



•	mmary of typical wrought superalloys, including links to supplier property o eralloys 2000 and citations for the alloys in Superalloys 2004	lata, full text of papers	SUPERALLOYS	SUPERALLOYS 2004
Would you like to submit n	nore information on these alloys or on another alloy?			
Go to www.materialstechr	ology.org and click on "Submit a Resource".		proc. Int. Symp. on Superalloys 2000, TMS, Warrendale PA, 2000	proc. Int. Symp. on Superalloys 2004, TMS, Warrendale PA, 2004
ALLOY UNS#	DESCRIPTION APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
720L1	Precipitation-hardened wrought alloy. Disc alloy Has also been made as P/M alloy - see Courturier et. al. in Superalloys 2004 reference to the right.		Sub-Solvus Recrystallization Mechanisms in UDIMET® Alloy 720L1 [pp. 59-68] B. Lindsley and X. Pierron Quench Cracking Characterization of Superalloys Using Fracture Mechanics Approach [pp. 109-116] J. Mao, K.M. Chang and D. The Microstructure Prediction of Alloy 720L1 for Turbine Disk Applications [pp. 127-133] T. Matsui, H. Takizawa, H. Kikuchi and S. Wakita Microstructure and Mechanical Property Development in Superalloy U720L1 [pp. 415-424 D.U. Furrer and H.J. Fecht Influence of Long Term Exposure in Air on Microstructure. Surface Stability and Mechanical Properties of UDIMET 720L1 [pp. 487-493] D. Helm and O. Roder Effects of Grain and Precipitate Size Variation on Creep-Fatigue Behaviour of UDIMET 720L1 in Both Air and Vacuum [pp. 495- 503] N.J. Hide, M.B. Henderson and P.A. S. Reed	Process Development and Mechanical Properties of Alloy U720LI for High Temperature Turbine Disks [pp. 351-360] R Couturier, H Burlet, S Terzi, SDubiez, L Guetaz, G Raisson Characterisation of gamma' across inertia friction welded Alloy 720Li [pp. 477- 484] M. Preuss, J. Quinta da Fonseca, I. Kyriakoglou, P.J. Withers, G.J. Baxter
A-286 S66286	Fe-Ni-Cr wrought alloy with additions of Blades, vanes, chafts, tail cones, Mo & Ti. Age-hardenable. Maintains strength & oxidation resistance to 700°C.	Special Metals		

T	MS	5	Typical Wrought Superalloys	м	aterials Technology.org	For additional resources, visit http://www.materialstechnology.org
on the all	oys in Supe	eralloys 2000 and citations for the all		data, full text of papers	SUPERALLOYS	SUPERALLOYS 2004
-		nore information on these alloys or on another a ology.org and click on "Submit a Resource".	anoy ?		proc. Int. Symp. on Superalloys	proc. Int. Symp. on Superalloys 2004, TMS,
G0 10 www.r		ology.org and click on Submit a Resource .			2000, TMS, Warrendale PA, 2000	Warrendale PA, 2004
ALLOY Alloy 901	UNS# N09901	DESCRIPTION Ni-Fe-Cr wrought alloy with additions of Mo, Ti and Al. For service up to 600°C		WEBLINK Special Metals	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
				<u>Carpenter</u>		
Allvac 718Plus	N07818	Wrought, precipitation-hardened nickel- base alloy. Has high temperature capability & thermal stability of Waspaloy with the processing characteristics of 718		<u>Allvac</u>		Role of Chemistry in 718-Type Alloys—Allvac®718Plus™ Alloy Development [pp. 91-100] W-D. Cao and R. Kennedy
Astroloy	N13017	Ni-Co-Cr-Mo precipitation Hardened alloy	Gas turbine hot section components	<u>Allvac</u>		Recovery and Recrystallization After Critical Strain in the Nickel-Based Superalloy René 88DT [pp. 391-400] D.D. Whitis
C263		Wrought Alloy.			Isothermal and Thermomechanical Fatigue of Superalloy C263 [pp. 545-552] Y.H. Zhang and D.M. Knowles	
C-276	N10276	Ni-Mo-Cr-W alloy with excellent corrosion resistance & good fabricability. Directionlly solidified.	chemical & petrochemical processing applications in the as-welded condition	Haynes International		
				<u>Carpenter</u>		
Hastelloy B	8 N10001	Low thermal expansion, Limited oxidation/corrosion resistance	Older gas turbine & Rocket engines	Haynes International		
Hastelloy S	8 N06635	Low thermal expansion, Hot & cold-workable	For severely cyclical heating conditions, low stress gas turbine engine parts, excellent dissimilar filler metal	Haynes International		
Hastelloy V	V N10004	Filler metal for welding	For welding dissimilar high- temperature alloys, for engine repair & maintenance Also ring-type applications in older gas turbine engines	Haynes International		





