used for construction of embankments).
- Avoids recurring expenditure on excavation of soil from one place for construction and filling up of low lying areas thus created.
- Does not deprive the nation of the agricultural produce that would be grown on the top soil which otherwise would have been used for embankment construction.
- Reduces the demand of land for disposal/deposition of fly ash that otherwise would not have been used for construction of embankment.



Uniash™ for Bricks & Roofing

BRICKS

The manufacturing of conventional clay bricks involves the consumption of large amounts of clay. This depletes topsoil and degradation of agricultural land. Uniash bricks do not require clay and serve two purposes; preservation of topsoil and constructive utilization of fly ash. Uniash bricks are made up of fly ash, sand and cement. In these bricks Uniash is used as the primary filler and sand is added as secondary filler. Cement is used to binder, which helps in holding all the raw material together.

Bricks can be mainly grouped into two categories:

- Uniash bricks using cement as a binder:
Raw materials include: Uniash, cement and sand.
- Uniash brick using lime as a binder:
Raw materials include: Uniash, lime gypsum and sand.

ROOFING

Corrugated roofing sheets, plain boards/ flat sheets, roofing fittings and accessories, pipes and pipe fittings and water storage tanks are prepared from a suitable composition consisting of 40-50% cement, 8-11% asbestos fibre, 25-35% Fly ash with or without 0-5% wood/paper pulp. This composition is converted in the form of a slurry for use for the preparation of the above items. The composition is prepared by mixing all the components with each other in a beater tank and the Fly ash is fed in the dry form with cement into the beater to be mixed with the other ingredients of the composition.



Uniash for Bricks
Wallbricks, Interlocking, Pavement etc.

Uniash for Roofing
Asbestos / Fibre sheets

UnishTM

in Various Industry



Construction Industry

- Pre-mixed Concrete
- Stabilised Road Base
- Roller Compacted Concrete Pavements
- Concrete Sub-base
- Conventional Concrete Pavements
- Roller Constructed Concrete Dams
- Concrete Products
- Asphaltic Roofing Material
- Mosaic Tiles
- Grout
- HVFA (High Volume Fly Ash) Concrete
- Wallboard
- Manufacture of Lightweight Aggregate (LWA) From Fly ash

Chemical Industry

- Fly Ash Based Polymer Composites as Wood Substitute
- Fly ash as an Adsorbent
- Removal of Phenol and its Derivatives
- Removal of Other Organic Compounds
- Removal of Inorganic Components
- Removal of Dye
- Removal of Chemical Oxygen Demand (COD)

Others

- Fly ash Beneficial Use in Mine Drainage Remediation
- Use of Fly ash in Mine Reclamation

Agriculture Industry

- Fly ash Based Polymer Composites as Wood Substitute
- Microbes in Soil Amended with Fly ash
- Biofertilizer & Biopesticide Formulation
- Fly ash Soil Stabilization
- Animal Performance in Pens with Fly ash Soil

General Information of Uniash

Appearance	Fine Dry Powder
Colour	Light Grey
Bulk Weight	Approx 0.90 Metric Ton Per Cubic Meter
Specific Density	Approx 2.30 Metric Ton Per Cubic Meter
Size	90% < 45 Micron
Particle Shape	Spherical
Package	40 Kg Bag, 1 Metric Ton Jumbo Bag and Bulk Tankers

Typical Properties of Uniash Sample with Relevant Indian / International Standards

