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REFRACTORY-LINED INSULATED PIPE BOOSTS MOLTEN METAL TRANSFER



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The transfer of molten metal is a procedure warranting prime consideration in melting, refining and casting shops. Here, Mario Taddeo* outlines some of the background and process benefits of incorporating the process solution delivered by refractory-lined steel pipe from Pyrotek, in terms of increased performance and productivity for transferring liquid metal. He responds to some commonly asked questions from existing and potential customers.

Q: How do these equipment systems solve traditional process issues?

A: Lip pouring from ladles results in cascading metal which leads to dross formation. Transferring metal long distances in open troughs or launders often requires the metal to be superheated to compensate for temperature losses.

Metallics Systems, a division of Pyrotek and a world-leader in molten metal pumps, offers an improved process solution: refractory lined insulated steel transfer pipe used to convey molten metal from the pump, to improve production performance, productivity and metal quality.

Q: What are the unique features of these systems and their prime potential advantages in my process?

A: The refractory lining is based on high-temperature fibre, which is processed to provide excellent strength, heat insulation, and erosion resistance. Additionally, premium grades are available for greater wear resistance and longer service life.

Q: How can these systems specifically reduce temperature loss?

A: Metallics refractory-lined pipe systems limit heat loss to less than 1/2°F per ft (~1°C per m) of length without the need for external heating. Another process benefit is that the pipe liner is non-wetted by molten zinc alloys and does not require pre-heating.

Q: Are the pipe systems flexible enough to be configured with my existing production setup and process metrics?

A: Pipe sections are manufactured in lengths up to 4 ft (1.2 m) and assemblies can be readily customised for particular applications and to specific customer requirements.

Steel flanges are welded on the ends so that pipe sections can be bolted together for longer transfers and refractory-lined elbows are also available to redirect the metal flow. Pipe systems are designed to drain when the pump is turned off. A 5-degree slope is standard, but other angles are possible depending on customer requirements. Elbows are available in angles from 60–105 degrees.

The maximum length of a transfer system will vary with each application. Factors that determine this include volume of metal to be pumped, pumping rate, frequency of pumping operations, metal temperature and slope of the pipe. Although most transfers are 3–6 ft

(~1–2 m), transfers as long as 82 ft (25 m) have been successful.

Q: What about a cleaning function?

A: The optional riser clean-out tee allows access to the inside of the riser without disassembly of the piping. In some transfer pump applications dross or fluxing salts may build up inside the riser, which can reduce and, in extreme cases, block the flow of metal from the pump. This deposit material can be very difficult to remove after the pump has cooled down to room temperature.

With the clean-out tee, the inspection cap can be removed while the pump is still hot and the inside of the riser can then be scraped clean. This allows the pump to be fixed quickly and put back into service with minimum effort and pump downtime.

Q: Are complementary transfer pump systems available to optimise the process?

A: Pyrotek Metallics transfer pump systems are available to complement the process in delivering optimum operation and increased performance.

Pumps can be driven by either an electric or air motor. This choice is



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generally determined by the sensitivity of control required, the discharge volume needed, or the metal head to be achieved. Several sizes are available depending on the flow rates and lift required. Liquid metal is pumped above the liquid metal line of the furnace for discharge to the end-use point. The pump remains in a furnace well and is activated whenever metal delivery is required. Transfer pumps are used in the zinc and aluminium industries for furnace-to-furnace transfers, furnace to ladle transfers, furnace to casting

machine transfers, and to pour sows or large castings. Most applications simply lift metal over the edge of the furnace; however, the high-pressure capabilities of these pumps have allowed some users to pump metal as high as 26 ft (~8 m) while considering proper safety measures.

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