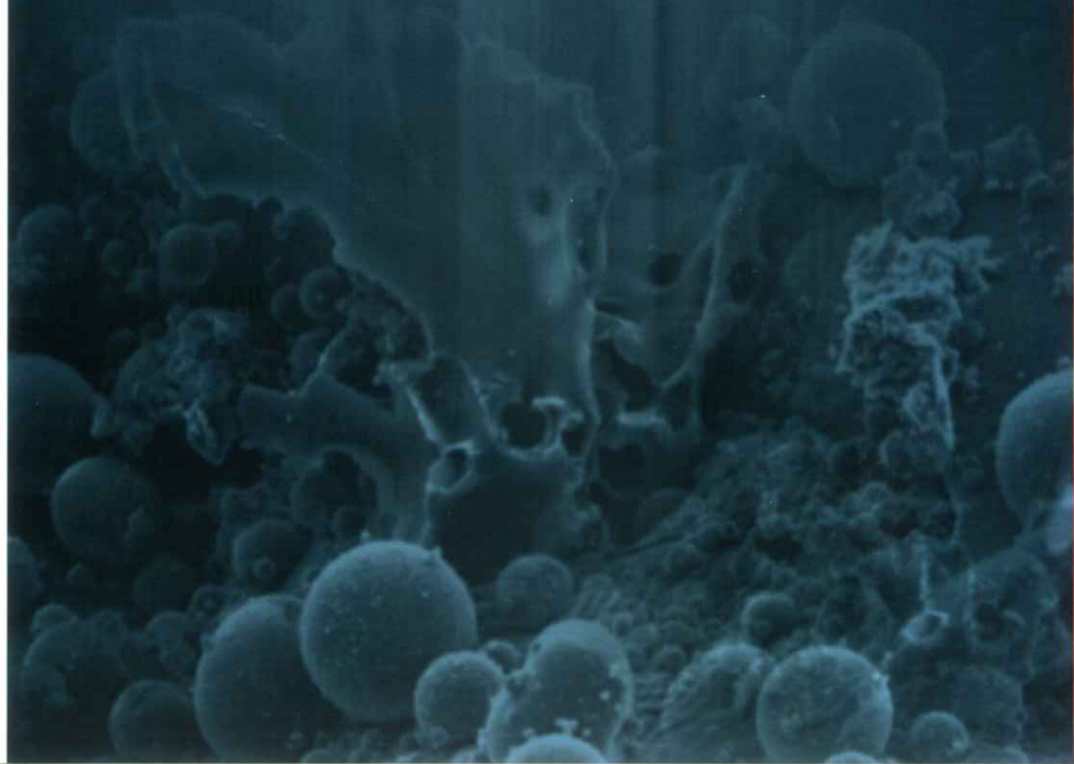




# POZZOCCRETE™



CREATING A MATCHLESS VALUE PRODUCT  
FOR BETTER PERFORMANCE & GREENER ENVIRONMENT



# POZZO



## Dirk Team in India

*The team of Dirk India Private Limited consists of Indian people; passionate about making the effective use of quality assured fly ash a reality in India. In addition to these people, the Dirk Group has called upon its international resources to bring in staff with previous experience in the production and application of high quality processed fly ash.*

*Together they form a strong team with the right mix of enthusiasm and knowledge, people who are able to produce, supply and advise on the effective use of POZZOCRETE™, to fulfil the needs of the construction industry in India.*



## Dirk POZZOCRETE™

*A Saga of Uninterrupted Quality*

POZZOCRETE™ is the flagship product of Dirk India Private Limited. It was introduced in India in 2001 and since then, it has become synonymous to 'Quality'. It has proved itself on various projects which include nuclear power stations, bridges, commercial high rise and domestic buildings.

- Dirk Pozzocrete is today the first and only fly ash product in India which has been certified by the prestigious ISI standard mark.
- Dirk Pozzocrete is today the first and only fly ash product in India which has been certified by the prestigious international Quality Seal DCL from Dubai Municipality.
- This means, not only the end product, but also the entire process of manufacturing of Pozzocrete is thoroughly scrutinised by the national body "Bureau of Indian Standards" as well as the international body "Dubai Central Laboratory"!

- The Pozzocrete processing plant located at Nashik is today the only fly ash processing plant in India which has been certified by ISO 9001:2000.

Dirk India utilises the most modern air classification plant for processing to ensure consistent high quality end product. The company operates on the basis of strict quality controls to maintain the highest levels of consistency of the product which ensures minimum standard deviation.

More detail and technical information can be obtained from the web site or by request to our head office. Our technical service is available to guide users on product application and benefits.

DIRK organises regular seminars and workshops for specifiers, consultants and architects to update customer information and provide training. Our ever growing network of distributors provides practical help on a local basis (Please ask your nearest Distributor or consult our web-page for this information).



