



SUYOG Elements India Pvt. Ltd.



Contact Detail:

Suyog Elements India Pvt. Ltd.

Plot No. 1306,07,11,12,

GIDC Industrial Estate, Palej,

Ta. & Dist. - Bharuch, Gujarat, India - 392220

PH. No. 02642 278278, 02642 277062

Web Site: www.suyogsuppliers.com

Contact Person:

Mr. Yogesh Varsada

Director

Cell No. 09909964397

Email : yogesh.suyog@yahoo.com

Mr. Suresh Varsada

Director

Cell No. 09227170107

Email : suyogsuppliers@yahoo.co.in

Reg Office : 138,Anmol plaza-1, Opp: GIDC Bus Stand,Old NH-8, Ankleshwar-393002, Gujarat (India), Ph-02646-227297

WORKS : Plot No:1306,07,11,12. GIDC, Palej, Dist: Bharuch-392220,Gujarat (India), Ph:02642 278278, 02642-277062



SUYOG Elements India Pvt. Ltd.

We Suyog Elements India Pvt. Ltd. (SEIPL) are in the field of Quick Lime production and supply. We provide best quality and services to our valued customer for our product. We believe in the continual improvement in quality, services and customer satisfaction. We always adopt technological changes to improve product quality and services to enhance customer satisfaction level and this is our motto of business.

We feel proud to announce that SEIPL is step up its foot in the field of Ground Granulated Blast Furness Slag (GGBS or GGBFS) and Fly Ash production and supply.

Our entity is located at Palej GIDC, near Bharuch of Gujarat State. Suyog Elements India Pvt Ltd. We have established drying (300 MT/Day), grinding and classification facilities at our premises. Our new entity is equipped with fully automation technology with a huge production capacity to fulfill our customer need.

We are committed to provide best quality and services to our customers.





GROUND GRANULATED BLAST FURNACE SLAG (GGBS)

GGBS replaces a substantial proportion of normal cement OPC in RMC. The mixing varies from 30% to 70% approximately (generally 50%). The higher the proportion, the better is durability for concrete. GGBS is also used in other forms of concrete including site batched and precast.

Replacement of Portland Cement by adding up to 70% GGBS, reduce cement content in concrete from about 530 Kg/m³ to 160 Kg/m³ and despite of this large reduction of cement in concrete, ultimate strength is not affected, also considerable improvement in durability properties is observed.

GGBS slag is by product of iron and steel manufacturing process. It contains the entire basic constituent of OPC but not exactly in the same ratio and chemical form. Slag itself has no cementing property but when mixed with OPC, it develops hydraulic properties similar to cement. The calcium oxide (CaO) found in slag is tied up as calcium silicate, calcium aluminates and calcium aluminosilicates. Although these compounds are not identical to those found in Portland cement (i.e. tricalcium silicate, tricalcium aluminates etc), they hydrate when activated by calcium hydroxide generated during the hydration of Portland cement. Since GGBS is almost 100% glassy, it is generally more reactive. This process of quenching is called granulation because it produces glassy granules similar in appearance to coarse sand, having excellent cementitious property when ground to high fineness and mixed with cement.

Replacement of OPC with GGBS increases the durability and workability without affecting strength. Thus finally it is cost effective solution in current competitive market.

