

# Building Greener Future



## Cement Replacement Products

**MASHEED IS COMMITTED TO BE A SUSTAINABLE  
LEADER TO SUPPORT THE KINGDOM'S 2030 VISION**



## About US

Masheed is a **leading supplier** of cement replacement materials in Saudi Arabia. We maintain a leading position by delivering the best value to all our stakeholders in a **sustainable** manner. We are dedicated to both **environmental preservation and societal progress**



# The importance of cement replacement for environmentally conscious builders

In a world where environmental responsibility is paramount, choosing the right construction materials can make a significant difference. Cement replacement solutions are at the forefront of sustainable building practices, offering a range of benefits that align perfectly with the values of environmentally conscious builders.



## Reduced Carbon Footprint

Cement replacement materials, such as microsilica, fly ash or GGBFS help in significantly lowering CO2 emissions in the final product. By opting for these alternatives, builders can make a substantial contribution to reducing the construction industry's environmental impact.



## Long-Term Sustainability

By using cement replacement materials, builders are investing in the longevity and sustainability of their structures. These materials are known for their durability and resilience, reducing the need for repairs and replacements, which further minimizes environmental disruption.



## Resource Conservation

Our cement replacement products are designed to make the most efficient use of resources. By reducing the need for traditional cement, these materials help conserve valuable natural resources like limestone and clay.



## Sustainable Sourcing

We take pride in sourcing our materials responsibly, ensuring they come from environmentally friendly and ethical sources. This commitment to sustainability goes hand in hand with the principles of environmentally conscious builders.



## Energy Efficiency

Cement replacement materials are considered byproducts because they are secondary materials generated during industrial processes that primarily produce other products; they require less energy compared to the production of traditional Portland cement. Portland cement is produced through the high-temperature calcination of limestone.



## Regulatory Compliance

Our products adhere to industry standards and certifications, demonstrating our commitment to environmentally friendly construction practices.

## Types of Cement Replacement Materials

### Fly Ash



#### Overview

- Fly Ash is a by-product of coal combustion in coal fired thermal power plants.
- It is captured in electro-static precipitators.
- Pozzolanic material, consists of small, hard and spherical particles rich in silica (glass) and alumina.
- Complements portland cement upon hydration by reacting with free lime (calcium hydroxide) to form an additional durable binder, namely calcium silicate hydrate.



#### Benefits

- Improved Workability
- Reduced Heat of Hydration
- Enhanced Long-Term Strength
- Helps Reduces Permeability
- Helps Prevent Cracking



#### Usage

- Concrete Production
- Road Construction
- Brick Manufacturing



#### Technical Specifications

##### Moisture (MC):

3% MAX

##### Loss of Ignition (LoI):

6% MAX

##### SO3:

5% MAX

##### SiO2 + Fe2O3 + Al2O3:

70% MIN

##### Fineness at 45-micron sieve:

34% MAX

##### Activity Index at 28 days:

75% MIN

##### Standards:

ASTM C618 and BS EN 450 Standard



#### Environmental benefits

- Decrease the carbon footprint print in the final product
- Natural resource preservation such as limestone and clay that are used in the production of portland cement

# Micro Silica

## Overview

- Microsilica, also known as silica fume, is a byproduct of the production of silicon metals and ferrosilicon alloys in the metallurgical industry. It is an extremely fine and amorphous (non-crystalline) form of silicon dioxide ( $\text{SiO}_2$ ) with highly reactive properties. Microsilica consists of very fine particles, with most of them being less than 1 micron in size.



## Benefits

- Improve Strength
- Improve Durability
- Increased Chemical Resistance in Concrete

## Usage

- Concrete Production
- Precast Concrete
- Grouts and Repair Mortars

## Environmental benefits

- Decrease the carbon footprint print in the final product
- Reduce water usage
- Energy conservation

## Technical Specifications

### Moisture (MC):

3% MAX

### Loss of Ignition (LOI):

6% MAX

### $\text{SiO}_2$ :

85% MIN

### Fineness at 45-micron sieve:

10% MAX

### Activity Index at 7 days:

105% MIN

### Standards:

ASTM C1240

# Ground Granulated Blast Furnace Slag (GGBFS)

## Overview

- GGBFS stands for Ground Granulated Blast Furnace Slag, which is a byproduct of the iron and steel manufacturing industry. GGBFS is produced by quenching molten iron slag (a byproduct of iron production in blast furnaces) with water or steam to rapidly cool it. This process leads to the formation of glassy granules that are then finely ground into a powder.



