Ualloy605(Alloy L605)

Stellite 25 refers to Haynes 25, alloy L605, UNS R30605, belongs to cobalt based heat resistant superalloy (HRSA) material.
They are mainly applicated in valves and fittings in an acidic environment, components in aero engines and biomaterial such as artificial hip joints and dental implants.

Cobalt Alloy L605 Chemical Composition

	Co	C	Mn	P	S	Si	Cr	Ni	W	Fe
Min	Balance	0.05	1				19	9	14	
Max	Balance	0.15	2	0.04	0.03	0.4	21	11	16	3

Alloy L605 | Haynes 25 Coefficient of Thermal Expansion

θ/°C	20-200	20-400	20-500	20-600	20-700	20-800	20-900	20-1000	20-1100
α	12.9	13.8	14.2	14.6	15.1	15.7	16.3	17.0	17.8

Is Alloy L605 | Haynes 25 magnetic?

No.

Alloy L605 Stent Fatigue Strength

480 Mpa at 400 million cycles.

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Haynes 25 Formability

The alloy has good cold and hot formability. The hot working temperature range is 1200-980 ° C, the forging temperature should be high enough to reduce grain boundary carbide, but also low enough to control the grain size, the appropriate forging temperature is about 1170 ° C. Care should be taken to prevent angular cracks when forging. The heating furnace atmosphere should be neutral or weakly oxidizing. The heating and holding time is about 1h per 25mm thickness, and it can be cooled at any speed after forging. The solid solution state of the alloy can carry out various cold forming processes, but it requires the use of large power forming equipment. Due to the high cold work hardening rate of cobalt alloy L605, many intermediate anneals are required during cold forming, and heating at 230 ° C is beneficial when sheet metal and other products are formed.

Haynes 25 Common Solution Heat Treatment

Forgings: 1230°C, water cool.
Rivets: 1160-1190°C, 10-20mins, water cool or fast cooling.
After Cold processing of solution treated material, the age hardening of 480-650°C and 4-16h holding(The best 600°C, hold 4h) helps improve the stress rupture and creep property of Haynes 25 under 980°C.

Alloy L605 | Haynes 25 Mechanical Property

Density g/cm3	Melt Point	Room Temperature Properties			Hardness	815°C Stress Rupture			Haynes 25 Microstructure Grain
		Tensile Strength Min., Mpa	0.2% Yield strength, Mpa	Elongation in 4D min. %		Stress Mpa	t/h min	Elongation in 4D min. %	
9.13	1325-1400°C	860	340	35	HB≤282	165	23	10	≥2

Haynes 25 Modulus of Elasticity

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θ/°C	25	200	425	540	650	870	980
E/GPa	231	217	199	196	181	162	148

Haynes 25 Shear Modulus

θ/°C	25	200	425	650	870
E/GPa	89	83	76	68	61

Haynes 25 Oxidation

It is suitable for working in the environment of jet engines and gas turbines, the lowest temperature of oxidation and carbonization resistance is 870°C when working under intermittent conditions, and can withstand high temperatures of 1090°C when working continuously under air conditions. The alloy also works in ocean atmospheres.

Haynes 25 Oxidation Depth when performing Oxidation Resistance Test in Still Air

Oxidation Condition		Oxidation Depth/(mm/single side)			
θ/°C	t/h	Oxidation Scale	Intergranular Oxidation	Depletion	Total Depth
850	500	0.005	0.008	0.008	0.013
950	500	0.010	0.020	0.038	0.048
1000	500	0.025	0.025	0.056	0.081
1000	1000	0.018	0.091	0.091	0.109
1000	5000	0.051	0.102	0.102	0.153
1000	10000	0.051	0.102	0.102	0.203
1150	500	0.041	0.038	0.076	0.117
1150	3000	/	/	/	4.445

Machining

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Alloy L605 | Haynes 25 has a poor machinability rating is 12%.
The hardness is a significant factor affecting the machinability. Alloy L605 belongs to the most challenging material for most fitting manufacturers.

Process	SMM	SFM
Turning (stable condition)	40-55	130-180
Milling (stable clamping and short overhang)	30-40	100-130

Alloy L605 | Haynes 25 Application

Stents
Bone drill bits
Guide vane
Turbine outer ring
Turbine outer wall
Sealing piece
Heat exchanger
Reactor
Medical implant
High temperature ball bearings, valves, springs

*Haynes is a trademark refers to high performance alloy belongs to Haynes International INC.
*Stellite is a trademark refers to cobalt based alloy belongs to Kennametal INC.

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