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ALLOY UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
Hastelloy X N06002	Ni-Cr-Fe-Mo alloy excellent forming & welding, good ductility after elevated temperature exposure	Aircraft, marine & industrial gas turbine engine combustors	Haynes International		Hold-Time Effects on Low-Cycle Fatigue Behavior of Hastelloy X Superalloy at High Temperature [pp. 241-250] Y. L. Lu, L. J. Chen*, G.Y. Wang, M. L. Benson, and P. K. Liaw
Haynes 188 R30188	Co-Ni-Cr-W alloy, Readily fabricated	combustion cans, transition ducts and afterburner components of military & commercial gas turbine engines	Haynes International		
Haynes 214 N07214	Ni-Cr-Al-Fe alloy, Conventional fabricating	Honeycomb seals, Flamehoods,belts & Burner assemblies	Haynes International		
Haynes 230 N06230	Ni-Cr-W-Mo alloy Low thermal expansion, Hot & cold-formable	Combustion cans, transition ducts, flameholders, thermo- couple sheaths	Haynes International	High Temperature Low-Cycle Fatigue Behavior of Haynes® 230® Superalloy [pp. 573-581] L.J. Chen, Y.H. He, P.K. Liaw, J.W. Blust, P.F. Browning, R.R. Seeleyand D.L. Klarstrom	
Haynes 242 N10242	Ni-Mo-Cr alloy, Low thermal expansion, Hot & cold formable	Seal rings, containment Rings, duct segments, casings, Fasteners, rocket nozzles, pumps	<u>Haynes International</u>	Structure/Property Interactions in a Long Range Order Strengthened Superalloy [pp. 553-562] M.F. Rothman, D.L. Klarstrom, M. Dollar and J.F. Radavich The Ductility of Haynes® 242™ Alloy as a Function of Temperature, Strain Rate and Environment [pp. 609-618] S.D. Antolovich, D.L. Klarstrom and J.F. Radavich	L
Incoloy 909 N19909	Ni-Fe-Co-Si-Nb-Ti alloy, Low thermal expansion Constant modulus of elasticity	Gas turbine casings, shrouds, Vanes and shafts	<u>Special Metals</u>		Thermal Stability of Inconel Alloy 783 at 593°C and 704°C [pp. 627-636] Sarwan K. Mannan, Gaylord D. Smith, Shailesh J. Patel
Incoloy S67956 MA956	Fe-Cr-Al alloy w/ yttrium oxide Strengthening. NO LONGER PRODUCED	Gas turbine combustion chambers, energy-conversion systems, rigorous service	<u>Special Metals</u>		





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ALLOY UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
Inconel 100	Wrought Alloy	high pressure turbine disk in gas turbine eng	ine		The Effect of Partial Vacuum on the Fatigue Crack Growth of Nickel Base Superalloys [pp. 233-239] Andrew H. Rosenberger Crystallographic Initiation of Nickel-Base Superalloy IN100 at RT and 538°C Under Low Cycle Fatigue Conditions [pp. 251-258] K. Li , N.E. Ashbaugh , and A.H. Rosenberger The Effects of Microstructure on the High Temperature Constitutive Behavior of IN100 [pp. 331-340] W.W. Milligan, E.L. Orth, J.J. Schirra, M.F. Savage Computer Simulations for the Prediction of Microstructure/Property Variation in Aeroturbine Disks [pp. 877-886] Herng-Jeng Jou , Peter Voorhees , Gregory B. Olson
Inconel 600 N06600	Wrought Ni-Cr alloy with good oxidation and corrosion resistance.	n furnace components, in chemical and food processing, in nuclear engineering, for sparking electrodes	<u>Special Metals</u> Carpenter <u>Allvac</u>		
Inconel 601 N06601	Wrought Ni-Cr alloy with Al additions for enhanced oxidation and corrosion resistance.	r industrial furnaces, heat treating equipment, petrochemical & other process equipment, gas-turbine components	Special Metals		
Inconel 625 N06625	Wrought Ni-Cr-Mo alloy with Nb additions for increased strength and corrosion resistance.	chemical processing, aerospace & marine engineering, pollution-control equipment and nuclear reactors	<u>Special Metals</u>	Segregation and Solid Evolution during the Solidification of Niobium-Containing Superalloys [pp. 75-84] W. Yang, W. Chen, K.M. Chang S. Mannan and J. deBarbadillo	- -





