D2-80 SERIES

- High Strength / High Yield
- High Corrosion Resistance
- Excellent Anti-lock Performance



Features

D2-80 duplex steel is a nickel-saving duplex stainless steel composed of ferrite and austenite, the D2 series in the national standard ISO3506-1-2020 (GB/T3098.6-2023).

D2-80 duplex stainless steel product features:

- Tensile strength above **800N/mm²**
- Yield strength above **600N/mm²**
- Corrosion resistance, neutral salt spray test is **2 times higher than that of 304 products**
- Anti-locking performance, no locking occurred after repeated unscrewing and installation **4 times**

ISO/FDIS 3506-1:2020(E)

Stainless steel group	Stainless steel grade	Property class	Fastener condition[b]
Austenitic	A1	50	Soft
		70	Soft or work hardened
		80	Work hardened, high strength
	A2[a]	50	Soft
		70	Soft or work hardened
		80	Work hardened, high strength
		100	Work hardened, high strength
	A3	50	Soft
		70	Soft or work hardened
		80	Work hardened, high strength
	A4[a]	50	Soft
		70	Soft or work hardened
		80	Work hardened, high strength
		100	Work hardened, high strength
	A5	50	Soft
		70	Soft or work hardened
		80	Work hardened, high strength
		100	Work hardened, high strength
	A8	70	Soft or work hardened
		80	Work hardened, high strength
		100	Work hardened, high strength
Ferritic	F1	45	Soft
		60	Work hardened
Martensitic	C1	50	Soft
		70	Quenched and tempered
		110	Quenched and tempered
	C3	80	Quenched and tempered
	C4	50	Soft
		70	Quenched and tempered
Duplex (austenitic-ferritic)	D2	70	Soft or work hardened
		80	Work hardened, high strength
	D4	70	Soft or work hardened
		80	Work hardened, high strength
	D6	70	Soft or work hardened
		80	Work hardened, high strength
	D8	70	Soft or work hardened
		80	Work hardened, high strength

Figure 1 International Standard ISO3506-1

APPLICATIONS

Case 1

A certain subway project conducted research and application on D2 duplex stainless steel and won the "China Steel Structure Association Science and Technology Award". Purchased multiple product series from Tong Ming, involving fasteners for 6 stations, and has now completed delivery and installation.



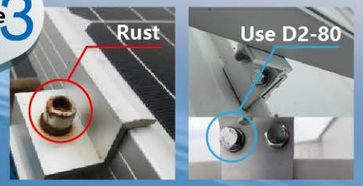
Case 2

A construction customer is the first of domestic prefabricated buildings. In order to reduce construction costs and extend service life, he visited Tong Ming in December 2022 and started a D2 fastener project to replace 304 fasteners. The project has been delivered for use.



Case 3

Applied in a China Electronics Technology project in the coastal area of Jiangsu. In the coastal environment, 304 material was used before and red rust appeared. Then it was replaced by Tong Ming D2 product. It has better pitting corrosion performance and is well received by users.



More cases to share....

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China's High-end Hardware Professional O2O B2B Platform

D2-80 Duplex Stainless-steel Fastener Products

【Version 2】



Chemical Composition

TYPE	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N
A2	0.1	1.0	2.0	0.05	0.03	15.0-20.0	–	8.0-19.0	4.0	–
D2	0.04	1.0	6.0	0.04	0.03	19.0-24.0	0.1-1.0	1.5-5.5	0.3	0.05-0.20
D6	0.03	1.0	2.0	0.04	0.015	21.0-23.0	2.5-3.5	4.5-6.5	-	0.08-0.35

Figure 2 Comparison of chemical composition of steel types (%)

Nitrogen (N) : The role of nitrogen improves the corrosion resistance of steel, especially its resistance to localized corrosion, such as resistance to intergranular corrosion, pitting corrosion and crevice corrosion.
Low nickel (Ni):2205 is a D6 super duplex stainless steel with a higher Ni content than D2; D2 is a nickel-saving duplex stainless steel that is more economical than 2205.
Low copper (Cu): The actual copper content of D2 material is about 0.3%, which can be applied to low-copper industries , such as new energy.

Material properties

Corrosion resistance - Better than 304 material

Measure the pitting corrosion potential and pitting corrosion rate of the material, and the results are shown in the table below.

