



ZAGROS Special Refractories Co.

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*"Continuity and Innovation
are two pillars of our success."*

Zagros Special Refractories Co.

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Today Zagros Special Refractories Company has a unique standing in the market. Our company is recognized in many renowned steel works around the world as a reliable partner for an especially wide range of products and solutions and for our expertise in consultancy and logistical services.

Reflecting on Our company's development over the past two decades, two nouns spring to mind which for me best describe the evolution and success of Zagros Special Refractories Company. **Continuity and Innovation.**

The word continuity describes an important trait of our company. It stands for our reliability, our long-standing relationships, our Steady growth over the past years, and the growing number of international clients. Our continuous commitment to our partners is one of the pillars of our success.

Innovation is our daily business. By this, I refer not only to our refractory products and solutions but to the whole package of our concepts — right down to pricing and last but not least logistics. These areas never become routine and are constantly reviewed to ensure we can claim the competitive edge with our products, services and prices.

We have a very strong team of employees who are very focused on helping us achieve our goals. Whether in Sales, Engineering, R&D or Logistics, everyone at this company contributes to moving our concept of complete refractory solutions forward, to ensure the highest level of customer satisfaction.

The Zagros Special Refractories Company provides an overview of the areas we deal in and informs on a selection of the comprehensive product portfolio we offer. The range of products and services.

This company offers is however growing consistently and permanently subject to optimization, and with this in mind, we welcome enquiries from our customers and interested business partners regarding any areas where Zagros Special Refractories Company can be of assistance.



Introduction of Zagros Special Refractories company

With respect to the growth and prosperity of the primary industry in recent years, especially the steel industry, the refractory industry has taken a special development position. Fortunately, relatively good and acceptable progress in refractory production in terms of quantity and quality has been made in the last decade and is continuing.

Zagros Special Refractories Company was founded in 2018 in Sefiddasht Industrial Zone due to relatively rapid changes in production technology and consumption of refractory products and the steel industry's growing need for refractory products, particularly special refractory parts.

As the first manufacturer of special refractory parts for continuous casting plants in the Middle East, this company started its activities with the aim of localization and satisfying the needs of the Iranian industry. The Zagros company has a nominal capacity of 1000 ton per year based on the current conditions and needs of the consumer industry, using the latest equipment and technology and relying on experienced experts.

Our product portfolio includes most of the special refractory parts used in the steel industry, such as many kinds of ladle shrouds, tundish nozzles, mono block stoppers, and tube changer nozzles. Therefore, Zagros company provides the needs of large steel factories in Iran such as Mobarakeh Steel Company, Isfahan Steel Company, Khuzestan Steel Company, and Iran alloy and etc Company.

