



Dyson Technical Ceramics manufactures a comprehensive range of zirconia metering nozzles used for the continuous casting of steel. Nozzles can be supplied as a solid one piece or within a co-moulded high alumina body. Solid metering nozzles were historically supplied but in recent years many customers have shown preference towards a composite nozzle for reasons of economy. The composite nozzle method of manufacture pioneered by Dyson allows a nozzle to be manufactured without the use of cement jointing, using an insert and pressed outer body. This method of manufacture provides a reliable system with no risk of steel leakage between the insert and outer body.

Zirconia nozzles are manufactured from a variety of raw materials depending upon the manufacturing route and service application.

Dyson Zirconia ZPN™ Metering Nozzles

The Zirconia ZPN™ series of products are acknowledged to be at the forefront of zirconia ceramics technology currently used in the continuous casting of steel. Many of our customers have achieved extended casting sequences when using ZPN™ metering nozzles and numerous casting records have been achieved.

The ultra-high densities associated with the ZPN™ family of products impart excellent

erosion resistance even in the most severe casting environments. Consistent casting speeds are achieved and the products have a high resistance to oxygen lancing.

Exchangeable Metering Nozzles

Dyson Technical Ceramics are closely involved with the development of nozzle changer systems in conjunction with both system manufacturers and steel plants.

Key features of nozzle changer systems include:

- Improved casting operator safety
- Enables longer casting sequences
- Improved metallurgical quality
- Flexibility - Ability to change the nozzle diameter to suit desired casting speed

Stationary (Upper/Inner) Nozzle

The stationary nozzle is located within the tundish lining and conveys steel to the controlling exchangeable nozzle, which determines the steel flow. The stationary nozzle must be capable of withstanding long sequence times.

Dyson Technical Ceramics recommends the use of a stationary nozzle that incorporates a ultra-high density ZPN™ insert. The ZPN™ insert provides excellent erosion resistance and can provide extended casting sequence times.

Zirconia ZPN Range - Key Features:

- Extended casting sequences
- Controlled and consistent casting speeds
- High resistance to oxygen lancing
- More consistent re-stranding

Zirconia ZPN Product Range:

Zirconia ZPN LS

Magnesia stabilised, ultra-high density zirconia insert. ZPN LS is of high chemical purity and is generally recommended for application with aggressive high manganese steel grades.

Zirconia ZPN

Magnesia stabilised, high density zirconia insert. ZPN has excellent erosion resistance and has achieved many casting records within our extensive customer base.

Zirconia ZPN E

Magnesia stabilised, high density zirconia insert.

Zirconia ZPN D

Magnesia stabilised, high density zirconia insert. ZPN D can accommodate high thermal stress and is generally recommended for cold start practises where minimal or no preheating is available.

Dyson currently supplies nozzles suitable for several nozzle changer systems including:

- Concast - CNM
- Danieli - FNC
- Interstop - MNC
- Krosaki - OTNC
- Vesuvius - CNC/SYS120



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ready for immediate use. The nozzle, which is of a composite design is encased within a thin metal can. This type of nozzle is supplied to exacting tolerances to ensure compatibility with the stationary nozzle and "runner" holding mechanism. The exchangeable nozzle can be supplied in a range of bore sizes to allow total flexibility within the casting process.

Dyson Technical Ceramics manufactures an ultra-high density insert from the ZPZ™ range within a cast fine grained alumina or pressed outer.

The technology used in Dyson manufacture provides a void free castable finish and is universally recognised as a premium grade nozzle.



The nozzle can be supplied with the following outer configuration:

- Chemically bonded bauxite, alumina or alumina chrome outer (co-mould)
- High alumina, fine grained castable
- Magnesia stabilised zirconia or zircon

The lower surface of the stationary nozzle is ground to exacting tolerances to ensure maximum surface contact between the two nozzle components.

Exchangeable (Lower/Outer) Nozzle

The exchangeable nozzle is located within an assembly that is fixed to the bottom of the tundish. The nozzle is actuated by a hydraulic

cylinder. This action can be completed with no disturbance or deviation to the steel stream. A refractory or metal blank can also be used in systems for emergency shut off.

The design of the exchangeable nozzle can vary according to the system manufacturer. Dyson Technical Ceramics manufactures a range of zirconia inserts and composite nozzle designs for the exchangeable metering of steel. Zirconia inserts can be supplied for on-site assembly into metallic holding blocks where cementing, grinding, size banding and on site drying are required prior to use.

Dyson Technical Ceramics manufactures and supplies disposable lower nozzles which are

Zirconia Metering Nozzles - Product Data

	Zirconia Inserts							Tundish Nozzle Outers			
	ZPZ™ Family of Products				Non ZPZ™			Pressed			Cast
	ZPZ LS	ZPZ	ZPZ E	ZPZ D	MX	SUPER M	P	PH850	PH850C4	Zircon F	1800 F
General Properties											
Apparent Porosity (%)	3.5	6.5	8.5	11.5	15.5	18.5	16.0	18.5	16.5	18.5	23.2
Bulk Density (g/ml) (lb/ft ³)	5.50 343	5.3 331	5.2 325	5.02 313	4.73 295	4.60 287	4.73 295	2.87 179	2.88 179	3.70 231	2.86 179
Linear Change (%) 2h at 1600°C (2912°F)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1.0	1.0	-0.2	0.5
Chemical Analysis (%)											
SiO ₂	0.2	0.5	0.3	1.1	1.6	1.7	1.2	10.0	7.3	33.0	0.1
TiO ₂	0.2	0.1	0.2	0.2	0.2	0.3	0.2	3.0	2.1	0.5	0.1
Fe ₂ O ₃	0.05	0.05	0.02	0.5	0.1	0.1	0.1	1.4	1.4	0.2	0.1
Al ₂ O ₃	0.05	0.1	0.4	0.4	0.9	0.6	0.9	83.0	82.0	1.4	96.2
Cr ₂ O ₃	-	-	-	-	-	-	-	-	4.4	-	-
CaO	0.05	0.05	0.1	0.1	0.2	0.1	1.9	0.2	0.1	0.1	3.0
MgO	2.4	2.4	2.4	2.4	2.5	4.8	0.1	0.2	0.1	0.2	0.1
K ₂ O	-	-	-	-	0.05	0.05	0.05	0.2	0.2	0.05	-
Na ₂ O	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.1	0.1	0.05	0.4
P ₂ O ₅	-	-	-	-	-	-	-	1.9	2.5	-	-
ZrO ₂ + HfO ₂	97.0	96.3	96.6	94.5	94.2	92.5	95.5	-	-	64.5	-



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