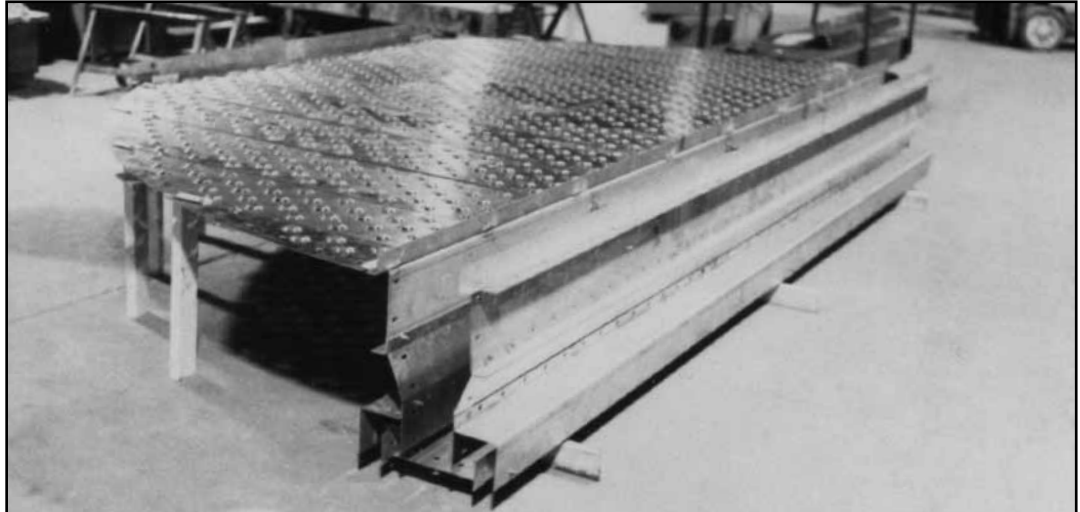


## AL-6XN® Distillation Trays Provide Over 10 Years Of Continuous Service.



### 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

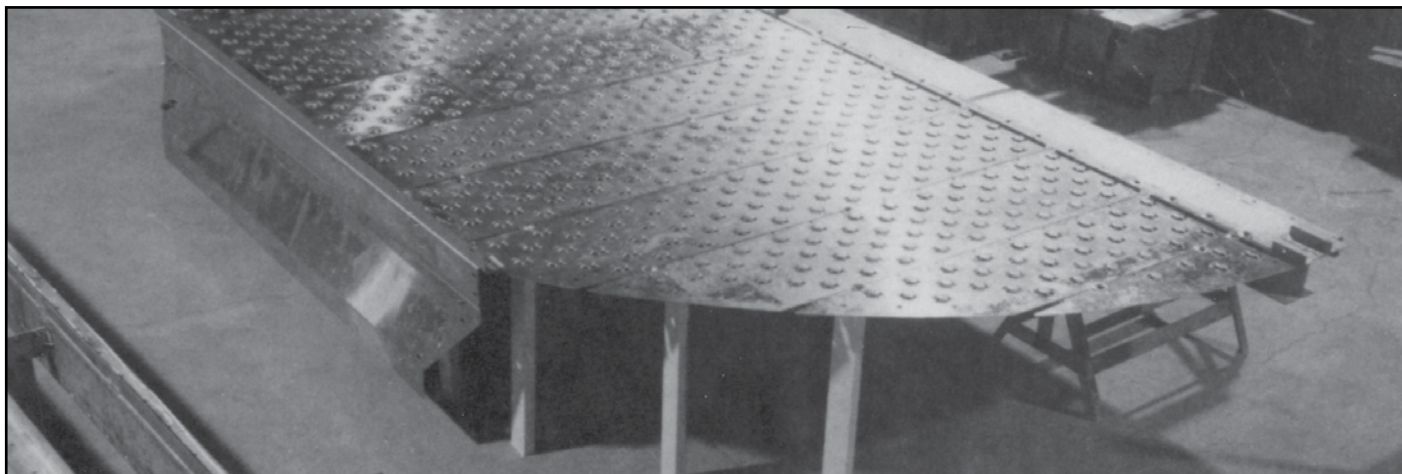
In the spring of 1989, a major gulf coast refinery elected to have the top nine trays in their main atmospheric crude oil distillation tower fabricated from AL-6XN Alloy. AL-6XN was selected to replace the previous tray alloy, Monel® or alloy 400. The refiner chose AL-6XN after a comprehensive testing program involving several alloys. AL-6XN was chosen based on its lower initial cost and because of its greater resistance to corrosion when processing higher sulfur crude oil.