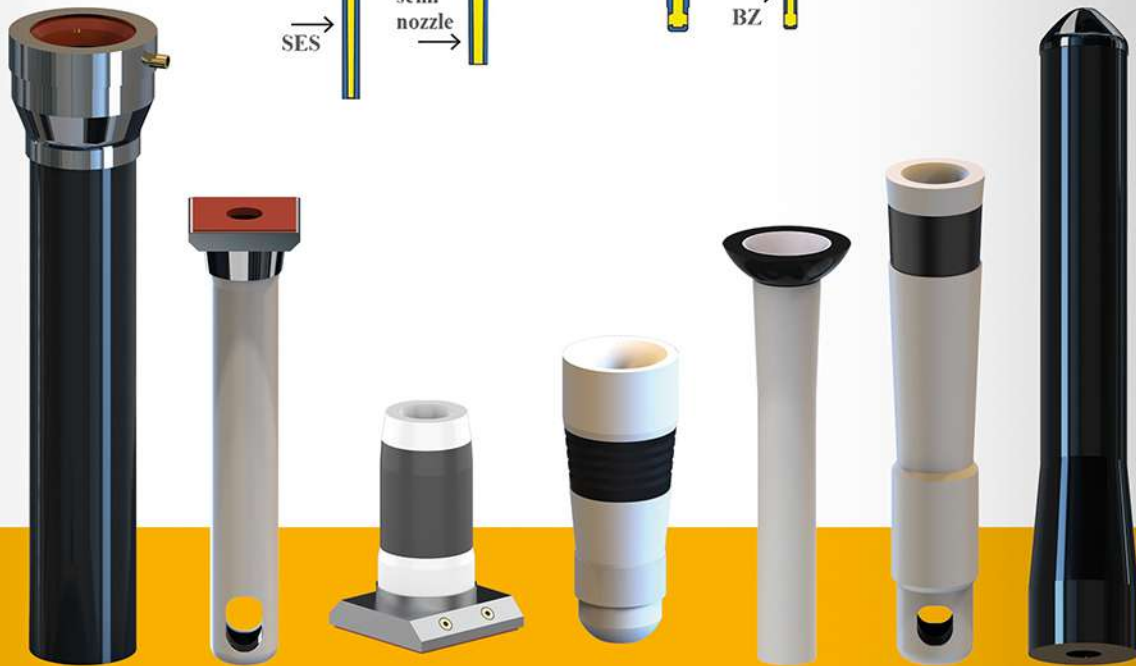
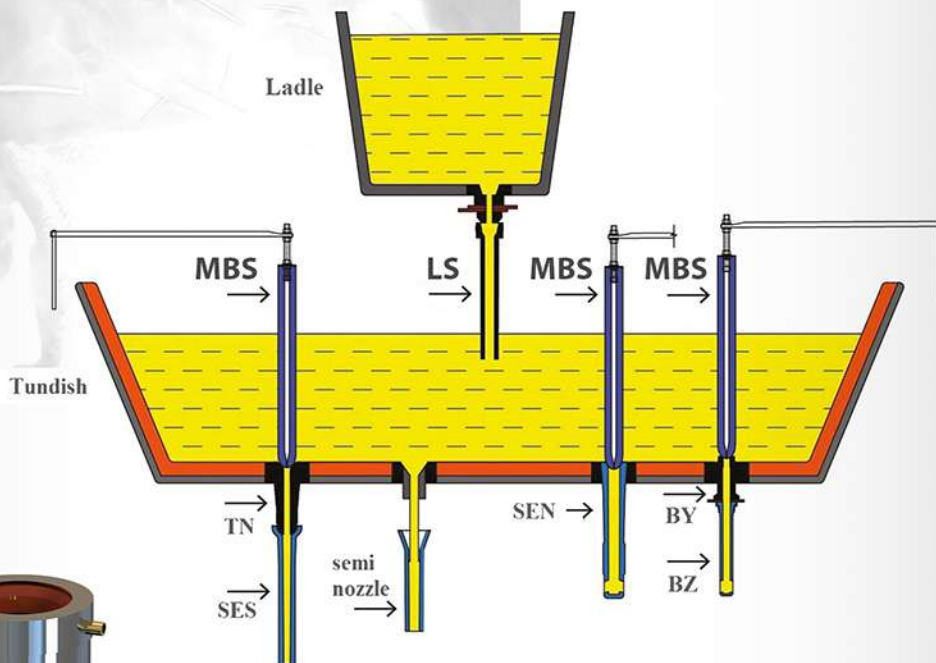
The Zagros Special Refractories Company plant was built on a 24,000 square meter plot in the Sefiddasht Industrial Zone in Chaharmahal and Bakhtiari Province. Around 200 experienced and specialized employees are currently working in this plant at different working levels.