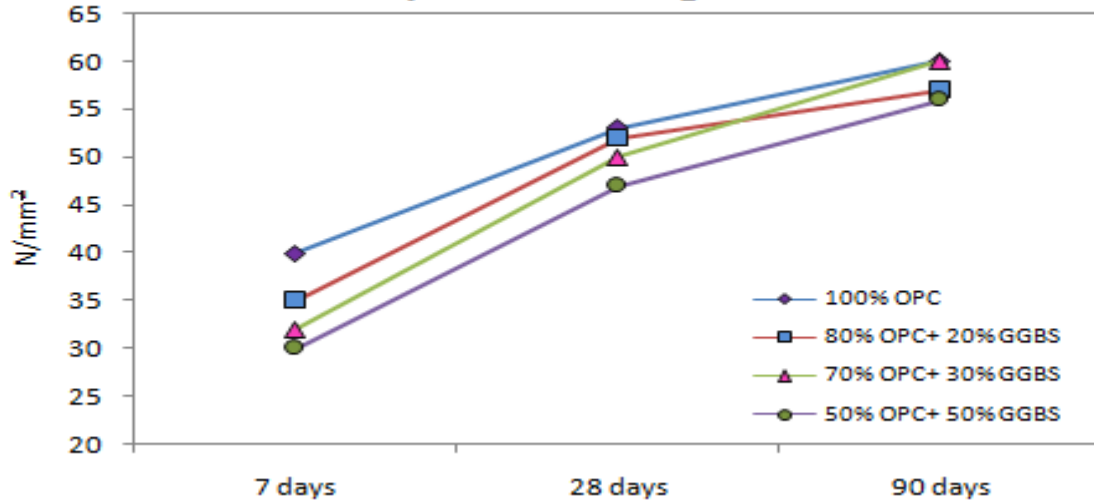
➤ Comparison of OPC vs GGBS

❖ **Compressive Strength**

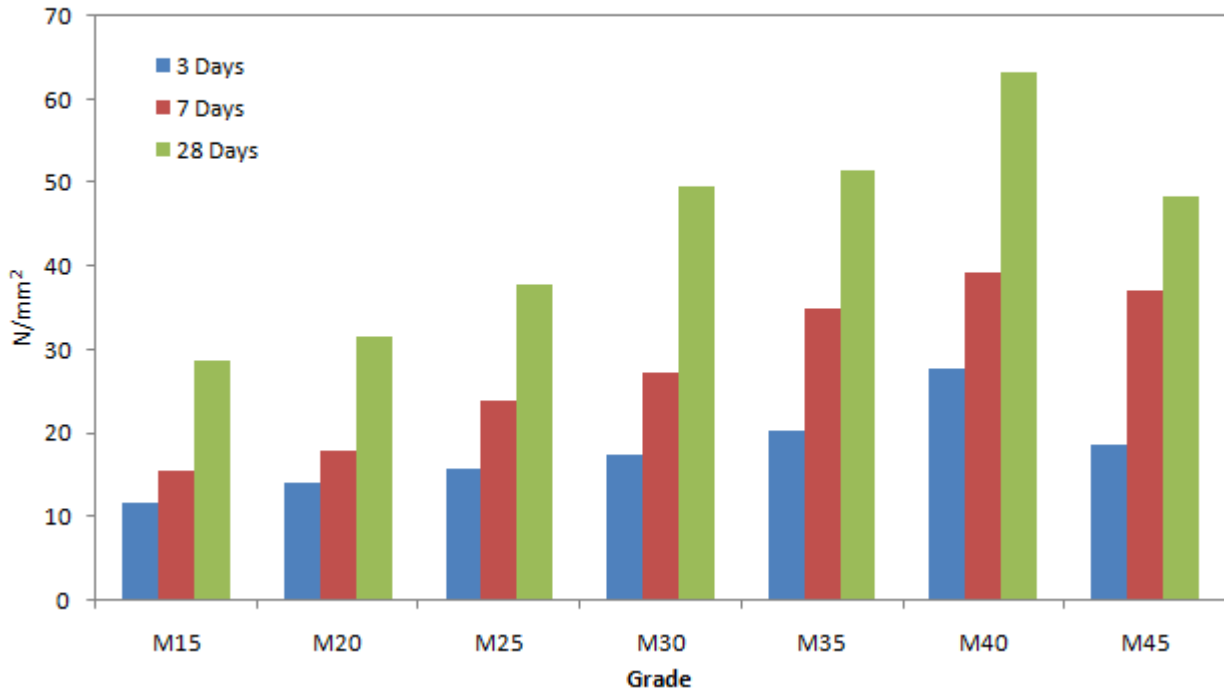
Ratio	Compressive strength N/mm ²			
	7 days	28 days	90 days	% Development from 7 to 90 days
100% OPC	40	53	60	50
80% OPC+ 20% GGBS	35	52	57	63
70% OPC+ 30% GGBS	32	50	60	88
50% OPC+ 50% GGBS	30	47	56	87
30% OPC+ 70% GGBS	25	45	58	132



