Corrosion and Heat Resistant Ni-Based Alloy

MC ALLOY PAT.

[Ni-45Cr-1Mo (mass%)]

MMC SUPERALLOY

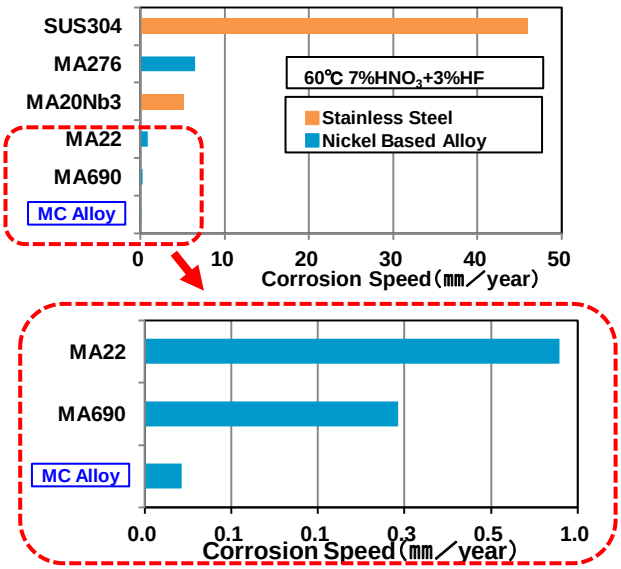
MC Alloy has been developed by our company as a nitric fluoric acid resistant material. This material shows excellent corrosion resistance in an environment of strong oxidizing properties, and the performance of corrosion resistance against nitric fluoric acid excels in the industrial metal material field.

As a heat resistant metal, MC Alloy also shows excellent characteristics against oxidation and high temperature corrosion (sulfur attack・vanadium attack). Corrosion-resistant applications: various pickling equipment, such as hydrofluoric acid plant

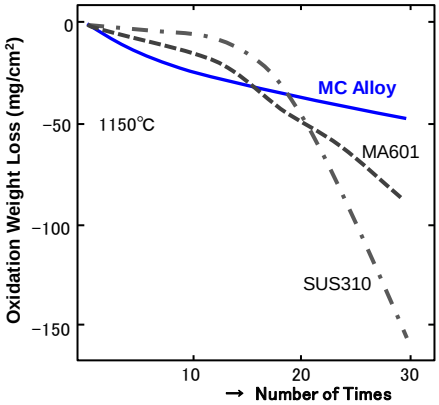
Heat-resistant applications: high-temperature drying trays, such as heavy oil heating furnace thermocouple protection tube

Nitric Fluoric Acid Pickling Tube

【Comparison of corrosion speed】



【Oxidation Resistance】



Repeated Oxidation testing in 1,150℃ atmosphere
Repeated testing process after heating at 1,150℃ for 24 hours, cooled to room temperature and measuring the weight loss.

【Corrosion Speed in nitric fluoric acid (mm/year)】

Testing fluid (Immersion for 24ht)	Temperature	MC	MA690	MA22
17%HNO_3 + 0.1%HF	60℃	**0.001**	0.009	0.024
17%HNO_3 + 3%HF	60℃	**0.042**	0.237	0.864
17%HNO_3 + 10%HF	60℃	**0.268**	1.185	7.775

【Sulfur Attack Data】

Corrosion test results in heavy oil heating furnace (950℃ × 1 Year)

	Corrosion Speed (mm/year)	Loss (mm)
MC	**0.001**	**0.05**
MA 600	0.042	1.50
SUS310S	0.152	0.52

*V：220ppm、Na：60ppm

Available Forms

◆Hot & Cold Rolled Plates/ Sheets ◆Welded Pipes, Seamless Pipes
◆Forgings (Round Bar, Square Bars, Machined parts, etc.) ◆Welding Wires, Structural Wire
◆ Fabricated (assembled) Items (towers, vessels, heat exchangers, pipings, etc.)

Mechanical and Physical Properties of MC Alloy

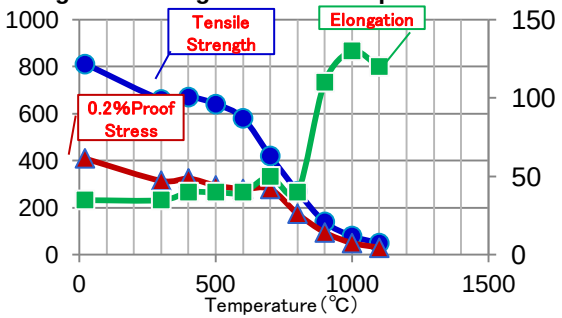
1. Physical Properties（Room Temp）

Density	7.97g / cm^2
Electric Resistance	87.1 μΩ･cm
Thermal Conductivity	13.3 W / (cm ･℃)
Specific Heat	0.107cal / (g ･℃)
Thermal Coefficient of Expansion (20～200℃)	13.8×10^{-6} / ℃

2. Mechanical Properties (Room Temp)

	Tensile Strength (MPa)	0.2%Proof Stress (MPa)	Elongation (%)	Hardness (HV)
1mm	740	380	40	190
12mm	750	380	40	210

3. Elongation Strength at each Temperature



4. Room Temperature Tensile Strength test after 1,000 hours of Heat Solution

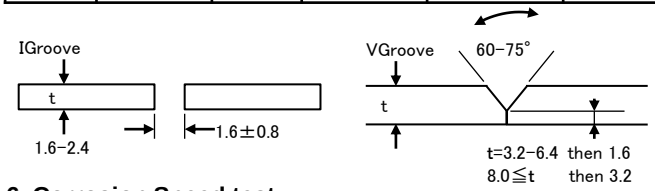
Heat Solution Temp (℃)	Tensile Strength (MPa)	0.2%Proof Stress (MPa)	Elongation (%)	Reduction of Area (%)
None	810	410	35	50
600	1140	920	20	50
700	1010	725	25	60
800	900	535	35	70
900	890	440	40	65
1000	890	415	35	50

・MC Alloy is a registered trademark alloy（No. 4978782, 4360229, etc.）
・Data in this brochure are typical values and is not a guaranteed value.
Physical testing is required for selection of material for individual applications.

5. Welding Process

The weldability of MC Alloy is similar to austenitic stainless steel. It can be easily welded by TIG (inert gas) . The fluidity is somewhat inferior compared to stainless steel, so make sure to take a rather wide groove in welding. Welding this material to other material such as stainless steel is possible. In these cases, we recommend using welding rod of MC Alloy.

Thickness (mm)	Groove shape	Weld Bead	Current (Amp)	Tungsten Electrode Dia (mm)	Welding Rod Dia (mm)
1.6 2.4	I I	1 1-2	50-80 60-100	1.6-2.4 2.4	0.9-2.4 0.9-2.4
3.2 6.4 12.7	V V V	1-2 3 5	80-130 90-150 120-180	2.4 2.4-3.2 3.2	0.9-3.2 0.9-3.2 0.9-6.4



6. Corrosion Speed test

Fluid	Temp (℃)	Corrosion Speed (mm/year)
10%HF+24%HNO_3	Room	0.012
65%HNO_3	Boiling	0.053
15%HF	Room	0.004
32%HF	Room	0.193
50%HF	Room	0.199
5%H_2SO_4	65	0
10%H_2SO_4	65	0
98.5%H_2SO_4	80	0.363
1%HCl	65	0
5%HCl	65	14.6
50%H_3PO_4	Boiling	0.067
70%H_3PO_4	Boiling	0.274
25%NaOH	80	0
25%KOH	80	0

＜Contact＞
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