

Ladle Stirring Hookup

Question

In our shop, in order to hook up the argon stirring hose to the ladle, a man must hook the hose to his belt, climb up the ladle car and connect the hose to a fitting on the side of the ladle. Sometimes the fittings do not connect due to heat expansion, mechanical damage or misconnect resulting in the man repeating the job. Additionally during a ladle boil over, the hose burns and then leaks even though we have gone to a steel braided hose. Always there is the continual possibility of the man falling off the ladle car. Is there a better way to hook up argon gas to a steel ladle? A.K.S., India

Answer (1)

This is an ongoing problem common to all melt shops using ladle stirring plugs. Argon costs about 10 times as much as nitrogen so leaks are expensive. Argon can also be an asphyxiate in a confined area so leaks should be avoided. "No Stirs" on ladle are extremely disruptive to the production flow. Replacing gas hoses occurs on a regular basis resulting in additional cost and production delays.

Most shops use a hose to hook up to the ladle as stated in your question. Some of the solutions observed include using an extremely long hose that can reach throughout the shop. This results in only one hookup and disconnect of the ladle during a processing cycle. The problem with this approach is that the hose tends to get caught on objects in the shop during ladle transport operations. A long hose length also leads to increased pressure drops and opportunity for leaks.

Another shop uses the weight of the ladle to seal the connection between the argon feed line on the ladle transfer car and the gas line on the ladle. A drilled hole in the ladle car support stand matches up with a drilled hole on the ladle support pad. An argon line from the distribution stand is hooked up to the ladle car and feeds gas through the hole in the support stand. A three-inch diameter "O" ring is placed around the hole on the ladle car support stand. When the ladle is placed in the car the holes line up and the "O" ring collapsed under the weight of the ladle and seals the joint. A pipe fitted to the drilled hole on the ladle support pad delivers argon to the stirring plug. A valve is then opened and stirring gas flows into the ladle. Sometimes the "O" ring is not in the

proper position or steel shards are on the pads which cut the "O" ring resulting in leaks. Also if the "O" ring is out of position a man must climb up on the ladle car and replace the "O" ring.

Perhaps the best solution observed is a commercially available mechanical device that connects to the ladle using the same principles as used for in-flight airplane refueling. A funnel cone is located on the side of the ladle. When the ladle is in position a pipe is extended out and feeds a probe into the funnel cone. The parts mate and positively connect. The probe seals and the joint is opened to the flow of argon. In this system, there are no hoses involved nor is a man used to hook up the fittings. Steel or slag may boil over onto the probe and funnel but will not melt the pipe thus ensuring the integrity of the stir. This type of device can also be installed in tight quarters since human access is not required. A supervisory monitoring system tracks information on argon gas consumption per ladle and signals problems with gas flow and pressure. Information for the ladle connection system described was provided by mtus@marti-tech.com, Marti Technologie, U.S., 3057 Nationwide Parkway, Brunswick, OH 44212.

Answer (2)

I read with great interest your comment to the letter from A.K.S., India and have to add some information. TBR Engineering has designed and provided a stirring gas coupling system which works automatically when placing a full ladle into a treatment stand, ladle car or ladle furnace. The coupling does not need an O-Ring or disk shaped seal. The mechanical contact between the upper and lower sections tightens the connection 100% of the time.

This information was provided by Gert O. Breslmar, breslmgo@aol.com, MURTECH INC. P.O. Box 168, Allison Park, PA 15101. I

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