



# BRODER METALS GROUP MP35N™

MP35N™ is a trademarked grade produced by Latrobe Speciality Steel, a subsidiary of Carpenter Technology in the USA, and the trademark is owned by SPS Technologies Inc.

MP35N™ is a nickel-cobalt alloy which provides a unique combination of properties including ultra high strength, toughness, ductility, and outstanding corrosion resistance.

## **MP35N™ Standards:**

### **High Strength option:**

- AMS 5844 – solution treated and cold drawn bars
- AMS 5845 – solution heat treated, cold drawn and aged bars

### **CRA option:**

NACE MR 01-75 - sulphide stress cracking resistant material for oil field equipment

### **Fastener standard:**

AMS 7468 – bolts and screws, forged head, roll threaded after ageing

The high strength variant of MP35N™ is used in the medical and aerospace industry while material produced for optimum corrosion resistance properties is primarily used in the oil & gas industry. MP35N™ can be used for fasteners, springs, non-magnetic electrical components, instrument parts, valve components, high pressure door fittings, actuators, seals, shafts and other components.

The combination of cold work and ageing temperature determines whether high strength or maximum CRA properties are achieved. Typically for optimum sulphide stress corrosion cracking (SCC) resistance the material is aged at 1300 / 1350 deg F for 4 hours (more strength / slightly less SCC resistance) or at 1425 deg F for 6 hours (higher SCC resistance / less strength)

Material produced for optimum corrosion resistance conforms to NACE MR 0175 / ISO 15166-3 (2015) and offers stress corrosion cracking (SCC) resistance for harsh environments such as hydrogen sulphide, salt water and other chloride environments, as well as resisting attack from mineral acids (nitric, hydrochloric and sulphur). The material has exceptional resistance to crevice and stress corrosion cracking in sea water and other hostile environments.

Highest strength material is often ordered to AMS 5844 with AMS 5845 capability results. This allows material to be machined and then aged at the capability time / temperature to achieve the high strength requirements in finished components.

We hold stock from 12.7 mm (1/2") to 76.2 mm (3"), mainly in the optimum SCC (NACE) condition, along with selected smaller sizes of AMS material. Material can also be supplied as cold drawn tubing on a lead-time.

MP35N™ has a face centred cubic structure matrix of cobalt and nickel, in which chromium and molybdenum are soluble at elevated temperatures. The fcc structure persists upon cooling to room temperature and below.

**Melting:** MP35N™ is produced by vacuum induction melting followed by VAC-ARC remelting to provide exceptional control of chemistry and ingot solidification.

ASTM Grain size is 4 or finer.

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## Chemistry:

Element	Composition
Ni	33 - 37 %
Co	Balance (usually about 35%)
Cr	19 - 21 %
Mo	9 – 10.5%
C	0.025% max
Mn	0.15% max
Si	0.15% max
P	0.015% max
S	0.01% max
Fe	1% max
Ti	1% max
B	0.15% max

## Heat Treatment

Treatment	Temperature	Time	Cooling
Solution Treat	1900 -1925 deg F	4 – 8 hours	Air
Age	AMS 5844 / AMS 5845		
	1000 - 1200 deg F	4 hours	Air
Age	NACE MR 0175		
	1300 deg F	4 hours min	Air
	1350 deg F	4 hours min	Air
	1425 deg F	6 hours min	Air

Note: Exposure to temperatures above the recommended ageing levels may result in a significant (and non-reversible) loss of strength caused by the reversion of the cold worked metallurgical structure to a much softer annealed structure.

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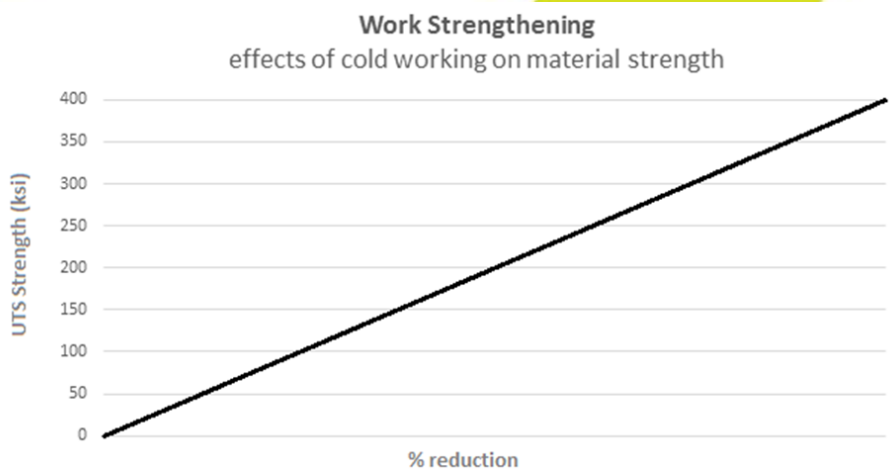
## Mechanicals

