Corrosion Resistant Ni-Based Alloy

MMC SUPERALLOY

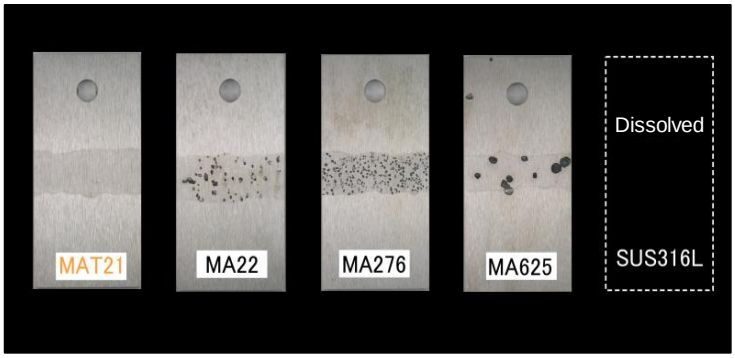
MAT®21 PAT.

UNS No.N06210
[Ni-19Cr-19Mo-1.8Ta（mass%）]

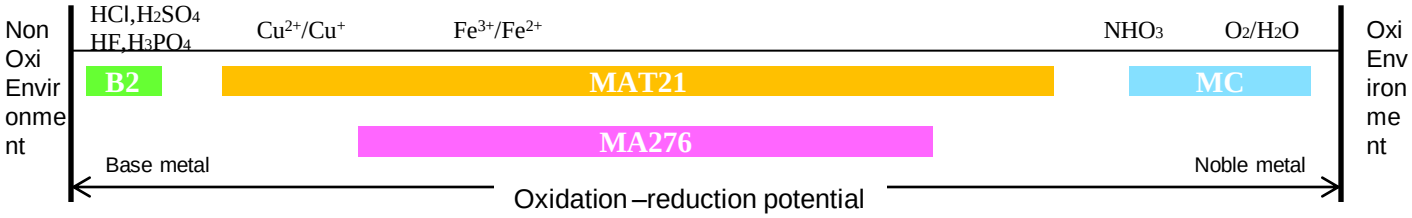
Excellent corrosion resistance in a wide range of environment

MAT®21PAT. is a nickel based alloy that has improved corrosion resistance by adding Cr, Mo, and Ta. This alloy has excellent corrosion resistance in both oxidizing and non-oxidizing environment. Since it shows stable corrosion resistance in a wide range of environments, it is suitable for multi reaction plants and environments where various chemicals are involved. As an application example, this material is used for pollution control devices such as hydrogen chloride removal equipment and flue gas desulfurization equipment where extreme corrosion solutions are an issue. Furthermore, in order to respond to validation regulations to ensure the safety of pharmaceuticals, it is also used as a material in pharmaceutical manufacturing plant by utilizing its excellent corrosion resistance.

【Pitting Corrosion Test Example】



【Suitable Environments】



【Corrosion Comparison Testing （mm/year）】

Testing Fluid（24ht immersion）	Temp	MAT21	MA22	MA276	MA625	SUS316L
1% HCl	Boiling	**0.01**	0.13	0.45	4.86	24.0
2% HCl	Boiling	**0.05**	1.72	1.14	11.90	51.2
10% H_2SO_4	Boiling	**0.04**	0.23	0.68	2.63	69.4
20% H_2SO_4+1.5% HCl	80℃	**0.04**	2.05	1.07	7.34	-
ASTM G28 Method B*	Boiling	**0.39**	0.12	1.00	-	38.1
85% H_3PO_4	Boiling	**0.33**	3.38	2.98	1.97	25.6

*23.0% H_2SO_4 ＋ 1.2% HCl ＋ 1% $FeCl_3$ ＋ 1% $CuCl_2$

Available Products and Specifications of MAT®21PAT.

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.)

Specifications

◆MAT®21PAT. Is the **first Nickel based alloy developed in Japan to be registered** in the U.S material Specifications
・ASME SB-366, SB-564, SB-574, SB-575, SB-619, SB-622, SB-626
・ASTM B-366, B-564, B-574, B-575, B-619, B-622, B-626

Mechanical and Physical Properties of MAT®21PAT.

