1.4362 Stainless Steel Bar

Steel Type - Duplex

V234N is a ferritic-austenitic duplex stainless steel with a lower Molybdenum content, whose duplex structure, containing approximately equal amounts of Ferrite and Austenite, is able to offer a sufficient resistance to pitting and uniform corrosion, a very good stress corrosion cracking resistance, together with high mechanical properties and toughness.

DESIGNATIONS

VALBRUNA	V234N
AISI	F68
W.N.	1.4362
UNS	S32304
EN	X2CRNIN23-4

SPECIFICATIONS

EN	10088-3 / 10250-4
ASTM	A276

CHEMICAL COMPOSITION

CHEMICAL ELEMENT	C	Mn	Si	S	P	Ni	Cr	N	Mo	Cu
MINIMUM VALUE %	-	-	-	-	-	3.5%	22%	0.05%	0.1%	0.1%
MAXIMUM VALUE %	0.03%	2%	1%	0.015%	0.035%	5.5%	24%	0.2%	0.6%	0.6%

APPLICATIONS

Pump and valve parts, pressure vessels, desalination plants, tanks, bolts, nuts, fittings, water flanges, rings, stirrers and shafts where corrosion fatigue resistance is required, and reinforcing bars for structural applications such as roads, bridges, harbors, landing zones, and buildings.

HEAT TREATMENT

Description of condition	Condition	Minimum temperature °C	Maximum temperature °C	Cooling
Solution Annealed	A	950	1050	Water /Air

COLD WORKING

V234N is suitable for the same cold heading and cold deforming processes applied to austenitic stainless steels, but it should be considered that its yield strength is higher and, therefore, more difficult to cold strain. Original mechanical properties and corrosion resistance are restored by a new annealing and fast cooling.

HOT WORKING

Large shapes and ingots require a suitable preheating. Avoid overheating or reaching the upper limit of forging temperature, to avoid an increase of the ferrite content. Both small pieces, rolled rings or bars could be either air or rapid quenched after forging. However, an annealing with fast cooling after every kind of hot working is mandatory for best mechanical properties and corrosion resistance. Even though V234N has a structure less prone to generate intermetallic phases, when compared to high Mo Duplex grades, a slow or improper cooling rate should be avoided.

MECHANICAL PROPERTIES

Condition	Subtype	Rm [N/mm²]	Rm [Ksi]	Rp0.2% [N/mm²]	Rp0.2% [Ksi]	HBW	E4d [%]
Solution Annealed	A	600 - 830	87 - 120	400 min.	58 min.	260 max.	25 min.

PHYSICAL PROPERTIES

Physical Property	SI / Metric Units	US / BS Imperial Units
Density	7.8 kg/dm³	0.282 lb/in³
Specific Thermal Capacity 20° C	500 J/(kg·K)	0.119 Btu/lb°F
Thermal conductivity 20° C	15 W/(m·K)	104.002 Btu in/ ft² h °F
Thermal expansion 20° - 100° C	13 (10^{-6}/K)	7.222 (10^{-6}/°F)
Electrical Resistivity 20° C	0.8 Ω·mm²/m	31.496 μΩin
Modulus of Elasticity 20° C	200 GPa	29007.548 ksi

MACHINABILITY

V234N, as with other duplex stainless steels, is more difficult to machine if compared to the typical austenitic grades. A careful choice of machining parameters should partially reduce the gap. For better performance in machinability, this grade could be substituted by MV274MDE, providing that MV274MDE is able to offer similar or acceptable results in terms of corrosion, toughness and weldability require by specific Norms, or the design.

CORROSION RESISTANCE

V234N has very good resistance in environments containing aggressive solutions. Particularly, it shows an acceptable resistance to general and pitting corrosion, better than 304L and similar to 316L austenitic grade, as well as a very high resistance to intergranular corrosion. It also has a good resistance to crevice corrosion thanks to high Chromium and Nitrogen contents. However, in this case, an accurate evaluation of the design of pieces should be carried out, in order to avoid very narrow crevices situations. Stress corrosion resistance is guaranteed thanks to the amount of Ferritic phase in its duplex structure. It's important to point out that the surface of every kind of stainless steel should be free of contaminants, tint and scale and passivated for optimum resistance corrosion.

WELDABILITY

V234N can be welded with the same techniques used for austenitic stainless steels, but special care and suitable choices must be used. No preheating is required and the structure of the HAZ should show an acceptable austenite content if the right welding parameters are applied. Autogenous welding could jeopardize the pitting resistance corrosion of the weld metal (fused zone). Therefore, over-alloyed fillers with more Ni or Ni-Mo, should be used in order to obtain comparable properties of base metal or, at least, a higher austenite content. In very aggressive environments, fillers of Nickel alloys or high alloy Austenitic grades should be used. Matching filler duplex alloys could be used if composition of FZ and HAZ is able to supply the expected results. Post welding annealing restores the balance of Ferrite/Austenite and eliminates the welding stresses.

MELTING PRACTICES

Argon Oxygen Decarburization.