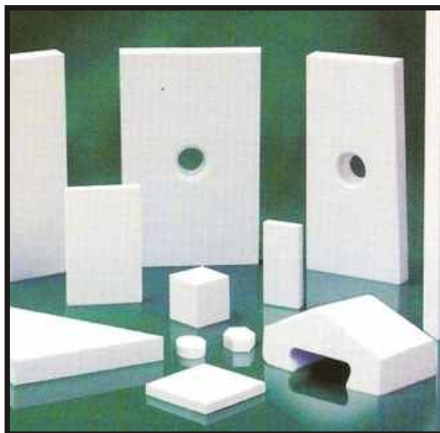


# BMW Steels Ltd.



**BMW Steels Ltd.**



## An ISO 9001-2008 Company

# Alumina Ceramic Division

# Company Profile

BMW Steels Ltd.



**B**MW Steels Ltd. was formed in 1962 as a one stop shop for wear and erosion solutions for Thermal Power Plants, Cement Plants, Steel Plants, Coal Washeries and other Mineral Processing Units. Company Started as casting unit but with the passage of time new products like Alumina Ceramic and Cast Basalt were added to the product range.

The company has introduced a complete set of advanced production line comprising of latest automatic and semi automatic productions machine, high temperature kilns, CNC Pipe profile cutting and Welding machines for manufacturing high wear and abrasion resistant products of international standards.

The company is ISO 9001-2008 accredited for its quality standard.

BMW is one of the oldest jobbing foundry and house of technical ceramics in India. BMW Steels Ltd. has earned a reputation for fast deliveries, superior quality, competitive pricing, and outstanding customer service.

## Products

### ⚡ Ceramic Linings

Alumina Ceramic

Cast Basalt

Monolithic Ceramic Lining (CBC)

### ⚡ Wear Resistant Iron Castings

Ni-Hard

Hi-Chrome

Manganese Steel

### ⚡ Pipe Connection Coupling System

Grooved Coupling

Slip on Type Coupling

Quick Release Coupling

Flexible Coupling

**W**e at BMW take the Clients requirement as the dominants factor with self surpassing spirit and excellent pursuit. We aim at basic principles of selecting high quality raw materials, state of art manufacturing facilities and high quality testing laboratories.

We design products to out-perform the others in extreme abrasion and corrosion prone areas. Our products find wide application in ambient and high temperature, bulk minerals, coal and ash handling systems and metals.

### Industries we serve...

We have been catering to the needs of various industries including Power Sector, Cement, Mining, Paper Pulp, Ceramic, Fertilizer, Mineral Processing and Construction industries since 1962.

### Production Capacity

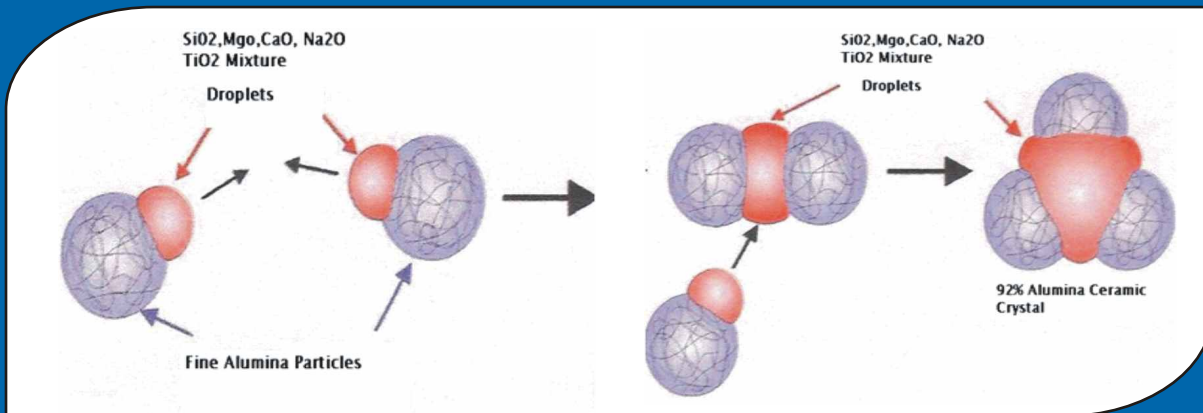
BMW Steels Ltd. has monthly capacity to produce 150 MT Alumina Ceramic, 150 MT Cast Basalt, 100 MT CBC Linings & 200MT Castings.

