Grade Data Sheet

Durinox™ F18S

Durinox F18S is a stabilised chromium ferritic stainless steel, combining good corrosion resistance with good formability and weldability. Its corrosion resistance enables it to replace grade 304 in less aggressive applications. Like all ferritic steels it is readily attracted to a magnet.

Durinox F18S is most commonly available in tube, sheet or coil up to about 2mm thick.

Corrosion Resistance

Durinox F18S has resistance in a variety of mildly corrosive media. It attains its maximum corrosion resistance when in the highly polished or buffed condition.

The resistance of grade F18S to pitting and crevice corrosion in chloride environments is between that of grades 430 and 304. Its PRE value of about 18 is close to that of 304. Chloride stress corrosion cracking (SCC) resistance of Durinox F18S is very high, as it is for all ferritic grades.

The resistance of Durinox F18S to acids is generally lower than that of 304, but performance varies for different acids, and these should be considered on a case by case basis.

Heat Resistance

Durinox F18S resists oxidation up to 980°C; it is particularly resistant to intermittent service conditions. It may become brittle at room temperature after prolonged heating in the 400 – 500°C range; this effect can be corrected by subsequent annealing. Niobium in F18S results in very high creep strength that makes it a good choice for critical auto exhaust system components.

Heat Treatment

Annealing

Heat to 790 - 870°C, hold for only a few minutes and then water quench or quickly air cool. Slow cooling will cause embrittlement and raise the ductile-to-brittle transition temperature, so should be avoided. It is important to not exceed 1000°C.

Durinox F18S is not hardenable by thermal treatment.

Welding

Welding of Durinox F18S can be readily carried out by all the common electric processes. As F18S has very low carbon and nitrogen contents and is stabilised by additions of titanium and / or niobium it has good resistance to sensitisation and hence intergranular corrosion. Like most ferritic grades it is subject to significant grain growth in the heat affected zones of welds. Heat input should therefore be kept to a minimum, and welding of thicknesses over 2mm become more difficult. Gas shielding of the arc, weld metal and back side of the weld is important to minimise air contact. Use Grade 308L (or 308LSi) filler rod, depending upon application.

Machining

F18S is easier to machine than the standard austenitic grades such as 304, but the grade is not commonly available as a bar.

Fabrication

Durinox F18S has a higher yield strength, higher tensile strength and lower work hardening rate compared to 304. Some operations will therefore be easier and some will require a little more force. The lower ductility of F18S restricts some very severe operations. It has quite good deep drawing capability; close to that of 304, but it has limited ability to stretch form. As these two processes are often combined in a single forming operation some changes to settings or tooling compared to the austenitic grades may be needed.

If very severe cold working is required it may be necessary to carry out an intermediate anneal.

Typical Applications

Chemical process equipment, heat exchanger tubing – particularly in the sugar industry, architectural panels and furniture for indoor environments, trolleys, equipment for food preparation service and display, refrigeration cabinets, exhaust flues, fuel burners.

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Specified Properties

The composition and mechanical properties are specified for flat rolled product (plate, sheet and coil) in ASTM A240/A240M, for grade UNS S43932. Durinox F18S is fully compliant with this specification. Similar but not necessarily identical properties are specified for other products in their respective specifications.

Chemical Composition (%)

Grade	C	Mn	Si	P	S	Cr	Mo	Ni	N	Ti+Nb
Durinox F18S	- 0.030	- 1.00	- 1.00	- 0.040	- 0.030	17.0 19.0	-	- 0.50	- 0.030	0.20+4(C+N) 0.75

Mechanical Properties

Grade	Tensile Strength (MPa) min	Yield Strength 0.2% Proof (MPa) min	Elongation (% in 50mm) min	Hardness		Cold Bend Transverse direction Bend radius = 1T
				Rockwell B (HR B) max	Brinell (HB) max	
Durinox F18S	415	205	22	89	183	180°

Physical Properties

(typical values in the annealed condition)

Grade	Density (kg/m^3)	Elastic Modulus (GPa)	Mean Coefficient of Thermal Expansion		Thermal Conductivity	Specific Heat	Electrical Resistivity
			0-100°C (µm/m/°C)	0-400°C (µm/m/°C)	at 100°C (W/m.K)	0-100°C (J/kg.K)	(nΩ.m)
Durinox F18S	7700	200	11.0	11.5	25	460	620

Grade Specification Comparison

Grade	UNS No	Euronorm		Swedish SS	Japanese JIS
		No	Name		
Durinox F18S	S43932	1.4509	X2CrTiNb18	-	-

These comparisons are approximate only. The list is intended as a comparison of functionally similar materials **not** as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted.

Possible Alternative Grades

Grade	Why it might be chosen instead of Durinox F18S
304	Need the increased weldability, especially in heavy sections, or better stretch formability of 304. 304 is also available in sections above the 2 to 3mm upper limit for Durinox F18S, and a much wider range of products generally.
430	430 has corrosion resistance that is nearly as high as F18S, so may be appropriate in indoor applications that are not welded.
F20S	Durinox F20S could be used if the corrosion resistance of F18S was not quite adequate. F20S is another low cost ferritic steel.