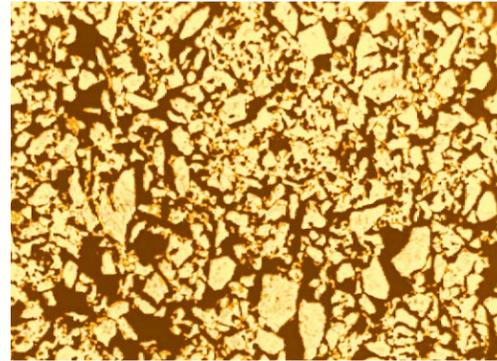
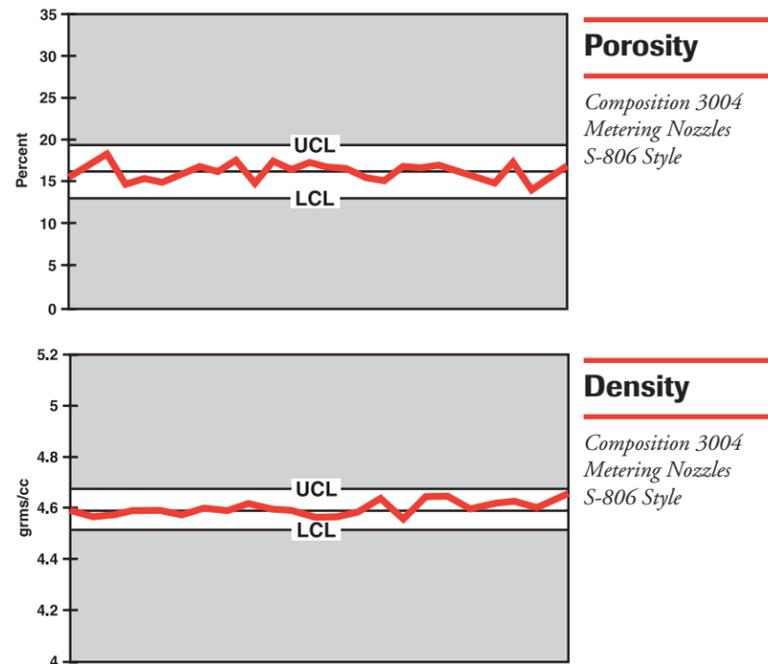


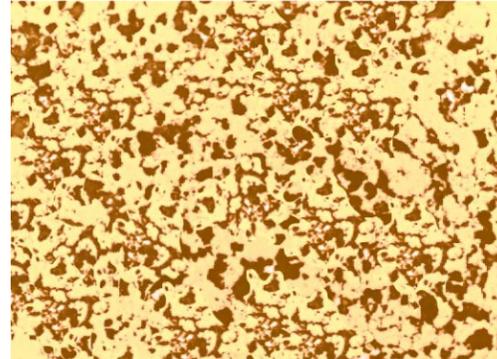
POROSITY		
3004 16 - 18%	Zbor 10 - 12%	DenZbor 5%
EXPECTED LIFE		
3004 8 - 12 Hours	Zbor 14 - 20 Hours	DenZbor 24+ Hours

Consistency

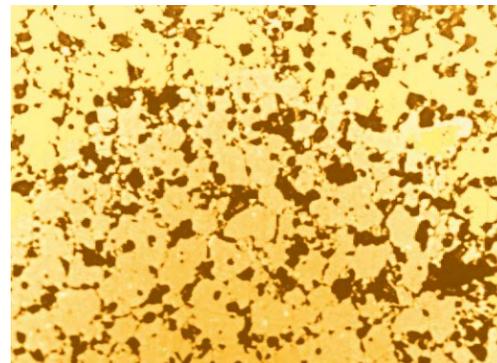
Statistical process control is the key to meeting the high quality standards we set for our metering nozzles. Our manufacturing philosophy at Zircoa is to control the process so that the product has a high level of consistency *before* it reaches final inspection. Our goal at Zircoa is to continuously improve performance in your tundish to save you \$/Ton.