Ceramic Linings/Coating can be done on any product in any quantity and shape for sliding abrasion.



Pioneers of War Against Wear

## Process of Alumina Liner Fusion at 1520 deg. Sintering

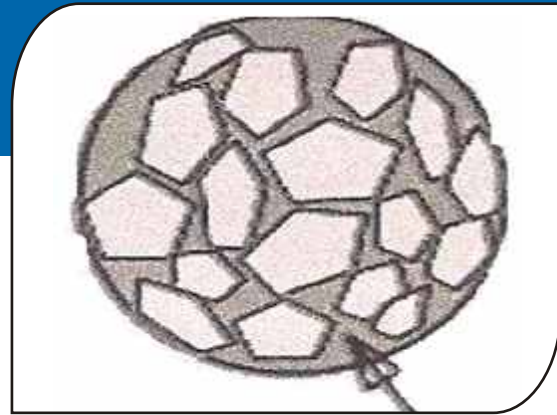


## Microstructure of 90-92% Alumina Liner (White)

### Microstructure of 80-87% Alumina Liner (Brown)



**With low SiO<sub>2</sub> and MgO, White colour  
(Chemical Grade Alumina)  
Sintering Temp. 1520 Deg.**



**VOIDS AND IMPURITIES**  
**With high SiO<sub>2</sub> and MgO Brown Colour**  
**(Bauxite base)**  
**Sintering Temp. 1380 Deg.**





# Alumina Ceramic Liner Manufacturing and Testing Facilities

## Alumina Granule Section

### Ball Mill

**O**ur high quality Alumina Ceramic Lined ball mill is a type of grinder, a cylindrical device used to grind Alumina, additives chemicals & other ceramic raw materials. Ball mills rotate around a horizontal axis, partially filled with the material to be ground plus the Alumina Ceramic Balls. An internal internal cascading effect reduce the material to a fine powder.

Our ball mill can grind mixture particles to as small as 0.0001 mm, enormously increasing surface area and reaction rates.



Ball Mill

### Granule Spray dryer

**A**lumina slurry by this method is dried through a hot gas to granules, Granules so formed are almost similar in size and moisture content, thus the pressing becomes more compact. This process of drying is a one step rapid process and eliminates additional processing.

The Alumina Mix liquid feed is pumped through an atomizer device that produces fine dropped into the main drying chamber. This method has unique advantage of similar granules and controlled moisture content.



Granule Spray dryer

## Alumina Granule Pressing Section

### 250 Ton Hydraulic Press

**F**or manufacturing balls it is required that equal pressure is applied on the granules in the mould from all sides.

Our Hydraulic press of 250 Ton compressive strength pressure enable high green compressive strength in the grinding media balls and cylpebs.

Press has dual pressing system i.e from top and bottom with multiple circular punch.



250 Ton Hydraulic Press



500 Ton Hydraulic Press

### 500Ton Hydraulic Press

**A**lumina Granules require very high compressive force to form a compact green tile. Repulsive forces generate between the molecules when it reaches high compactness.

Our Alumina Powder Press mechanism applies 500 ton compressive force. Hydraulic press depends on Pascal's principle: the pressure. It produces a very compact liner with high green flexural strength.

## Alumina Product Firing Section



Kiln suitable for firing at 1650° C

### Kiln suitable for firing at 1650°C

**T**he green Alumina Liners and Balls are required to be fixed at 1525 Deg. C Temperature with soaking period of 6 Hours. Our Tunnel KILN is suitable for Temperature upto 1650 Deg. C with high soaking period.

We use waste heat in form of hot gases to heat the air and the fuel for firing. We also use bio gas in our kilns as a mark of solidarity towards climate change issue.

## Alumina Product Testing Section



Compressive Testing Machine

### Compressive strength Testing Machine

**C**ompressive Strength is the capacity of the product to withstand the fracture. Our Alumina Ceramic products are very high compressive strength. Compressive Strength testing machine ranges from 200 Mpa to 1000 Mpa. Testing is done in confirmation to IS 4860 : 1968.

