

# Super Refractories Glass Industry Applications



- Commenced operations in 1965 at Tiruvottiyur in Chennai
- Technical know-how from Carborundum, USA for Fired and Monolithics
- Introduced Low Cement Castable technology in India for the first time in 1985
- Started operations in 1990 at Ranipet – Plant 1
- Commenced operations in Jabalpur, MP in 2007 for monolithics
- Started refractory production in Ranipet – Plant 2
- Commercial and technical Tie up with [Anderman Ceramics](#) in 2012

# Why CUMI?

- **A Pioneer in Super Refractories; 48 years experience**
- **Full-fledged R&D team for product development and continuous improvement**
- **Ability to design & manufacture complex shapes**
- **Standard & Tailor made products**
- **In-house production of Electro-fused grains for mullite/Zircon mullite/fused alumina**
- **CUMI and Anderman combined distribution network**

# Why CUMI?

- **Our high quality Refractories like Mullite/ Zircon mullite/Insulation Firebricks (IFB) meet with International Standards.**
- **Mullite products were tested and approved by Corning , US for SAMCOR Glass, Kota in 1991.**
- **Mullite products jointly tested with Saint Gobain and gave good value for creep for WHF grade.**
- **Cumilite W has given as high as 13 years life in SAMCOR Glass for Port application.**
- **Cumilite W Port Neck Arches had given a life of 2 campaigns i.e 16 years in Vitrum Glass.**
- **Cumizite ZM2HF Spl is the only Indian Product in Z/M grade to give consistent good life in Regenerator checkers and Port Neck in BRS furnaces.**

## Resources & Capabilities

### Production Capacity

#### **13,000 tons / year for Fired Products**

- 8 Shuttle kilns available
- 1 Tunnel Kiln
- Firing temperature – 1450 – 1750 Deg. C

#### **50,000 tons / year for Monolithic products**

Meeting the standards of ISO 9001: 2008 requirements  
Following Integrated Management Systems

# Products

- Mullite/Sillimanite
- High Alumina
- Insulation Firebricks (IFBs)
- Zircon
- Zircon Mullite
- Fused Silica
- Conventional Castables
- Low Cement Castables (LCC)
- Insulating Castables
- No Cement Easy Flow Castables
- Ramming Masses
- Laying Mortars
- Zircon Patch

# Glass Industry Applications

## Melter

- Crown
- Sub Paving
- Buffer layers
- Peephole blocks

## Regenerator

- Target, partition and side walls
- Crown
- Rider Arches
- Spanner Tiles
- Checkers

## Port

- Port wall
- Neck Arches
- Paving

## Distributor

- Cover Blocks

## Forehearth

- Super Structure
  - Covers
  - Burner Blocks
- Sub Structure

# Piramal Glass



- 35 TPD
- 2006 – Still in service
- Regenerator
  - └ Rider Arches
  - └ Spanner tiles
- Forehearth super structure

# Piramal Glass



- 100 TPD
- 2006 – Still in service
- Rider Arches and spanner tiles
- Distributor and forehearth super structure
- HORN Furnace

# Gujarat Borosil



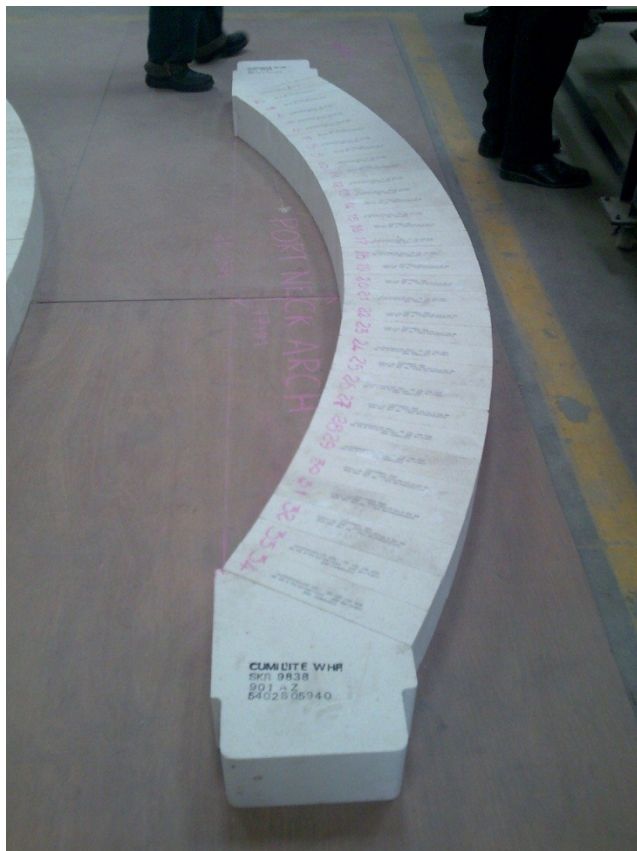
- 120 TPD
- 2008 - Still in service
- Regenerator
  - Crown Arch
  - Partition Wall
  - Target wall
  - Rider Arches & Spanner tiles
  - Subpaving