Composition 3004 (15x)



Zbor (15x)



DenZbor (15x)



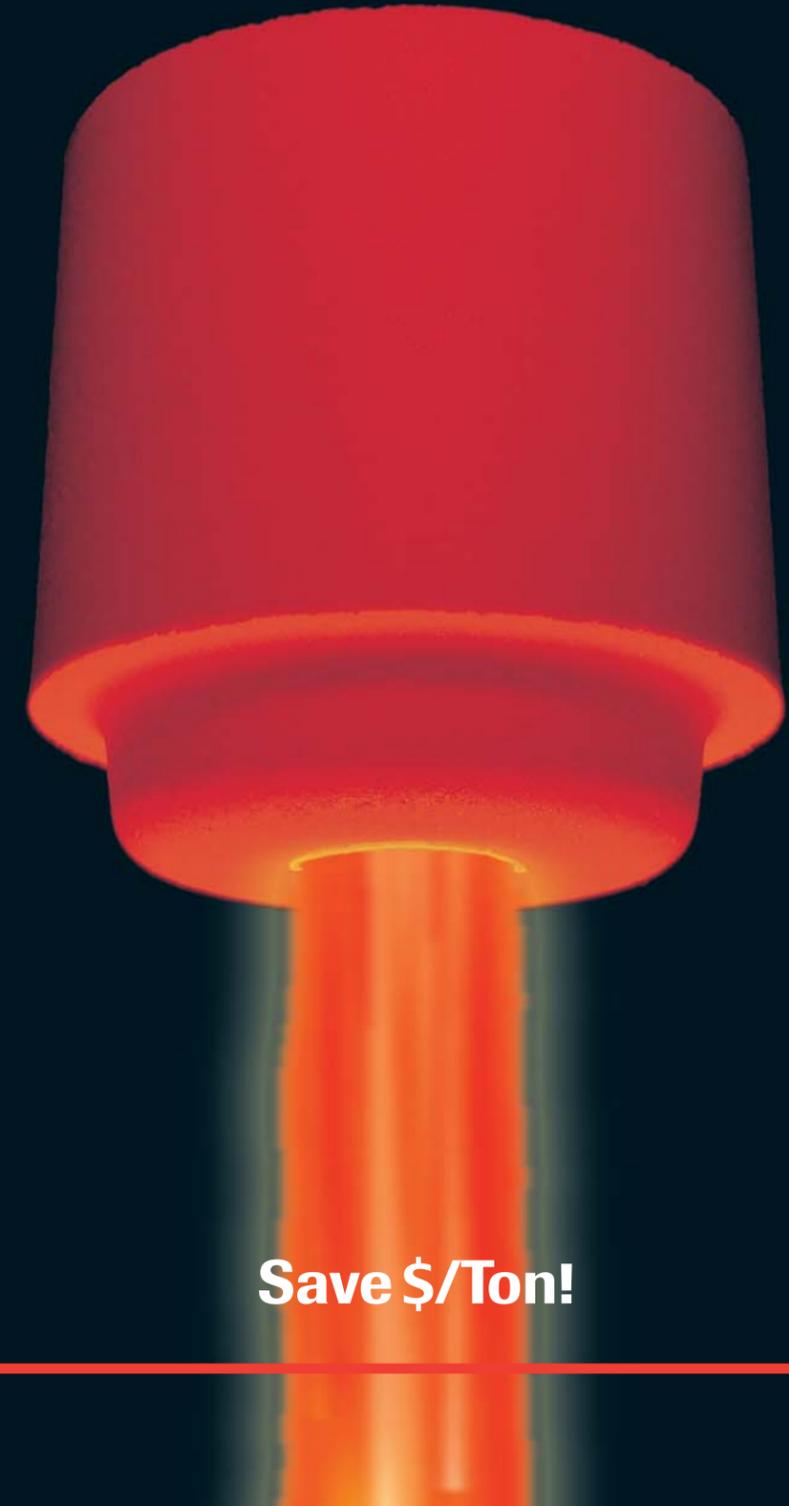
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Tundish Metering Nozzles



Save \$/Ton!

One heat or thirty, non-aggressive or low carbon, conventional or quick-change, multiple or single bore ... Zircoa has the metering nozzle to fit your practice and save you \$/Ton. We are the tundish metering nozzle experts! Zircoa matches its technical and development resources to meet the caster's constantly changing needs. No matter what your challenge, Zircoa has the material ... formulation ... innovative design ... and manufacturing technique to meet it.

Selection

Zircoa's 30 years of manufacturing experience provides tooling for a wide range of tundish metering nozzle shapes and bore sizes. Single and multiple bore styles are available as monolithic formulations or as fine grain insert assemblies. Our metering nozzle compositions are engineered to fit today's casting practice in your plant. The bottom line is metering nozzles that fit your operation and save you \$/Ton.

