LAMINERIES MATTHEY
NOTZ group advanced metal solutions

MP35N®

		DIN	UNS	AISI	LMSA
Designation	**CoNi35Cr20Mo10**	-	R30035	-	**E400**

Chemical composition

Co	Cr	Ni	Mo	Mn	Fe
Balance	19.0 - 21.0	33.0 - 37.0	9.0 - 10.5	0.15 max.	1.0 max.
Si	**C**	**Ti**	**P**	**S**	**B**
0.15 max.	0.025 max.	1.0 max.	0.015 max.	0.010 max.	0.015 max.

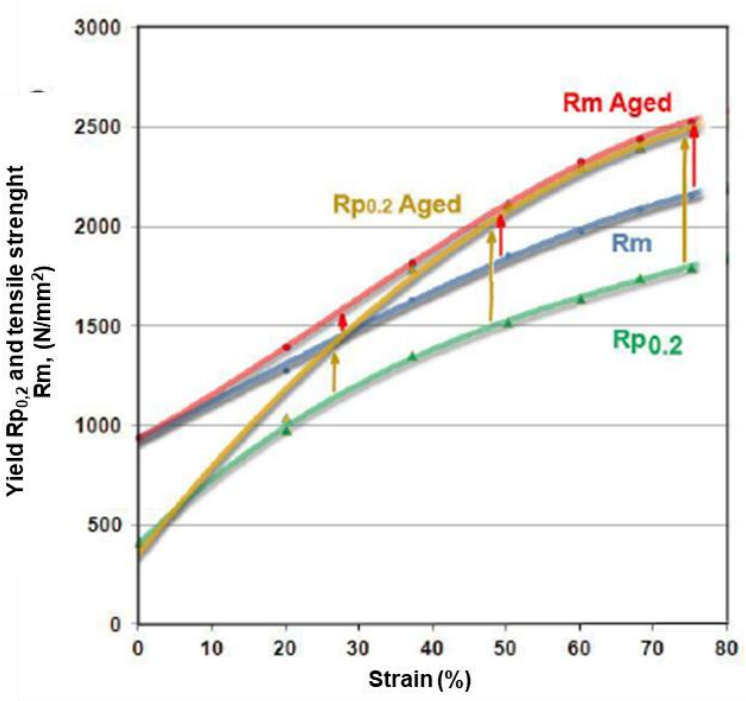
Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precise than the composition indicated.

Main technical properties and features

MP35N® alloy is a multi-phase nickel-cobalt based alloy with a unique range of properties - ultra high strength, toughness, corrosion resistance, biocompatibility and non-magnetic. MP35N® is produced by vacuum induction melting (VIM), followed by vacuum arc remelting (VAR).

MP35N® alloy is included in NACE MR0175 to a maximum hardness of 35 HRC (maximum hardness of 51 HRC in specific cold reduced plus aged conditions). This material requirement lists, sulfide stress cracking resistant for exposure to sour environments, such as in gas and oil well service. MP35N® is suitable for medical implants and orthodontic/prosthetic applications and also respects ASTM F562 / ISO 5832-6 / BS 7252-6 for Surgical Implant Applications. MP35N® resists to corrosion in most mineral acid, hydrogen sulfide and seawater environments whilst exhibiting excellent resistance to stress corrosion cracking and hydrogen embrittlement, even at high strength levels. MP35N® alloy is an extremely noble metal. This can result in galvanic corrosion when electrically coupled with more active metals such as carbon steel and stainless steel.

The annealing temperature of MP35N® is between 1040 - 1150°C in a protective or neutral atmosphere. The strength levels developed by MP35N® alloy are primarily the result of mechanical working, such as cold rolling for sheet and strip products. Both strength and hardness increase in a nearly linear manner with the percentage of cold work. As expected, ductility decreases with higher cold work. However, even with large amounts of deformation, excellent ductility is retained. After cold working, MP35N® alloy can be aged at different temperatures for increased strength. The alloy will respond to aging only if already cold work strengthened. No increase in strength will result from aging annealed material. For optimum mechanical properties, cold rolled MP35N® should be aged at 550 - 600°C for 4 hours, then air cooled. The effect of the cold rolling, followed by hardening at 550°C during 4h is shown on the strength-strain curve.



Lamineries MATTHEY produces the Alloy MP35N® in precision cold-rolled product forms (strip and sheet).

