High Performance
Nickel-Chromium-Molybdenum Heat and Corrosion Resistant Alloy

Alloy 625

Alloy 625 Product Description

Nickel-chromium-molybdenum alloy 625 is a material with excellent resistance to pitting, crevice and corrosion cracking. Highly resistant in a wide range of organic and mineral acids. Good high temperature strength.

Specifications	
Form	**Standard**
Metal Type	UNS N06625
Bar	ASTM B446 AMS 5666 BS3076
Wire	AMS 5837
Sheet	ASTM B443 AMS 5599 BS3072
Plate	ASTM B443 AMS 5599 BS3072
Pipe	ASTMB444 ASTM B704 AMS 5581 BS3074 GEB50TF133
Tube	ASTM B444 ASTM B704 AMS 5581 BS3074 GEB50TF133
Fitting	ASTM B366 Din 17754
Forging	
Weld Wire	
Weld Electrode	
NA 21	All forms
Din	2.4856

High Performance Alloys can make hot rolled, cold worked, and strain hardened high performance stainless steel bars in-house.

Ask for our GFM Bulletin for more information about our bar processing capabilities. We have expanded to enhance product availability.

HPA has a full line of high strength nickel based alloys.

Questions?
Call (800)HPALLOY

Chemical Requirements							
	Ni	**Fe**	**Cr**	**Si**	**Mo**	**Mn**	**C**
Max		5.0	23.0	0.50	10.0	0.50	0.10
Min	58.0		20.0		8.0		

Characteristics

- Excellent mechanical properties at both extremely low and extremely high temperatures.
- Outstanding resistance to pitting, crevice corrosion and intercrystalline corrosion.
- Almost complete freedom from chloride induced stress corrosion cracking.
- High resistance to oxidation at elevated temperatures up to 1050°C.
- Good resistance to acids, such as nitric, phosphoric, sulfuric and hydrochloric, as well as to alkalis makes possible the construction of thin structural parts of high heat transfer.

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Any questions or comments can also be sent via E-Mail to:
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Room Temperature Mechanical Properties					
	Ultimate Tensile	Yield Strength (0.2% OS)	Elong. in 2 in. or 50mm or 4D, min., %	R/A	Hardness Brinell
Cold Worked/Annealed					
Min	120 KSi	60 KSi	30	40	145
Max	150 KSi	95 KSi	60	60	220
Min					
Max					

Machining

Nickel & cobalt base corrosion, temperature and wear-resistant alloys are classified as moderate to difficult when machining, however, it should be emphasized that these alloys can be machined using conventional production methods at satisfactory rates. During machining these alloys work harden rapidly, generate high heat during cutting, weld to the cutting tool surface and offer high resistance to metal removal because of their high shear strengths. The following are key points which should be considered during machining operations:

CAPACITY - Machine should be rigid and overpowered as much as possible.

RIGIDITY - Work piece and tool should be held rigid. Minimize tool overhang.

TOOL SHARPNESS - Make sure tools are sharp at all times. Change to sharpened tools at regular intervals rather than out of necessity. A 0.015 inch wear land is considered a dull tool.

TOOLS - Use positive rake angle tools for most machining operations. Negative rake angle tools can be considered for intermittent cuts and heavy stock removal. Carbide-tipped tools are suggested for most applications. High speed tools can be used, with lower production rates, and are often recommended for intermittent cuts.

POSITIVE CUTS - Use heavy, constant, feeds to maintain positive cutting action. If feed slows and the tool dwells in the cut, work hardening occurs, tool life deteriorates and close tolerances are impossible.

LUBRICATION - lubricants are desirable. Soluble oils are recommended especially when using carbide tooling. Detailed machining parameters are presented Tables 16 and 17. General plasma cutting recommendations are presented in Table 18.

