HAYNES® 625SQ® alloy

HAYNES® 625 and 625SQ® alloys are used in wide variety of aerospace components. The 625SQ® alloy grade offers improved LCF properties for bellows type applications.

Principal Features

HAYNES® 625SQ® alloy (UNS N06626) is a solid-solution strengthened superalloy. It is a modification of HAYNES 625 alloy developed to enhance resistance to fatigue at temperatures up to approximately 1200°F (649°C). The alloy composition is tightly controlled to very low levels of carbon, silicon, and nitrogen.

Primary melting is by vacuum induction melting, followed by consumable electrode practice using electroslag remelting. During processing, the grain size is controlled to ASTM #5 or finer.

HAYNES® 625SQ® alloy is readily fabricated and welded using practices common to HAYNES® 625 alloy. 625SQ® alloy sheet and strip find application in aerospace, automotive, and chemical process industry bellow, expansion joints, and fabrications where fatigue resistance, strength, and corrosion resistance are required.

Nominal Composition

	Weight %
Nickel:	62 Balance
Cobalt:	1 max.
Iron:	5 max.
Chromium:	21
Molybdenum:	9
Niobium* + Tantalum:	3.7
Manganese:	0.5 max.
Silicon:	0.15 max.
Nitrogen:	0.02 max.
Aluminum:	0.4 max.
Titanium:	0.4 max.
Carbon:	0.03 max.

*Also known as Columbium

Physical Properties

Physical Property	British Units		Metric Units	
Density	RT	0.305lb/in^3	RT	8.44 g/cm^3
Melting Range	2350-2460°F	-	1290-1350ºC	-
Thermal Conductivity	800°F	109 Btu-in/ft^2-hr-°F	1290-1350°C	15.3 W/m-°C
	1000°F	121 Btu-in/ft^2-hr-°F	400°C	18.3 W/m-°C
	1200°F	132 Btu-in/ft^2-hr-°F	600°C	19.8 W/m-°C
	1400°F	144 Btu-in/ft^2-hr-°F	700°C	21.5 W/m-°C
	1600°F	158 Btu-in/ft^2-hr-°F	800°C	23.4 W/m-°C
	1800°F	175 Btu-in/ft^2-hr-°F	900°C	25.6 W/m-°C
Mean Coefficient of Thermal Expansion	70-800°F	7.7 µin/in-°F	1000°C	14.2 µm/m-°C
	70-1000°F	8.0 µin/in-°F	20-500°C	14.8 µm/m-°C
	70-1200°F	8.2 µin/in-°F	20-600°C	15.4 µm/m-°C
	70-1400°F	8.6 µin/in-°F	20-700°C	16.1 µm/m-°C
	70-1600°F	9.2 µin/in-°F	20-800°C	16.8 µm/m-°C
	70-1800°F	9.6 µin/in-°F	20-900°C	17.4 µm/m-°C
Electrical Resistivity	400°F	52.8 µohm-in	20-1000°C	134.0 µohm-cm
	800°F	53.5 µohm-in	200°C	135.6 µohm-cm
	1000°F	54.3 µohm-in	400°C	137.9 µohm-cm
	1200°F	54.3 µohm-in	600°C	137.5 µohm-cm
	1400°F	53.9 µohm-in	700°C	136.5 µohm-cm
	1600°F	53.5 µohm-in	800°C	135.6 µohm-cm
	1800°F	53.1 µohm-in	900°C	134.8 µohm-cm
Dynamic Modulus of Elasticity	70°F	30.2 x 10^6 psi	1000°C	208 GPa
	400ºF	28.8 x 10^6 psi	20°C	199 GPa
	800°F	26.7 x 10^6 psi	200°C	186 GPa
	1000°F	25.6 x 10^6 psi	400°C	171 GPa
	1200°F	24.3 x 10^6 psi	600°C	163 GPa
	1400°F	22.8 x 10^6 psi	700°C	153 GPa
	1600°F	21.2 x 10^6 psi	800°C	142 GPa
	1800°F	18.7 x 10^6 psi	900°C	126 GPa

Tensile Properties

Sheet (AMS 5879)

Test Temperature		Yield Strength 0.2% Offset		Ultimate Tensile Strength		Elongation
°F	**°C**	**ksi**	**MPa**	**ksi**	**MPa**	**%**
RT	RT	65.5	895	129.9	452	51.7
600	316	51.1	809	117.4	353	64.1
800	427	49.1	776	112.6	339	60.9
1000	538	49.9	776	112.5	344	60.5
1200	649	46.9	787	114.2	323	81.4
1300	704	44.4	646	93.7	306	103.9
1400	760	46.9	497	72.1	323	88.8

RT= Room Temperature

Heat Treatment

Sheet and Strip, AMS 5879

1600 °F (871 °C) Minimum/Bright Anneal

Specifications and Codes

Specifications

HAYNES® 625SQ® alloy (N06626)	
Sheet, Plate & Strip	AMS 5879 ASME Code Case 2276
Billet, Rod & Bar	-
Coated Electrodes	-
Bare Welding Rods & Wire	-
Seamless Pipe & Tube	-
Welded Pipe & Tube	ASME Code Case No. 2276 P= 43
Fittings	ASME Code Case No. 2276 P= 43
Forgings	-
DIN	-
Others	-

Codes

HAYNES® 625SQ® alloy (N06626)			
ASME	**Section I**	-	
	Section III	**Class 1**	-
		Class 2	-
		Class 3	-
	Section IV	**HF-300.2**	-
	Section VIII	**Div. 1**	Code Case 2276 800°F (427°C)[1]
		Div. 2	-
	Section XII	-	
	B16.5	-	
	B16.34	-	
	B31.1	-	
	B31.3	-	

[1]Sheet, fittings, welded pipe/tube

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