Compressive strength



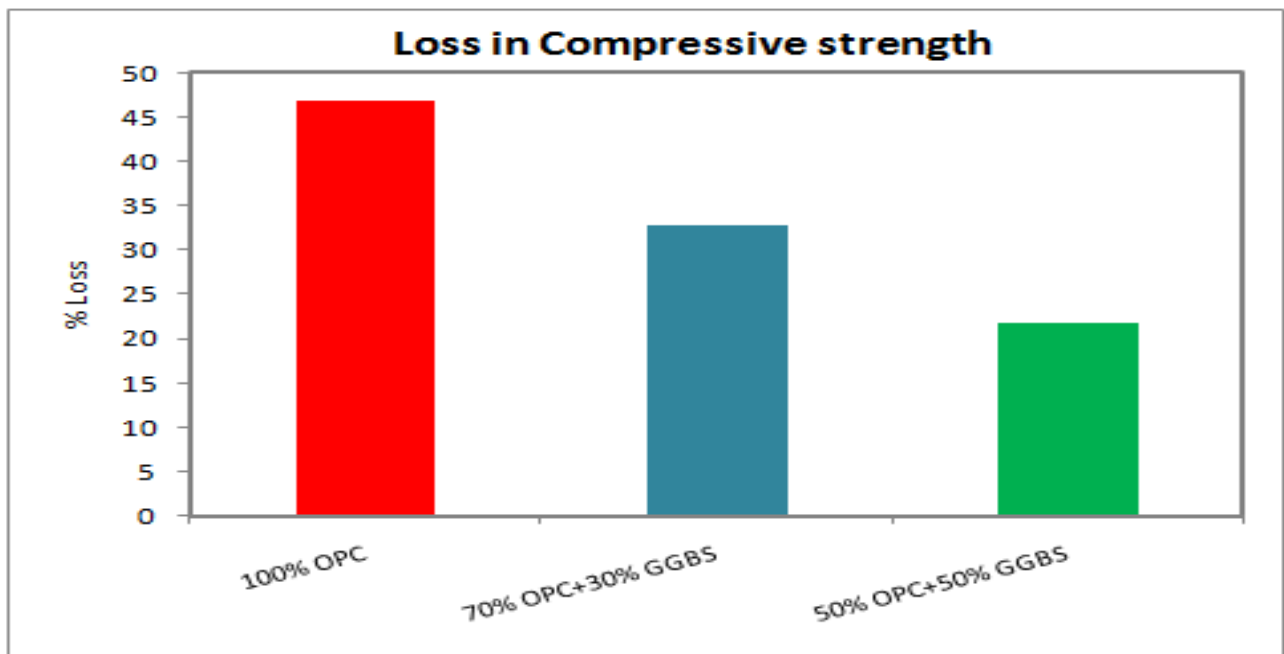
Compressive strength of different grade concrete with 50% OPC+50% GGBS





❖ Durability of OPC vs GGBS

GGBS has excellent property with effluent exposure and thus it has good durability with effluent. Excellent durability of GGBS with effluent enhanced its application for long life of construction.



Effect of effluent exposure on block with OPC and GGBS mixed concrete:



