DATA SHEET

LATROBE SPECIALTY STEEL COMPANY
Latrobe, PA 15650-0031 USA

LESCALLOY® 4330+V VAC-ARC®

HIGH STRENGTH ALLOY STEEL

Typical Composition	C	Mn	Si	Cr	Ni	Mo	V
	0.30	0.85	0.30	0.85	1.80	0.40	0.07

GENERAL CHARACTERISTICS

LESCALLOY 4330+V VAC-ARC steel is a modification of 4330 steel with hardenability and other properties improved by the addition of vanadium. It is a low alloy steel capable of being heat treated to high strength levels. The alloy is primarily used in the 220 to 240 ksi (1517-1655 MPa) strength range. The comparatively low carbon content of the alloy makes it particularly useful in applications involving shock loading or stress concentration.

LESCALLOY 4330+V VAC-ARC steel is produced by the vacuum consumable electrode melting process to provide optimum cleanliness and preferred ingot structure.

PHYSICAL PROPERTIES

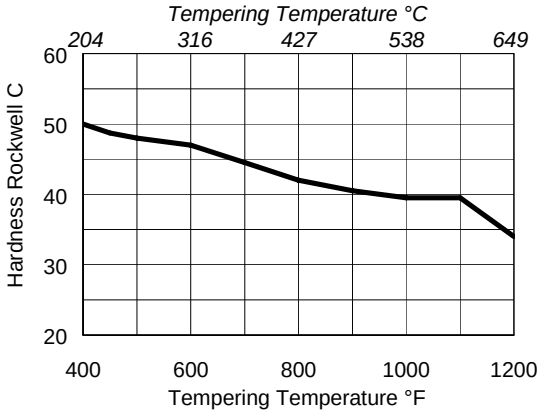
Density: 0.283 lb/in^3 (7.84 g/cm^3)

Specific Heat: 0.16 Btu/lb./°F (0.16 cal/g/°C)

TEMPERING CURVE

Austenitized 1550°F (843°C) - Oil Quenched

Tempered Twice - 2 + 2 Hours



HEAT TREATMENT

Normalize: 1600-1700°F (871-927°C), air cool.

Austenitize: 1550-1600°F (843-871°C), 15 minutes per inch of thickness, oil quench.

Temper: 500-1100°F (260-593°C), depending on desired strength. Temper between 500-700°F (260-371°C) to obtain tensile strengths of 220-240 ksi (1517-1655 MPa).

WORKABILITY

Forging: Forge between 1950 and 2250°F (1066-1232°C). Because of the high hardening capability of the material, preheating and furnace cooling or cooling in ash or lime after forging is recommended.

Machining: Normalize and temper at 1250°F (677°C) maximum prior to rough machining. This steel may also be machined at maximum strength, but machining must then be followed with a stress relieving at approximately 400F (204°C).

Weldability: The steel has good welding characteristics and can be welded by resistance flash welding.

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MECHANICAL PROPERTIES

TYPICAL TRANSVERSE MECHANICAL PROPERTIES DATA

Tempering Temperature		U.T.S		0.2% Y.S.		Elong.	R.A.	Hardness	Notched UTS K_t7	
		ksi	MPa	ksi	MPa	%	%	HRC	ksi	MPa
540°F	282°C	235	1621	195	1345	11.0	47.0	50	302	2083
600°F	316°C	225	1552	193	1331	11.0	47.0	47	297	2048

These data were obtained by averaging the tensile results obtained during an extended program that produced large block sizes of 4330+V steel. Testing was at mid-radius in the transverse direction. The samples were austenitized at 1600°F (871°C) for 1 hour and oil quenched prior to tempering at the above temperatures.

ACTUAL ROOM TEMPERATURE TENSILE AND CHARPY V IMPACT DATA

5½" (140 mm) Square

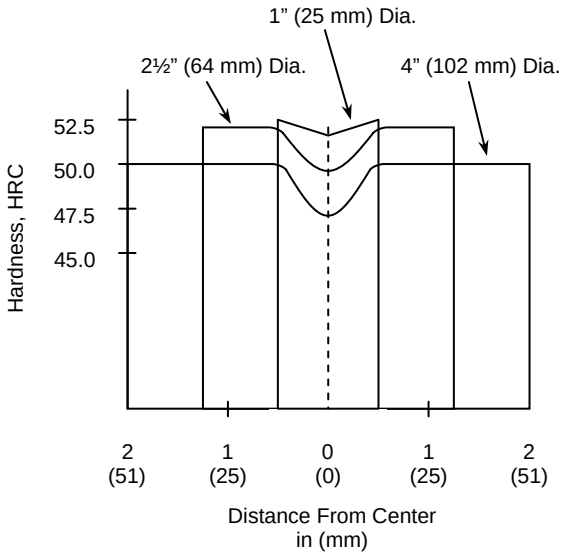
Direction	U.T.S		0.2% Y.S.		Elong.	R.A.	Impact Energy*		Range of Impact Energy*	
	ksi	MPa	ksi	MPa	%	%	ft-lbs	J	ft-lbs	J
Long.	226	1559	188	1297	13.0	58.3	26	35	24-29	33-39
Trans.	222	1531	185	1276	11.5	51.0	17	23	10-25	14-34

* Average of 8 samples

Samples were obtained from a mid-radius location and heat treated to 45 HRC as follows:
1700°F (927°C) - ½ hour - air cool
1600°F (871°C) - ¼ hour - oil quench
600°F (316°C) - 2 hours

HARDENABILITY

This set of curves relates to the general hardening characteristics of the alloy throughout the cross sections of various size bars. This information covers material austenitized at 1550°F (843°C) and then oil quenched.



SPECIFICATIONS

The following list of popular industry specifications is a general reference. This should not be considered a complete listing.

AMS 6411
AMS 6427
CE-0906 (Bendix)
BMS 7-122 (Boeing)
BMS 7-27 (Boeing)
FMS 1012 (General Dynamics)
EMS 96242 (Honeywell)

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