We have state of art testing machine to test the compressive strength of our products.



### Jet Erosion Testing Machine

**W**ear loss by Jet Erosion test is performed by subjecting high velocity alumina particles on alumina liners fixed at  $90^\circ$  and  $45^\circ$  with respect to alumina Jet.

Alumina Liner is weighed before subjecting to alumina Jet and after subjecting alumina Jet



Jet Erosion Testing Machine

### Hardness Testing Machine

**A**lumina Ceramic liners are tested for scratch hardness with the help of diamond tip and the same is compared with the known hardness sample. This hardness is measured in Moh's table.

Diamond is 10 on Moh's table while Alumina Ceramic is placed at 9 and Cast Basalt is at 8 and carbon steel is at 5 Moh's. Hardness can be a indicator for wear resistance.

Testing is done in confirmation to IS 13630 (Part 13) : 2006



Hardness Testing Machine

### Deep Abrasion Test Machine

**A**lumina Ceramic is mainly used in pneumatic coal/ash/ore handling equipments and as such they are subjected to deep abrasion by jet of the material being handled. Therefore it is necessary to test its performance in similar condition. Our Testing machine has a wheel which rubs the Alumina powder on the Alumina tile sample in a way that continuous deep abrasion conditions are generated. The wear so created is measured which should be less than 0.1 mm.

Testing is done in confirmation to IS 13630 (Part 12) : 2006

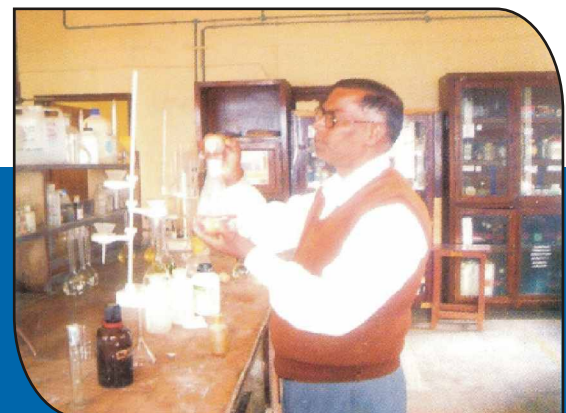


Deep Abrasion Test Machine

### Alumina Testing Apparatus

**A**lumina Ceramic performance depends on the percentage of Alumina Content. Alumina Percentage is measured by heating the fine powder received from the product by grinding and heating the same with chemicals in platinum crucible. Thereafter this mixture is converted into solution. This solution after titration gives the alumina percentage.

Testing is done in confirmation to IS 4589 : 1979



Alumina Testing Apparatus

## Desirable Alumina Ceramic Properties for achieving optimum wear life

Properties	Units	Properties of our Alumina Liners
Alumina Content	%	90-92%
Density	gm/cc	3.6-3.7
Crystal Size Average	Microns	4
Water Absorption	-	0.005 (Max)
Gas Permeability	-	0
Color	-	White
Flexural Strength (MOR) 20°C	MPa	220-275
Compressive Strength 20°C	MPa	700
Hardness	Moh's	9
	R45N	75
Coefficient of Thermal Expansion	$1 \times 10^{-6}/^{\circ}\text{C}$	7.0-9.0
Maximum Use temperature	$^{\circ}\text{C}$	1500
Abrasion by Jet Erosion	-	max 0.05 gm/ 30 Seconds
Abrasion by Rubbing	-	max 0.01 gm/ 30 Seconds
Thermal Shock	$^{\circ}\text{C}/\text{min}$	250





## Alumina Ceramic Physical Indicators













Alumina (%)	Hard ness (Moh's)	Compressive strength (kg/cm2)	Weight Loss (% 24 hrs)	Water-absorption (%)
95	9	$\geq 10000$	0.100	$< 0.005$
90	9	$\geq 7000$	0.100	$< 0.010$
80	9	$\geq 5000$	0.150	$< 0.010$
70	8	$\geq 4000$	0.150	$< 0.050$
65	7	$\geq 3500$	0.250	$< 0.015$