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ALLOY UNS# Inconel 706 N09706	DESCRIPTION Wrought Ni-Fe-Cr precipitation hardened alloy with good fabricability.	APPLICATION aerospace & land base gas turbine parts	WEBLINK Special Metals	SUPERALLOYS 2000 Segregation and Solid Evolution during the Solidification of Niobium-Containing Superalloys [pp. 75-84] W. Yang, W. Chen, K.M. Chang, S. Mannan and J. deBarbadillo Long Term Thermal Stability of INCONEL Alloys 718. 706. 909 and WASPALOY at 593°C and 704°C [pp. 449-458] S. Mannan, S. Patel and J. deBarbadillo Simulation of Microstructure of Nickel-Base Alloy 706 in Production of Power Generation Turbine Disks [pp. 477-484] J. Huez and J.F. Uginet	- -
Inconel 718 N07718	precipitation strengthened Ni based superalloy, good oxidation and creep resistance up to 650°C, high strength and fatigue resistance	components for gas turbine (discs), liquid- fueled rockets, high temperature plant and cryogenic systems	<u>Special Metals</u> Carpenter	Sub-Solvus Recrystallization Mechanisms in UDIMET® Alloy 720L1 [pp. 59-68] B. Lindsley and X. Pierron Predicting Grain Size Evolution of UDIMET® Alloy 718 during the "Cogging" Process through Use of Numerical Analysis [pp. 39-47] B. F. Antolovich and M.D. Evans	Role of Chemistry in 718-Type Alloys—Allvac®718Plus™ Alloy Development [pp. 91-100] W-D. Cao and R. Kennedy Effect of Boron Concentration on Fatigue Crack Propagation Resistance and Low Cycle Fatigue Properties of Inconel 718 [pp. 275-282] L. Xiao, D.L. Chen, and M.C. Chaturvedi
			<u>Haynes</u>	Segregation and Solid Evolution during the Solidification of Niobium-Containing Superalloys [pp. 75-84] W. Yang, W. Chen, K.M. Chang, S. Mannan and J. deBarbadillo	D. Dye, B.A. Roder, S.Tin, M.A> Rist, J.A.





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ALLOY UNS#	DESCRIPTION	APPLICATION	WEBLINK Alivac	SUPERALLOYS 2000 Properties of RS5 and Other Superalloys Cast Using Thermally Controlled Solidification [pp. 161-170] M.L. Gambone, S.B. Shendye, P. Andrews, W. Chen, M.N. Gungor, J.J. Valencia, and M.L. Tims Effect of Oxidation on High. Temperature Fatigue Crack. Initiation and Short Crack. Growth in Inconel 718 [pp. 435- 444] T. Connolley, M.J. Starink and P.A. S. Reed The Effects of Processing on Stability of Alloy 718 [pp. 445- 448] G. Shen, J. Radavich, X. Xie and B. Lindsley Long Term Thermal Stability of INCONEL Alloys 718, 706, 909 and WASPALOY at 593°C and 704°C [pp. 449-458] S. Mannan, S. Patel and J. deBarbadillo	SUPERALLOYS 2004 (link above) Superalloy Lattice Block Structures [pp. 431- 440] M.V. Nathal, J.D. Whittenberger, M.G. Hesbur, P.T. Kantzos, and D.L. Krause Microstructure, Macrostructure, and Modelling of the Centrifugal Spray Deposition of Large Diameter Ni Superalloy Preforms [pp. 563-570] M.D. Basrratt, Z. Shi, R.M. Ward, P.S. Grant, M.H. Jacobs Modeling of Vacuum Arc Remelting of Alloy 718 Ingots [pp. 917-924] A.D. Patel, R.S. Minisandram, and D.G.
Inconel 783 R30783	Low thermal expansion alloy designed for high strength, good oxidation resistance and higher temperature capability with respect to the 900 series alloys.	Gas turbine and steam turbine components	<u>Special Metals</u>	Effect of Thermomechanical Processing on Fatigue Crack Propagation in INCONEL Alloy 783 [pp. 601-608] L.Z. Ma, K.M. Chang, S.K. Mannan and S.J. Patel	Thermal Stability of Inconel Alloy 783 at 593°C and 704°C [pp. 627-636] Sarwan K. Mannan, Gaylord D. Smith, Shailesh J. Patel Environmental Behavior of Low Thermal Expansion Inconel Alloy 783 [pp. 643-656] Eric A. Ott, Jon R. Groh, and Sarwan K. Mannan
Inconel N07754 MA754	Includes yttrium oxide strengthening. NO LONGER PRODUCED	Extreme service applications.	Special Metals		





