

TECHNICAL DATA SHEET

Stainless Steel Grade J4

Jindal Stainless J4 Grade is a chromium-manganese austenitic stainless steel with moderate amounts of copper, nickel and nitrogen. Balancing of the alloying elements (austenitizer versus ferritizer) produces an austenitic structure in the annealed condition even at sub zero temperatures.

Type J4 is comparable to chromium-nickel grades 301, 304 in many respects. It provides some advantages over 18 – 8 grade in certain applications. Lower cost manganese and nitrogen additions render this grade more economical while endowing it with good strength and high formability making it highly suitable for a wide variety of consumer and structural applications.

Presence of copper in this steel reduces work hardening rate, the alloy is non-magnetic in annealed condition and like 304 becomes lightly magnetic after cold working due to formation of martensite. Thus J4 can display a wide range of mechanical strength depending on the degree of cold working, which is essential for certain structural applications.

Typical Applications for J-4

Catering & Food Processing

Shallow/medium drawn utensils, tableware, cutlery, stands for water filters, water tanks, flasks.

Consumer durables

Steel furniture, fruit stands, flower vases, pipes and tubes, gift items, thermaware, gas stoves.

Architecture, building & construction

Handrails, street furniture, door knobs, pipes and tubes, Ornamental tubes, dust bin.

Transport

Automotive trim, wheel caps, wiper arms, rims, auto accessories, roll formed sections, truck parts, roofing, siding, conveyor, buses, cargo container.

Industrial

Baking equipment, dairy equipment, Laundry and dry cleaning equipment, refrigeration equipment.

Chemical Composition

Elements	As per Jindal Product Standard		Typical
	Min	Max	
C	-	0.10	0.095
Mn	8.5	10.0	9.25
S	-	0.030	0.005
P	-	0.090	0.065
Si	-	0.75	0.35
Ni	1.00	1.50	1.05
Cr	15.0	17.0	15.30
Cu	1.5	2.0	1.75
N	-	0.20	0.13
Fe	Balance	Balance	Balance

Intergranular Corrosion

Test as per ASTM A262	Corrosion Rate Mils Per year (MPY)	
Practice B	Boiling Ferric Sulfate	
	Type J4	Type 304
	250	50
Practice C	Copper/ 16% Copper Sulfate/sulphuric Acid, Boiling	
	Type J4	Type 304
	No cracks	No cracks
Practice A	Oxalic Acid etch Test	
	Type J4	Type 304
	Step Structure	Step Structure

Pitting and Crevice Corrosion

Type J4 is susceptible to pitting & crevice corrosion attack in chloride containing media. Although the alloy can successfully be used in fresh water where chloride ion concentration is very low.

Stress Corrosion Test

The stress corrosion resistance of the alloy is comparable to 18/8 types of alloys. The results of the test conducted on the solution-annealed samples as per ASTM G36 (MgCl₂·6H₂O) are shown in the following table and comparison is made with type 304

Standard	Type J4	Type 304
ASTM G38 (MgCl ₂ ·6H ₂ O U-bend Stressed samples)	Cracked in 18 – 16 Hours	Cracked in 2-4 Hours

Mechanical Properties

Room Temperature	Type J4	Type 304
UTS (Mpa)	700-750	550-580
Ys (Mpa)	375-400	270-300
% Elongation	50-55	50-55
Hardness (HRB)	94-96	84-87
Ericcson	10-12	12-14.5
Cupping Value		
At 350°		
UTS (Mpa)	577	463
YS	222	166
(0.2%)(Mpa)	38	41
% Elongation		
At 550°		
UTS (Mpa)	452	404
YS	174	142
(0.02%)(Mpa)		
% Elongation	33	35

Type J4 is mainly used both in Fully annealed condition and in temper rolled as well as cold rolled condition. The mechanical properties vary considerably depending upon the amount of cold work introduced. The strength of J4 is higher than conventional austenitic steel (such as type 304) and for this reason have found a wide field of application in structural assemblies.

Heat Treatment

Type J4 is annealed between 1050 - 1100°C. The annealing temperature should not exceed 1100°C to avoid excessive oxidation and grain coarsening. The primary purpose of annealing is to relieve strain, recrystallise the material if it has been cold worked and take carbides into solution. For J4, Rapid cooling through the carbide precipitation range (500 - 800°C) is necessary to avoid the precipitation of the carbide at grain-boundaries.

Fabrication

Welding

Type J4 can be welded by all conventional methods applied to 18/8 type of austenitic stainless steel. Filler wire or electrodes of the conventional chromium-nickel 300 series stainless steel can be used. Type J4 is sensitive to Intergranular corrosion in weld heat affected zone.

Hot working

Can be readily rolled or forged. Because of the presence of nitrogen, more power for a given reduction is required than with AISI 304 Stainless steel but lesser compared to AISI 316.

Cold Working

Very tough and ductile and readily emanable to deep drawing, bending, stretch forming and spinning. After heavy cold working, it is only mildly magnetic like 304.