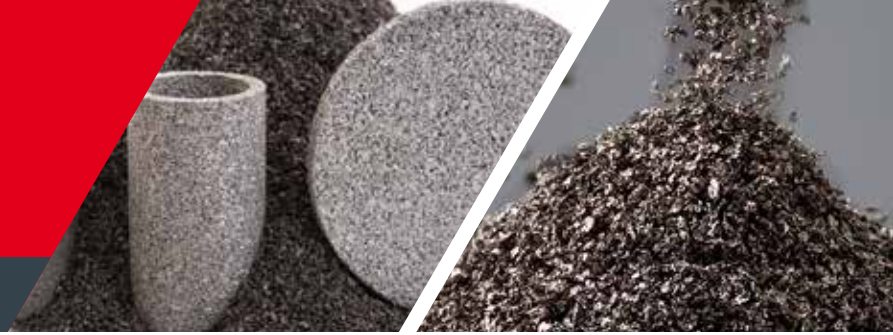


HASTELLOY® X POWDER

TECHNICAL DATASHEET



HASTELLOY® X POWDER

AMETEK offers several different Hastelloy® alloys in powder form, including but not limited to C-22, C-276, B, and X alloys. They are nickel based and used in applications where the corrosion resistance or service temperature of stainless steels is insufficient.

HASTELLOY® X

Hastelloy® X (UNS N06002) (W86002) is one of the original nickel superalloys. It has excellent fabricability and weldability for a high temperature nickel alloy, and is used in sintered metal filters and coatings applications where prolonged exposure above roughly 1200°F / 650°C is expected.

Hastelloy® X is a nickel-chromium-iron-molybdenum alloy that possesses exceptional high- temperature strength and oxidation resistance. It also displays outstanding resistance to stress- corrosion cracking in petrochemical applications.

The alloy is ductile and has excellent formability properties after long exposure at temperatures above 1200°F / 650°C for 16,000 hours.

It can be hot-worked and is also easily formed by cold working. To restore the optimum balance of properties, all hot- or cold- worked parts should be annealed and cooled quickly.

MARKETS

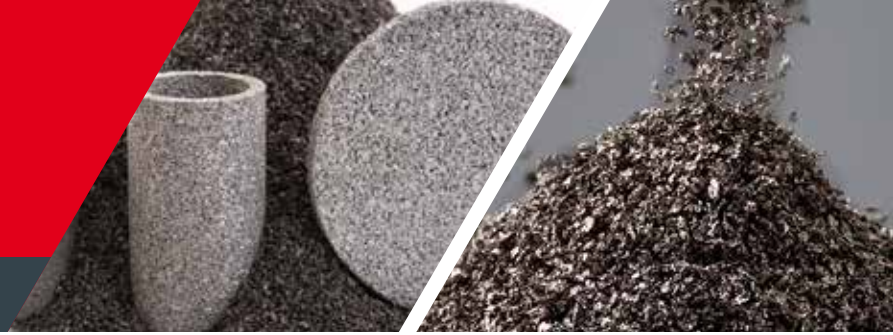
- Chemical Process
- Oil & Gas
- Geothermal
- LNG (Liquefied Natural Gas)
- Petrochemical
- Pharmaceutical
- Sea Water
- Nuclear Power

CHEMICAL COMPOSITION %

Alloy	Ni	Co	Cr	Mo	Fe	W	Mn	V	Si	C	Cu	Nb	B	Al	Ti	Ta	Zr
X	47 bal	1.5 max	22	9	18	0.6	1 max	-	1 max	0.1	-	0.5 max	0.008 max	0.5 max	0.15 max	-	-

