

“The Switch Is On™”

**The Case for
AL 201HP™ Substitution**



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Why AL 201HP™ Alloy?

- AL 201HP™ alloy is a High Performance alloy that ATI Allegheny Ludlum has been producing for over 50 years.
- AL 201HP™ alloy has the look & performance of Types 304 & 301 at a lower & more stable cost.
- AL 201HP™ alloy is a high strength alloy that permits a reduced weight design in many applications.
- AL 201HP™ alloy has permanently replaced Types 304 & 301 in many applications.
- AL 201HP™ alloy is available in all of the same cold-rolled mill product forms and finishes as Types 304 and 301.

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The Technical Argument for AL 201HP™ Alloy

Lower cost raw materials such as manganese and nitrogen are added to AL 201HP™ alloy as partial substitutes for nickel, which has a higher and more volatile cost. These substitutions are made without major tradeoffs in performance.

Corrosion Resistance The composition of AL 201HP™ alloy provides excellent corrosion resistance equivalent to T301 and T304 in most environments.

Formability High uniform elongation permits bending, forming and drawing performance similar to T301 and T304.

Structural Strength Wide range of mechanical strengths in the annealed and cold worked conditions for tough applications such as transit car and truck trailer.

Welding Similar to 300 series austenitic stainless.

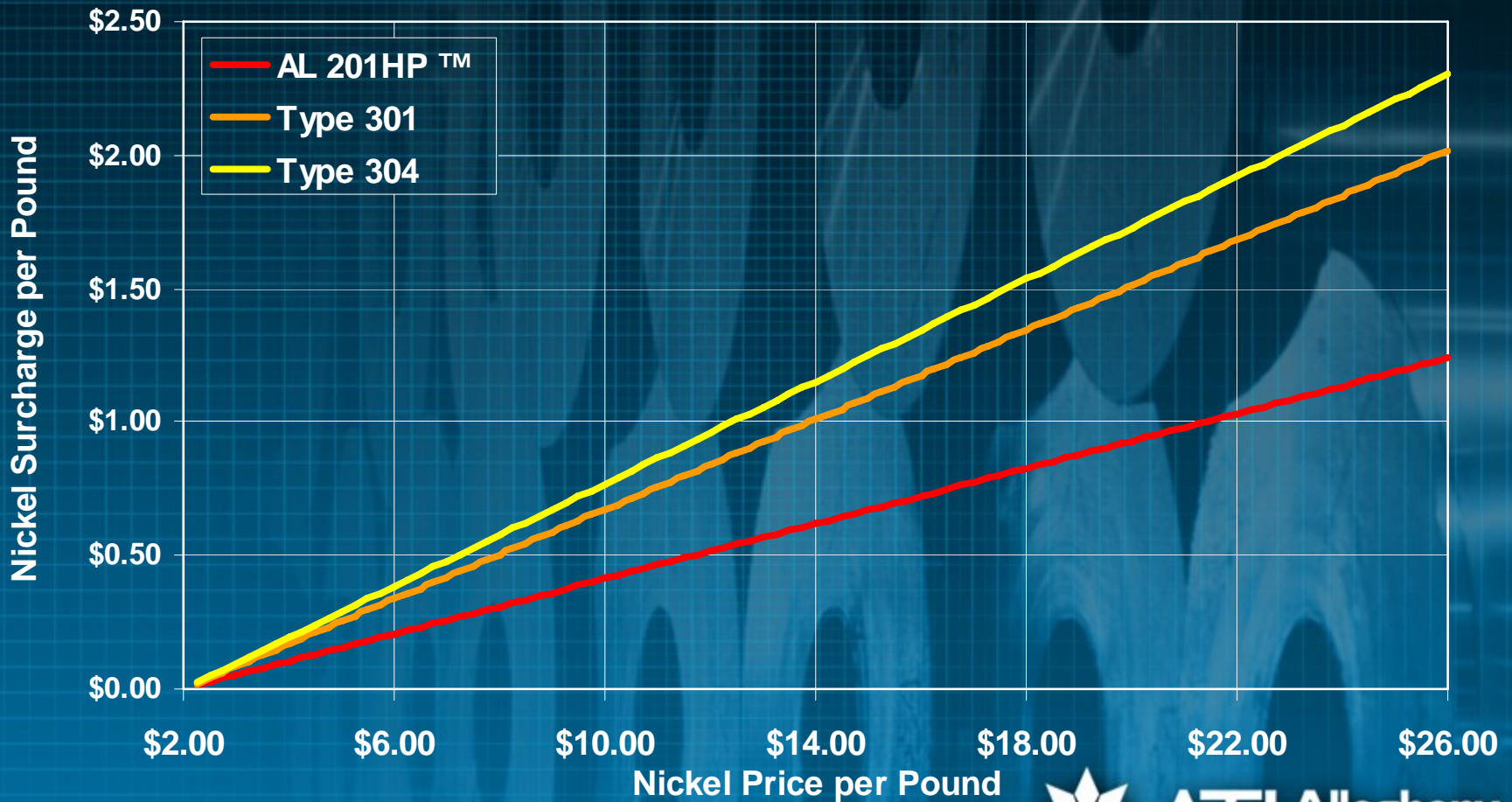


Raw Materials

Historical Nickel Prices (1980 through March 2007)



The Effect of Price on the Nickel Surcharge



AL 201HP™ Alloy
Technical
Comparison

Low-Nickel Austenitic Stainless Steels – "The Basics"

- The most important alloying element that makes stainless steels "stainless" is Chromium (Cr).