Pollock, and J.W. Jones

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
Nimonic 75	N06075	Ni-Cr-Ti-C alloy, for sheet applications	Gas turbine engines, components of industrial furnaces, heat treating equipment & fixtures, in nuclear engineering	Special Metals		
Nimonic 80A	N07080	Like Nimonic 75 but with Al and Ti for greater strength	blades, rings & discs for gas turbines; bolts & tube supports in nuclear steam generators; die casting inserts & cores; exhaust valves in internal- combustion engines	<u>Special Metals</u>		An Innovative Device for the Mechanical Testing of Miniature Specimens of Superalloys [pp. 523-528] B Roebuck1, D C Cox and R C Reed
Nimonic 90	N07090	Ni-Cr-Co-Ti-Al alloy	blades & discs for gas turbines, hot-working tools and springs	Special Metals		
RA 333	N06333	High Cr, nickel-base superalloy resistant to high temperature oxidation, carbutization and thermal shock.	dampers and refractory anchors in 13%SO2/SO3 at 1800°F, for refinery flare tips	Rolled Alloys		
Rene 41	N07041	precipitation-hardened wrought nickel- base superalloy with high strength and good oxidation resistance	afterburner parts and nozzle diaphragm partitions in gas turbine engines, turbine blades and wheels, combustion chamber liners and structural hardware	<u>Haynes</u> s <u>Carpenter</u> <u>Allvac</u>		
				Special Metals		
Rene 88DT		advanced high strength powder metallurgy Ni based superalloy, good creep and fatigue crack growth resistance	rotating compressor and turbine disks		Control of Grain Size Via Forging Strain Rate Limits for R'88DT [pp. 49-58] E. Huron, S. Srivatsa and E. Raymond, Quench Cracking Characterization of Superalloys Using Fracture Mechanics Approach [pp. 109-116] J. Mao, K.M. Chang and D. Furrer	 Deformation Mechanisms at Intermediate Creep Temperatures in Rene88 DT [pp. 173- 178] G.B. Viswanathan, P. Sarosi, M. henry, D. Whitis, and M. Mills Development of Ultrasonic Fatigue for Rapid, High Temperature Fatigue Studies in Turbine Engine Materials [pp. 259-268] A. Shyam, C.J. Torbet, S.K. Jha, J.M. Larsen, M.J. Caton, C.J. Szczepanski, T.M.