Special Refractories in steel continuous casting:

Products

- 1) Ladle Shroud (LS)
- 2) Mono Block Stopper (MBS)
- 3) Nozzles:
 - Tundish Nozzle (TN)
 - Submerged Entry Shroud (SES)
 - Submerged Entry Nozzle (SEN)
 - Tube Changer Design BY & BZ (TCD)



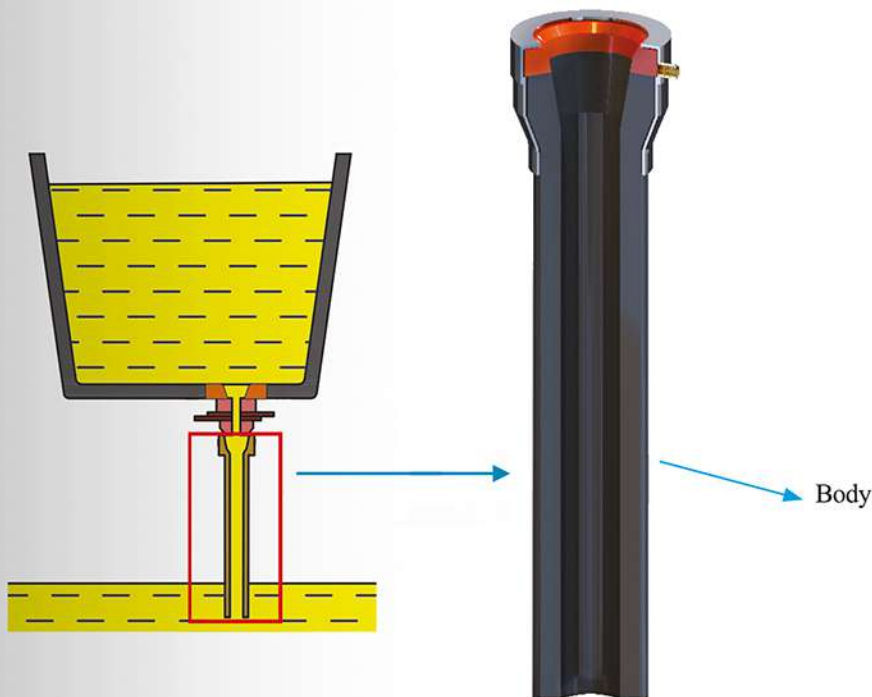
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Ladle Shroud (LS) :

Major applications:

- Transfer the molten steel from the Ladle to the tundish
- Prevent oxidation of steel during casting
- Prevent splashing of molten steel

These parts are made by isostatic pressing and are generally composed of alumina-carbon and zirconia-carbon compounds. The desired composition is designed and selected depending on the type of casting machine, the steel grade and the type of steel product. Therefore, all customer requests in all types of models, sizes and shapes are produced in this factory.



Physical & Chemical Analysis of LS

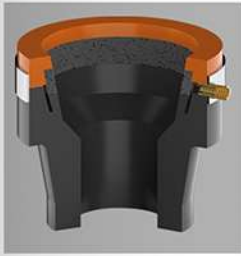
	Type	Al ₂ O ₃ %	ZrO ₂ %	SiO ₂ %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	424	81-85	-	6-8	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
	07A	-	70-80	-	-	-	3.1-3.45	18-23.5	13-15	3-5

Specifications of different types of Ladle shrouds:

A) Based on the argon gas injection system

1. Without argon gas injection system
2. With an argon gas injection system

The design of the argon gas injection system can be a circular groove or a porous ring inside the cup or metallic can with argon injection from the top of the cup.



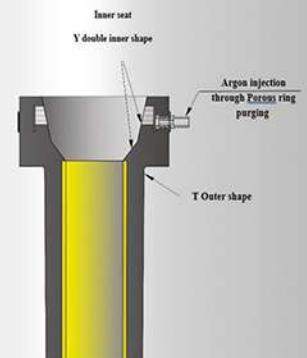
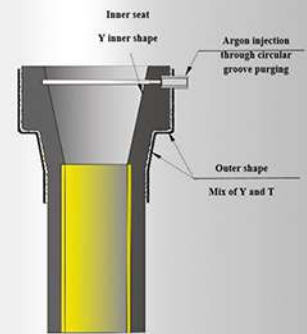
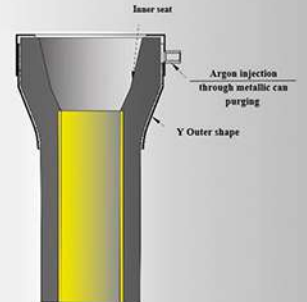
Porous ring purging