# AGI Glaspac



- 350 TPD
- 2010 – still in service
- Regenerator
  - Crown Arch
  - Partition Wall
  - Target Wall
- Distributor/Forehearth
- SORG Furnace

# HNGIL – Rishikesh



- 270 TPD
- 2010 – still in service
- Regenerator
  - Sidewall
  - Partition Wall
  - Crown
- Port Neck Arch

# Hindusthan National Glass



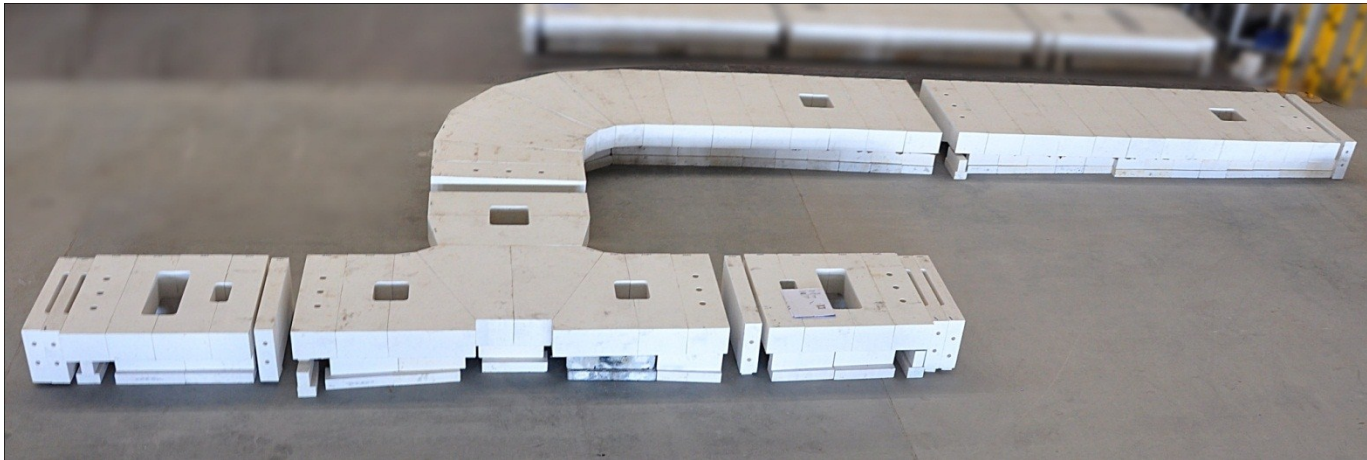
- 330 TPD
- 2010 – Still in service
- Silimanite Rider Arches
- Spanner Tiles
- Burner Tiles
- Port neck refractories
- HORN Furnace

# AGI Glaspac



- 425 TPD
- 2011 – still in service
- Sub-paving.
- Regenerator
  - Crown Arch
  - Partition Wall
  - Target Wall
- Distributor/Forehearth
- SORG Furnace

# Piramal Glass Ltd



- 160 TPD
- 2011/12 – Still in service
- HORN Furnace
- Sub-paving & Buffer layer
- Port Connection
- Distributor / Forehearth



- 45 TPD
- Rebuild of Forehearth super structure
- New installation
- SORG Furnace

# Our Materials

## Silimanite

Originally designated as AS1, **CUMILOX 55C** is an industry recognised Silimanite based material with many years of proven performance in the Glass industry.

Product Definition	Typical Value
Max. Hot Face Temperature (°C)	1500
Bulk Density (Kg/m <sup>3</sup> )	2140
Cold Crushing Strength (MN/m <sup>2</sup> )	40
Apparent Porosity (%)	25
Permanent Linear Change (%) 1500 °C	0.2
<b>Chemical Analysis (%)</b>	
Al <sub>2</sub> O <sub>3</sub>	55
SiO <sub>2</sub>	41
Fe <sub>2</sub> O <sub>3</sub>	0.4

## Mullite

Originally designated as ASSM6, **CUMILITE 76C** is an industry recognised Mullite based material with many years of proven performance in the Glass industry.

