



Laser Welded Duplex Stainless (329J4L) Tube for Gas Gas Heater

Member company POSCO
Category significant global market potential or reduction in operational costs

The Challenge

In Korea, environmental facilities of thermal power plants are recently being upgraded to improve atmospheric environmental problems. In particular, plate heat exchangers that were applied to thermal power plants in the past are being replaced with tube heat exchangers due to the problem of flue gas leakage. For the tube heat exchanger, seamless duplex stainless steel tubes were mainly applied in Korea. However, the seamless duplex stainless steel tube is expensive and has a long delivery period, so heat exchanger manufacturers have requested the development of a welded tube with equivalent characteristics, low price, and short delivery time.

Why?

The first reason for this challenge was to reduce the manufacturing cost of the customer, and the second reason was to expand the application field of our company's materials.

Needed Action

First of all, we started by selecting the most suitable welding process from among various welding processes such as GTAW, ERW, LBW, etc., considering the characteristics, productivity, and price of the weld. Through comparison between welding processes, the LBW method was finally selected, and the welding and heat treatment conditions were optimized with a focus on improving the corrosion

resistance of the weld. In addition, in order to prove that the welded tube has characteristics equivalent to that of the seamless tube, various evaluation methods (ASTM G48A, C, D & Sulfuric Acid Dew Point Corrosion Test, Hydrochloric Acid Dew Point Corrosion Test etc.) were used. Particularly, in order to prove that the corrosion resistance of the welded part is equivalent to that of the base metal, after inducing artificial pitting electrochemically, it was proved that the frequency of pitting occurrence was the same in the base metal and the welded part as shown in Fig. 1.

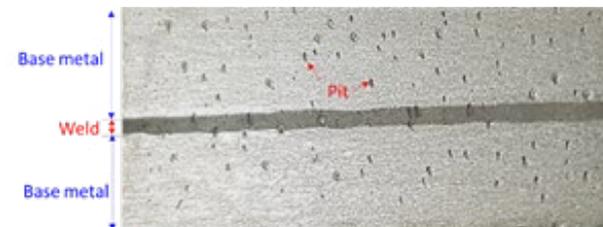


Fig.1 Appearance of pitting made electrochemically in weld and base metal
 Courtesy of POSCO

In addition, a small sample was attached to the GGH (Gas Gas Heater) reheater of the Yeongheung thermal power plant in order to check the corrosion resistance in an actual environment. As a result of checking the sample condition one year later, the developed LBW tube was not damaged at all as shown in Fig. 2.

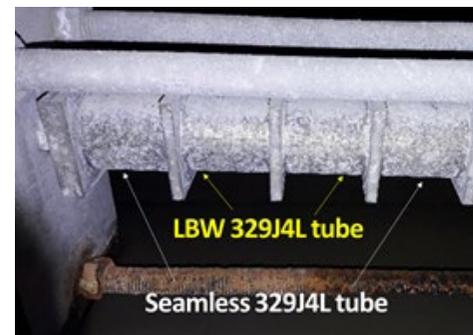


Fig. 2 Sample appearance after field test for 1 year
 Courtesy of POSCO



Action Review

It has been confirmed that this product can be mass-produced through laser welding and post-heat treatment by domestic manufacturing companies, and the corrosion resistance of the produced product meets the requirements of the customer through the ASTM corrosion evaluation method. The developed 329J4L LBW tube was applied to the GGH of a new thermal power plant in Samcheok, Korea.

Horizontal Expansion Capability

This product can be widely applied to various industrial fields such as power plant, petrochemical, construction, and automobiles where seamless tubes are used.

Outcome

The newly developed 329J4L LBW tube was applied to a new thermal power plant in Samcheok, Korea, and through this, GGH manufacturers were able to reduce manufacturing costs by more than 30% and shorten delivery time by 1.5 months. In addition, our company was able to expand the market area to the industrial field where seamless tubes are used.



Fig. 3 GGH bundle made by 329J4L LBW tube
Courtesy of POSCO