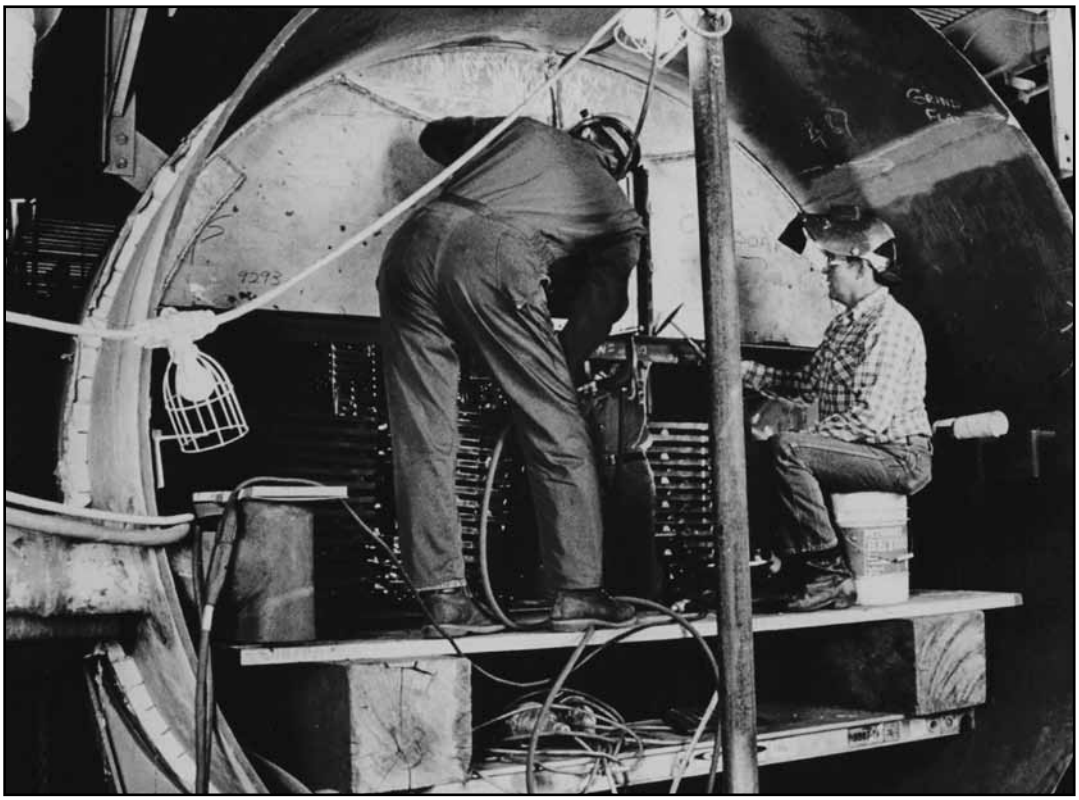
Electric Power Plant chooses AL-6XN® for DA Heater



Specifications

UNS: N08367 **ASTM:** B 688, A 240, B 675, A 312, B 676, A 249, B 804, B 691, A 479, B 462, A 182, B 564, B 366, B 472
ASME: SB-688, SA-240, SB-6 75, SA-312, SB-276, SA-249, SB-691, SA-479, SB-462, SA-182, SB-564, SB-366 Code Case N-438-3, B-31.1 Case 155-1

Chemical Composition, %

	Ni	Cr	Mo	Mn	Cu	Si	C	N	S	P	Fe
MIN	23.5	20.0	6.0	–	–	–	–	0.18	–	–	–
MAX	25.5	22.0	7.0	2.0	0.75	1.0	0.03	0.25	0.03	0.04	balance

Case History

In the production of electric power, water is the key component in the process of converting some fuel energy into useful electric energy. Water is heated, converted into steam which is made to turn a turbine powered generator and then condensed. The condensate is then reused to again feed the boilers.

Water, with its entrapped gases, minerals and impurities can be quite corrosive to many metals and alloys. At the elevated temperatures seen in power plant preheaters and condensing equipment, localized corrosion i.e., pitting and crevice corrosion can cause rapid failure. In addition, steam impingement can cause extreme metal loss in steel components through cavitation and erosion corrosion.

Condensate from the main steam condenser, which condenses spent steam from the turbine generator, often contains excess air and gases. It has been proven beneficial to deaerate and preheat such condensate in a deaerater heater before sending that water back to the boiler. Recently, Virginia Power Co., Richmond, VA selected AL-6XN alloy sheet and plate for lining and shielding the critical areas of what they call their “DA Heater”.

Case History, Continued

The DA Heater is a unit approximately 36' long by 9'6" in diameter. The AL-6XN alloy was installed, in this unit, as an inner wall or liner and as shrouds to protect the carbon steel wall and baffles from direct steam impingement.

According to Virginia Power's Production Planner, Jerry Jarvis, the DA Heater works by injecting steam into the bottom of the heater and letting the condensate spray into the heater from nozzles at the top. The condensate then flows down over a series of offset baffles (or trays) through the rising steam.

The rising steam flash evaporated the excess air and gases from the condensate. The air and gases are released through a vent hood at the top and the heated condensate water drains from the bottom into a holding tank until it is pumped back into the boiler.

The AL-6XN alloy used in this DA Heater involved 11gage sheet (640 sq. ft.) and 0.250" thick plate (180 sq. ft.). This alloy, with a typical molybdenum content of 6.2%, was selected for both its expected superior pitting, resistance when exposed to a concentration of and for its good resistance to steam impingement which would be unexpected to cause severe cavitation and erosion corrosion of unprotected carbon steel in this DA Heater.

The AL-6XN alloy was welded to itself and to carbon steel using the SMA and GMA processes with alloy 625 filler metal. According to Allan Vig, Welding Engineer at Virginia Power, "AL-6XN has a number of potential applications in our power plants and the welding procedures generated during this replacement project will allow us to make high quality, cost effective weldments."

The AL-6XN alloy is a nitrogen enriched and generally improved version of the AL-6X alloy which has been used extensively, as tubing, in electric power plant seawater cooled steam condensers. That alloy has proved its resistance to both Cl^- ion pitting and to steam impingement attack. It was this heritage of AL-6XN alloy that caused Virginia Power to select AL-6XN for this DA Heater service.

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