- When at least 11% Cr is present, a continuous layer of an invisible oxide film will form, which is what gives stainless steels their superior corrosion resistance.
- Nickel (Ni) is the most commonly talked about element in stainless steels, due to its effect on price. The main role of Ni in 200 and 300 series grades is to help create an austenitic structure, which provides favorable mechanical properties. T304, the most common grade of stainless, contains 8% minimum Ni. AL 201HP™ alloy contains 3.5% minimum Ni.

Low-Nickel Austenitic Stainless Steels – "The Basics"

- Manganese (Mn) is used as a replacement for Ni in AL 201HP™ alloy. It is about half as effective at stabilizing the austenitic phase, so it replaces Ni in about a 2:1 ratio.
- Copper (Cu) is also an austenite stabilizer and may be used to replace Ni. It plays a role in reducing the work hardening rate.
- Nitrogen (N) enhances austenite stability and may be used to replace Ni. N also increases the strength of these alloys.

Chemical Composition Comparison

per ASTM A240

UNS	C (max)	Mn	P (max)	S (max)	Si (max)	Cr	Ni	N	Fe
S20100	0.15	5.5 / 7.5	0.060	0.030	1.00	16.0 / 18.0	3.5 / 5.5	0.25	balance
S30100	0.15	2.00 max	0.045	0.030	1.00	16.0 / 18.0	6.0 / 8.0	0.10	balance
S30400	0.08	2.00 max	0.045	0.030	0.75	18.0 / 20.0	8.0 / 10.5	0.10	balance
S43000	0.12	1.00 max	0.040	0.030	1.00	16.0/18.0	0.75	Not Specified	balance

Typical Values

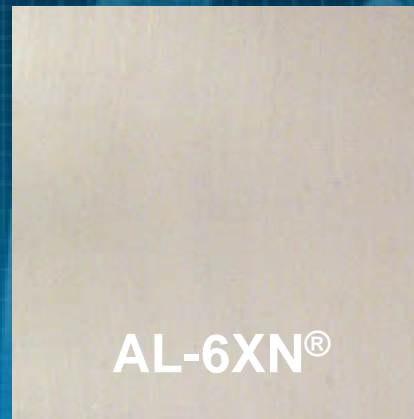
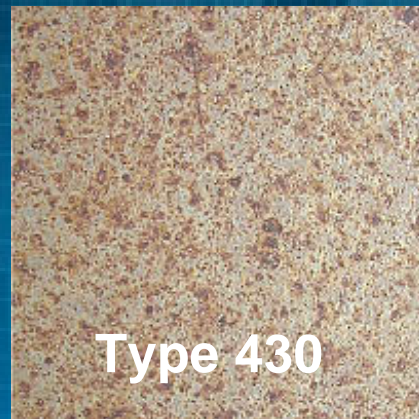
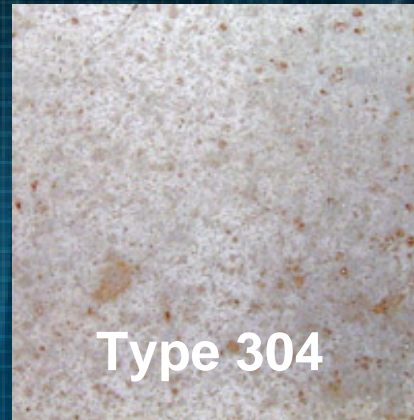
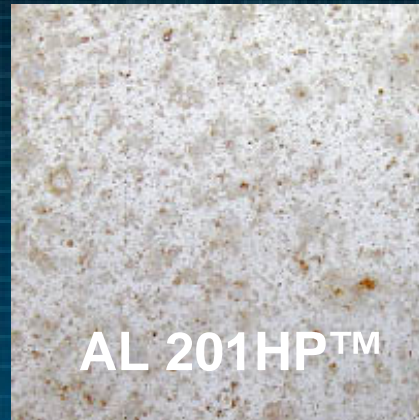
Alloy	C	Mn	P	S	Si	Cr	Ni	N	Fe
AL 201HP™	0.08	7.1	0.032	<0.001	0.48	16.3	4.5	0.07	balance
Type 301	0.10	1.8	0.026	<0.001	0.45	17.3	6.7	0.04	balance
Type 304	0.06	1.0	0.031	<0.001	0.44	18.3	8.1	0.07	balance
Type 430	0.04	0.37	0.028	<.001	0.45	16.4	0.4	0.04	balance