100% OPC



70% OPC+30% GGBS



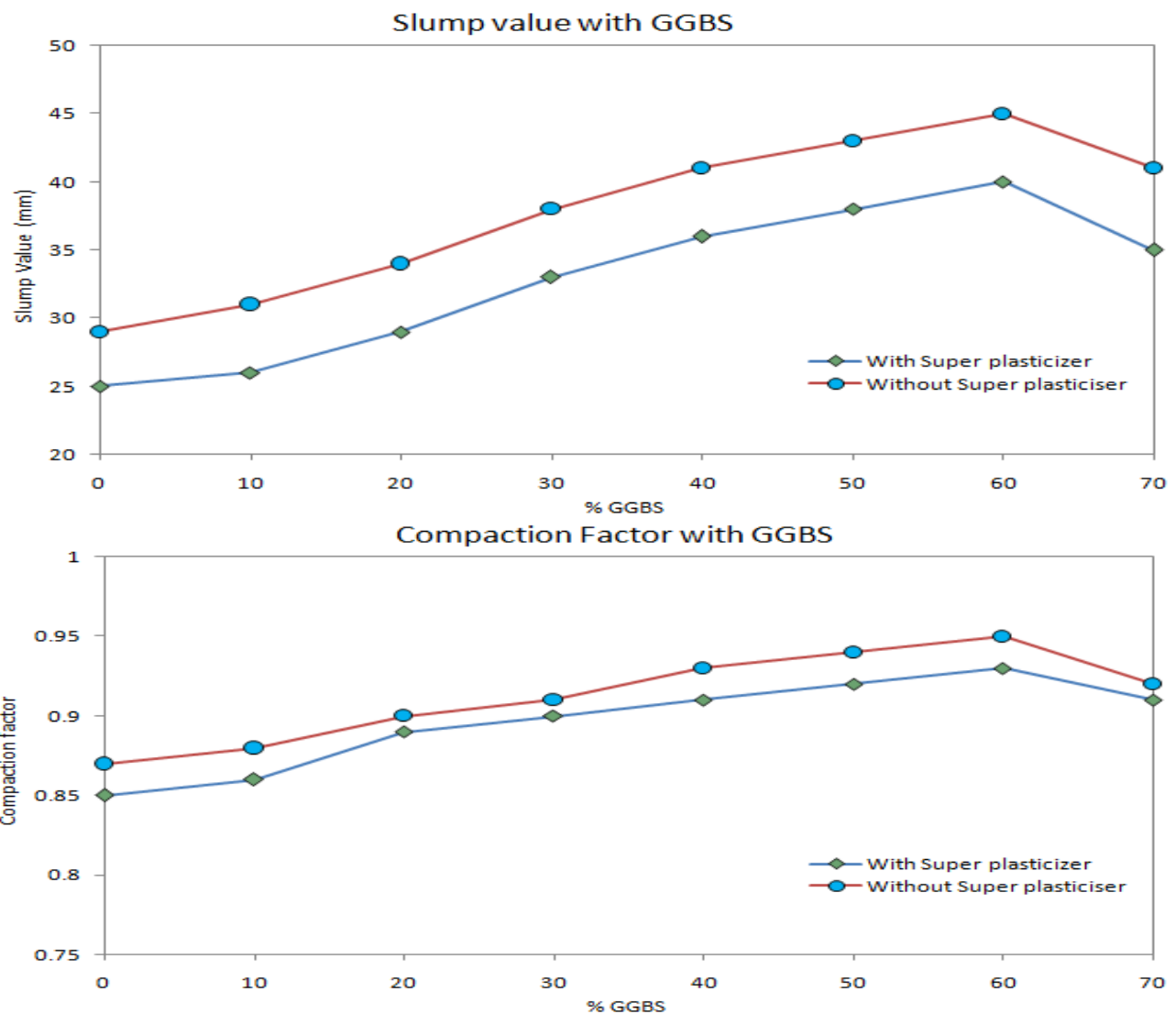
50% OPC+50% GGBS



❖ Workability of GGBS

Workability is defined as that property of freshly mixed concrete that determine the ease and homogeneity with which can be mixed, placed and compacted due to its consistency. Workability is most important property of concrete in the plastic stage. A workable concrete does not result in bleeding and segregation.

Workability of concrete mix largely depends upon water content. With increase of water, the workability increases, but too much water results into concrete of low strength and poor durability.





