



## Specifications

Form	Standard
Metal Type	UNS N07718
Bar	ASTM B637 AMS 5662 AMS 5663 AMS 5664 PWA 1009 PWA 1010 GE B50TF15
Wire	AMS 5832
Sheet	ASTM B670 AMS 5596 AMS 5597 PWA 1033 GE B50TF14 ASTM B670 ASTM B637
Plate	ASTM B670 AMS 5596 AMS 5597 PWA 1033 GE B50TF15 ASTM B670 ASTM B637
Tube	AMS 5589 AMS 5590
Pipe	AMS 5589 AMS 5590
Fitting	
Forging	ASTM B637 AMS 5562 AMS 5663 AMS 5664 PWA 1009 PWA 1010 GE B50TF15
Weld Wire	A5.14 ERNiFeCr-2
Weld Electrode	
Din	2.4668

## Machinability Ratings

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 on Page 3.

*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.*

## Recommended Tool Types and Machining Conditions

Operations	Carbide Tools
<b>Roughing, with severe interruption</b>	Turning or Facing C-2 and C-3 grade: Negative rake square insert, 45 degree SCEA, 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. Dry, oil, or water-base coolant.
<b>Normal roughing</b>	Turning or Facing C-2 or C-3 grade: Negative rake 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.
<b>Finishing</b>	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.
<b>Rough Boring</b>	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.
<b>Finish Boring</b>	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.
<b>Drilling</b>	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.
<b>Reaming</b>	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.
<b>Tapping</b>	Not recommended, machine threads, or roll-form them.

### 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.

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