 Pozzocrete Nashik Plant

# POZZOCRETE™



## Processing of Pozzocrete™

(The Necessity of Consistency)

To produce reliably consistent concrete of high quality and durability, it is accepted that only the finer particles of the fly ash produced from Power Station combustion can be used. Indeed, in some of the Thermal Power Stations in India, the finest material - arising from the final banks of electro-static precipitators - is collected for use. However, let us keep the following in mind :

- Quality of the unprocessed fly ash fluctuates with the changes in the coal mill and boiler conditions. The behaviour of the concrete is adversely affected by these unstable properties. On the other hand, Pozzocrete undergoes strict quality control and provides Pulverized Fuel Ash (PFA) with consistent and predictable properties.
- The presence of the unburnt carbon in fly ash is not a healthy component, as it increases the water demand in the concrete, posing serious problems on many fronts like workability, strength and durability. Hence, in spite of major international codes allowing carbon content between 5-7% in fly ash, Pozzocrete is processed to deliver negligible

amounts of carbon content with a maximum limit of 3%. This tightening of the specification helps in delivering much superior concrete-Pozzocrete Concrete-when compared to that one produced with unprocessed fly ash.

- Pozzocrete guarantees you well designed particle size so that higher replacement levels can be achieved. In an unprocessed ash, you get what the power station produces without any control over the processing system.
- Pozzocrete particles are solid, glassy and perfectly spherical due to a complete fusion under the boiler temperature above 1200 degrees Celsius. In an unprocessed ash, the sphericity and glassy properties of ash particles are badly affected due to the incomplete fusion resulting from the fluctuating boiler conditions.

### Benefits of Processed Fly Ash

Concrete construction is a challenging task. It needs special attention due to following problems :

1. Plastic Shrinkage Cracking
2. Thermal Cracking
3. Concrete Permeability
4. Ingress of Salts : Chloride Attack, Sulphate Attack
5. Leaching of Lime : Durability of structure is reduced
6. Reduced pH due to Carbonation : Reinforced steel becomes susceptible to corrosion

Processed fly ash becomes an ideal solution to all above problems without sacrificing the strength criteria. Adjacent table gives a list of properties which Processed Fly Ash imparts to concrete.

## Fineness of Fly Ash: Blaine Vs Wet Sieving

Fineness of fly ash is considered as one of the most important properties and is measured in two ways by various codes all over the world, as below:

- 1.0 Fineness by Blaine's Apparatus: With this method, time taken by air to pass through a bed of fly ash is correlated to its specific surface area and is given in m<sup>2</sup>/kg. The Indian Standard IS 3812 Part 1 specifies a minimum Blaine area of 320 m<sup>2</sup>/kg for fly ash.
- 2.0 Fineness by wet sieve analysis: This method measures the % of particles in fly ash bigger than 45 micron sieve. This method of measuring fineness is considered as relatively more accurate amongst the two and is prescribed by major international codes all over the world.

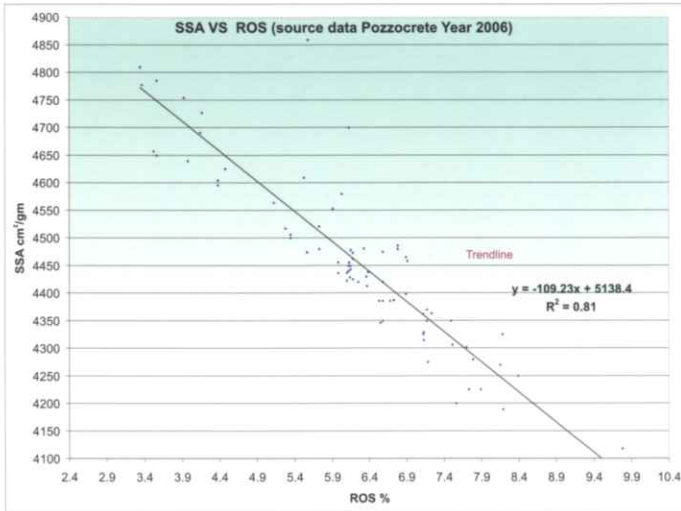


### Typical concrete performance with 25% Pozzocrete

Water Demand	Reduced by 8%
Workability	Improved
Setting Time	Increased 30-60 min
Long Term Strength	Increased 15%-20%
28 day Strength	Similar
Early Strength (7 days)	Reduces by 10-15%
Required Curing	10 To 14 Days
Permeability	Reduced 2-5 times
Sulphate Attack	Reduced
Chlorine Penetration	Reduced
Heat of Hydration	Reduced
Plastic Shrinkage	Reduced



Even though the relationship is not a straight line, following graph shows an indicative correlation:



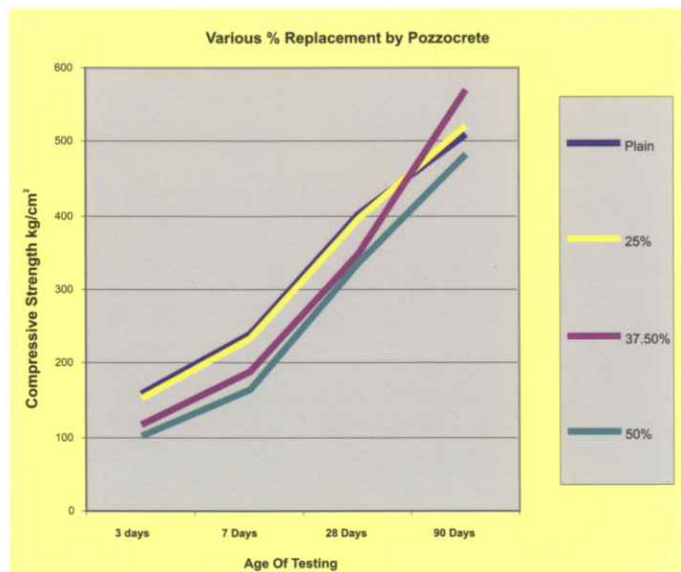
Pozzocrete™ at work  
Hiranandani project, Mumbai

## Strength Development at Various Replacement Levels

Concrete behaviour changes in many respects as replacement levels change. At higher replacement levels, flowability and impermeability of concrete improves substantially. It is the 28 day strength which becomes critical at the higher replacement levels. The following graph indicates strength development up to 90 days for replacement levels as high as 50%. It is important to note that the water content is adjusted only to maintain similar flow table values in accordance to IS 3812 Part 1.



Pozzocrete™ at work  
Golden quadrilateral national highway



Pozzocrete™ at work  
Lower dam, Ghatghar, Maharashtra



## A Look At The World Standards On Fly Ash

Following table offers an interesting comparison of the various international codes on fly ash. Dirk India offers a range of products to meet all these international standards.

International Codes							
Test No.	Test	Unit	ASTM 618	EN 450		BS 3892	IS 3812
				Category S	Category N		
1	Fineness - Specific Surface by Blaine's Permeability Method	m <sup>2</sup> /kg		Not Specified		320	
2	ROS 45 micron sieve	%	34.0	12 max	40 max	12.0	34.0
3	Loss on Ignition(Max.)	%	6.0	7.0		7.0	5.0
4	Water Requirement	%	115%	95% max	Not Specified	95% max	
5	Moisture Content(Max.)	%	3.00	Not Specified		0.50	2.00
6	Soundness by Autoclave		0.8%	10mm		10mm	0.80%
7	Compressive Strength At 28 days - % of Plain Cement Mortar	N/mm <sup>2</sup>	75%	75%		80%	80%
8	Chemical Analysis SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub>	%	70.0 min	70.0 min		Not Specified	70.0 min
	SiO <sub>2</sub>	% Specified	Not Specified	Not Specified			35.0 min
	Reactive Silica	%		25% min			20.0 min
	CaO	%	10.0 max	10.0 max			-
	MgO	%	-	4.0 max			5.0 max
	SO <sub>3</sub>	%	4.0 max	3.0 max		2.0 max	3.0 max
	Na <sub>2</sub> O	%	Not Specified	5.0 max		Not Specified	1.5 max
	Total Chlorides	% Specified	Not	0.10 max		0.10 max	0.05 max

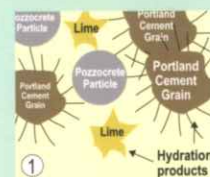
### Technical Information

Average strength development as a percentage of OPC strength, according to Indian Standards, using a blend of 25% POZZOCRETE™ with 75% OPC and 25% POZZOCRETE™ with 75% slag cement.

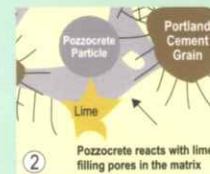
	Age (days)			
	3	7	28	90
OPC 53 + POZZOCRETE™ 60	80%	92%	97%	103%
Slag cement + POZZOCRETE™	73%	85%	103%	105%

The heat of hydration ratio of 70% OPC & 30% POZZOCRETE™ mix compared with 100% OPC.

Time duration in day(s)	1	3	7	28
% Ratio to OPC	73%	79%	83%	88%



1. Through contact with water, cement particles hydrate, leading to the formation of hydrated calcium silicates and aluminates and also of calcium hydroxide. Some of these hydration products, such as the calcium hydroxide become present in the water solution between the particles, leading to an increase of the pH.



