



# IFGL REFRACTORIES LTD

## TUNDISH METERING NOZZLES



ISO 9001 : 2000 / FM 71747

***DEDICATED TO CLEAN STEEL***

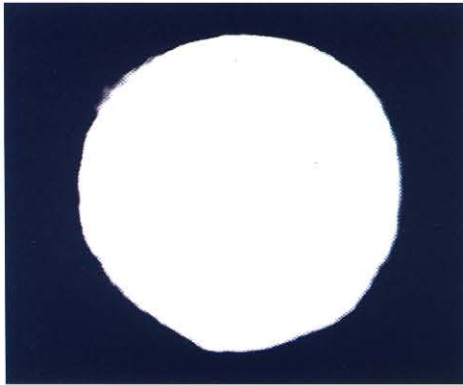
## Tundish Metering Nozzles

IFGL Refractories Limited offers a comprehensive range of Zirconia & Zircon based Tundish Metering Nozzles which are characterized by :

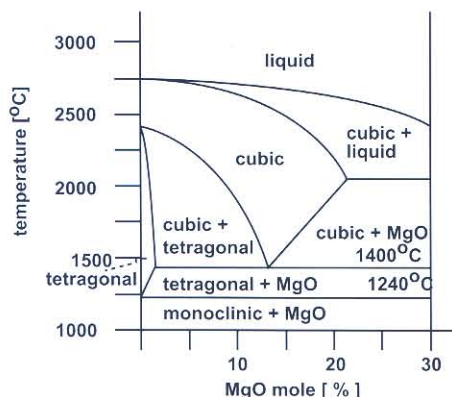
- High erosion and corrosion resistance
- High thermal shock resistance
- High refractoriness and density
- Exact flow area dimensions

## Zirconia based Tundish Metering Nozzle

Zirconia is a white crystalline oxide of zirconium. Its most naturally occurring form, with crystalline structure, is the rare mineral, baddeleyite. It has several useful properties like high strength, high fracture toughness, excellent wear resistance, high hardness, toughness and refractoriness.

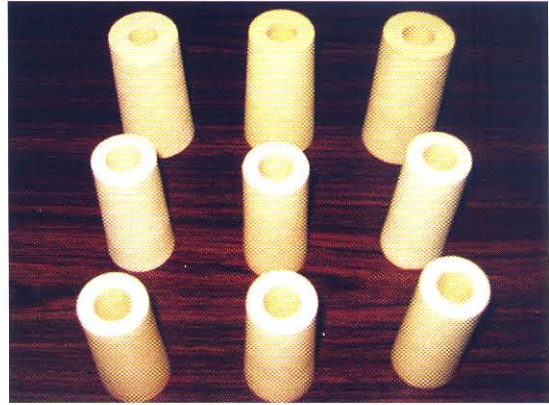


Pure Zirconia has a monoclinic crystal structure at room temperature and at high temperatures it tends to crack on account of volume expansion accompanied due to changes in its crystal structure from monoclinic to tetragonal. The phase equilibrium of zirconia with other oxide systems is fundamental to the application of zirconia as an advanced refractory ceramic. The greatest interest is the oxide MgO with similar atomic radius, which dissolves to a significant extent in zirconia and tends to stabilize, full or partially, the cubic fluorite phase. The ZrO<sub>2</sub>-MgO phase diagram is shown here for complete understanding.



Magnesium Oxide is therefore used to stabilize the zirconia making it suitable for use as **inserts**.

## Insert



The improvements made in the continuous casting of steel and the long casting time has resulted in the demand of use of zirconia based inserts in the metering nozzles. The requirement of constant rate of casting for such long sequence of 24 hours or more implies that the bore dia. erosion of the nozzle should be at the minimal level.

We optimize the structure of the material by using special methods for stabilization and produce a high density insert after firing. In addition, manufacturing of thin-walled nozzle inserts also ensures economic use of Zirconia which is an expensive raw material.

## Our Brand for Zirconia Insert

### ZRTN 95

This is a zirconia insert with coarse grain microstructure which is designed to provide typically 10 to 12 hrs. of casting time. It provides good thermal shock resistance and exhibits good resistance to erosion.

### ZRTN 95 A

This is a fine grained low porosity zirconia insert which is designed to provide typically more than 24hrs. of casting time. It provides uniform flow during casting and exhibits excellent resistance to erosion.



The same quality inserts are used for manufacturing Tundish Slide Plates of various design.