Product Definition	Typical Value
Max. Hot Face Temperature (°C)	1750
Bulk Density (Kg/m <sup>3</sup> )	2560
Cold Crushing Strength (MN/m <sup>2</sup> )	60
Apparent Porosity (%)	20
Permanent Linear Change (%)	- 0.1
<b>Chemical Analysis (%)</b>	
Al <sub>2</sub> O <sub>3</sub>	78
SiO <sub>2</sub>	20.5
Fe <sub>2</sub> O <sub>3</sub>	0.35

## Zirconia/Mullite

Originally designated as AZ7, **CUMIZITE 30C** is an industry recognised Zirconia/Mullite based refractory material with many years of proven performance in the Glass industry.

Product Definition	Typical Value
Max. Hot Face Temperature (°C)	1750
Bulk Density (gm/cc)	2.78
Cold Crushing Strength (Kg/cm <sup>2</sup> )	400
Apparent Porosity (%)	26
Permanent Linear Change (%)	+/- 0.6
Chemical Analysis (%)	
Al <sub>2</sub> O <sub>3</sub>	50
ZrO <sub>2</sub>	28
Fe <sub>2</sub> O <sub>3</sub>	0.15

## Mullite

**CUMILITE W** is a MULLITE refractory based on 76% Alumina, Fused mullite with a secondary mullite bond.

**CUMILITE WHF** is the same composition but high fired to produce an even stronger product.

	CUMILITE W	CUMILITE WHF
<b>Product Definition</b>	<b>Typical Value</b>	
Max. Hot Face Temperature ( $^{\circ}\text{C}$ )	1760	1760
Bulk Density (gm/cc)	2.60	2.65
Apparent Porosity (%)	19	17.5
Cold Crushing Strength (Kg/cm $^2$ )	950	1000
<b>Modulus of Rupture</b>		
At room temperature (Kg/cm $^2$ )	175	175
At 1350 $^{\circ}\text{C}$ (Kg/cm $^2$ )	100	100
Reheat Change % After heating at 1450 $^{\circ}\text{C}$ for 6 hrs.	-	-
<b>Thermal Conductivity (W/m <math>\cdot</math> K)</b>		
At 800 $^{\circ}\text{C}$ Hot Face Temp.	1.68	1.68
At 1000 $^{\circ}\text{C}$ Hot Face Temp	1.61	1.61
At 1200 $^{\circ}\text{C}$ Hot Face Temp	1.74	1.74
<b>Chemical Analysis (%)</b>		
Al $_2$ O $_3$	77.47	77.42
SiO $_2$	20.64	21.01
Fe $_2$ O $_3$	0.21	0.19

## Sillimanite

**CUMILITE 60A** is a MULLITE refractory based on 60% Alumina, Andalusite mullite with improved purity levels

**CUMILITE 60A SPL** is the same composition but high fired to produce a lower porosity, stronger product with high hot strength and high creep resistance.

	CUMILITE 60A	CUMILITE 60A SPL
<b>Product Definition</b>	<b>Typical Value</b>	
Max. Hot Face Temperature (°C)	1550	1550
Bulk Density (gm/cc)	2.55	2.55
Apparent Porosity (%)	16	15
Cold Crushing Strength (Kg/cm <sup>2</sup> )	600	650
<b>Modulus of Rupture</b>		
At room temperature (Kg/cm <sup>2</sup> )	65	90
At 1350 °C (Kg/cm <sup>2</sup> )	40	50
Reheat Change %	+ 0.2	+ 0.17
After heating at 1450 °C for 6 hrs.		
<b>Chemical Analysis (%)</b>		
Al <sub>2</sub> O <sub>3</sub>	61	60.50
SiO <sub>2</sub>	33.5	35.50
Fe <sub>2</sub> O <sub>3</sub>	0.85	0.75