## Alumina Ceramic Chemical Indicators (%)

Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	CaO	MgO	Fe <sub>2</sub> O <sub>3</sub>	Other
65-95	22-5	10-0.5	2-0.5	0.5-0.01	Micro

## Hardness Comparison Chart

### Hardness Comparison

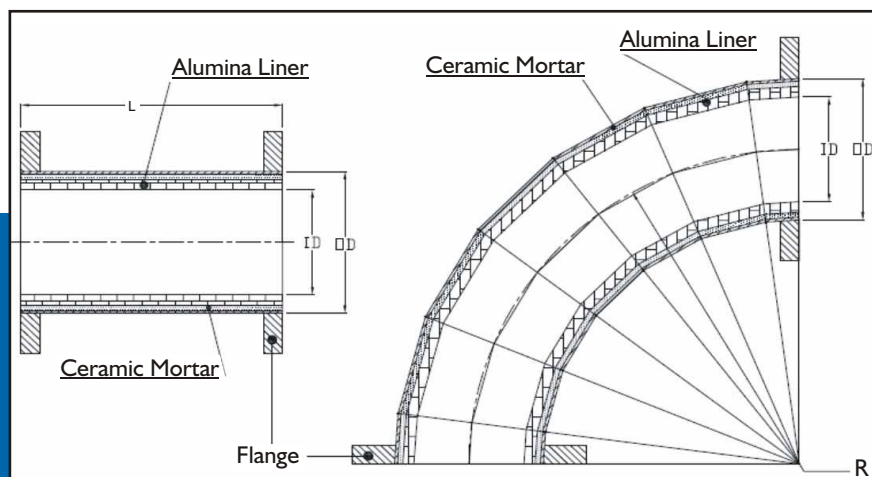
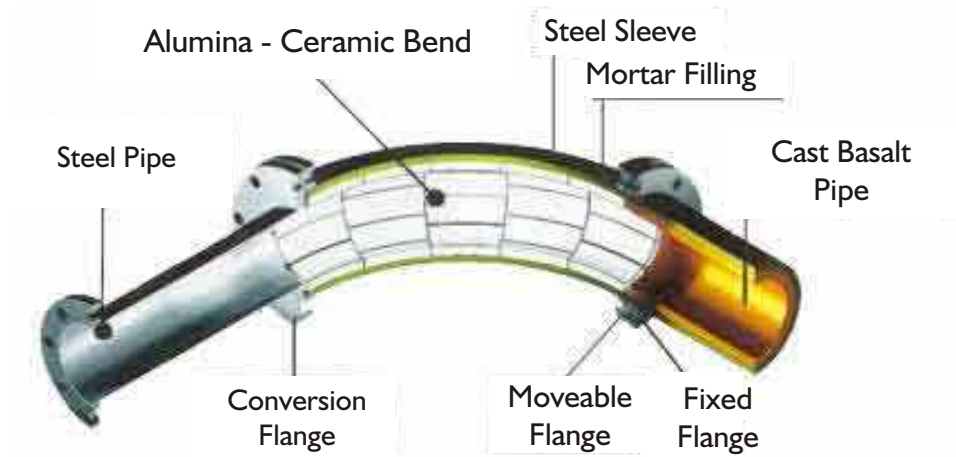
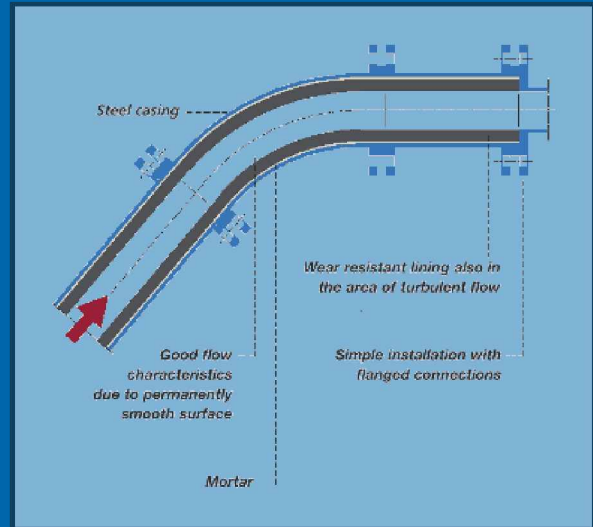
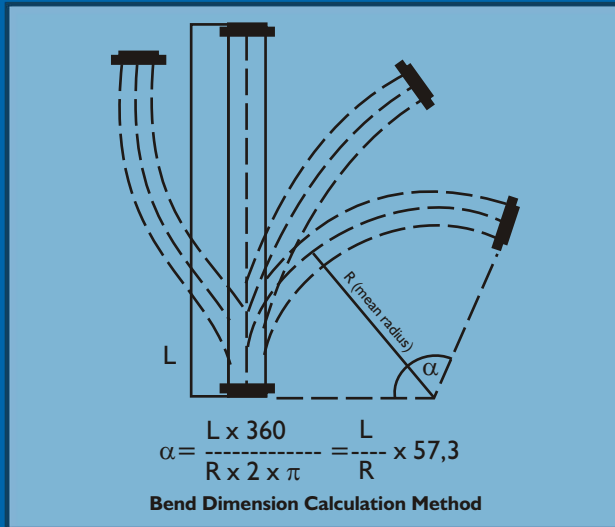
<u>Material</u>		<u>Moh Hardness</u>
Diamond		10
Sapphire		9
Alumina Ceramic		9
Topaz		8
Cast Basalt		7+
Quartz		7
Tool steel		6+
Silica		6.0
Glass		5+
Carbon steel		5+
Limestone		3+
Copper		3



