Evapco Engineering Flash

What Is "Series 300" Stainless Steel?

The basic material of construction in the evaporative cooling industry is mill galvanized steel with G-235 designation. However, stainless steel is an alternate material that can provide superior corrosion protection. There are three grades of stainless steel readily available to Cooling Tower and Closed Circuit Cooler consumers, all of which fall under the generic title of "Series 300": Type 301, 304 and 316 Stainless Steel. Stainless steel "L" types, such as 316L, represent an extra-low carbon composition to minimize carbon precipitation during extreme heat. Structural stainless steel components that are welded should be manufactured with "L" material. Each stainless steel type is unique in composition and provides different levels of corrosion and pitting protection. See Table 1 below.

Table 1: Stainless Steel Element Composition

Type	Chromium	Nickel	Molybdenum	Carbon (max)
301	16.0-18.0%	6.0-8.0%	0.0%	0.15%
301L	16.0-18.0%	6.0-8.0%	0.0%	0.03%
304	18.0-20.0%	8.0-12.0%	0.0%	0.15%
304L	18.0-20.0%	8.0-12.0%	0.0%	0.03%
316L[1]	16.0-18.0%	10.0-14.0%	2.0-3.0%	0.03%

Note: Composition Referenced From AKSteel.com
[1]In North America, only Type 316L is readily available

The HVAC and Industrial markets utilize Cooling Towers and Closed Circuit Coolers as an energy efficient means of rejecting system heat to the atmosphere. Longevity of this capital equipment can be attributed to proper water treatment, routine maintenance, and the highest grades of construction material – stainless steel. Caution: not all stainless steel is created equal!

Type 304/304L and Type 316L Stainless Steel are upgrades to G-235 Galvanized Steel due to their superior corrosion resistance and versatility in harsh environments, including high levels of chloride.

Steel becomes "stainless" when it contains a minimum of 12% chromium. Oxygen in the air combines with the chromium to form a renewable passive chromium oxide layer. Other elements, such as nickel and molybdenum, provide increased protection against corrosion as their percent composition increases.

Molybdenum (element MO), which is only found in Type 316L stainless steel, enhances the overall rust resistance and provides the added benefit of chloride pitting protection. Cooling towers constructed of Type 316L Stainless Steel are well suited for high chlorides (> 500 ppm), coastal environments, and water with high cycles of concentration, to name a few.

See Table 2 below for recommended water quality guidelines of common recirculated water properties, among the three EVAPCO material offerings.

Table 2: Recommended Water Chemistry Guidelines

PROPERTY	G-235 Galvanized Steel	Type 304 Stainless Steel	Type 316 Stainless Steel
pH	7.0 - 8.8	6.0 – 9.5	6.0 – 9.5
Chloride as Cl^- (ppm)	< 300	< 500	< 2000
Alkalinity as CaCO3 (ppm)	75 - 400	< 600	< 600

Note: Please refer to EVAPCO's Operation and Maintenance Instructions for a complete chemistry guideline.

"300 Series" Stainless Steel is not descriptive of a specific composition, but rather describes a vague range of potential materials. Ask questions if presented with "300 Series" Stainless Steel construction. Specify high quality Type 304 Stainless Steel or the highest quality Type 316 Stainless Steel!

For more information, please contact your local EVAPCO Sales Representative!

Patrick Strine Jr
Product Manager / HVAC

EEF #1
September 2012