## Sillimanite

**CUMILITE 65A** is a Sillimanite refractory based on Andalusite grains.

**CUMILITE 65A SPL** is based on Andalusite grains but has better purity and higher strength.

	CUMILITE 65A	CUMILITE 65A SPL
<b>Product Definition</b>	<b>Typical Value</b>	
Max. Hot Face Temperature ( $^{\circ}\text{C}$ )	1550	1500
Bulk Density (gm/cc)	2.55	2.60
Apparent Porosity (%)	19	19
Cold Crushing Strength (Kg/cm $^2$ )	600	750
<b>Modulus of Rupture</b>		
At room temperature (Kg/cm $^2$ )	75	90
At 1350 $^{\circ}\text{C}$ (Kg/cm $^2$ )	50	50
Reheat Change %	-	-
After heating at 1450 $^{\circ}\text{C}$ for 6 hrs.	-	-
<b>Thermal Conductivity (W/m <math>^{\circ}\text{K}</math>)</b>		
At 800 $^{\circ}\text{C}$ Hot Face Temp.	-	1.64
At 1000 $^{\circ}\text{C}$ Hot Face Temp	-	1.53
At 1200 $^{\circ}\text{C}$ Hot Face Temp	-	1.72
<b>Chemical Analysis (%)</b>		
Al $_2$ O $_3$	66.02	66.5
SiO $_2$	33.05	32.50
Fe $_2$ O $_3$	0.85	0.85

## Zircon

**CUMIZON** and **CUMIZON 65G** are Zircon based refractories. The 65G is a higher strength version with a slightly higher Zirconia content.

	CUMIZON	CUMIZON 65G
<b>Product Definition</b>	<b>Typical Value</b>	
Max. Hot Face Temperature (°C)	1600	1600
Bulk Density (gm/cc)	3.55	3.70
Apparent Porosity (%)	20.5	16.50
Cold Crushing Strength (Kg/cm <sup>2</sup> )	600	800
Reheat Change % After heating at 1450 °C for 6 hrs.	+ 0.1	+ 0.1
<b>Chemical Analysis (%)</b>		
ZrO <sub>2</sub>	65.20	65.50
SiO <sub>2</sub>	32.60	32.10
Fe <sub>2</sub> O <sub>3</sub>	0.40	0.40

## Zircon/Mullite

**CUMIZITE ZM** is based on fused alumina and Zircon Silicate.

**CUMIZITE ZM 2 HF SPL** is based on high purity fused zircon mullite material and has excellent thermal shock and corrosion resistance.

	CUMILITE ZM	CUMILITE ZM2 HF
<b>Product Definition</b>	<b>Typical Value</b>	
Max. Hot Face Temperature (°C)	1750	1750
Bulk Density (gm/cc)	3.20	3
Apparent Porosity (%)	17	17
Cold Crushing Strength (Kg/cm <sup>2</sup> )	800	950
Reheat Change % After heating at 1450 °C for 6 hrs.	+ 0.20	+ 0.05
Thermal Conductivity (W/m .K)	1.88	1.90
<b>Chemical Analysis (%)</b>		
Al <sub>2</sub> O <sub>3</sub>	70.30	65.50
ZrO <sub>2</sub>	19.30	19.80
SiO <sub>2</sub>	10.10	12.90
Fe <sub>2</sub> O <sub>3</sub>	0.09	0.13

# Major References

- SAMCOR Glass, Kota
- Majan Glass, Oman
- Ceylon Glass, Srilanka (SORG)
- Milly Glass, Kenya, (HORN)
- Videocon Glass
- Gujarat Borosil
- Philips Electronics
- Cema Electric Lighting, Limbasi
- Neutral Glass, kosamba
- Bisazza, Kadi
- Pino Bisazza / Gemstone, kadi
- Nahar colours / Orient glazes

# Furnace Designs

## CUMI – SR has supplied refractories for designs of

- Horn Glass, Germany
- SORG, Germany
- KTG, UK / India
- Corning, US
- Demaglass, UK.
- Tech Glass, Poland
- Glass Services, Italy
- Glacera Engineers, India
- St Gobain Glass, Float

# Anderman Industrial Ceramics

- **Strategic alliances with a number of world leading refractory and ceramic manufacturers**
- **Highly focused on customer satisfaction**
- **A highly motivated and experienced sales team**
- **Technical, commercial and logistics support**
- **Expert technical advice & support**
- **Offices in the UK, France, USA and China (Beijing & Shenzhen)**
- **Multilingual team (English, French, Japanese, Spanish, Portuguese, Chinese, Russian & Hindi)**

**[www.earthwaterfire.com](http://www.earthwaterfire.com)**



**CARBORUNDUM UNIVERSAL LIMITED**  
SUPER REFRACTORIES



**murugappa**