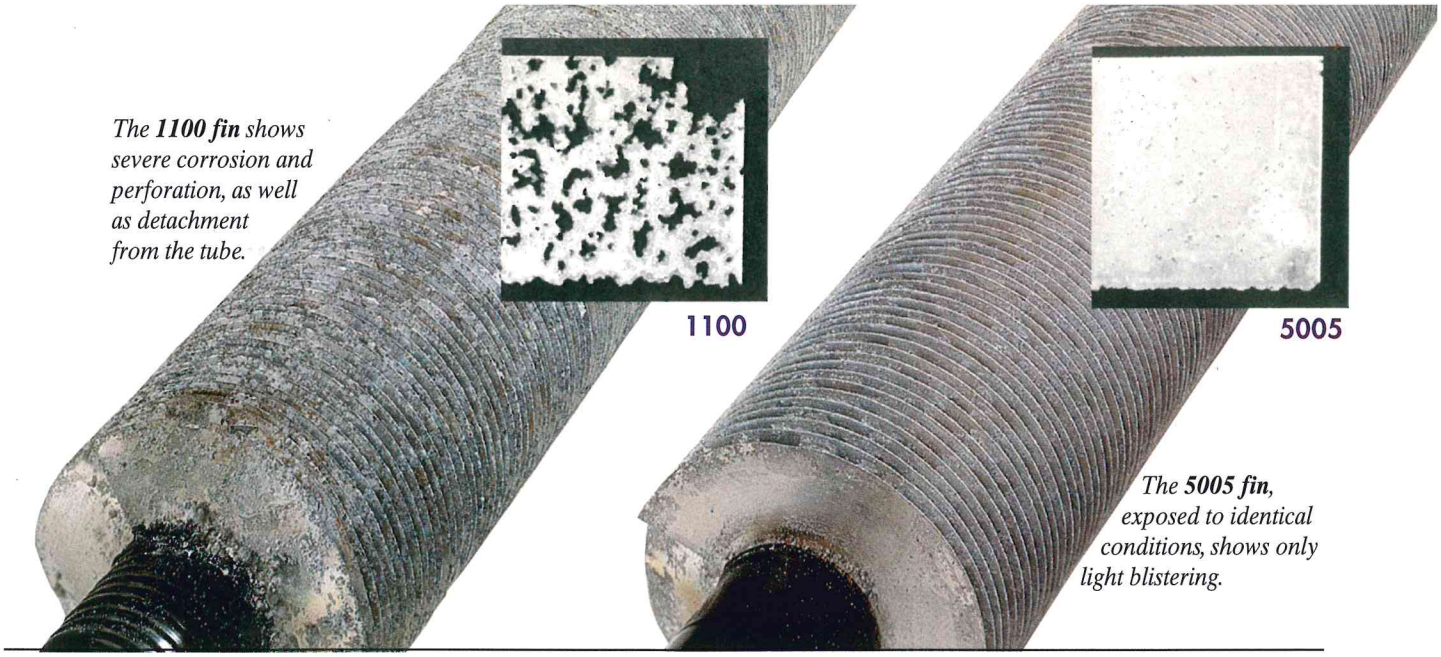

*The **1100 fin** shows severe corrosion and perforation, as well as detachment from the tube.*

*The **5005 fin**, exposed to identical conditions, shows only light blistering.*

Compare 1100 and United Aluminum's 5005

Typically, spiral fin manufacturers have relied upon commercial purity aluminum, such as 1100 alloy. It has good formability but low strength. Therefore fins made of 1100 are easily bent and damaged during handling, installation and cleaning. This can severely degrade the thermal efficiency of a heat exchanger during its lifetime. United's 5005 alloy offers similar heat transfer properties but significantly greater resistance to denting and marine corrosion.

Corrosion Test Results

Alloy 5005's magnesium content offers considerably enhanced corrosion resistance to salty, marine environments. This is dramatically illustrated above by samples of 1100 and 5005 spiral finstock subjected to a constant immersion salt bath test (ASTM G 66).

Thermal Test Results

The University of Tulsa compared the heat transfer performance of 1100 and 5005 alloy fins. Researchers found no significant difference in heat transfer efficiency between tubes finned with these alloys, despite 5005's slightly inferior thermal conductivity coefficient. This result was expected because the harder 5005 alloy allows fins to grip the tubes much more tightly, thereby improving heat transfer at the fin/tube interface.

Physical Characteristics

	1100	5005
Liquidus temperature:	657°C	652°C
Solidus temperature:	646°C	632°C
Coefficient of thermal expansion:		
Average linear		
20-100°C	23.6 µm/m·K	23.7 µm/m·K
20-200°C	24.5 µm/m·K	24.6 µm/m·K
20-300°C	25.5 µm/m·K	25.6 µm/m·K
Volumetric	$68.1 \times 10^{-6} m^3/m^3 \cdot K$	$68 \times 10^{-6} m^3/m^3 \cdot K$
Specific heat:	904 J/kg·K	900 J/kg·K
Thermal conductivity:	222 W/m·K	205 W/m·K

Chemical Composition

1100 is unalloyed aluminum with up to 1% impurities, mainly iron and silicon. It has good formability but low strength. Alloy 5005 contains about .8% magnesium, which increases strength and enhances corrosion resistance to marine environments.

Composition in weight percent maximum unless shown as a range or a minimum.

1100

Si	Fe	Cu	Mn	Mg	Cr	Zn	Others	Total	Aluminum
.95 Si+Fe		.05-.20	.05	-	-	.10	.05	.15	99.00 min.

5005

Si	Fe	Cu	Mn	Mg	Cr	Zn	Others	Total	Aluminum
.30	.7	.20	.20	.50-1.1	.10	.25	.05	.15	Remainder

Mechanical Properties

United Aluminum 5005 finstock is *Custom Rolled*®, maximizing ductility for ease of fabricating, and minimizing machine adjustments when changing from 1100.

	Tensile Strength (ksi)		Elongation (%)	
	Limits	Typical	Limit	Typical
1100-0				
.006-.019"	11.0 - 15.5	12	15 min.	30
.020-.031"	11.0 - 15.5	12	20 min.	34
5005-02				
.013-.019"	15.0 - 21.0	18	16 min.	20
.020-.031	15.0 - 21.0	18	18 min.	25

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