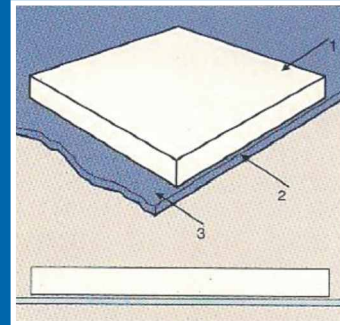


# Composition of Ceramic Lined Bends

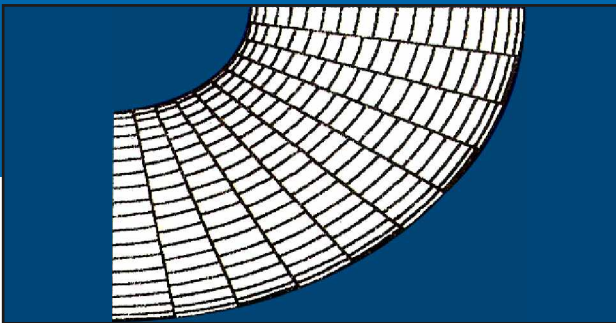
## Pipes and Bends



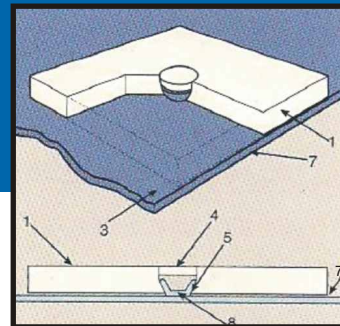
## Alumina Ceramic Liner Fixing Arrangement