3004 — Non-aggressive Steels, Average Casting Times

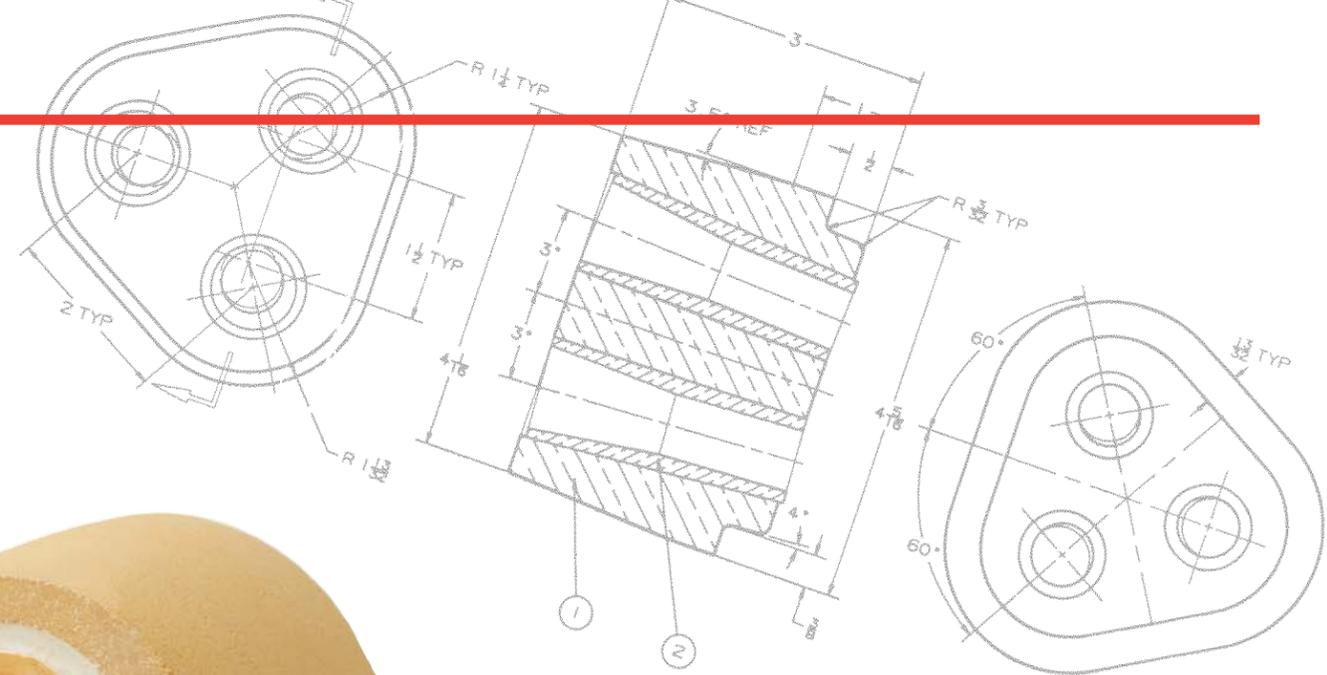
Composition 3004 is a coarse grain metering nozzle mix developed to optimize thermal shock resistance while providing good erosion resistance. 3004 typically provides 8 -12 hours of casting time.

Zbor™ — Low Carbon Steels, Moderate Casting Times

Developed to satisfy mills where 24 hour sequence casting is not practical, but 14 - 20 hour times are desirable. Zbor is an intermediate product with performance superior in erosion resistance to 3004 even when casting low carbon steels.

DenZbor™ — Low Carbon Steels, Extended Casting Times

This 2-part design features a fine grain, low porosity inner metering nozzle within a coarse grain support block. This combination optimizes erosion resistance and maximizes casting times. Extremely uniform stream flow, with little flaring, and casting times exceeding 24 hours are characteristic of DenZbor metering nozzles.



The Same, Yet Different

Magnesia stabilized zirconia is the key to today's high performance tundish metering nozzles. The material's well known resistance to erosion and thermal shock has been optimized by Zircoa's technicians utilizing specific forms of zirconia and process treatments during manufacturing. Zircoa's ability to manufacture zirconium oxide materials internally provides the capability to engineer metering nozzle formulations not available from any other manufacturer in the world. When you choose tundish metering nozzles from Zircoa, you get product engineered to satisfy your requirements and save you \$/Ton.

The micrographs and charts on the next page detail the zirconia formulations and their effect on expected life.

