

INCOLOY® alloy 832 is a low cost stainless steel developed specifically for domestic and industrial sheathed heater applications. With specific chemistry additions to ensure satisfactory formation of a protective and aesthetically pleasing surface oxide film, it can replace, for example, Type 309 stainless steel, or the more expensive, higher nickel products such as INCOLOY alloys 800 or 840 (if cost is the only consideration).

The alloy exhibits excellent thermal stability and good resistance to hot salt corrosion, and to pitting. It is readily formed and has excellent weldability, making it suitable for use on high output continuous strip welding machines.

Physical Constants

Table 2 - Physical constants

Density, lb/in ³	0.280
g/cm ³	7.75

Electrical Resistivity

Table 4 - Electrical Resistivity Values^a
0.100-in Cold-Rolled Plate

Temperature °C	Electrical Resistivity μΩ•cm	Temperature °F	Electrical Resistivity ohm•circ mil/ft
22	80.28	72	482.91
93	84.61	200	508.95
204	90.80	400	546.19
315	96.00	600	577.47
427	101.01	800	607.60
538	106.01	1000	637.68
649	110.60	1200	665.29
760	114.93	1400	691.34

^aTests were conducted in accordance with ASTM B-63.

Room-Temperature Mechanical Properties

Table 6 - Room-Temperature Mechanical Properties^a

0.2% Proof Strength		Ultimate Tensile Strength		Elongation %	Hardness Fb
ksi	MPa	ksi	MPa		
52.8	364	101.6	762	37.5	82.3

^aProperties were determined on 0.0192-in. (0.50-mm) thick strip material with an ASTM grain size of 10.5-11.0.

Table 1 - Limiting Chemical Composition, %

Nickel.....	8.75-15.5
Chromium.....	19.5-21.0
Molybdenum.....	0.4
Iron.....	Balance
Aluminum.....	0.15
Manganese.....	0.4
Titanium.....	0.4
Copper.....	0.75 max.
Silicon.....	0.7
Carbon.....	0.05 max.
Sulfur.....	0.005 max.

Coefficient of Thermal Expansion

Table 3 - Coefficient of Thermal Expansion (ASTM E 228)
0.100-in Cold-Rolled Plate, Ref Temperature=25°C (77°F)

Temperature °C	Coefficient of Expansion 10 ⁻⁶ cm/cm/°C	Temperature °F	Coefficient of Expansion 10 ⁻⁶ in./in./°F
100	16.61	200	9.22
200	16.78	400	9.33
300	17.02	600	9.47
400	17.26	800	9.63
500	17.45	1000	9.72
600	17.69	1200	9.81
700	17.48	1400	9.73

Other Physical Properties

Table 5 - Other Physical Properties

Temperature °C	Thermal Diffusivity cm ² /sec	Specific Heat W•s/g•K	Thermal Conductivity W/cm•K
23	0.0385	0.472	0.14189
50	0.0392	0.482	0.14753
100	0.0401	0.497	0.15561
200	0.0421	0.521	0.17127
300	0.0440	0.540	0.18552
400	0.0460	0.556	0.19970
500	0.0479	0.572	0.21393
600	0.0500	0.585	0.22839
700	0.0519	0.597	0.24193
800	0.0538	0.608	0.25541
900	0.0558	0.618	0.26926
1000	0.0578	0.626	0.28252
1100	0.0599	0.634	0.29653
1150	0.0607	0.638	0.30238

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High-Temperature Oxidation

The oxidation behavior of INCOLOY alloy 832 is compared to other commonly used sheathing alloys in Table 7 and Figures 1 and 2.

Table 7 - Mass Change after Cycling 0.01-in. thick Cold-Rolled & Annealed Sheet Coupons in Air at 900°C (1652°F)^a

Alloy	Depth of Oxidation, inches	Final Mass Change, mg/cm ²	Number of Cycles
800	0.0001	0.96	1001
316	0.0005	-3.82	1001
840	0.0010	0.90	1001
832	0.0011	0.62	1001
803	0.0013	1.33	1001
321	0.0030	-4.93	408

^aOne cycle involved 15 minutes in the furnace followed by 5 minutes cooling in ambient air.