TIMIS	5	Typical Wrought Superalloys	M	aterialsTechnology.org	For additional resources, visit http://www.materialstechnology.org
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ALLOY UNS#	DESCRIPTION	APPLICATION turbine disks	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above) Divergence of Mechanisms and the Effect on the Fatigue Life Variability of Rene' 88 DT [pp. 305-314] M.J. Caton, S.K. Jha, A.H. Rosenberger, and J.M. Larsen Recovery and Recrystallization After Critical Strain in the Nickel-Based Superalloy René 88DT [pp. 391-400] D.D. Whitis Imaging and Characterization of γ Precipitates in Nickel-Based Superalloys [pp. 989-998] P. Sarosi, G. Viswanathan, D. Whitis, and M. Mills Recovery and Recrystallization After Critical
	metallurgy Ni based superalloy			Characterization of Superalloys Using Fracture Mechanics Approach [pp. 109-116] J. Mao, K.M. Chang and D. Furrer	Strain in the Nickel-Based Superalloy René 88DT [pp. 391-400] D.D. Whitis
Thermospa n	Fe-Ni-Co-Cr alloy with low thermal expansion	compressor and exhaust casings, seals, and other gas turbine components requiring low expansion	<u>Carpenter</u>		
Udimet 700	Wrought Nickel-base superalloy.	turbine discs	Principal Metals <u>C-M Group</u>		
Udimet 720 n/a	Ni-Cr-Co-W-Mo-Ti-Al with high impact strength after elevated temperature exposure.	Gas turbine blade & disc	Special Metals		Developing Damage Tolerance and Creep Resistance in a High Strength Nickel Alloy for Disc Applications [pp. 83-90] M.C. Hardy, B. Zirbel, G. Shen, and R. Shankar
				The Mechanical Property Response of Turbine Disks Produced Using Advanced PM Processing Techniques [pp. 69- 74] A. Banik and K.A. Green Removal of Ceramic Defects from a Superalloy Powder Using Triboelectric Processing [pp. 95- 99]	Effects of High Temperature Exposures on Fatigue Life of Disk Superalloys [pp. 269- 274] T.P. Gabb, J. Telesman, P.T. Kantzos, J.W. Smith, and P.F. Browning Fatigue Crack Behavior Under Mixed Mode Loading in UDIMET 720 SX [pp. 295-304] M.R Joyce and P.A.S. Reed





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ALLOY UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
				Characteristics and Properties of As-HIP P/M Alloy 720 [pp. 135- 141] J.H. Moll and J.J. Conway	 Effect of Powder Cleanliness on the Fatigue Behavior of Powder Metallurgy Ni-Disk Alloy Udimet 720 [pp. 409-421] P.Kantzos, P. Bonacuse, J. Telesman, T. Gabb, R. Barrie, and A. Banik
				Enhanced Powder Metallurgy (P/M) Processing of UDIMET® Alloy 720 Turbine Disks - Modeling Studies [pp. 143-149] J.J. Fisher, A. Casagranda, S.P. Vaze, F.D. Arnold, S.Y. Lin	-
				Sub-Solidus HIP Process for P/M Superalloy Conventional Billet Conversion [pp. 425-433] X. Pierron, A. Banik, G.E. Maurer, J. Lemsky, D.U. Furrer and S. Jain	
				The Development of Improved Performance PM UDIMET® 720 Turbine Disks [pp. 785-794] S.K. Jain, B.A. Ewing and C.A. Yin	
Waspaloy N07001	Ni-Co-Cr-Mo-Al-Ti alloy	gas turbine engine parts	Special Metals	Characterization of Freckles in a High Strength Wrought Nickel Superalloys [pp. 19-28] P.D. Genereux and C.A. Borg	The Effect of Partial Vacuum on the Fatigue Crack Growth of Nickel Base Superalloys [pp. 233-240] A.H. Rosenberger
			<u>Capenter</u>	Long Term Thermal Stability of INCONEL Alloys 718, 706, 909 and WASPALOY at 593°C and 704°C [pp. 449-458] S. Mannan, S. Patel and J. deBarbadillo	Recovery and Recrystallization After Critical Strain in the Nickel-Based Superalloy René 88DT [pp. 391-400] D.D. Whitis
			Allvac	Stress Rupture Behavior of Waspaloy and IN-738LC at 600°C (1112°F) in Low Oxygen Gaseous Environments Containing Sulfur [pp. 535-544] D.C. Seib	Determination of the y'-Solvus Temperature of Two Commercial Wrought Ni-Base Superalloys by Thermal Expansion Measurements [pp. 517-522] W. Hermann, M. Fahrmann, and H-G. Sockel

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Go to www.materialstechnology.org and click on "Subn	nit a Resource".	proc. Int. Symp. on Superalloys 2000, TMS, Warrendale PA, 200	
ALLOY UNS# DESCRIPTION	APPLICATION WEB	es International	SUPERALLOYS 2004 (link above) Mechanical Property and Microstructural Characterization of Vacuum Die Cast Superalloy Materials [pp. 553-562] John J. Schirra, Christopher A. Borg and Robert W. Hatala