

# M- LINE

## MARINE ALLOY HEAT EXCHANGERS

### INNOVATIVE PRODUCT SOLUTIONS

The AIC M-Line is a line of complete welded, shell and tube heat exchangers made entirely of NICROM-24, a super austenitic marine alloy. Its compact structure is an integration of innovative material with detailed engineering for effective use with high fluid velocities and low pressure drops, designed specifically for the salt water pool market.

The versatility of this robust straight tube design covers a comprehensive range of capacities, suitable for all residential and commercial applications.

### NICROM-24

NICROM-24 is a super austenitic alloy that for the past two decades has been tested and used in marine environments around the world.

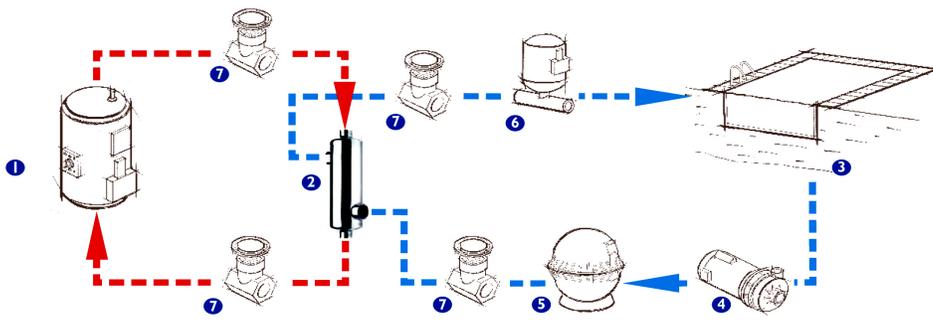
A low carbon, high purity, nitrogen-bearing alloy, it was originally engineered to be a seawater resistant material, but has since proven to be resilient in a wide range of corrosive environments.

MODELS	HTA	Overall Length	Shell OD	Connections	
	(ft <sup>2</sup> )	(in)	(in)	Tubeside	Shellside
M-180	4.7	15.3	4.1	1" NPT	1.5" NPT
M-300	9.0	25.1	4.1	1" NPT	1.5" NPT
M-500	16.8	42.9	4.1	1" NPT	1.5" NPT

DESIGN PRESSURE: 150 PSI    DESIGN TEMPERATURE: 406 °F

MATERIAL OF CONSTRUCTION: NICROM-24

### TYPICAL POOL INSTALLTION



1 Boiler    2 Heat exchanger    3 Swimming Pool    4 Pump    5 Filter    6 Chlorine Feeder    7 Gate Valve



- Boiler/Heating Circuit through the TUBE SIDE
- Pool Circuit through the SHELL SIDE
- Connect in counter-current flow to achieve maximum effectiveness

### TYPICAL APPLICATIONS

- Salt water swimming pools, spas, hot tubs
- Marine oil coolers
- Transmission and engine coolers
- Boiler sample coolers
- Waste water heat recovery

### DISTINCT ADVANTAGES

- Superior corrosion resistance provides protection for salt water and other marine applications.
- High erosion corrosion resistance suitable for applications with high fluid velocities.
- High material strength for quality performance and long product life.

# NICROM-24

## SUPER AUSTENITIC MARINE ALLOY

### SEAWATER ENVIRONMENT

Seawater environments are very corrosive due to their high concentration of chloride salts, dissolved oxygen, and carbon dioxide. In stagnant or polluted conditions, additional corrosive elements such as ammonia or sulfide ions are present. Such environments are damaging to the structural integrity of traditional copper-based alloys, and enhance the potential for localized pitting, crevice corrosion and chloride stress-corrosion cracking (SCC) in stainless materials.

### NICROM-24 CORROSION RESISTANCE

Elevated levels of chromium, molybdenum, and the addition of nitrogen enhance the strength and resistance of NICROM-24 to chloride pitting, crevice corrosion, and SCC, making it the ideal material for use in such environments. Its chemical composition enables it to perform at levels only previously achieved by materials such as titanium.

Consistently, NICROM-24 has demonstrated its superior performance and strength over other commercially marketed 'marine alloys', such as 90/10 CuNi and 254SMo<sup>®</sup>, and is highly valued for use in the fabrication of seawater and salt water heat exchangers.

Material	PREn	Crevice Corrosion in Seawater (% of Sites Attacked)
254SMo <sup>®</sup>	46.8	6
NICROM-24	47.7	0

Pitting Resistance Equivalent number (PREn) of an alloy can be correlated to its chemical composition of chromium, molybdenum, and nitrogen, in terms of weight percentage.

Material	Corrosion <sup>1</sup> (avg. mils/year)	Erosion Corrosion Rate <sup>2</sup> (avg. mils/year)
90/10 CuNi	20.84	25.00
NICROM-24	0.00	1.00

1. Synthetic Seawater (pH=8.2) 168 hours at 149°F  
2. 30 day exposure in natural seawater at 48-59°F

### ALLOY STRENGTH COMPARISONS

Alloy	Min.Tensile Strength (Mpa)	Max. Stress @ 200°F (Mpa)
90/10 CuNi	275	65.5
SS316	483	97.9
254SMo <sup>®</sup>	648	164.8
NICROM-24	690	180.6

NICROM-24 is a tradename of AIC Inc.  
254SMo<sup>®</sup> is a registered trademark of Avesta Sheffield AB

At AIC, we are committed to providing exceptional service and high quality heat exchangers for our valued clients. Our technical expertise, wide range of product design offerings, and readily available stock, enable us to be your sole source supplier of heat exchangers, and custom designed heat transfer solutions.



**Advanced Industrial Components Inc.**  
2899 Portland Drive  
Oakville, ON Canada L6H 5S4  
Tel: 905-829-4666  
Fax: 905-829-4646  
Toll-Free: 1-888-738-1350  
[www.aicheatexchangers.com](http://www.aicheatexchangers.com)

Authorized Representative