Technical Data Sheet
UGIMA® 4057

Chemical composition (%)

C	Si	Mn	Ni	Cr	P	S
0.16 – 0.21	≤0.8	≤1,0	1.5 – 2.5	15,5 – 17,0	≤ 0.035	0,015-0,030

23-06-2010 – REV 03

General presentation

UGIMA® 4057 is a member of the UGIMA® family of improved machinability martensitic stainless steels. It is developed exclusively by Ugitech.

Its properties are identical to those of 1.4057, except for its machinability which is even better than that of 1.4057:

- UGIMA® 4057's new technological advances are extremely advantageous and a great improvement on 1.4057.
- productivity increases of between 10% and 20% over grade 1.4057 have been obtained. Such increases are more noticeable in the case of monobloc carbide drilling or when a carbide-tipped toolbit is used.

In addition to excellent corrosion resistance, this stainless steel has the particular advantage of offering a wide range of mechanical properties in the processed condition. This grade also meets the requirements of EN 10272 with respect to pressure vessels.

Its performance - depending on its metallurgical condition - ensures compliance with high mechanical strength requirements and meets the demands of applications where substantial resilience is needed.

Classification

Molybdenum austenitic stainless steel.

Designation

Material N°

Europe		USA		Japan	International	
EN 10088-3		ASTM	AISI	SUS	ISO 15510	
N°	Name				N°	Name
1.4057	X17CrNi16-2	S43100	431	SUS431	4057-431-00	X17CrNi16-2

Other material name

France	Germany	UK	Sweden
AFNOR	DIN	BS	S.S
Z15CN16.02	1.4057	431S29	2321

Conforms to ASTM A276, A479

Physical properties

Temperature	Density	Elastic modulus	Thermal conductivity	Expansion coefficient	ElectriΩcal resistivity	Specific heat
°C	kg/dm³	GPa	W/m.K	(/K) from 20°C	Ω.mm²/m	J/kg.K
20	7.7	215	25		0.70	460
100	7.7	215		10.5×10^{-6}		

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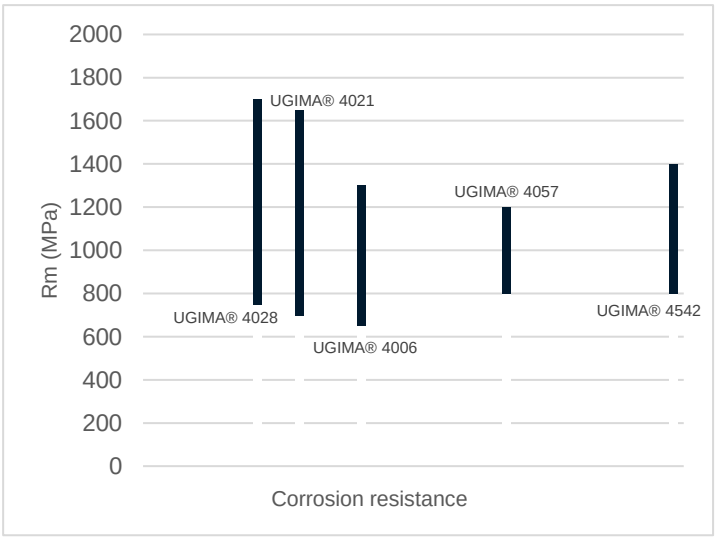
Mechanical properties

Garanteed mechanical property levels

Standards	Coding		Heat treatment applied	Guaranteed mechanical properties						
	Conditions	Thickness		Rm (Mpa)	Rp 0.2 (Mpa)	A %	Z %	KV (J)	HRC	HB
EN 10088-3	QT800	<= 60	HARDENED from 950-1050°C + TEMPERED 750-800°C (+ 650-700°C)	800-950	600	14	-	25	-	-
		60 <d<= 160		800-950	600	12	-	20	-	-
	QT900	<= 60	HARDENED from 950-1050°C + TEMPERED 600-650°C	900-1050	700	12	-	20	-	-
		60 <d<= 160		900-1050	700	10	-	15	-	-
ASTM A479	A	ALL Ø	SOFTENED	-	-	-	-	-	-	< 277
	TEMPERED	ALL Ø	HARDENED TEMPERED	> 795	> 620	15	45	-	-	< 321
ASTM A276	A	ALL Ø	SOFTENED	-	-	-	-	-	-	< 285

Corrosion resistance

This alloy has excellent atmospheric corrosion resistance and is one of the standard martensitic grades best able to withstand corrosion in marine environments; only structurally hardened grades such as UGIMA® 4542 have a higher resistance (amongst martensitic grades).



UGIMA® 4057 is also resistant to certain petroleum and organic products.

Environment	Behaviour/ Use
Nitric acid	Good
Phosphoric acid	Restricted use
Sulphuric acid	Restricted use
Acetic acid	Restricted use
Sodium carbonate	Average
NaCl (Saline mist)	Average
Humidity	Good
Sea water	Restricted use

Note:
The corrosion resistance of a stainless steel depends on many factors related to the composition of the corrosive atmosphere (chloride concentration, presence or absence of oxidising agents, temperature, pH, agitation or no agitation, and so on), as well as to the preparation of the material (surfaces free from metal particles, surface finish, such as hardening, polishing, and so on).
Precautionary measures should be taken for certain tests such as the saline mist test (French standard NFX 41002), for example marking labels (that might cause corrosion run-outs and reduce the test resistance time) should not be used on the test pieces.
In terms of pitting corrosion UGIMA® 4057 performs better than most martensiitic grades.

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Hot transformation
Forging

UGIMA® 4057 is suitable for forging. It is heated slowly to 850°C, then more quickly to 1150/1180°C for forging between 1180°C and 950°C. Forging must be followed by a stress relief heat treatment at 200°C or softening at between 750 and 850°C or hardening and tempering.

Machinability

The performance of UGIMA® 4057 in machining is exceptionally good, as a result of the optimisation of the inclusion population.

Welding

Provided certain precautionary measures are taken, UGIMA® 4057 can be subjected to most arc welding or resistance welding techniques in tempered, hardened or softened condition.

To prevent any risk of cold weld cracking, UGIMA® 4057 must be preheated to between 200 and 300°C and the temperatures between passes maintained at a minimum of 200°C. A stress relief heat treatment at 650°C is also required after welding.

If a filler metal is needed, a wire with a similar composition to that of UGIMA® 4057, such as AWS E/ER410 is recommended. AWS E/ER310 austenitic wire can also be used if the mechanical properties on welding and the response of the welding to the post welding heat treatment are not required to be the same as those of the base metal.

Ar + 1 to 3% CO_2 or O_2 shielding gases are recommended for MIG welding. Gas containing H_2 should not be used. Coated electrodes must be oven dried before welding.

Available products

Product	Shape	Finishing	Tolerance	Dimension	
Bar	Round	Rolled and descaled bars	12 to 13	22 to 15	mm
	Round	Turned and polished	9 to 11	22 to 115	mm
	Round	Drawn bar	8 to 9	3 to 55	mm
	Round	Ground bar	6 to 9	3 to 80	mm
	Hexagonal	Drawn bar	11	3 to 55	mm
Wire rod	Round	Pickeled		5,0 to 32	mm
Drawn wire	Round			1,0 to 16,0	mm

Applications

- Process and energy industry,
- Chemical industry,
- Oil and petrochemical industries,
- Household and electrical appliance industry,
- Automotive and transport industry
- Arms industry