Typical uses

Thanks to its unique combination of properties, MP35N® alloy has been used in a wide variety of applications, such as: fasteners, springs, nonmagnetic electrical components and instrument parts in medical, seawater, oil and gas, chemical and food processing environments and aerospace. MP35N can be effectively used at cryogenic temperatures without embrittlement and maintains its properties at temperatures up to 320°C. This alloy is also suitable for medical implants and orthodontic/prosthetic devices.

Typical manufacturing range

		Thickness (mm)	Width (mm)	Length (mm)
Rolled products	Strip in coils [1]	0.010 - 0.400	1.5 - 200.0	-
	Strip as sheets [1]	0.015 - 0.400	10.0 - 200.0	100 - 3000

[1] Not all our production possibilities are presented here. Other dimensions or product forms available upon request. Some combinations of thicknesses and widths are not possible.

Mechanical properties of strips

Temper		$Rp_{0.2}$ (N/mm^2)	R_m (N/mm^2)	A_{50mm} (%)	Hardness HV
R800	annealed	350 - 650	850 - 1000	30 min.	200 - 270
R1000	¼ hard	650 - 1150	1000 - 1300	15 min.	260 - 410
R1200	½ hard	900 - 1350	1200 - 1500	-	320 - 440
R1500	¾ hard	1150 - 1600	1500 - 1800	-	420 - 530
R1600	hard	1300 - 1850	1600 - 1900	-	450 - 560
R1800	extra hard	1650 min.	1800 min.	-	560 min.

Physical properties

Modulus of elasticity	kN/mm^2	220 - 240 (annealed / cold rolled and aged)
Poisson ratio		0.29
Density	g/cm^3	8.43
Melting point / Melting range	°C	1315 - 1450
Linear dilatation coefficient	10^{-6}·/ °C	12.8 (20 -100°C), 13.7 (20 - 200°C), 14.8 (20 - 320°C)
Thermal conductivity at 20°C	W/m °K	11.3
Electrical resistivity	μΩcm	103
Electrical conductivity	MS/m	0.97
Specific heat at 20°C	J/(kg. K)	502
Magnetic properties		Non-magnetic in soft and cold worked tempers. μ = 1.00092 (annealed - T 25ºC)

Tolerances (strip and foil)

Thickness

The table shown is an outline of our typical thickness tolerances available. They are tighter than industry standards.

Our "LMSA Precision" and "LMSA Extreme" tolerances are available upon request.

Thickness (mm)		Lamineries MATTHEY		
≥	<	LMSA Standard	LMSA Precision	LMSA Extreme
-	0.025	-	-	± 0.001
0.025	0.050	± 0.003	± 0.002	± 0.0015
0.050	0.065	± 0.004	± 0.003	± 0.002
0.065	0.100	± 0.006	± 0.004	± 0.003
0.100	0.125	± 0.008	± 0.006	± 0.003
0.125	0.150	± 0.008	± 0.006	± 0.004
0.150	0.250	± 0.010	± 0.008	± 0.004
0.250	0.300	± 0.012	± 0.008	± 0.005
0.300	0.400	± 0.012	± 0.009	± 0.005
0.400	0.500	± 0.015	± 0.010	± 0.006
0.500	0.600	± 0.020	± 0.012	± 0.007
0.600	0.800	± 0.020	± 0.014	± 0.007
0.800	1.000	± 0.025	± 0.015	± 0.009
1.000	1.200	± 0.025	± 0.018	± 0.012
1.200	1.250	± 0.030	± 0.020	± 0.012
1.250	1.500	± 0.035	± 0.025	± 0.014

Width

Our width tolerances "Standard" is +0.2, -0.0 (or ± 0.1 mm upon request). They are available for slit widths < 125 mm and thicknesses < 1.00 mm. Special tolerances upon request.

Camber

Our tolerance "LMSA Standard" respects the EN Standard 1654 (Length of measurement 1000 mm).
Other tolerances upon request.

Width (mm)		Camber max. (mm/m)			
		LMSA standard		LMSA extreme	
>	≤	≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 0.5 mm
3	6	12	-	6	-
6	10	8	10	4	5
10	20	4	6	2	3
20	250	2	3	1	1.5

Surface

Special surface qualities upon request

Flatness

Special requirement on the longitudinal or transversal flatness upon request

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