## Composite Nozzle

IFGL Refractories Ltd. offers composite nozzles comprising of thin-walled zirconia inserts encased with hydraulically bonded high alumina material. The metering nozzle body is cast using an appropriately shaped mandrel. The casting technique enables to maintain a very good control on the dimensional tolerances of the composite body.

**We offer the following combination in Composite Nozzle :**

**ZRTN - 95 / MONOCAST SF B 1800 and**

**ZRTN - 95 A / MONOCAST SF B 1800**

The casting technique ensures that the insert is tightly fitted in the composite nozzle and this process helps to reduce crack formation and prevents cracks from opening up should they happen to take place.



High Capacity DIP press is used for manufacturing the Zirconia inserts which ensures production of inserts with precise dimensional tolerance.

## Zircon based Tundish Nozzle

Pure Zircon sand is a colorless and transparent crystal, but usually stained with impurities into yellow, orange or brown color.



Characterised by high degree of hardness (Mohrs scale 6~7), good resistance to erosion and excellent resistance to thermal shock, this is an ideal material for use in Tundish Nozzles for short and medium sequence casting of steel.



### Brands

- ZRTN 60
- ZRTN 66
- ZRTN 70
- ZRTN 75

Branded in accordance to the percentage of Zircon content, the above materials can be used starting from short sequence to medium sequence casting of steel.

**The nozzles are manufactured in the following design:**

- Cone Type (Swirling & Non-Swirling Variety)
- Cup Type (Swirling & Non-Swirling Variety)

## TYPICAL PROPERTIES

Properties	ZRTN 95		ZRTN 95 A		MONOCAST SF B 1800	
	Typical Data	Specification	Typical Data	Specification	Typical Data	Specification
<b>CHEMICAL ANALYSIS</b>						
% Zirconia ( ZrO <sub>2</sub> )	95	93 min.	96.3	95 min.		
% Magnesia ( MgO )	2.2	2.60 max.	2.3	2.60 max.		
% Silica ( SiO <sub>2</sub> )	0.9	1.0 max.	0.8	1.0 max.		1.10 ~ 1.50
% Alumina ( Al <sub>2</sub> O <sub>3</sub> )					92.6	91 ~ 95
% Iron Oxide ( Fe <sub>2</sub> O <sub>3</sub> )					0.6	0.6 ~ 1.0
% Calcium Oxide ( CaO )						1.5 ~ 2.0
<b>PHYSICAL PROPERTIES</b>						
Bulk Density ( gm./cc )	4.85	4.80 min.	5	4.90 - 5.10	2.95	2.90 ~ 3.0
% Porosity	16	18.0 max.	6	4 - 9	16.5	14 ~ 18
CCS at 110 Deg C/24 Hrs. (Kg/sq.cm)					500	450 ~ 550
% PLC at 1550 Deg C / 2 hrs.					- 0.52	0.40 ~ 0.80

\* Based on average result of quality control tests as per internal documented procedures.

Properties	ZRTN 60		ZRTN 66		ZRTN 70		ZRTN 75	
	Typical Data	Specification	Typical Data	Specification	Typical Data	Specification	Typical Data	Specification
<b>CHEMICAL ANALYSIS</b>								
% Zirconia ( ZrO <sub>2</sub> )	61	59 min.	66	65 min.	70.5	69 min.	75	74 min.
<b>PHYSICAL PROPERTIES</b>								
Bulk Density ( gm./cc )	3.63	3.60 min.	3.68	3.65 min.	3.73	3.7	3.78	3.75
% Porosity	18	20.0 max.	18	20 max.	18	20 max.	18	20 max.

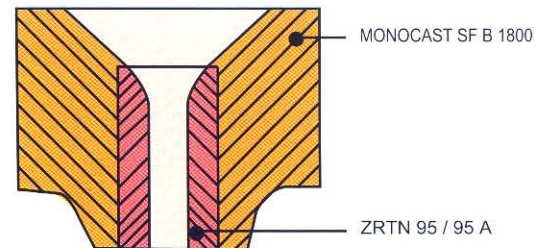
\* Based on average result of quality control tests as per internal documented procedures.

IFGL Refractories Ltd. operates a Quality Management System which complies with the requirements of **BS EN ISO 9001 - 2000**

Statistical process control is the key to meeting the high quality standards which we have set for manufacturing our Zircon & Zirconia nozzles. The process is controlled so that a high level of consistency is achieved and ensures delivery of a product which performs in accordance to the customer's expectations.

### Complete Engineering , Training and Technical Support :

- Our service engineers work with the plant operators to monitor product performance
- Product re-engineering is done in accordance to the needs of the specific plant operation.
- Our team of specialists are always available to provide all necessary assistance to our customers.



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