ALLOY STEELS - 4340

AISI /SAE 4340 (UNS G 43400)

NICKEL-CHROMIUM-MOLYBDENUM STEEL

TYPICAL ANALYSIS

C.	Mn.	P.	S.	Si.	Cr.	Ni.	Mo.
.38/.43	.60/.80	.035 MAX.	.040 MAX.	.15/.35	.70/.90	1.65/2.00	.20/.30

THE "KING" OF THE HARDENING GRADES OF CONSTRUCTIONAL ALLOY STEELS. A RICH ALLOY CONTENT, THIS NICKEL-CHROMIUM-MOLYBDENUM STEEL, POSSESSES MUCH DEEPER HARDENABILITY THEN THE 4100 SERIES. THIS IS THE MOST EXTENSIVELY USED MACHINERY STEEL WITH AN EXCEPTIONAL RANGE OF STRENGTH, TOUGHNESS AND DUCTILITY. THE ADVANTAGE IS REALIZED PRINCIPALLY WHERE HIGH STRENGTH IS REQUIRED IN HEAVY SECTIONS. THE HIGH FATIGUE-TENSILE RATIO OF 4340 MAKES IT IDEAL FOR HIGHLY STRESSED PARTS OPERATING UNDER THE MOST SEVERE CONDITIONS, AND MAY BE USED IN BOTH ELEVATED AND LOW TEMPERATURE ENVIRONMENT. IT HAS REMARKABLE NON-DISTORTING PROPERTIES FOR AN ALLOY STEEL. IT HAS GOOD WEAR RESISTANCE AND SHOULD BE USED WHERE THE GREATEST MARGIN OF SAFETY IS DESIRED.

TYPICAL APPLICATIONS

COUPLINGS, HEAVY DUTY SHAFTING, GEARS, DIES, HIGH STRENGTH MACHINE PARTS, CRANKSHAFTS, ARBORS, HIGH TENSILE BOLTS AND STUDS, MINE-DRILLING PARTS, BORING BARS, DOWN HOLE DRILLING COMPONENTS ETC.

MECHANICAL PROPERTIES - ANNEALED

THE FOLLOWING ARE AVERAGE VALUES AND MAY BE CONSIDERED AS REPRESENTATIVE:

	1"	2"	4"	8"
TENSILE STRENGTH, PSI.	**114,000**	**110,000**	**106,000**	**104,000**
YIELD STRENGTH, PSI.	**91,000**	**86,000**	**85,500**	**81,500**
ELONGATION, % IN 2"	**20.0**	**23.0**	**21.0**	**22.0**
REDUCTION IN AREA, %	**46.0**	**49.0**	**50.0**	**48.0**
BRINELL HARDNESS	**229**	**223**	**217**	**217**

(CONTINUED)

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MECHANICAL PROPERTIES - HEAT TREATED AND STRESS RELIEVED
ASTM A 434 / BD

THE FOLLOWING ARE AVERAGE VALUES AND MAY BE CONSIDERED AS REPRESENTATIVE:

	2-1/4"	3-1/2"	5"	8"
TENSILE STRENGTH, PSI.	141,000	157,615	152,437	138,078
YIELD STRENGTH, PSI.	124,000	144,275	136,628	114,872
ELONGATION, % IN 2"	17.0	18.2	17.8	14.4
REDUCTION IN AREA, %	53.0	55.8	54.6	40.2
BRINELL HARDNESS	285	321	285/311	302/311

THERMAL TREATMENTS — DEGREES IN CELSIUS

FORGING	COMMENCE AT 1200° MAX. FINISH AT 950°
ANNEALING	830/855° COOL SLOWLY IN FURNACE
NORMALIZING	855/900° (DUE TO THE AIR HARDENING PROPERTIES OF 4340, NORMALIZING IS NOT RECOMMENDED EXCEPT WHEN FOLLOWED BY TEMPERING)
HARDENING	815/855° OIL QUENCH
TEMPERING	ACCORDING TO STRENGTH LEVEL REQUIRED

MACHINABILITY

4340 IN THE ANNEALED CONDITION HAS A MACHINABILITY RATING OF 57% OF AISI B-1112 AVERAGE SURFACE CUTTING SPEED IS 95 FEET PER MINUTE.

(CONTINUED)

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SHEAR STRENGTH

THE ULTIMATE SHEAR STRENGTH IS APPROXIMATELY 66% OF THE ULTIMATE TENSILE STRENGTH.

WELDABILITY

4340 IS ON THE BORDER LINE OF WELDABILITY BECAUSE OF ITS RELATIVELY HIGH CARBON CONTENTS. IT CAN BE WELDED BY ANY OF THE COMMON WELDING PROCESSES PROVIDING THE SECTION IS PREHEATED AND STRESS RELIEVED AFTER WELDING.
THE GRADE OF WELDING ROD TO BE USED DEPENDS UPON THE THICKNESS OF SECTION, DESIGN, AND SERVICE REQUIREMENTS, ETC.