➤ Advantages and Benefits of Using GGBS

Superior Quality Concrete

- Improved workability, pumpability and compaction characteristics for concrete placement
- Increased strength
- Reduced permeability
- More chemically stable
- High resistance to chloride penetration
- Very low heat of hydration
- Improved resistance to attack from fire

Superior Appearance

- Improved surface finish
- Lighter and more even color
- Enhanced reflectivity for greater visibility and safety
- Suppresses/eliminates efflorescence

Low Environmental Impact

- Use of GGBS extends the life cycle of concrete structures
- Enhanced durability, reduced maintenance and repair costs
- Reduces construction costs

Better Value for Money

- Enhanced durability and strength longer life
- Enhanced architectural appearance reduced need for other expensive finishes or painting
- Lower maintenance costs
- Enhanced life cycle
- No additional premium on material costs



Physical properties of GGBS as per BS 6699:1992

Characteristics	Specification	Typical value
Moisture (%)	1.0 max	0.38
Fineness		
Specific surface area (m ² /kg)	275 min	395
Retention on 45 micron (%)	No limit	2.90
Setting time		
Initial minutes	60 min	195
Final minutes	No limit	290
Soundness		
Le-Chatelier Expansion (mm)	10 max	1.0
Compressive strength		
(Mortar) with Portland cement (PC)		
2 days-N/mm ²	10.0 min	28.30
7 days-N/mm ²	No limit	38.20
28 days-N/mm ^{2*}	42.5-62.5	47.40
(Mortar) with 70% GGBS+30% PC		
2 days-N/mm ²	No limit	10.40
7 days-N/mm ²	12.0 min	24.10
28 days-N/mm ^{2*}	32.5 min	42.10
Glass content (%)	67 min	94.00



Chemical properties of GGBS as per BS 6699:1992

Composition (%)	Specification	Typical value
Loss on Ignition (LOI)	3.0 max	0.65
Insoluble Residue (IR)	1.5 max	0.42
Silica as SiO ₂	No limit	34.52
Alumina (Al ₂ O ₃)	No limit	13.95
Iron oxide (Fe ₂ O ₃)	No limit	0.90
Calcium oxide (CaO)	No limit	41.75
Magnesium oxide (MgO)	14.0 max	6.03
Sulphur trioxide (SO ₃)	2.5 max	0.26
Sulphide Sulphur	2.0 max	0.70
Sodium oxide (Na ₂ O)	No limit	0.30
Potassium oxide (K ₂ O)	No limit	0.34
Chloride (Cl)	0.10 max	0.01
Manganese oxide (Mn ₂ O ₃)	2.0 max	0.45
Chemical ratio		
CaO+MgO+SiO ₂	66.67 min	82.30
(CaO+MgO)/SiO ₂	1.0 min	1.38
CaO/SiO ₂	1.4 max	1.21



Experiments Trial detail

Concrete Grade	M15	M20	M25	M30	M35	M40	M45
Material							
OPC 53 Grade (UltraTech)	140	150	170	190	210	225	250
GGBS	140	150	170	190	210	225	250
20 Sevaliya	660	669	678	725	694	740	706
10 Sevaliya	439	445	451	420	462	428	470
Sand Fine Nareshwar	372	362	346	308	307	272	264
Sand Coarse Sankheda	559	544	519	462	461	408	397
Admixture (0.9%)	2.52	2.7	3.1	3.42	3.7	4.05	4.5
Free Water	165	163	160	160	161	162	168
Total Water	188	185	182	181	182	183	188
W/C Ratio	0.59	0.54	0.47	0.42	0.38	0.36	0.34
Density	2477.2	2485.7	2497.1	2458.42	2508.7	2464.05	2509.5
Initial Slump (mm)	130	120	140	135	190	165	175
30 min (mm)	120	105	130	110	190	140	175
60 min (mm)	60	70	110	100	170	120	160
90 min (mm)		—	90		140	100	130
120 min (mm)					110		110
Compressive Strength Avg. Results N/MM²							
03 Days	11.85	14.1	15.73	17.58	20.32	27.79	28.81
07 Days	15.63	17.9	23.99	27.30	35.05	39.21	37.22
28 Days	28.84	31.6	37.77	49.73	51.44	53.25	52.50