Metallic can purging



Circular groove purging



B) Based on interior and exterior design

1. T-shaped type in the design of the inside and outside of the cup.
2. Y-shaped type in the design of the inside and outside of the cup, resulting in strengthening the neck and reducing air suction.
3. Bell type: reducing the flow pressure of the molten steel in the tundish bottom and preventing the back pressure of the melt into the ladle mechanism.
4. Reverse model: reducing the flow pressure of molten steel in the bottom of the tundish and preventing the Due to the important role of connecting the Ladle Shroud cup with the ladle collector in the melt oxidation, in addition to the proper design of the cup and argon injection, the gasket is used as a supplement in the connection. Furthermore, zirconia-carbon is used in the structure of the contact area of Ladle Shroud with the tundish slag line to reduce corrosion and increase the life of the part for longer sequence casting.



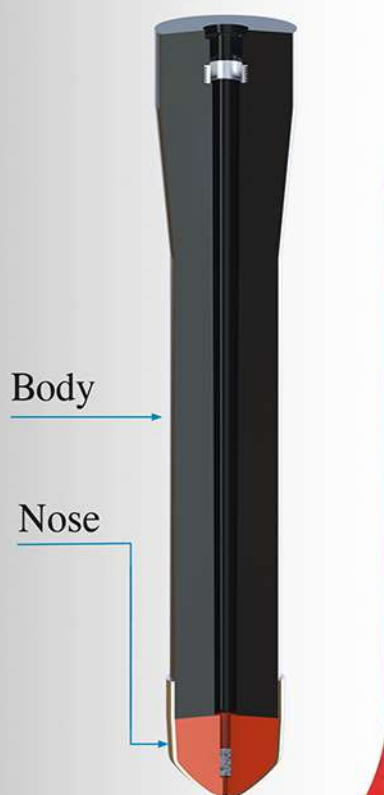
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Mono Block Stopper (MBS)

Mono Block Stoppers are used to control the flow of steel through the sub-entry nozzle or the tundish nozzle to mold. The body material of the stopper is made of alumina-carbon composite, while in the nose they are made of various compounds of alumina-carbon or magnesia-carbon under special conditions of the molten steel (high calcium content). The design and selection of the desired composition depends on the type of casting machine, the steel grade and the type of steel product. All customer requirements in all kinds of models, sizes and shapes are considered in the production of parts.

Physical & Chemical Analysis of MBS

	Type	Al ₂ O ₃ %	SiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	501	88-92	8-10	1-2	2.4-2.6	13-16	27.9 - 30.9	10-13
Nose	882	90-98	0-0.5	-	2.7-3	13-16	12.2 - 13.5	12-15
	06	93-97	3-5	-	2.25-2.45	18-22	17.72-19.58	5-8



..... Specifications of Mono Block Stopper designs:

With respect to the argon gas injection system

1. Without argon gas injection system
 2. With an argon gas injection system
- Design of stoppers with argon gas injection system is divided into two categories, porous and direct



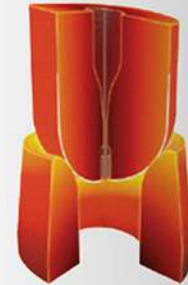
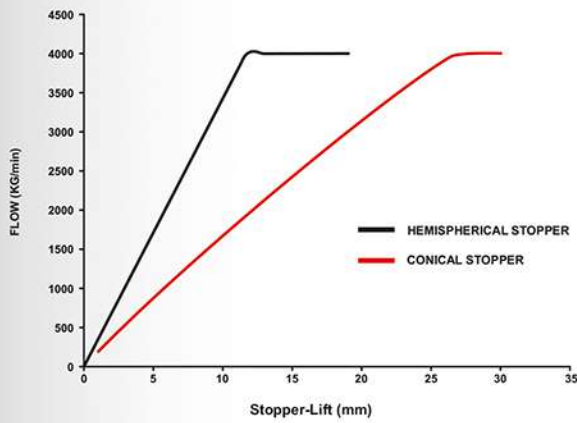
B) Porous system