2. The POZZOCRETE™ particles are dissolved by the alkaline solution, and a reaction takes place, mainly between the calcium hydroxide and the reactive silica from POZZOCRETE™. This reaction promotes a better and more stable bonding of the matrix, while it also fills the voids between the particles. This way the binder matrix becomes impermeable and strong.

## Maharashtra Fly Ash Information Centre



India is one of the highest fly ash producing nations of the world producing about 125 million tons per year. On the other hand, the Indian economy is growing at a rapid pace leading to an unprecedented boom in the construction industry, and of course, the Indian engineers are kept in high esteem. The availability of this raw material in the presence of engineering skills is the best basis for full utilization of this national resource if sufficient information about fly ash can be obtained.

The solution lies in the word "Training". Dirk India played its own part in the first phase of fly ash revolution in Maharashtra. This was achieved by making a high quality "ISI Marked" fly ash available in Maharashtra. This raised the confidence of the users which was lacking earlier when it came to fly ash. Now, Dirk India is gearing up for the second phase of fly ash revolution by having set up the "Maharashtra Fly Ash Information Centre". The centre is exclusively dedicated for training the Indian Construction



fraternity for the effective use of fly ash.

This centre conducts several activities for educating the industry in various aspects of fly ash viz. Environmental Protection, Structural Durability and Life Cycle Costs, Fly Ash Processing and Concrete Mix Designing. This is achieved by conducting residential courses at Maharashtra Fly Ash Information Centre, located at Eklahare, Nashik. These courses are conducted at regular frequency and are charged "At Cost" so that more and more professionals can get the benefits.

For further details, log on to <http://www.fly-ash-information-center.in>

[www.pozzocrete.co.in](http://www.pozzocrete.co.in)



## General guide for the application of POZZOCRETE™

The optimum level of replacement of Cement with POZZOCRETE™ within the concrete mix will be between 20 - 35% by weight. Remember that the addition of POZZOCRETE™ will have a plasticising effect on your concrete and we would recommend that you reduce the total volume of water in the concrete by about 10% to achieve the same workability as Ordinary Portland Cement concrete and to give the guarantee of strength development. In addition you may find that reducing the amount of sand by 5% by weight will be beneficial to the final mix.

In general there is a slight slowing down in the setting time of POZZOCRETE™ concrete which may lead to a delay in form stripping - for stripping of formwork after 10 days or shorter we would advise retaining the formwork for about one extra day. Please consult your structural engineer for exact requirement.

### General guide for the application of POZZOplast

#### Mortar for bricklaying

POZZOplast is an ideal product for bricklaying mortar. It improves the cohesiveness and flowability of the resulting mortar.

We recommend a replacement level of around 33% of the Ordinary Portland Cement by weight and accordingly adjust the content of sand and water.

#### External Plaster

POZZOplast improves the surface finish of external mortars and reduces the level of surface cracking and will also lead to a decrease in permeability of the hardened plaster. External plaster containing POZZOplast will give a more impermeable cover to your building as well as giving a finer surface finish.

We would recommend a replacement of 33% by weight of the Ordinary Portland Cement and accordingly adjust the content of sand and water.

#### Internal Plaster

Using POZZOplast in your internal plaster gives a better surface finish, more time for finishing and a virtually crack-free surface, leading to a higher quality look to all internal walls.

We would recommend a replacement of 33% by weight of the Ordinary Portland Cement and accordingly adjust the content of sand and water.

### Additional Product Range from Dirk India

#### POZZOblock

POZZOblock is a lightweight ingredient, obtained by selection and processing of power station by-products resulting from the combustion of pulverized bituminous coal. POZZOblock is subjected to strict quality control.

POZZOblock can be used in combination with natural sand or crushed sand. The strength of the end product has to be derived from the Portland Cement. Typically, POZZOblock can be used in the proportion of 1:5 with the cement. If required, an additional amount of sand can be added as per the requirement of the mix design.

#### POZZOtar

POZZOtar replaces the filler ingredient of the asphalt mix, which is usually 7 to 10%. This replacement of filler helps achieving reduction in Bitumen consumption by 10 to 15% resulting into superior asphalt mix or financial savings.



Corporate Head Office

### Dirk India Private Limited

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Offices in Germany, and  
the Czech Republic.

#### Web Site

[www.pozzocrete.co.in](http://www.pozzocrete.co.in)

### Order Pozzocrete™ on-line

Pozzocrete™ is available directly from authorised distributors and on-line from our web site.



POZZOCRETE™ is produced in accordance with ISO9002. POZZOCRETE™ is tested and found to satisfy the requirements in IS3812:2003. DIRK is a member of the Quality Ash Association. POZZOCRETE™ meets all European Standards.

All information given under reference of "today" is as per publishing date of this brochure in June 2009.



We supply products in :

30 kg bags

1 ton big bags

Bulk tanker