Trays manufactured of the Monel lasted less than 1-1/2 years. The tray material utilized prior to Monel was type 410 stainless. Type 410 stainless lasted between 2-3 years. The replacement AL-6XN trays were replaced after being in continuous service for over 10 years.

These trays operate at approximately 200°F. The worst case corrosion occurs when a variety of acids condense onto the trays. The material must be able to resist attack by H<sub>2</sub>SO<sub>4</sub>, which can form due to the processing of high sulfur crude, organic acids, and HCl which was also present in the upper tower.

In addition to these main tower trays, the refiner also utilized AL-6XN Alloy for trays in a smaller “stripper tower”, which operates on a reflux stream off of their main distillation tower.

Glitsch, Inc of Dallas, TX, now Koch-Glitsch, Inc. fabricated the AL-6XN distillation trays. These trays, were manufactured in narrow sections for ease of assembly inside of the tower. The final installed trays measured 17 feet in diameter.



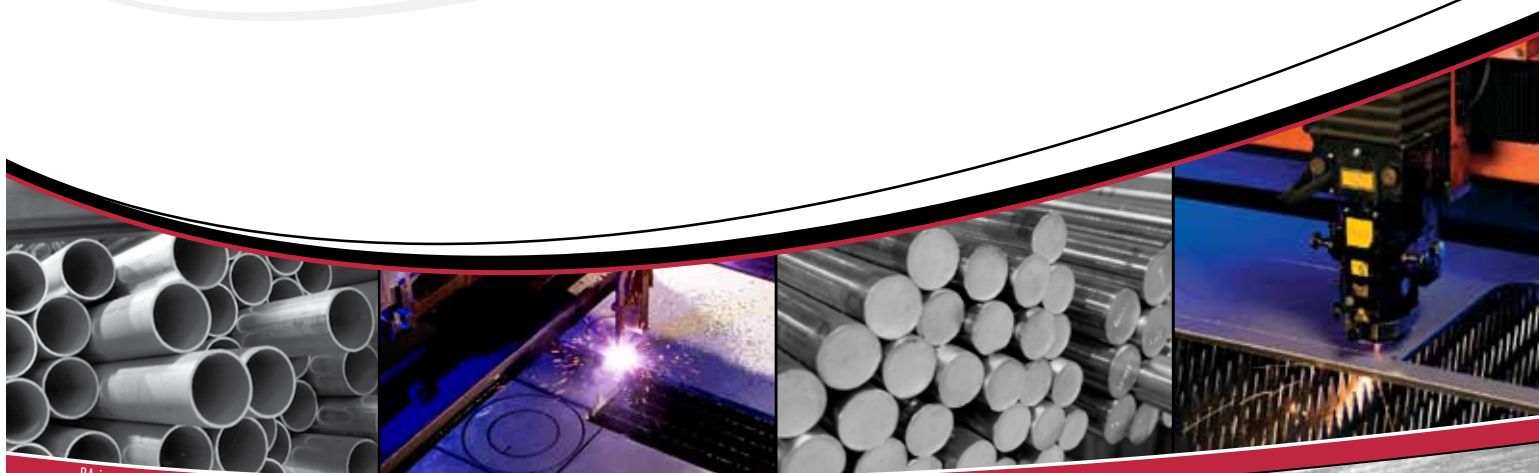
### Case History, Continued

AL-6XN Alloy is much stronger than Monel. Often the user can lower their initial costs by exploiting this greater strength and using a lighter gauge of AL-6XN. The replacement trays were made using 14 gauge AL-6XN sheet. The original trays used 11 gauge Monel sheet. The lower weight of the replacement trays provided additional cost savings.

Koch-Glitsch was able to fabricate the tray components using their standard production tooling. According to Koch-Glitsch, they were able to shear, bend, and punch the higher strength AL-6XN with no difficulty.

AL-6XN has a minimum room temperature tensile strength of 100,000 psi and an ASME maximum allowable stress of 27,100 psi at 200°F. AL-6XN was specified for this application for its resistance to a variety of acids in the upper section of the atmospheric crude tower. In many other applications, this material is utilized for its excellent resistance to chloride pitting and crevice corrosion.

This 24% nickel, 20.5% chromium, 6.3 molybdenum alloy has a nitrogen addition for improved strength, metallurgical stability, and localized corrosion resistance (i.e. pitting, crevice corrosion, and under deposit corrosion) compared to other stainless steels. This alloy has strived as a more economical alternative to the "C" family of alloys and alloy 400 when the service is too corrosive for conventional stainless steels.



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