Pitting and Crevice Corrosion Test Results

		AL 201HP™	Type 304	Type 430
PRE_N=%Cr + 3.3% Mo + 16% N		18.4	20.4	17.3
ASTM G48 A Pitting Test	Weight Loss	0.0228 g/cm ²	0.0280 g/cm ²	0.0240 g/cm ²
	Max. Pit Depth	0.003"	0.003"	0.051"
ASTM G48 B Crevice Test	Weight Loss	0.0211 g/cm ²	0.0205 g/cm ²	0.0232 g/cm ²

Kure Beach Samples

Exposed for 10 years 200 meters from the shore



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ASTM B117 Salt Spray Test

- Unwelded samples did not rust significantly.
- 100-hour test results on welded samples are shown below.



AL 201HP™



Type 304



Type 430

Mechanical Property Comparison

per ASTM A240

UNS	Tensile Strength (ksi, min)	Yield Strength (ksi, min)	Elongation (% in 2", min)	Hardness (RB, max)
S20100	75	38	40	95
S30100	75	30	40	95
S30400	75	30	40	92
S43000	65	30	22	89

Typical Values

Alloy	Tensile Strength (ksi)	Yield Strength (ksi)	Elongation (% in 2")	Hardness (RB)
AL 201HP™	105	45	58	88
Type 301	105	45	58	85
Type 304	95	45	53	85
Type 430	74	50	29	82

Welding and Fabrication

- AL 201HP™ alloy may be welded using the same methods and procedures as are used for Types 304 and 301.
- If filler metal is required, standard NiCr grades such as T 308L may be used.
- AL 201HP™ alloy can also be welded to Types 304 and 301. No galvanic coupling will occur.
- AL 201HP™ alloy can routinely be fabricated on the same equipment used to fabricate Types 304 and 301. Initial, one-time adjustments may be needed to compensate for the higher mechanical strength.

Weldability

UNS (Type/Grade)	Filler	Alternative Fillers
Lower Strength S20100 (201-1)	308L (S30880)	209 (S20980) 219 (S21980) 2209 (S39209)
Higher Strength S20100 (201-2)	209 (S20980)	219 (S21980) 2209 (S39209) NiCrMo-4 (N10276) NiCrMo-10 (N06022)
S20153 (201LN)	209 (S20980)	219 (S21980) 2209 (S39209) NiCrMo-4 (N10276) NiCrMo-10 (N06022)

Available Finishes

Product Forms

1 D

Sheet

2 B

Strip

Polished

Precision Rolled Strip[®]
products

Kooline[®] Products

Continuous Mill Plate

Bright Anneal

Plate Mill Plate

2TR



AL 201HP™ Alloy Applications



Markets and Applications



Beverage
Dispensers



Subways
And Trolleys



Toasters



Disposals



Industrial and
Home
Washers

Markets and Applications



Cookline



Specialty
Clamps



Hot Food
Wells



Trucks /
Trailers



Ice & Water
Dispensers

Food Service Applications



Highlights and Value Proposition

Highlights & Value Proposition

- The cost of nickel has risen to record levels. It is currently trading at over \$22.00/lb on the LME in April 2007.
- The price of nickel is expected to remain volatile.
- The surcharge cost component of austenitic grades increases proportionally to their nickel contents.
- AL 201HP™ alloy offers a lower cost (i.e. lower surcharge) and a more stable cost.
- AL 201HP™ alloy is available in the same product forms and finishes as T304 and T301.
- AL 201HP™ alloy has the same physical appearance as Types 304 and 301.