*Adhesive Fixation*



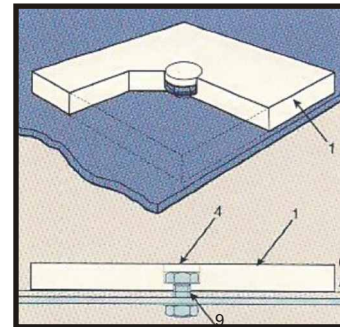
Fixing Pattern of Liners in Bend



*Metal Stud weldable*

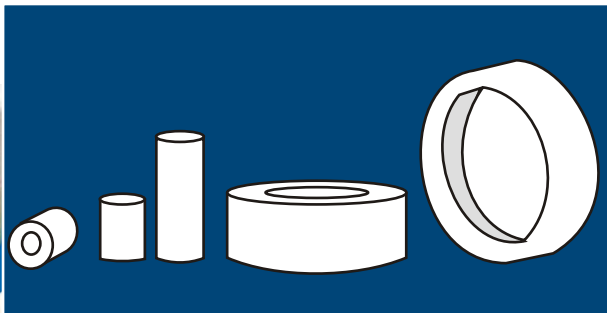


Rectangular Liner



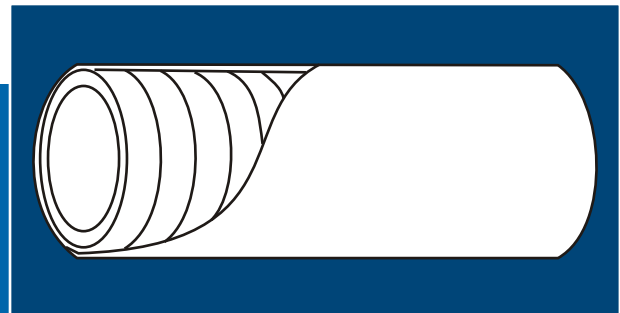
*Bolttable*

## Pipe Ceramic Liner Fixing



Liners upto 200mm I.D

Pioneers of War Against Wear



Fixing Pattern of Liners in small I.D Pipe

## Ceramic Lined Coal Mill Components



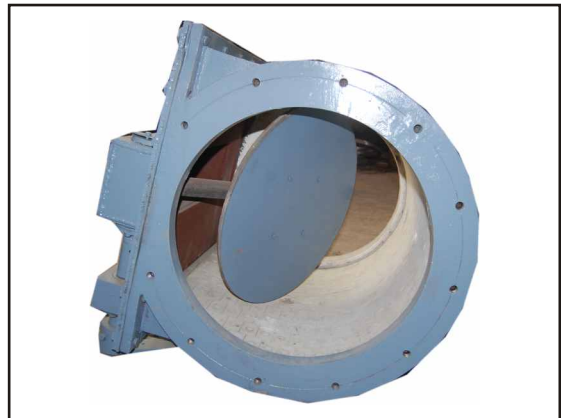
Multiple Port Outlet



Multiple Port Outlet Assembly



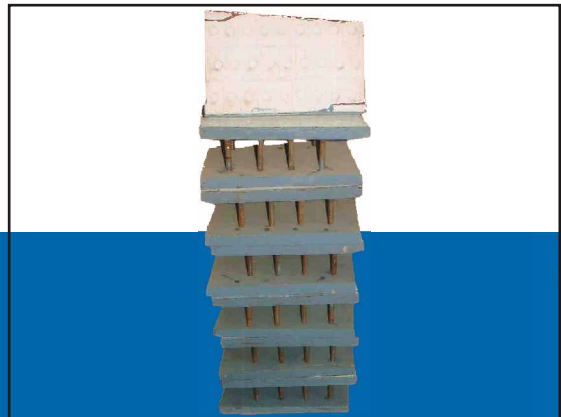
Mill Discharge Valve



Mill Discharge Valve



Coal Nozzle



Ventury Vane





# Ceramic Lined Coal Mill Components



Both Side Ceramic Lined Inner Cone



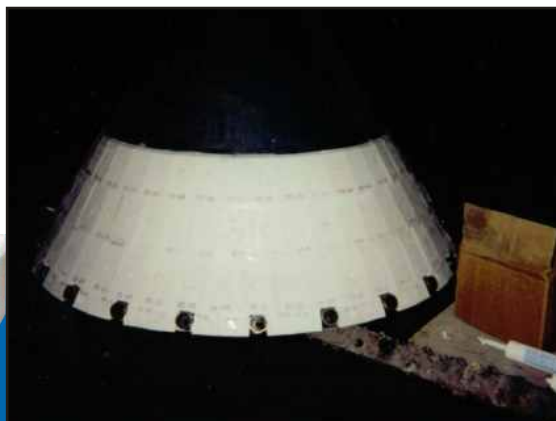
Both Side Ceramic Lined Inner Cone in 3/4 Pcs