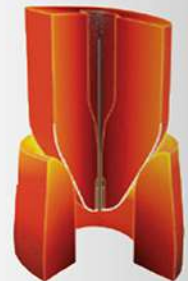
A) Direct argon injection

Based on the steel grade and nose shape design

stoppers with a nose made of Magnesia-carbon can be used for high calcium steels, and compounds with high corrosion resistance such as alumina-carbon are used for MS and SS steel grades. design of the nose shape affects the amount of molten steel output.



HEMISPHERICAL STOPPER



CONICAL STOPPER



3

Casting Nozzle:

Types of Nozzles

1- Tundish Nozzle (TN)

This type of nozzle is installed permanently inside the tundish and plays the role of the interface between the mono block stopper and the outer nozzle. With the help of a stopper, it can control and protect the molten steel flow before the molten steel leaves the tundish. Zagros special refractories company manufactures and supplies this type of nozzles according to customer requirements.

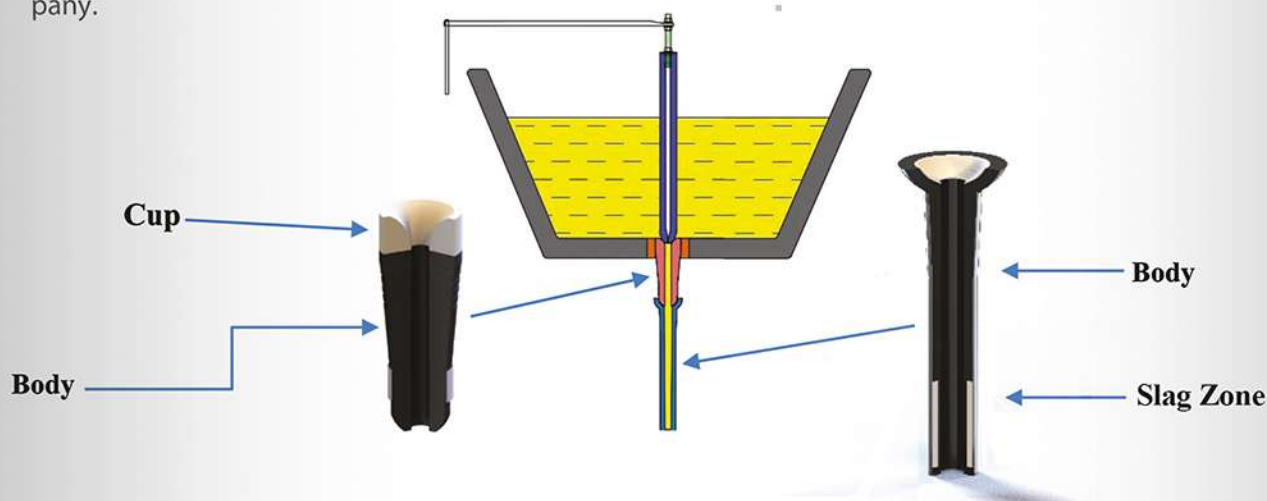
2- Submerged Entry Shroud (SES)

These nozzles that have the role of transporting molten steel from the tundish into the mold and are used in machines that produce blooms and billets. Depending on the type of casting machine, steel grade, and product type, these nozzles are designed and manufactured in this company.