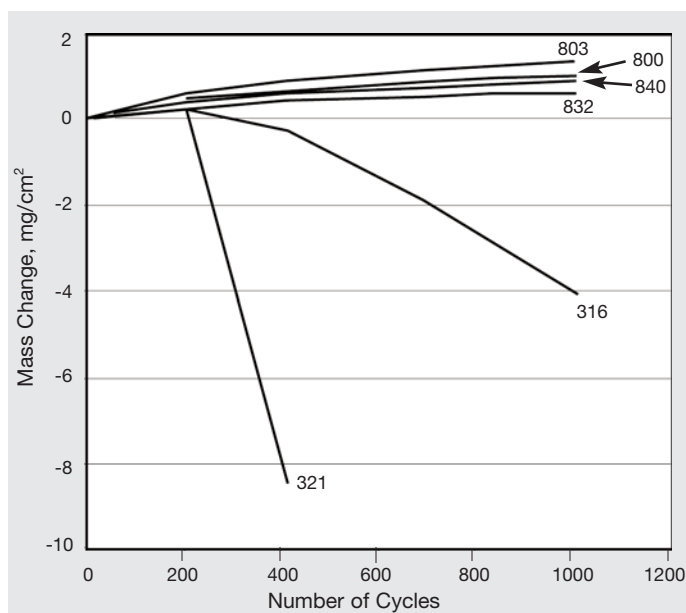


Figure 2. Mass change after cycling 0.01-in. thick cold-rolled & annealed sheet coupons in air at 900°C (1652°F). One cycle involved 15 minutes in the furnace followed by 5 minutes cooling in ambient air.

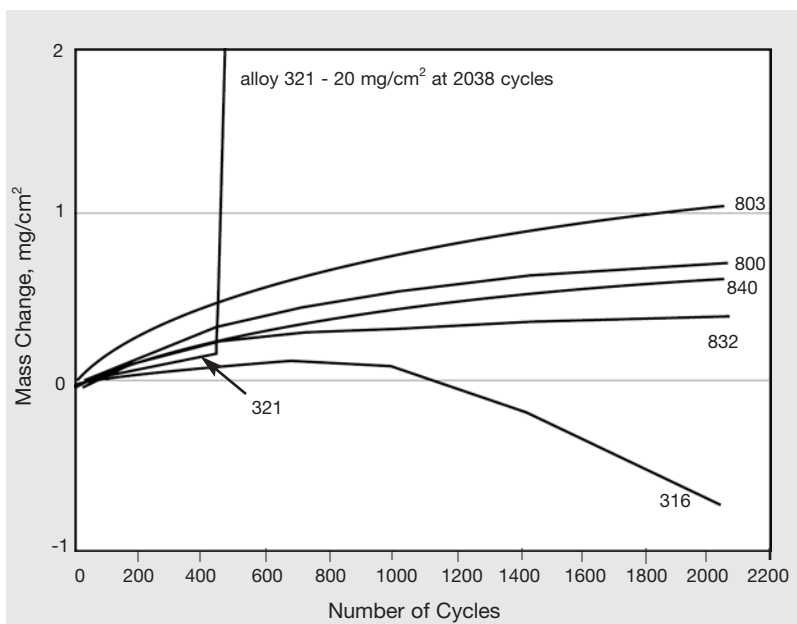


Figure 1. Mass change after cycling 0.01-in. thick cold-rolled & annealed sheet coupons in air at 850°C (1562°F). One cycle involved 15 minutes in the furnace followed by 5 minutes cooling in ambient air.

Welding

It is essential that there is no trace of oil, grease or other organic matter present on the strip prior to welding. Autogeneous TIG welds can be made on continuous strip welding machines. Resistance welds are also possible. The strip would normally be in the annealed condition prior to welding. For specific advice on welding matters, refer to Special Metals Publication: "Joining" on our website, www.specialmetals.com. Also visit Special Metals Welding Products Company at www.specialmetalswelding.com.

Available Products and Specifications

INCOLOY alloy 832 is available as cold-rolled strip.

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