TYPE	Pitting corrosion potential mV	Pitting corrosion rate g/(m²*h)	5% sulfuric acid	Crystal rot D method	Stress corrosion crack initiation	Stress corrosion crack penetration
304	297	6.48	449.66	282.74	1h	3h
D2	346	5.8	3.74	160.91	23h	92h

Figure 3 Material corrosion performance test results

[The results showed that]
D2 duplex stainless steel has significant resistance to sulfuric acid corrosion and stress corrosion, which is **better than 304 stainless steel.**

Magnetism - higher than 304 material

TYPE	D2	S32205	S30400	SUS304	QN1701	QN1803
Relative magnetic permeability	>5.0	>5.0	1.010	1.022	1.008	1.005

Figure 4 Magnetic comparison

[The results showed that]
D2 is as magnetic as 2205 duplex steel, but the corrosion resistance of stainless steel has no correlation with magnetism.
Magnetic products are suitable for use in the mechanical processing industry, magnetic screening equipment industry, etc.
High magnetism is beneficial to improve the stability of anti-drop processing .

Material environmental protection - stainless steel food safety

Test items	Limit mg/kg	Detection limit RL	D2	SUS304
Arsenic (As) migration amount	0.04	0.004	ND	ND
Cadmium (Cd) migration amount	0.02	0.002	ND	ND
Lead (Pb) migration amount	0.05	0.005	ND	ND
Chromium (Cr) migration amount	2	0.2	ND	ND
Nickel (Ni) migration amount	0.5	0.05	ND	ND
Note: Data source: Shanghai SGS			conform to	conform to

Figure 5 D2 and 304 heavy metal migration test

[The results showed that]
D2 material complies with national food standard requirements.

Product performance

Neutral salt spray - strong corrosion resistance

According to GB/T10125-2012 Artificial Atmosphere Corrosion Test-Salt Spray Test, after 96 hours of neutral salt spray atmosphere (NSS) test, no rust was found on the surface of the D2-80 product.



Figure 6 Product illustration after salt spray test

[The results showed that]
The corrosion resistance of D2-80 duplex stainless steel products is **higher than that of 304 products.**

Mechanical properties - high strength, high yield

2.1 Conduct mechanical performance test on DIN933 (M8*25) bolts. The test uses a material testing machine. In order to reduce the impact of speed on the tensile result of the specimen, the test is conducted at a low speed as much as possible, and 1mm/min is selected. , the result is as follows:

TYPE	Material	Tensile strength N/mm²		Yield strength N/mm²		Elongation after break%	
		Standard min	Actual value	Standard min	Actual value	Standard min	Actual value
Duplex steel	D2-80	800	≥ 850	600	≥ 650	2.4	≥4.8
Austenite	A2-70	700	≥ 720	450	≥ 550	3.2	≥4.8

Figure 7-1 Performance comparison

[The results showed that]
The tensile strength and yield strength of D2-80 products are **better than those of A2-70 products.**

2.2 Conduct mechanical performance test on DIN933 (M12*60) and (M16*60) D2-80 bolts (refer to carbon steel grade 8.8 for performance).

Specifications	Tensile strength N/mm²		Yield strength N/mm²		Elongation after break%		Rockwell hardness HRC	
	Standard min	Actual value	Standard min	Actual value	Standard min	Actual value	Standard min	Actual value
M12X60	800	957	640	784	12.0	19.8	22~32	28~30
M16X80	800	884	640	725	12.0	18.8	22~32	27~29

Figure 7-2 Performance comparison

[The results showed that]
Tensile strength, yield, elongation after fracture and Rockwell hardness of D2-80 products
All can reach the carbon steel grade 8.8 level.

Product performance

Anti-lock performance - excellent

Use flanges to fix the bolts, flat washers and spring washers respectively, use a torque wrench to tighten the nuts to breaking torque, then screw out the nuts, repeatedly screw them in and out, and check whether the bolts and nuts are locked, as shown in the figure below.



Figure 8-1 Installation flange test diagram

测试结果

D2-80 material M12*65	Sample size 10 The fourth time I unscrewed everything without locking.		The thread appearance is slightly damaged
304 material M12*65	Sample size 10 The second time I unscrewed all the test results, all locks occurred.		Severely locked and cannot be disassembled

Figure 8-2 Comparison of anti-lock performance

[The results showed that]
D2-80 products have excellent anti-lock performance and are **better than 304 products.**

Fields of application

D2-80 duplex stainless steel fastener products
Widely used in rail transit, construction and photovoltaic industries







In summary

Compared with 304 austenitic stainless steel, D2-80 duplex stainless steel fastener products show good mechanical properties. The product has outstanding corrosion resistance and anti-locking performance, so it can replace some high-strength stainless steel, 2205 duplex steel, 201 and 304 stainless steel and other series.