## Benefits

- Reduce Permeability
- Improve Durability
- Increased Resistance to Sulfate Attack

## Usage

- Concrete Production
- Asphalt Concrete
- Precast Concrete

## Environmental benefits

- Decrease the carbon footprint print in the final product
- Energy conservation
- Natural resource preservation such as limestone and clay that are used in the production of portland cement

## Technical Specifications

### Loss of Ignition (LOI):

3% MAX

### MgO:

18% MAX

### $\text{SO}_3$ :

2.5% MAX

### $\text{S}_2$ :

2.5% MAX

### Fineness Blaine:

Typical 410-470  $\text{m}^2/\text{kg}$

### Activity Index (50% OPC: 50% GGBFS):

at 28 days 95% MIN

### Standards:

ASTM C989 - Grade 100

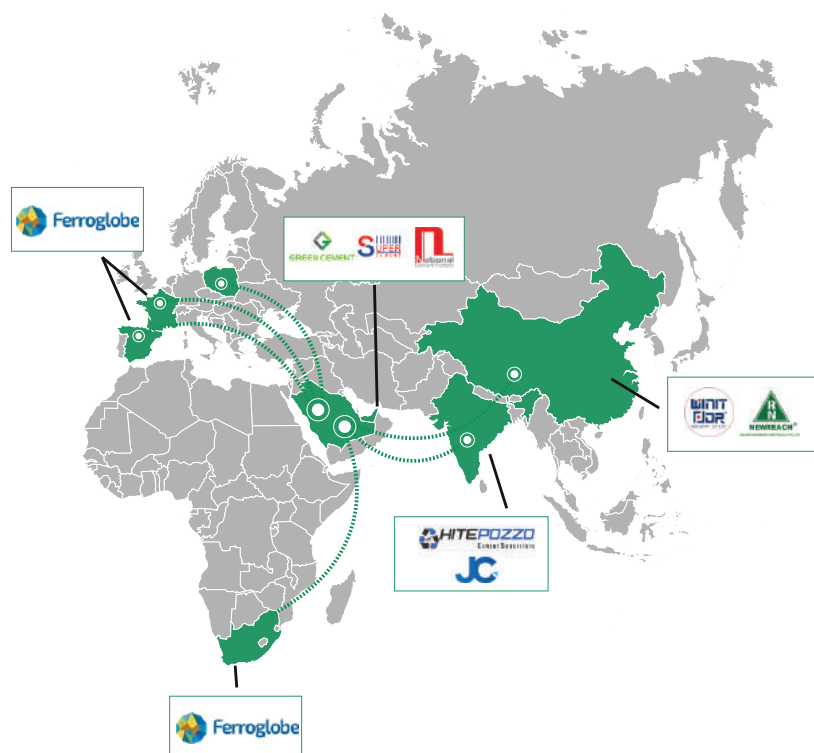


# Our Supply Chain

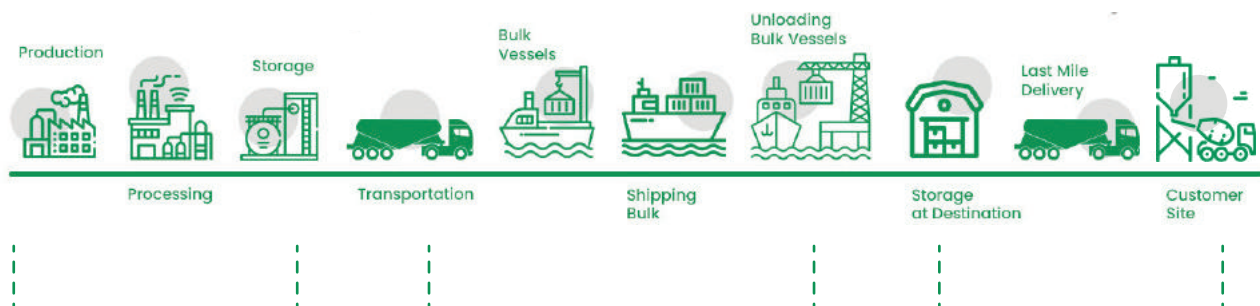
## Sourcing

We procure the world's finest cement replacement materials sourced from diverse countries across the globe. Our commitment to excellence ensures that you receive top-tier alternatives, meticulously chosen for their superior quality.

Product	Source
Fly Ash	India
Microsilica	China, Malaysia, South Africa, France & Spain
GGBFS	UAE, India & China



## Sourcing Journey



### Production

Cement replacement byproducts” collectively encompass materials like fly ash, microsilica, and ground granulated blast furnace slag (GGBFS), which serve as alternatives or supplements to traditional Portland cement in concrete production. Masheed sources cement replacement materials from different countries around the world.



