

DATA SHEET



LATROBE SPECIALTY
STEEL COMPANY

Latrobe, PA 15650-0031 USA

NITRALLOY 135™ MODIFIED VAC-ARC® PREMIUM NITRIDING STEEL

Typical Composition	C	Mn	Si	Cr	Mo	Al
	0.40	0.60	0.30	1.60	0.35	1.20

GENERAL CHARACTERISTICS

NITRALLOY 135 MODIFIED VAC-ARC steel is a low alloy nitriding grade with moderate hardenability. It has been designed to provide a high case hardness and to maintain its core strength during the nitriding cycle. VAC-ARC remelting is employed to provide preferred ingot solidification and superior microcleanliness. Nitralloy 135 Modified Vac-Arc steel is also produced by vacuum induction melting followed by vacuum arc remelting (VIM-VAR).

FORGING

Heat uniformly to 2000-2025°F (1093-1107°C). Do not forge below 1700°F (927°C). Air cool after forging.

HEAT TREATMENT

Anneal: Heat to 1700°F (927°C) and slow cool or subcritical anneal at 1250-1300°F (675-704°C).

Normalize: Heat to 1800°F (982°C) hold for 1-4 hours and air cool.

Austenitize: Heat to 1700-1750°F (927-954°C) for ½ hour per inch of cross section and quench into oil or water. Water quenching is preferred when the cross section exceeds 1 inch in thickness.

Temper: Heat to 1000-1300°F (538-704°C) depending on the desired hardness. Material should be tempered for 1 hour per inch of thickness.

Nitride: The nitriding time, temperature and method will vary depending upon the requirements of the final product. The nitriding temperature is usually between 900 and 1100°F (482 and 593°C).

APPLICATIONS

Aircraft gears, shafts, pinions, crankshafts, cams, camshafts and bolts.

FORMS AVAILABLE

Billets; hot rolled round, square and flat bars; rough turned, centerless ground or cold drawn bars.

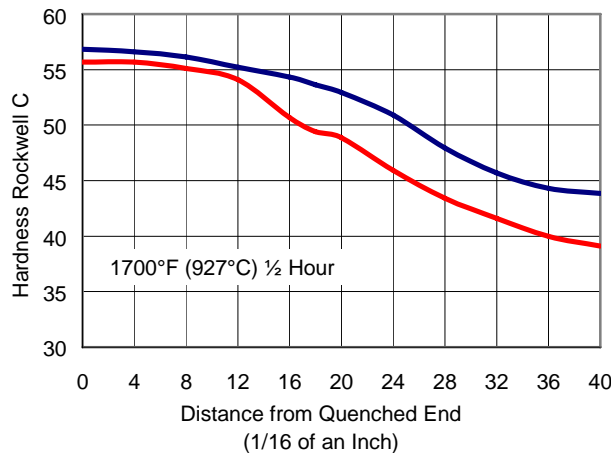
NITRALLOY 135™ MODIFIED VAC-ARC®

TYPICAL MECHANICAL PROPERTIES (CORE)

Size of Section		U.T.S		Y.S.		El.	R of A	Hardness
in	cm	ksi	MPa	ksi	MPa	(%)	(%)	HBW
Up to 1½	3.8	135	930	100	690	16	50	280 - 340
1½ - 3	3.8 - 7.6	125	860	90	620	15	40	280 - 340 on Surface 269 - 321 on Test Specimen
3 - 5	7.6 - 12.7	110	760	85	580	15	40	269 - 321 on Surface 240 - 300 on Test Specimen

Mid-radius tests of fully heat treated bars. Heat treating times were dependent on section size.
 Hardened at 1725°F (940°C) and quench
 Tempered at 1200°F (648°C) and air cool
 The 3 and 5" bars were water quenched, all others were oil quenched.

JOMINY END QUENCH HARDENABILITY



Jominy hardenability band based on limited data.
 These data should not be used for specification requirements.

SPECIFICATIONS

The following popular industry specifications are offered for general familiarization and cross-reference purposes. This list contains several air melt specifications, so indicated, as purchase of VAC-ARC material against these documents may warrant consideration. This should not be considered a complete listing.

AMS 6470 (Air Melt)
 AMS 6471
 AMS-S-6709 (Air Melt)

299-947-036 (Bell Helicopter)
 299-947-083 (VIM-VAR) (Bell Helicopter)
 B50TA314 (General Electric)



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Latrobe, Pennsylvania 15650-0031 U.S.A.
 Phone: (724) 537-7711 Fax: (724) 532-6316
www.latrobesteel.com