



VANGUARD STEEL LTD.

PRODUCT MANUAL

HOT ROLLED CARBON STEELS - 1040-1045

AISI/SAE 1040-1045

ASTM A576 UNS G 10400-G 10450

TYPICAL ANALYSIS

	C.	Mn.	P. MAX.	S. MAX.
1040	0.37/0.44	0.60/0.90	0.040	0.050
1045	0.43/0.50	0.60/0.90	0.040	0.050

A GENERAL PURPOSE MILD STEEL, MEDIUM-CARBON FINE GRAIN MACHINERY STEEL. IN THE PRODUCTION OF THIS GRADE, SPECIAL CONTROLS ARE USED FOR CHEMICAL COMPOSITION, HEATING, ROLLING AND SURFACE PREPARATION. THESE BARS ARE SUITABLE FOR APPLICATIONS OF FORGING, COLD DRAWING, MACHINING, HEAT TREATING (INCLUDING FLAME HARDENING). GOOD WEAR RESISTANCE CAN BE OBTAINED BY FLAME OR INDUCTION HARDENING.

TYPICAL APPLICATIONS

AXLES, BOLTS, SHAFTS, MACHINERY PARTS, LIGHTLY STRESSED GEARS, PINIONS FORMING DIES.

MECHANICAL PROPERTIES - AS SUPPLIED.

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

TENSILE STRENGTH, PSI	87,000
YIELD STRENGTH, PSI	52,500
ELONGATION, %	25
REDUCTION IN AREA, %	49
BRINELL HARDNESS	180



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(CONTINUED)

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THERMAL TREATMENTS

DEGREES IN CELSIUS

FORGING

**COMMENCE AT 1150° MAX.
FINISH AT 950°**

ANNEALING

800/830° SURFACE COOL

NORMALIZING

870/920° COOL IN AIR

HARDENING

**840/870° WATER QUENCH
855/885° OIL QUENCH**

TEMPERING

430/700° ACCORDING TO PROPERTIES REQUIRED

MACHINABILITY

1040 IN THE AS ROLLED BAR HAS A MACHINABILITY RATING OF 62% OF AISI B-1112.
AVERAGE SURFACE CUTTING SPEED IS 105 FEET PER MINUTE.

SHEAR STRENGTH

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

WELDABILITY

DUE TO HIGH CARBON CONTENT, THIS MATERIAL IS NOT READILY WELDED. WITH THIN SECTIONS AND FLEXIBLE DESIGN, GAS OR ARC WELDING MAY BE USED WITHOUT PREHEATING, BUT IN JOINTS OVER 1/2" TO 3/4" THICK, PREHEATING IS NECESSARY. TO DEVELOP EQUIVALENT STRENGTH IN A WELD, A LOW ALLOY FILLER IS RECOMMENDED. THE GRADE OF WELDING ROD TO BE USED DEPENDS ON THICKNESS OF SECTION, DESIGN, SERVICE REQUIREMENTS, ETC.