The main tasks:

- Transfer molten steel from Tundish to mold nozzle (inner nozzle)
- Protection of the molten steel against oxidation and temperature drop
- Pouring molten steel into the mold (submerged entry nozzle and submerged entry shroud)

In the manufacture of these parts, alumina-carbon, zirconia-carbon, and magnesia-carbon compounds are used in different areas of the nozzles to prolong casting sequences that meet different customer needs such as clogging reduction, corrosion resistance, long life and accidents reduction.



Physical & Chemical Analysis of SES

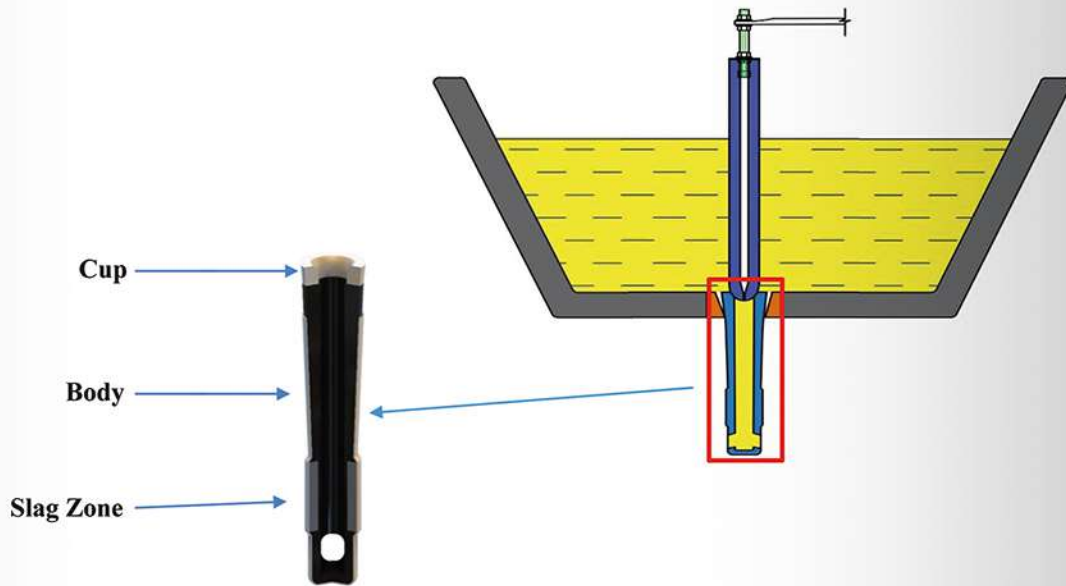
	Type	Al ₂ O ₃ %	ZrO ₂ %	SiO ₂ %	CaO %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	424	81-85	-	6-8	-	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
Slag Zone	114Z	-	95-98	0-0.5	2-5	-	-	3.5-3.8	17-21	12.3 - 13.9	6-9

Physical & Chemical Analysis of TN

	Type	Al ₂ O ₃ %	MgO %	SiO ₂ %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	424	81-85	-	6-8	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
Cup	06	-	93-97	3-5	-	-	2.2-2.4	18-22	17.7 - 19.6	5-8

3- Submerged Entry Nozzle (SEN)

Sub entry nozzles transport and distribute molten steel flow from the tundish to the mold. They are used in casting machines for the production of slabs. In order to precisely control the flow of molten steel from the tundish to the mold, the design of the stopper nose and the upper part of the nozzle is engineered in this company.



Physical & Chemical Analysis of SEN												
	Type	Al ₂ O ₃ %	MgO %	ZrO ₂ %	SiO ₂ %	CaO %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Cup	06	-	93-97	-	3-5	-	-	-	2.2-2.4	18-22	17.7-19.6	5-8
Body	424	81-85	-	-	6-8	-	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
Slag Zone	114Z	-	-	95-98	0-0.5	2-5	-	-	3.5-3.8	17-21	12.3-13.9	6-9

4- Tube changer Design (TCD)

In order to prolong the casting time and increase the amount of steel production in a sequence, the tube changer mechanism is used.