Highlights & Value Proposition

- AL 201HP™ alloy is branded as a high performance alloy to distinguish it from other low-Ni grades, some of which are called "Type 201", that have lower Ni, lower Cr, and higher Cu contents than AL 201HP™ alloy, and do not meet AISI or UNS specifications.
- The higher strength of AL 201HP™ alloy may permit reduced weight usage by allowing the use of thinner material.
- AL 201HP™ alloy is approved for use by ANSI/NSF Standard 51 for food contact.
- AL 201HP™ alloy has the same lead-time as T304 & T301.

Highlights & Value Proposition

- AL 201HP™ alloy is not a niche alloy with a few restricted applications.
- Current applications exist in building & construction, transportation, household goods, chemical process industry (CPI), LNG, etc.
- Applications currently using AL 201HP™ alloy take advantage of its good strength & formability, good fabricability, fairly deep drawability, aesthetically pleasing appearance (similar to Type 304), approval for use in food contact areas, and reproducibility of properties and finish from coil-to-coil.

Additional Information...

- Go to the Featured Products section of our Website www.alleghenyludlum.com for additional technical information.



Search: [find it!](#)

Wednesday, April 4

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Allegheny Ludlum serves customers in diversified consumer and capital goods [markets](#) in more than 30 nations.

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What's New?

- March 08, 2007** - ATI Allegheny Ludlum Announces Silicon Electrical Steel Raw Materials Surcharge [..more](#)
- February 13, 2007** - ATI Allegheny Ludlum Announces Silicon Electrical Steel Raw Materials Surcharge [..more](#)
- January 24, 2007** - Allegheny Technologies Announces Strong Fourth Quarter and Full Year 2006 Results [..more](#)
- January 16, 2007** - ATI Allegheny Ludlum Announces Silicon Electrical Steel Raw Materials Surcharge [..more](#)

Featured Products

- Alloy and Ti Substitution - "The Switch Is On™"**
- [AL 201HP™ ..more](#)
- [AL 201LH™ ..more](#)
- [AL 201LH™ vs 9% Ni Carbon Steel ..more](#)
- [AL 2003™ vs T316L ..more **New!**](#)
- [Lean Substitution Options for 300 Series Alloy and CP Titanium ..more **New!**](#)
- [Titanium Alternatives ..more](#)



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- Corrosion Resistant
- Electronic Alloys
- High Temperature
- Titanium
- Alloyed
- Commercially Pure
- Electrical Silicon Steel
- Grain Oriented Silicon Steels
- Tool Steel
- Tool Steel Grades
- Armor Material
- Steel Armor Plate

AL 201HP™ Stainless Steel

AL 201HP™ alloy is a high performance austenitic stainless steel formulated to have a lower and more stable cost due to the substitution of manganese for a portion of the nickel found in the 300 series alloys. The resulting alloy has comparable properties and performance to the 300 series alloys.

Market Applications

Consumer and transportation applications

Lower-Nickel Austenitic Stainless Steels for the Foodservice Industry – reprinted from FCSI's The Consultant magazine *New!*

Stainless Steel World 2006 Paper: Lean Substitutions Options for 300 Series Alloys and Commercially Pure Titanium. *New!*

Why Make The Switch To Type 201 Stainless Steel – reprinted from MAFSI's OutFront Magazine

Stainless Steel World Paper: AL 201HP™ (UNS S20100) Alloy: A High-Performance, Lower-Nickel Alternative To 300 Series Alloys

The Case for AL 201HP™ Substitution

AL 201HP™ Brochure

Guide To Selecting Lower Nickel Alternatives to Type 304 Stainless Steel

Technical Data
Bluesheet

Surcharge

OSHA

Product by Alloy:

201HP™