HASTELLOY® X POWDER

TECHNICAL DATASHEET



HASTELLOY® X BULK PROPERTIES

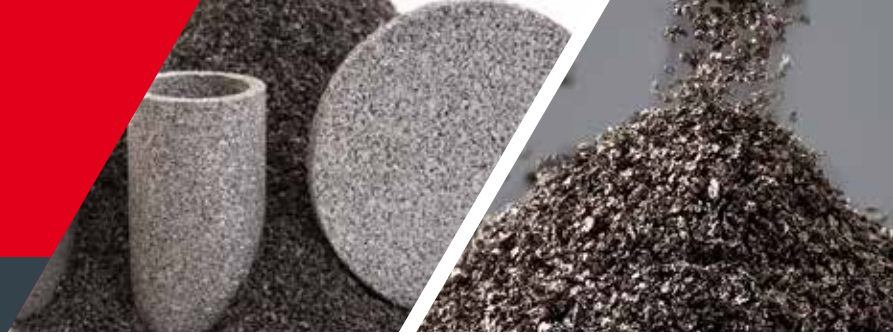
PHYSICAL PROPERTIES				
Physical Property	Imperial units		Metric Units	
Density	72°F	0.297 lb/in ³	22°C	8.22 g/cm ³
Melting Range	2300 - 2470 °F		1260 - 1355°C	
Electrical Resistivity	-400°F	43.8 μohm-in	-250°C	16.86 μohm-cm
	-300°F	43.2 μohm-in	-200°C	16.96 μohm-cm
	-200°F	43.8 μohm-in	-150°C	17.14 μohm-cm
	-100°F	44.3 μohm-in	-100°C	17.34 μohm-cm
	0°F	45.0 μohm-in	-50°C	17.55 μohm-cm
	75°F	45.4 μohm-in	25°C	17.87 μohm-cm
Thermal Conductivity	70°F	63 Btu-in/ft. ² h-°F	25°C	9.2 W/m-°C
	200°F	76 Btu-in/ft. ² h-°F	100°C	11.2 W/m-°C
	500°F	98 Btu-in/ft. ² h-°F	200°C	14.1 W/m-°C
	1100°F	144 Btu-in/ft. ² h-°F	600°C	20.9 W/m-°C
	1200°F	151 Btu-in/ft. ² h-°F	650°C	21.9 W/m-°C
	1300°F	159 Btu-in/ft. ² h-°F	700°C	22.8 W/m-°C
	1400°F	166 Btu-in/ft. ² h-°F	750°C	23.8 W/m-°C
	1500°F	174 Btu-in/ft. ² h-°F	800°C	24.7 W/m-°C
	1600°F	182 Btu-in/ft. ² h-°F	850°C	25.7 W/m-°C
1700°F	189 Btu-in/ft. ² h-°F	900°C	26.7 W/m-°C	
Specific Heat	RT	0.116 Btu/lb.-°F	RT	486 J/kg-°C
	200°F	0.117 Btu/lb.-°F	100°C	487 J/kg-°C
	400°F	0.118 Btu/lb.-°F	200°C	484 J/kg-°C
	600°F	0.119 Btu/lb.-°F	300°C	491 J/kg-°C
	800°F	0.123 Btu/lb.-°F	400°C	507 J/kg-°C
	1000°F	0.130 Btu/lb.-°F	500°C	531 J/kg-°C
	1200°F	0.139 Btu/lb.-°F	600°C	564 J/kg-°C
	1400°F	0.151 Btu/lb.-°F	700°C	606 J/kg-°C
	1600°F	0.167 Btu/lb.-°F	800°C	657 J/kg-°C
	1800°F	0.186 Btu/lb.-°F	900°C	716 J/kg-°C
2000°F	0.205 Btu/lb.-°F	1000°C	784 J/kg-°C	

RT = Room Temperature

Data shown for Physical Properties sourced from Haynes International, Inc.

HASTELLOY® X POWDER

TECHNICAL DATASHEET



HASTELLOY® X BULK PROPERTIES (CONTINUED)

PHYSICAL PROPERTIES				
Physical Property	Imperial units		Metric Units	
Mean Coefficient of Thermal Expansion	79 - 200°F	7.7 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 100°C	13.9 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1000°F	8.4 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 500°C	15.0 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1200°F	8.6 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 600°C	15.3 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1350°F	8.8 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 700°C	15.7 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1400°F	8.9 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 750°C	15.9 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1500°F	8.9 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 800°C	16.0 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1600°F	9.1 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 850°C	16.2 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1650°F	9.1 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 900°C	16.4 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
	79 - 1800°F	9.2 $\mu\text{in}/\text{in.}\cdot^{\circ}\text{F}$	26 - 975°C	16.6 $10^{-6} \text{ m}/\text{m}\cdot^{\circ}\text{C}$
Dynamic Modulus of Elasticity	RT	29.8 x 10^6 psi	RT	205 GPa
	200°F	29.4 x 10^6 psi	100°C	202 GPa
	400°F	28.6 x 10^6 psi	200°C	198 GPa
	600°F	27.8 x 10^6 psi	300°C	192 GPa
	800°F	26.7 x 10^6 psi	400°C	187 GPa
	1000°F	25.8 x 10^6 psi	500°C	180 GPa
	1200°F	24.7 x 10^6 psi	600°C	173 GPa
	1400°F	23.3 x 10^6 psi	700°C	165 GPa
	1600°F	22.2 x 10^6 psi	800°C	157 GPa
	1800°F	20.4 x 10^6 psi	900°C	148 GPa
Poisson's Ratio	-108°F	0.328	-78°C	0.328
	72°F	0.32	22°C	0.32
Magnetic Permeability	RT	1.002 at 200 oersteds (15,900 A/m)		

RT = Room Temperature

Data shown for Physical Properties sourced from Haynes International, Inc.

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