

UDIMET® alloy L-605 (UNS R30605) is a solid solution strengthened cobalt-chromium-tungsten-nickel alloy with excellent high-temperature strength and excellent oxidation resistance to 2000°F (1093°C). The alloy also offers good resistance to sulfidation and resistance to wear and galling. Alloy L-605 is useful in gas turbine applications such as rings, blades and combustion chamber parts (sheet fabrications) and can also be used in industrial furnace applications such as muffles or liners in high-temperature kilns.

Table 1 - Limiting Chemical Composition, wt %

Carbon.....	0.05-0.15
Manganese.....	1.0-2.0
Silicon.....	0.40 max.
Chromium.....	19.0-21.0
Nickel.....	9.0-11.0
Tungsten.....	14.0-16.0
Phosphorus.....	0.040 max.
Sulfur.....	0.030 max.
Iron.....	3.0 max.
Cobalt.....	Balance*

*Reference to the 'balance' of a composition does not guarantee this is exclusively of the element mentioned but that it predominates and others are present only in minimal quantities.

Mechanical Properties

Table 4 - Rupture Strength of UDIMET alloy L-605 (1000 hr)

Temperature		Rupture Strength	
°F	°C	ksi	MPa
1200	649	39	270
1300	704	32	220
1400	760	24	165
1500	816	17	120
1600	871	10	72
1700	927	6	44
1800	982	4	25

Physical Constants and Thermal Properties

Table 2 - Physical Constants

Density, lb/in ³	0.335
g/cm ³	9.27
Melting Range, °F.....	2426-2570
°C.....	1330-1410
Specific Heat at 70°F, Btu/lb°F.....	0.092
at 21 °C, J/kg°C.....	385
Permeability at 200 oersted.....	1.002
Thermal Conductivity, Btu·in/ft ² ·h·°F.....	65
W/m·°C.....	9.4
Electrical Resistivity (75°F), ohm·circ mil/ft.....	533.2
(24°C), microhm-m.....	0.886

Table 3 - Thermal Properties

Temperature		Linear Expansion	Coefficient of Thermal Expansion
°F	°C	in/in x 10 ⁻³	in/in x 10 ⁻⁶
200	93	0.891	7.24
300	149	1.640	7.36
400	204	2.400	7.43
500	260	3.193	7.55
600	316	4.007	7.66
700	371	4.844	7.78
800	427	5.701	7.89
900	482	6.573	7.99
1000	538	7.444	8.06
1100	593	8.296	8.11
1200	649	9.303	8.28
1300	704	10.391	8.5
1400	760	11.486	8.68
1500	816	12.567	8.83
1600	871	13.618	8.94



Mechanical Properties (continued)

Table 5 - Typical Room Temperature Mechanical Properties of annealed UDIMET alloy L-605 Sheet

Tensile Strength		Yield Strength		Elongation
ksi	MPa	ksi	MPa	%
145	994	68	466	50

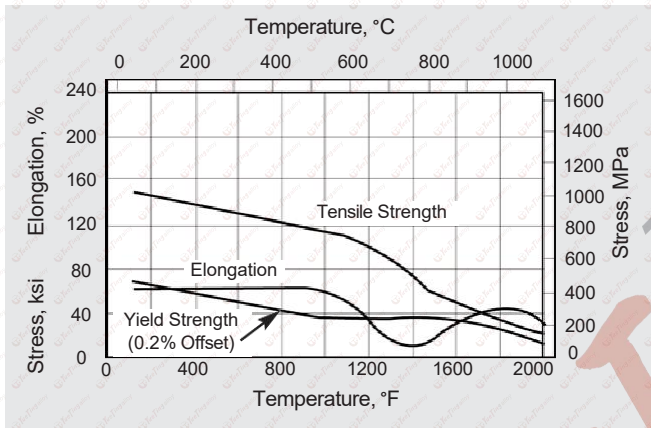


Figure 1 - Tensile properties of UDIMET alloy L-605

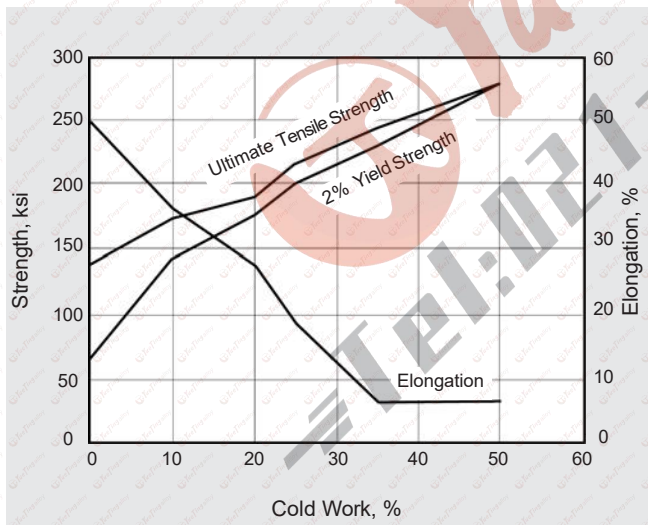


Figure 2 - Effect of cold work on UDIMET alloy L-605 material initially annealed 0.275-in plate.

Heat Treatment

UDIMET alloy L-605 is normally solution-treated in the range of 2150°F-2250°F (1175°-1230°C) and rapid air-cooled or water-quenched to attain optimum properties. Annealing at lower temperatures may cause some precipitation of carbide, which is undesirable for the achievement of many properties.

The alloy can be given a strain aging treatment at 900°F to enhance its strength and resistance to creep as long as the final temperature remains below 1300°F.

Hot Working

The metal temperature during hot working should be greater than 1900°F but less than 2300°F to avoid ductility loss and subsequent cracking. In this temperature range, the alloy is readily hot formable. Above this range, nil ductility will prevent any formation and below this range, the alloy will harden quickly.

Cold Forming

It is preferable to cold-work the alloy for bending, deep drawing and spinning of components. This is facilitated by the excellent as annealed ductility of the alloy, however, high forces may be required to achieve such processing, due to the inherent strength of the alloy. It may therefore be necessary to interstage anneal the material after each step of processing due to the work hardening of the alloy that will be encountered. Annealing at 2150°F - 2250°F (1175-1230°C) is required to allow for subsequent working of cold-worked material. The hardness of the alloy reaches the mid 40s on the Rockwell 'C' scale by 25% cold work and can reach the upper 50s.

Fabricating

UDIMET alloy L-605 has good fabricability. Forming, machining and welding can be carried out by standard methods.

Joining

UDIMET alloy L-605 can be welded by shielded metal-arc, gas tungsten-arc (TIG) and gas metal-arc (MIG) methods.

Applicable Specifications

UDIMET alloy L-605 is designated as UNS R30605. Contact Special Metals for information on available product forms.

Flat products: AMS 5537

Bar: AMS 5759

Welding wire: AMS 5796

Covered welding rod: AMS 5797

YueTing alloy
Tel: 021-61198229

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