

HASTELLOY® C-2000® alloy

CHEMISTRY: Weight %

Ni	Cr	Mo	Cu	Fe	Co	Si	C
59 ^a	23	16	1.6	3*	2*	0.08*	0.01*

^a As Balance * Maximum

ALLOY DESCRIPTION:

HASTELLOY C-2000 alloy brings a new dimension to the well known versatility of Ni-Cr-Mo alloys in resisting corrosion under widely varying conditions. Combining outstanding resistance to oxidizing media with superior resistance to reducing environments, C-2000 alloy represents a true performance breakthrough for chemical process equipment applications.

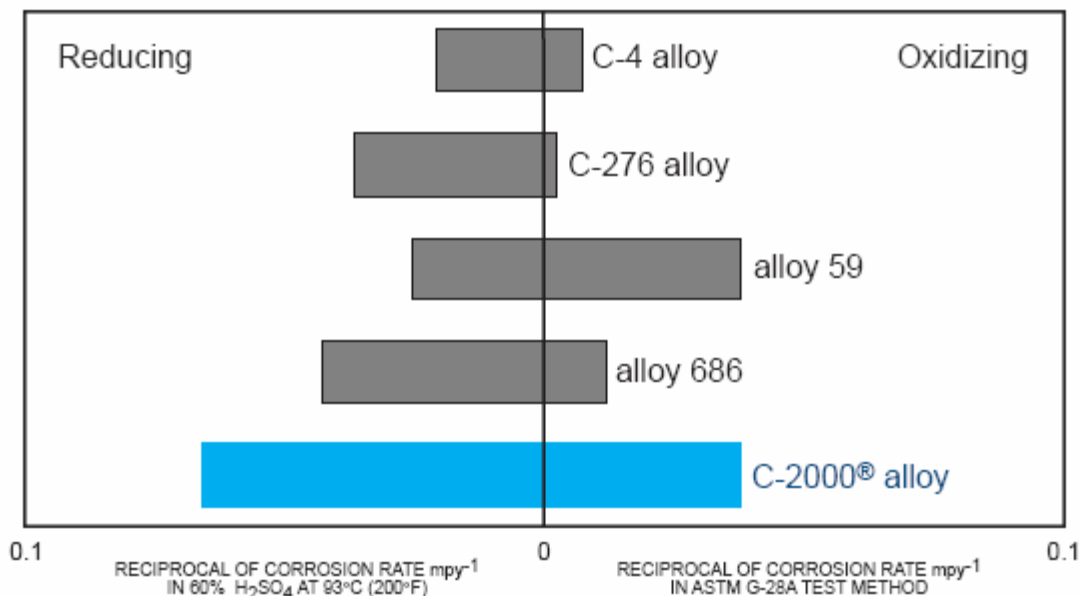
Previously, attempts to fully optimize the corrosion resistance of Ni-Cr-Mo alloys have been unsuccessful. A high chromium content is required for resistance to oxidizing media, such as when ferric ions, cupric ions or dissolved oxygen are present. Reducing environments, however, such as dilute hydrochloric or sulfuric acids, require a high content of molybdenum plus tungsten. Metallurgical stability limitations dictate that you cannot optimize both.

HASTELLOY C-2000 alloy solves this alloy design dilemma. A high chromium content is combined with both molybdenum and copper contents, sufficient to provide outstanding resistance to reducing environments, with no sacrifice of metallurgical stability.

C-2000 alloy also exhibits pitting resistance and crevice corrosion resistance superior to the industry standard, C-276 alloy. Its forming, welding and machining characteristics are similar to C-276 alloy.

HASTELLOY C-2000 alloy is available as sheet, plate, bar, wire, tubular products and forging stock.

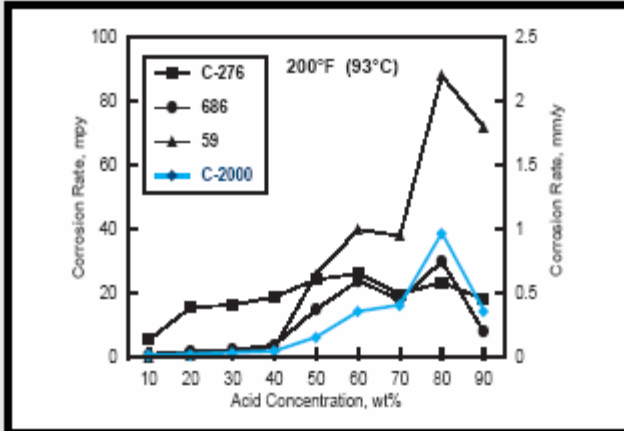
Ni-Cr-Mo Alloy Application Ranges



HASTELLOY® C-2000® alloy

CORROSION RESISTANCE:

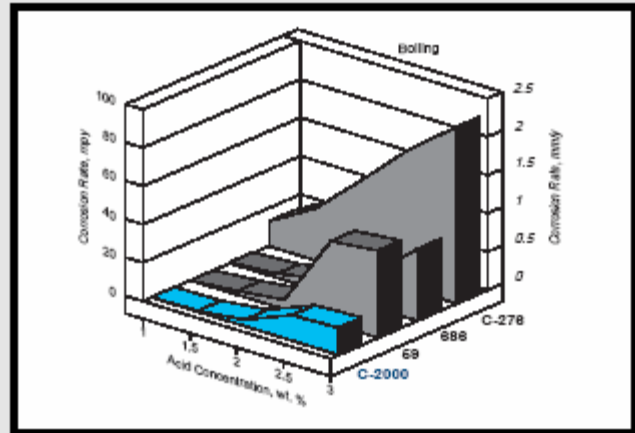
SULFURIC ACID:



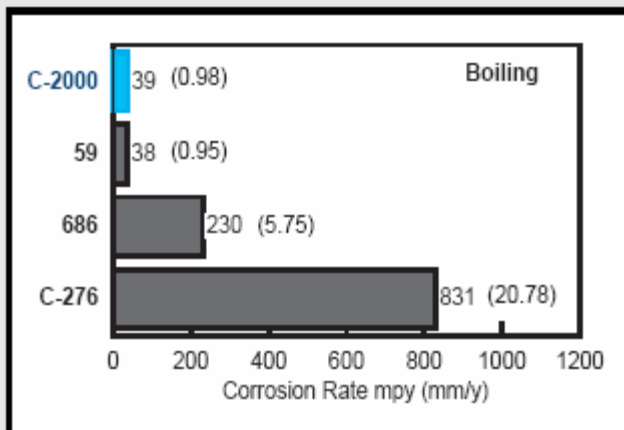
In hot, reducing (0 to 60 wt. percent) sulfuric acid, **C-2000 alloy** is up to an order of magnitude better than the industry standard, C-276 alloy.

HYDROCHLORIC ACID:

C-2000 alloy also possesses the highest resistance of any Ni-Cr-Mo alloy to boiling, dilute hydrochloric acid. While the corrosion rate for C-276 alloy exceeds 20 mpy (0.5 mm/y) at between 1 and 1.5 wt. percent, **C-2000 alloy** provides good resistance up to a concentration of 3 wt. percent.



65% NITRIC ACID:



In oxidizing media, such as nitric acid, and solutions containing ferric ions, cupric ions or dissolved oxygen, **C-2000 alloy**, with its high (23 wt. percent) chromium content, exhibits excellent resistance.

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UNIFORM CORROSION RESISTANCE:

Media	Corrosion Rate			
	C-2000		C-276	
	mpy	mm/y	mpy	mm/y
ASTM G-28A, Boiling*	26	0.65	250	6.25
ASTM G-28B, Boiling**	4	0.10	55	1.37
20% HF, 79°C	19	0.47	32	0.80
50% H ₃ PO ₄ , Boiling	1	0.02	7	0.17
75% H ₃ PO ₄ , Boiling	33	0.83	51	1.27
99% Acetic, Boiling	<0.1	<0.01	<0.1	<0.01
88% Formic, Boiling	0.4	0.01	1.4	0.03
10% Chromic, Boiling	44	1.10	62	1.55

* G-28A; 50% H₂SO₄+42g/l Fe₂(SO₄)₃, boiling

** G-28B; 23% H₂SO₄+1.2% HCl+1% FeCl₃+1%CuCl₂, boiling

LOCALIZED CORROSION RESISTANCE:

CRITICAL PITTING TEMPERATURE:

11.5% H₂SO₄+1.2%HCl+1%FeCl₃+1%CuCl₂

Alloy	Temperatures	
	°C	°F
C-2000	110	230
C-276	105	221
C-4	90	194

CRITICAL CREVICE TEMPERATURE:

4%NaCl+0.1% Fe₂(SO₄)₃+0.01M HCl

Alloy	Temperatures	
	°C	°F
C-2000	95	203
C-276	60	140
C-4	50	122

STRESS-CORROSION CRACKING RESISTANCE:

45% MgCl₂, 154°C (309°F)

Alloy	Time to Failure
	Hours
C-2000	>1008*
C-276	>1008*
20CB-3	6
316LSS	3

* No cracking

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TYPICAL ROOM TEMPERATURE TENSILE PROPERTIES:

Thickness inch	Ultimate Tensile Strength		Yield Strength at 0.2% Offset		Elongation in 2 in. %
	Ksi	MPa	Ksi	MPa	
0.063	109.0	752	52.0	358	64.0
0.125	111.0	765	57.0	393	63.0
0.250	113.0	779	55.0	379	62.0
0.500	110.0	758	50.0	345	68.0
1.00	109.0	752	54.0	372	63.0

PHYSICAL PROPERTIES:

	Temp., °F	British Units	Temp., °C	Metric Units
Density	Room	0.307 lb/in ³	Room	8.50 g/cm ³
Thermal Conductivity	Room	63 BTU-in/ft ² -hr-°F	Room	9.1 W/m-K
	200	74 BTU-in/ft ² -hr-°F	100	10.8 W/m-K
	600	99 BTU-in/ft ² -hr-°F	300	14.1 W/m-K
	1000	133 BTU-in/ft ² -hr-°F	500	18.0 W/m-K
	1400	180 BTU-in/ft ² -hr-°F	700	24.8 W/m-K
	1800	191 BTU-in/ft ² -hr-°F	900	25.9 W/m-K
Mean Coefficient of Thermal Expansion	77-200	6.9 µin/in-°F	25-100	12.4 µm/m-°C
	77-600	7.0 µin/in-°F	25-300	12.6 µm/m-°C
	77-1000	7.4 µin/in-°F	25-500	13.2 µm/m-°C
	77-1400	8.0 µin/in-°F	25-700	14.0 µm/m-°C
	77-1800	8.5 µin/in-°F	25-900	15.0 µm/m-°C
Electrical Resistivity	Room	50.6 µohm-in	Room	128 µohm-cm
	200	50.8 µohm-in	100	129 µohm-cm
	600	51.6 µohm-in	300	131 µohm-cm
	1000	52.9 µohm-in	500	134 µohm-cm
	1400	52.4 µohm-in	700	134 µohm-cm
	1800	51.8 µohm-in	900	132 µohm-cm

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