### Shipping

Masheed has established strategic partnerships with carriers to streamline its trading operations within the region. Additionally, through dependable port operators, Masheed effectively oversees stevedores, storage, and logistics activities at ports within the kingdom, ensuring a seamless and efficient management of its shipping and handling operations.



### Last Mile Delivery

Masheed places a strong emphasis on providing a seamless and efficient last-mile delivery experience for its customers. Leveraging advanced logistics and transportation networks, Masheed ensures that products swiftly reach their destination.



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# Fly Ash

## Product Overview:

- **Product Type:** Supplementary Cementitious Material (SCM)
- **Description:** Fly ash is a fine, powdery material produced as a byproduct from the combustion of pulverized coal in power plants. It consists of spherical glassy particles that are rich in silica ( $\text{SiO}_2$ ), alumina ( $\text{Al}_2\text{O}_3$ ), and iron oxide ( $\text{Fe}_2\text{O}_3$ ). Fly ash is an environmentally friendly material that can be used in a wide range of construction and industrial applications.
- **Source:** India and Malaysia

## Key Features:

- **Sustainable:** Fly ash is a sustainable material that reduces the carbon footprint of concrete and other construction materials.
- **High Pozzolanic Activity:** It enhances the properties of concrete and provides long-term strength and durability.
- **Cost-Effective:** Fly ash is cost-effective and readily available, making it an economical choice for various applications.
- **Chemical Resistance:** It enhances the resistance of concrete to sulfate and chloride attacks.
- **Reduced Heat of Hydration:** Fly ash helps in reducing the heat generated during the cement hydration process.
- **Improve Workability:** Reduces water demand while improving slump characteristics and extending workability time for easier mixing, Pumping, and finishing of concrete.

## Applications:

- **Concrete Production:** Fly ash is widely used as a supplementary cementitious material in concrete production, reducing the need for Portland cement and lowering the environmental impact.
- **Mortar and Grout:** It improves the workability and long-term performance of mortar and grout in construction projects.
- **Highway Construction:** Fly ash is used in road construction for stabilizing soils and as a partial replacement for cement in concrete pavements.
- **Brick and Block Manufacturing:** It is utilized as an ingredient in the production of bricks and blocks, enhancing their strength and durability.
- **Soil Stabilization:** Fly ash can be mixed with soils to improve their engineering properties, making it valuable in construction and infrastructure projects.
- **Waste Stabilization:** It can be used to stabilize hazardous and non-hazardous waste materials.

# Technical Specifications:

Properties	Unit	ASTM C618 Class F
Silicon Dioxide, Aluminum Oxide, Iron Oxide (SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub> )	%	70 Min.
Sulfur Trioxide (SO <sub>3</sub> )	%	5.0 Max.
Moisture Content (H <sub>2</sub> O)	%	3.0 Max.
Loss on Ignition (LOI)	%	6.0 Max.
Fineness – Retained on 45 µm (No. 325) sieve	%	34 Max.
7 day (% of control)	%	75 Min.
28 day (% of control)	%	75 Min.
Water Requirement (% of control)	%	105 Max.
Autoclave Expansion or Contraction	%	0.8 Max.



## Quality Standards:

Fly ash products conform to ASTM C618 and other international standards for supplementary cementitious materials.

## Storage and Handling:

Store fly ash in a dry environment to prevent moisture absorption. Handle with care to minimize dust generation.

## Environmental Benefits:

Using fly ash in construction materials significantly reduces greenhouse gas emissions and conserves natural resources. It is an environmentally responsible choice for sustainable construction practices.

masheed is a **leading supplier** of Flyash in Saudi Arabia. We maintain a leading position by delivering the best value to all our stakeholders in a sustainable manner. We are dedicated to both **environmental preservation and societal progress**



# Microsilica (Silica Fume)



## Product Overview:

- **Product Type:** Supplementary Cementitious Material (SCM)
- **Description:** Microsilica, also known as silica fume, is an ultrafine powder produced as a byproduct of the silicon and ferrosilicon alloy production process. It consists of very fine spherical particles rich in silicon dioxide ( $\text{SiO}_2$ ). Microsilica is a highly reactive pozzolan and is used to enhance the properties of concrete and other construction materials.
- **Source:** China, Malaysia, South Africa, France & Spain

## Key Features:

- **High Reactivity:** Microsilica is highly reactive and provides excellent pozzolanic properties, improving concrete strength, durability, and other properties.
- **Reduced Permeability:** It significantly reduces the permeability of concrete, making it highly resistant to chloride ion penetration and sulfate attack.
- **Increased Strength:** Microsilica contributes to increased compressive and flexural strength in concrete.
- **Reduced Heat of Hydration:** It helps in controlling the heat generated during the cement hydration process.
- **Enhanced Durability:** Microsilica improves resistance to alkali-silica reactivity (ASR) and enhances freeze-thaw resistance.
- **Environmental Benefits:** Using Microsilica in concrete reduces the carbon footprint, making it a sustainable choice for construction projects.