Alloy 625

Recommended Tool Types and Machining Conditions

Operations	Carbide Tools
Roughing, with severe interruption	Turning or Facing C-2 and C-3 grade: Negative rake square insert, 45 degree SCEA1, 1/32 in. nose radius. Tool holder: 5 degree neg. back rake, 5 degree neg. side rake. Speed: 30-50 sfm, 0.004-0.008 in. feed, 0.150 in depth of cut. Dry2, oil3, or water-base coolant4.
Normal roughing	Turning or Facing C-2 or C-3 grade: Negative rate square insert, 45 degree SCEA, 1/32 in nose radius. Tool holder: 5 degree neg. back rake, 5 degree neg. side rake. Speed: 90 sfm depending on rigidity of set up, 0.010 in. feed, 0.150 in. depth of cut. Dry, oil, or water-base coolant.
Finishing	Turning or Facing C-2 or C-3 grade: Positive rake square insert, if possible, 45 degree SCEA, 1/32 in. nose radius. Tool holder: 5 degree pos. back rake, 5 degree pos. side rake. Speed: 95-110 sfm, 0.005-0.007 in. feed, 0.040 in. depth of cut. Dry or water-base coolant.
Rough Boring	C-2 or C-3 grade: If insert type boring bar, use standard positive rake tools with largest possible SCEA and 1/16 in. nose radius. If brazed tool bar, grind 0 degree back rake, 10 degree pos. side rake, 1/32 in. nose radius and largest possible SCEA. Speed: 70 sfm depending on the rigidity of setup, 0.005-0.008 in. feed, 1/8 in. depth of cut. Dry, oil or water-base coolant.
Finish Boring	C-2 or C-3 grade: Use standard positive rake tools on insert type bars. Grind brazed tools as for finish turning and facing except back rake may be best at 0 degrees. Speed: 95-110 sfm, 0.002-0.004 in feed. Water-base coolant.
Facing Milling	Carbide not generally successful, C- grade may work. Use positive axial and radial rake, 45 degree corner angle, 10 degree relief angle. Speed: 50-60 sfm. Feed: 0.005-0.008 in. Oil or waterbase coolants will reduce thermal shock damage of carbide cutter teeth.
End Milling	Not recommended, but C-2 grades may be successful on good setups. Use positive rake. Speed: 50-60 sfm. Feed: Same as high speed steel. Oil or water-base coolants will reduce thermal shock damage.
Drilling	C-2 grade not recommended, but tipped drills may be successful on rigid setup if no great depth. The web must thinned to reduce thrust. Use 135 degree included angle on point. Gun drill can be used. Speed: 50 sfm. Oil or water-base coolant. Coolant-feed carbide tipped drills may be economical in some setups.
Reaming	C-2 or C-3 grade: Tipped reamers recommended, solid carbide reamers require vary good setup. Tool geometry same as high speed steel. Speed: 50 sfm. Feed: Same as high speed steel.
Tapping	Not recommended, machine threads, or roll-form them.
Electrical Discharge Machining	The alloys can be easily cut using any conventional electrical discharge machining system (EDM) or wire (EDM).

Notes:

1. SCEA - Side cutting edge angle or lead angle of the tool.
2. At any point where dry cutting is recommended, an air jet directed on the tool may provide substantial tool life increases. A water-base coolant mist may also be effective.
3. Oil coolant should be premium quality, sulfochlorinated oil with extreme pressure additives. A viscosity at 100 degrees F from 50 to 125 SSU.
4. Water-base coolant should be premium quality, sulfochlorinated water soluble oil or chemical emulsion with extreme pressure additives. Dilute with water to make 15:1 mix. Water-base coolant may cause chipping and rapid failure of carbide tools in interrupted cuts.
5. M-40 series High Speed Steels include M-41 , M-42, M-43, M-44, M-45 and M-46 at the time of writing. Others may be added and should be equally suitable.
6. Oil coolant should be a premium quality, sulfochlorinated oil with extreme pressure additives. A viscosity at 100 degree F from 50 to 125 SSU.
7. Water-base coolant should be premium quality, sulfochlorinated water soluble oil or chemical emulsion with extreme pressure additives. Dilute with water to make 15:1 mix.

Plasma Arc Cutting

Our alloys can be cut using any conventional plasma arc cutting system. The best arc quality is achieved using a mixture of argon and hydrogen gases. Nitrogen gas can be substituted for hydrogen gases, but the cut quality will deteriorate slightly. Shop air or any oxygen bearing gases should be avoided when plasma cutting these alloys.

About High Performance Alloys

High Performance Alloys offers distribution and production of bar, sheet, plate, forgings, fasteners, and formed angles. Browse through the materials, products, and services that we offer. Stocking many grades of materials: Hastelloy®, Inconel®, Nitronic®, Cobalt based alloys such as Stellite®, and L605, and Commercially Pure Nickel grades. Call us toll free in the USA for your stock and production material requirements at 800-HPALLOY.

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ISO 9001
Registered

An ISO 9001:2015 Registered Manufacturer & Distributor of Super Alloys

We manufacture custom items, special grades and tempers. Ask our technical department for assistance today. Our forging processes allow manufacturing many difficult to produce alloys. We have put material into naval, aerospace and space applications. In-house open die forging of super alloy, Nickel alloys, and super stainless items. This expands our range of production up through 12" diameter, and 18" wide. Part sizes from 20 lbs to 3000 lbs produced in our Tipton facility, allowing greater scheduling flexibility and control for our customers.

Require custom plate or sheet size? We can help there as well. We rolled over 50 tons of our own plate and sheet last year. If your requirement is for a small cold rolled item see information on our Rolling Capability, including cold rolled rounds, squares and flats. Our GFM Rotary Forge capabilities, including round, square and flat configurations for cold or hot working materials.

One piece to mill quantities, and everything in between. As a secondary producer as well as a distributor of high performance alloys, HPAlloys can help solve your corrosion, temperature and wear problems. How can we serve you today?

Bar Stock, Flat Stock and Depot Material available.

Alloy 625

(UNS N06625)

Ni 58.0, Cr 21.5 Mo 9.0,Mn 0.50 C0.10
Si 0.50 Fe 5.0

High Performance Alloys stocks and produces this grade in the following forms: Bar, wire, sheet, plate, coil, fasteners and forgings. See our on-line catalog for sizes stocked.

Applications

- Components where exposure to sea water and high mechanical stresses are required.
- Oil and gas production where hydrogen sulfide and elementary sulfur exist at temperature in excess of 150°C.
- Components exposed to flue gas or in flue gas desulfurization plants.
- Flare stacks on offshore oil platforms.
- Hydrocarbon processing from tar-sand and oil-shale recovery projects.

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