TCD (BY)

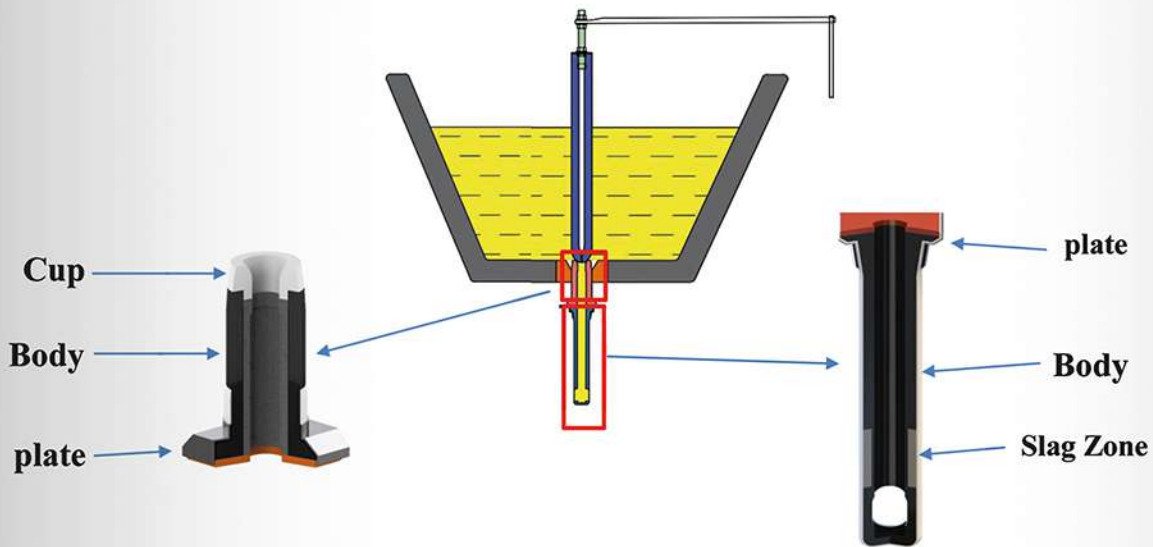
The BY tundish nozzle is used as an interface between the stopper and the outer nozzle in the tundish with a tube changer mechanism. It is fixed in the mechanism and allows the mold nozzle to be replaced during casting process. This type of nozzles use the ability to inject argon gas to prevent nozzle clogging and air suction.

TCD (BZ)

In tundishes where the tube changer design is installed, the **BZ mold nozzle** is used with the possibility of changing during casting in the mechanism.

Advantages

- Replacement of BZ mold nozzle during sequence without stop casting.
- Reducing alumina clogging by injecting the argon gas in BY inner nozzle
- Possibility to stop the casting process line at the time of the accident using a fire plate.(Easy Emergency Stop)
- Preventing O₂/N₂ pick up by injecting the argon gas by BY



Physical &Chemical Analysis of BY									
	Type	Al ₂ O ₃ %	SiO ₂ %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	424	81-85	6-8	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
Cup	882	90-98	0-0.5	-	-	2.7-3	13-16	12.2-13.5	12-15
Plate	113	85-97	0.9-1.4	-	0-0.6	2.7-3	12-19	9-11	9-14

Physical &Chemical Analysis of BZ											
	Type	Al ₂ O ₃ %	SiO ₂ %	ZrO ₂ %	CaO %	TiO ₂ %	B ₂ O ₃ %	BD g/cm ³	AP %	L.O.I %	CMOR MPa
Body	424	81-85	6-8	-	-	1-2	2-3	2.3-2.5	11-17	26.8-29.6	7-11
Slag Zone	114 Z	-	0-0.5	95-98	2-5	-	-	3.5-3.8	17-21	12.3-13.9	6-9
Plate	113	85-97	-	-	-	-	-	2.7-3	12-19	9-11	9-14





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