Spec (aging time / temp)	Guaranteed minimum properties				
	UTS (ksi)	YS (0.2%) ksi	Elong % (4D)	RA %	HRC (max)
Acc to AMS 5844 / 5845					
Full Strength	260	230	8	35	44
Reduced strength (210 min yield)	220	210	10	45	N/A
Reduced strength (190 min yield)	200	190	10	45	N/A
Acc to NACE MR 0175					
Age 1300 deg F / Time 4 hours	220	210	10	40	51
Age 1350 deg F / Time 4 hours	210	200	10	40	51
Age 1425 deg F / Time 6 hours	190	180	10	40	51

Values are not provided for 1450 deg F / 4 hours. The above are only guaranteed up to 2" dia.

Mechanical Tests are conducted at room temperature in accordance with ASTM E8; hardness in accordance with ASTM E18; Macrotech in accordance with ASTM A604; Grain Size in accordance with ASTM E112.

Shear strength: bar sizes up to 1" (25.4 mm) can be guaranteed to a minimum shear strength of 150 ksi. Bar sizes of a diameter largest than 1" are considered capable of meeting the 150 ksi minimum shear strength value, but this is not guaranteed.



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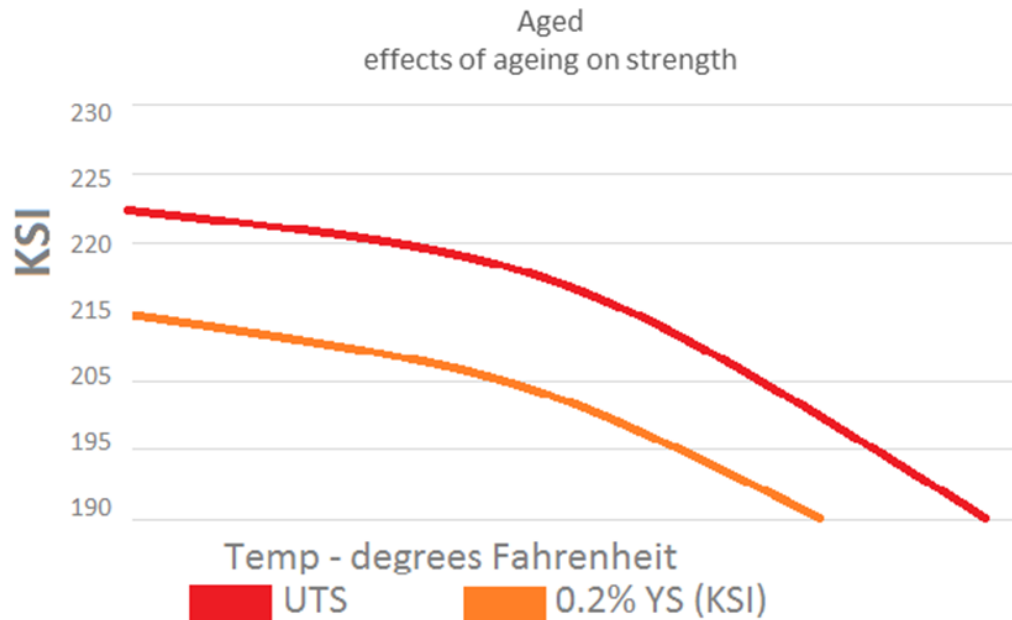


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## Other

Diameter tolerance: +/- 0.003" (0.076 mm)

Density: 8.43 g/cm<sup>3</sup>

We can arrange additional Charpy impact and NDE ultrasonic testing if required.

MP35N is just one of a range of corrosion resistant materials stocked by Broder Metals Group Ltd – please see our website for the full range stocked: [www.broder-metals-group.com](http://www.broder-metals-group.com)

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