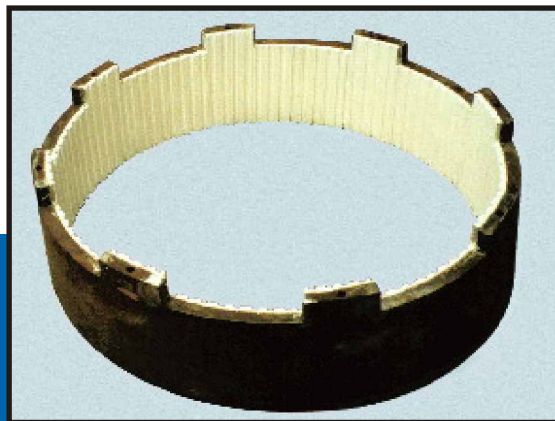
Transition Piece



Ventury Outlet



Center Feed Pipe Cone



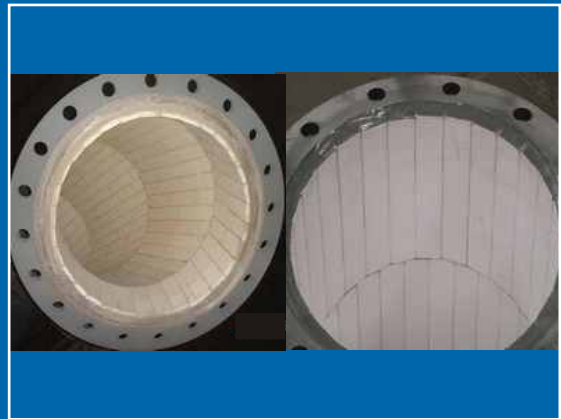
Coal Mill Body Lining



# Ceramic Lined Coal Pipe Line Components



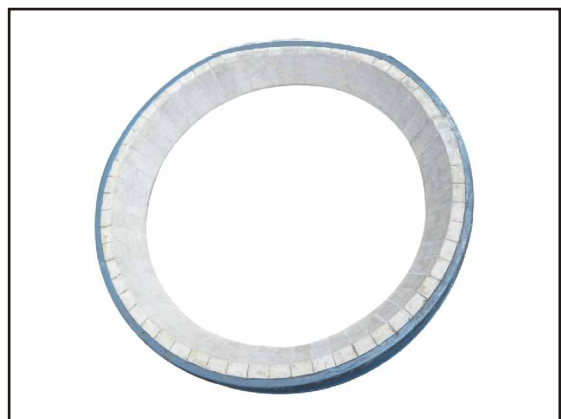
Pulverized Fuel Pipe Bends



Mill Outlet and Fuel Inlet Elbows



PF Bends & Elbows



Fixed Orifice



Variable Orifice with two handle Operation



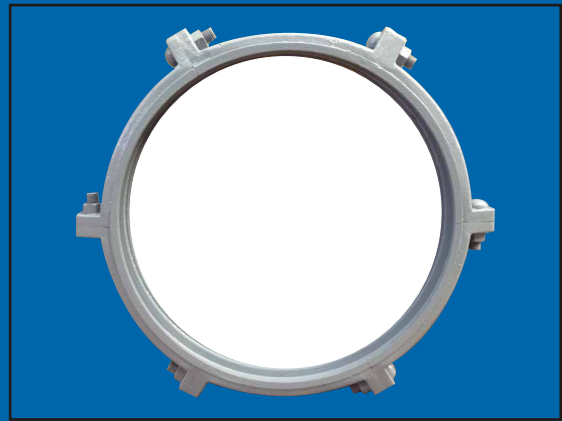
Variable Orifice with one handle Operation