1. Physical Properties（Room Temp）

Density	8.76	g / cm^2
Melting Point	1308 ～1362	℃
Electric Resistance	127.4	μΩ – cm
Heat Conductivity	0.087	W / (cm・℃)
Specific Heat	0.099	cal / (g・℃)
Coefficient of Thermal Expansion	12.0	×10^{-6} / ℃
longitudinal Modular Ratio	205	GPa
Side Modular Ratio	77.4	GPa
Poisson Ratio	0.33	

2. Mechanical Properties and Hardness

2-1 Moldability

【Erichsen Value（Room Temp）】

Form (Plate)	Condition	Erichsen Value (mm)
2mm	Solution Annealed	15.0
2mm	538℃×1000hrs Aged	12.7
0.6mm	Cold Rolled(red.70%)	5.5
0.6mm	538℃×1000hrs Aged	1.9

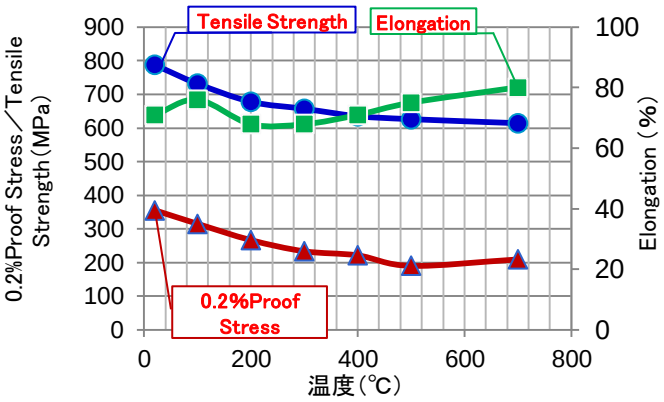
2-2 Hardness

【Vickers（HV）（Room Temp）】

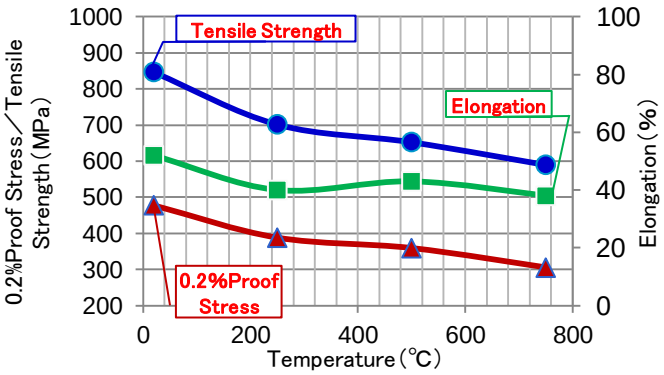
Thickness (mm)	HV （10kg）
4	212
2	201

2-3 Tensile Characteristics

【12mmPlate/Annealed】



【12mmPlate/Welded coupling/as weld】



2-4 Impact Value

【Charpy Impact Value】

Form	Temperature	Impact Value(J)	Rupture
12mmPlate	Room Temp	—	Non
	-196℃	—	Non
All Welded	Room Temp	46	Ruptured
	-196℃	31	Ruptured

*Not heat treated

3. Recommended Welding Condition（TIG）

Thickness（mm）	Electric Current（A）	Argon Gas Flow（l/min.）	Heat Input（J）
4	100 ～ 120	Torch：15 Back Seal：15	10,000～12,000

・MAT21 is patent registered (No. 2910565, 3303024, etc.)
・“MAT” and “MAT21” is a registered trademark of MMC Superalloy Corp.
・Data in this brochure are typical values and is not a guaranteed value.
Physical testing is required for selection of material for individual applications.

＜Contact＞

MMC Superalloy Corporation

◆High Performance Alloy Sales Group

1230 Kamihideya, Okegawa-shi, Saitama, 363-8510, Japan

TEL：048-786-3709／FAX：048-786-3416 ◇URLhttp://group.mmc.co.jp/superalloy/en

MMC SUPERALLOY

Mitsubishi Materials Group

2013.6