## Applications:

- **High-Performance Concrete:** Microsilica is used in high-strength and high-performance concrete to enhance strength, durability, and impermeability.
- **Shotcrete:** It is utilized in shotcrete applications, such as tunnel linings, to achieve high strength and resistance to harsh environmental conditions.
- **Bridge Decks:** Microsilica improves the durability of bridge decks, making them more resistant to corrosion and extending their service life.
- **Self-Compacting Concrete:** It is used in self-compacting concrete mixes to enhance flowability and strength.
- **Pre-cast Concrete:** Microsilica is valuable in pre-cast concrete products, including panels, beams, and columns.
- **Grouts and Repair Materials:** It enhances the properties of grouts and repair materials for structural repairs.

# Technical Specifications:

Properties	Unit	ASTM C1240
Silicon Dioxide (SiO <sub>2</sub> )	%	85 Min
Moisture Content (H <sub>2</sub> O)	%	3.0 Max
Loss on Ignition (LOI)	%	6.0 Max
Cl	%	0.1 Max
Surface Area	%	>15m <sup>2</sup> /g
Pozzolanic Activity Index (7 days)	%	≥105
Fineness at 45-micron sieve	%	10 Max



## Quality Standards:

Microsilica products conform to ASTM C1240 and other international standards for supplementary cementitious materials.

## Storage and Handling:

Store Microsilica in a dry environment to prevent moisture absorption. Handle with care to minimize dust generation.

## Environmental Benefits:

Using Microsilica in construction materials significantly reduces greenhouse gas emissions and conserves natural resources. It is an environmentally responsible choice for sustainable construction practices.

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# Ground Granulated Blast Furnace Slag (GGBFS)



## Product Overview:

- **Product Type:** Supplementary Cementitious Material (SCM)
- **Description:** GGBFS is a fine granular material that is a byproduct of the iron manufacturing process. It is produced by quenching molten blast furnace slag with water or steam, resulting in a glassy granular product. GGBFS is known for its pozzolanic properties, which make it an excellent choice for enhancing the properties of concrete and other construction materials.
- **Source:** UAE, India & China

## Key Features:

- **Pozzolanic Reactivity:** GGBFS is highly pozzolanic and reacts with calcium hydroxide to produce additional cementitious compounds, enhancing the strength and durability of concrete.
- **Reduced Heat of Hydration:** It helps in controlling the heat generated during the cement hydration process, making it suitable for mass concrete applications.
- **Improved Workability:** GGBFS enhances the workability of concrete, making it easier to place and finish.
- **Enhanced Durability:** It improves concrete's resistance to sulfate attacks, chloride penetration, and alkali-silica reactivity (ASR).
- **Environmental Benefits:** Using GGBFS in concrete significantly reduces carbon emissions and conserves natural resources, making it an environmentally responsible choice for construction projects.

## Applications:

- **Concrete Production:** GGBFS is widely used as a supplementary cementitious material in concrete production, reducing the need for Portland cement and improving the long-term performance of concrete.
- **Mass Concrete:** It is suitable for mass concrete applications, such as dams, bridges, and foundations, where heat generation during curing needs to be controlled.
- **High-Performance Concrete:** GGBFS is used to produce high-performance concrete with enhanced strength and durability.
- **Sustainable Construction:** It is a key component in sustainable construction practices, helping reduce the environmental impact of construction materials.
- **Infrastructure Projects:** GGBFS is valuable in infrastructure projects, including roads, bridges, and tunnels, where durability and long-term performance are crucial.

# Technical Specifications:

Properties	Unit	ASTM C989
Sulfur Trioxide (SO <sub>3</sub> )	%	2.5 Max
S <sub>2</sub>	%	2.5 Max
Loss on Ignition (LOI)	%	3.0 Max
Fineness Blaine	%	Typical 410–470 m <sup>2</sup> /kg
Magnesium oxide	%	18 Max
Activity Index at 28 days	%	95 Min



## Quality Standards:

GGBFS products conform to ASTM C989 and other international standards for supplementary cementitious materials.

## Storage and Handling:

Store GGBFS in a dry environment to prevent moisture absorption. Handle with care to minimize dust generation.

## Environmental Benefits:

Using GGBFS in construction materials significantly reduces greenhouse gas emissions and conserves natural resources. It is an environmentally responsible choice for sustainable construction practices.

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