Properties of fly ash	Various Standards (Nominal Requirements)					Uniash
	ASTM C 618		EN 450	IS 3812 : 2013	BS 3892	Typical Sample
	Class F	Class C				
Chemical Properties						
SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃ (min. %)	70	50	70	70	70	94
Sulfur trioxide (SO ₃) (max. %)	5	5	3	3	2	0.3
Moisture content (max. %)	3	3	--	--	0.5	--
Loss on ignition (max. %)	6	6	--	5	7	0.3
Silicon dioxide SiO ₂ (min. %)	--	--	25	35	--	60
Reactive silica by mass (min. %)	--	--	--	20	--	--
Magnesium oxide MgO (max. %)	--	--	--	5	--	0.41
Alkalies Na ₂ O (max. %)	--	--	--	1.5	--	0.2
Chlorides Cl (max. %)	--	--	0.1	0.05	0.1	0.02
Total/reactive CaO (max. %)	--	--	10	--	10	--
Physical Properties						
Fineness:						
Amount retained when wet-sieved on 45 µm (No. 325) sieve, (max. %)	34	34	40	34	12	11
Specific surface (m²/Kg) (min.) (Blaine's Air Permeability Method)	--	--	--	320	--	820
Strength activity index:						
With portland cement, at 7 days (min. % of Control)	75	75	--	--	--	--
With portland cement, at 28 days (min. % of Control)	75	75	75	80	80	90
Lime Reactivity (Avg. Compressive Strength Mpa) (min.)	--	--	--	4.5	--	5
Water requirement (max. % of control)	105	105	--	--	--	--
Specific Gravity	--	--	--	--	--	2.6
Soundness:						
Autoclave expansion or contraction (max. %)	0.8	0.8	--	0.8	--	0.05
Uniformity requirements:						
Density (max variation from avg. %)	5	5	--	--	--	--
Percent retained on 45-µm (No. 325) (max, variation % from Avg.)	5	5	--	--	--	--

Effects of Supplementary Uniash on **Fresh Concrete** Properties

	Class F	Class C
Water Requirements	↓↓	↓↓
Workability	↑	↑
Bleeding and Segregation	↓	↓
Air Content	↓↓	↓
Heat of Hydration	↓	↕
Setting Time	↑	↕
Finishability	↑	↑
Pumpability	↑	↑
Plastic Shrinkage Cracking	↔	↔

Effects of Supplementary Uniash on **Hardened Concrete** Properties

	Class F	Class C
Early Strength	↓	↔
Long Term Strength	↑	↑
Permeability	↓	↓
Chloride Ingress	↓	↓
ASR	↓↓	↕
Sulfate Resistance	↑↑	↕
Freezing and Thawing	↔	↔
Abrasion Resistance	↔	↔
Drying Shrinkage	↔	↔

- ↓

Reduce
- ↑↑

Significantly Increased
- ↓↓

Significantly Reduced
- ↔

No Significant Change
- ↑

Increased
- ↕

Effect Varies

Fly Ash Management

It is the action of human beings that determines the worth of any material. Materials having potential for gainful utilization remain in the category of waste until its potential is understood and put to right use. Fly ash is one such example, which has been treated as a waste material in India & many other parts of world till a decade back, and has now emerged not only as a resource material, but also for better environment. The Global market is extremely receptive to clean development mechanism (CDM), with a fair amount of appreciation both by the government and the industry.

Operators of coal-fired power plants must manage costs, revenues, and risk to be successful. Successfully managing fly ash has become an increasingly important piece of overall success for power plants. In this business environment, power plants must carefully control expenses, capital commitments and risks and smart management of coal combustion products provides a significant opportunity in several important ways:

Cost Reduction and Cost Management for Landfill

Managing fly ash results in landfill cost avoidance by reducing current ash disposal expenses and by delaying or avoiding the significant costs of future landfill or pond development.

Avoiding or Reducing Future Liability

Recycling fly ash means reducing the chances that, in the future, environmental regulators will take actions targeted at a fly ash disposal site.

An Environmentally-Friendly Solution

Beneficiation and utilization of fly ash is a “green” solution that turns expenses into revenue and demonstrates a utility’s commitment to the environment and the communities in which they do business.

Mission

- To provide total customer satisfaction to our customer segments: power plant owners and operators, cement & construction industry and other fly ash users.
- To deliver a commercially proven, flexible, least-cost, least-risk technology for processing coal fly ash.
- To deliver a consistent, high-quality, branded fly ash that meets and exceeds customers’ needs and expectations for cost-savings, dependability, product strength and durability, and customer desirability as an environmentally friendly, “green” product.

Vision

Our vision is to be the most efficient and indomitable Global material supplier by serving various industries with economical solutions.

Clients



Rustomjee®

Creative
Infra & Construction



IJM CONCRETE
PRODUCTS PVT LTD



RAPID
INFRA

Indian Infra
Solutions LLP

RRD
HEIGHTS & BUILDERS PVT LTD



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