# Ceramic Lined Coal and Ash Pipe Line Components



Alumina Ceramic Lined Straight Pipe



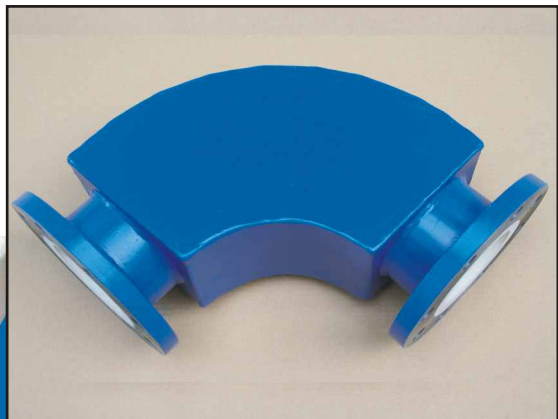
Victaulic type Grooved Coupling



Alumina Ceramic Lined Expansion Bellow



Three way Bend for Ash Line

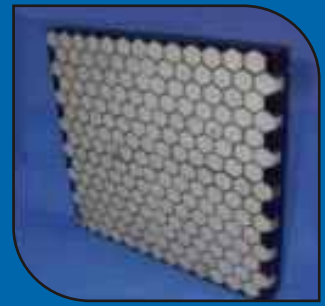
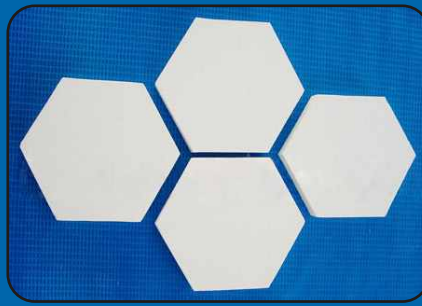


Extra Thick Alumina Ceramic Lined Bend



Small ID Bends

# Cylindrical, Hexagonal & Square Tiles



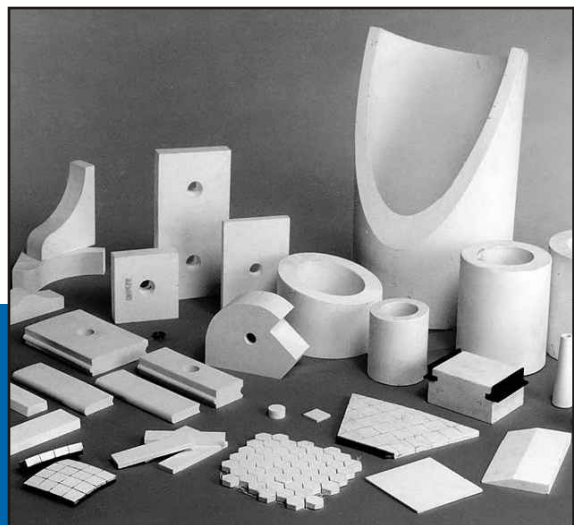
**H**exagonal and small square tiles ranging from 10 sq. mm to 20 Sq. mm in thickness ranging from 5 mm to 15 mm are manufactured for small curves and fast in-Situ application. In case of high impact conditions Hexagonal Tiles with Rubber Armour is provided.



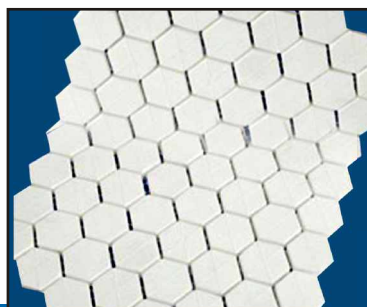
Square Liners



Trapezoid Liners and Balls



Different Shape and Sizes of Alumina Liner



Hexagonal Liners

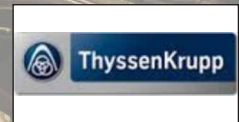


Wedge Type Liners  
Pioneers of War Against Wear





## Few of Our Prestigious Clients



### Head Office

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[sales@bmwsteels.com](mailto:sales@bmwsteels.com)

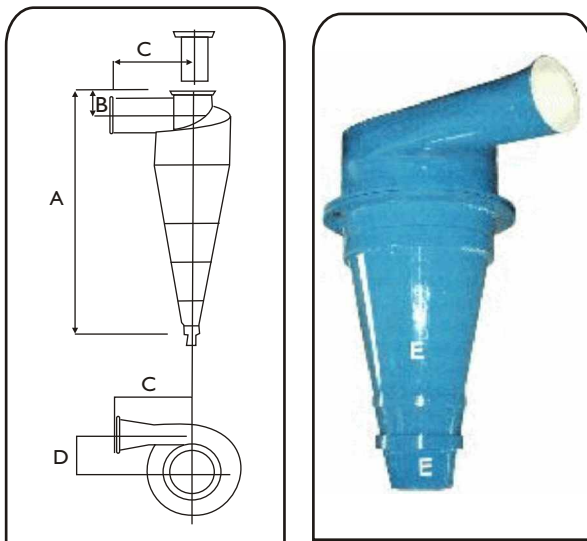
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Alumina Ceramic Lined Hydro-Cyclones

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