



FREE CUTTING STEELS

Clean Steel
State of the Art Process Technology

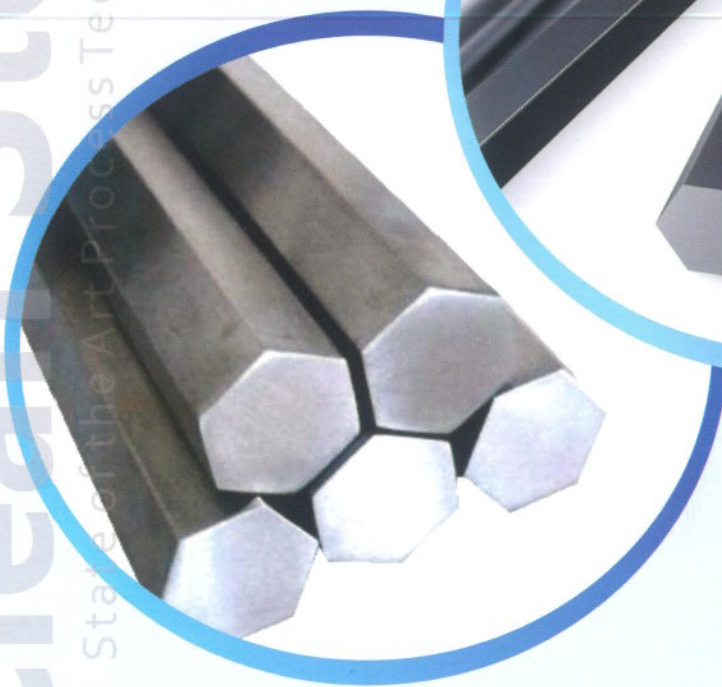
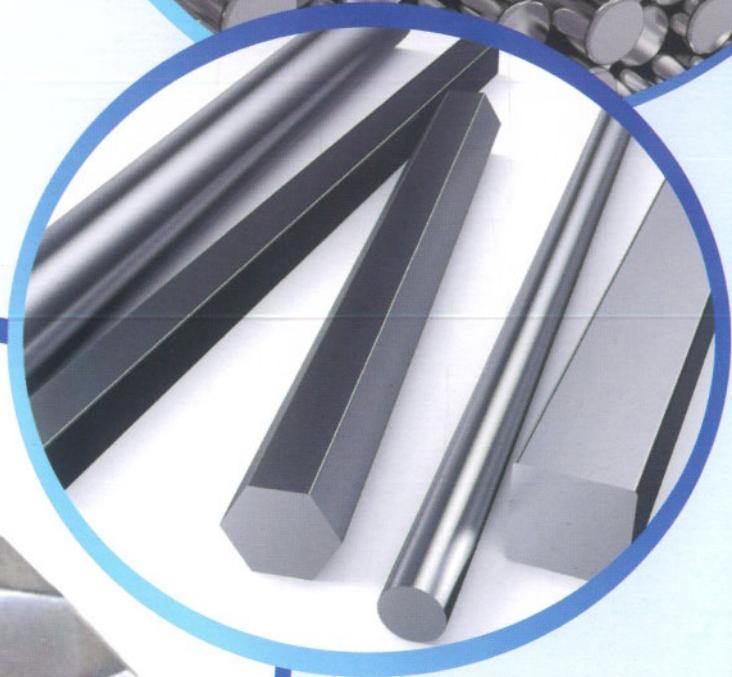
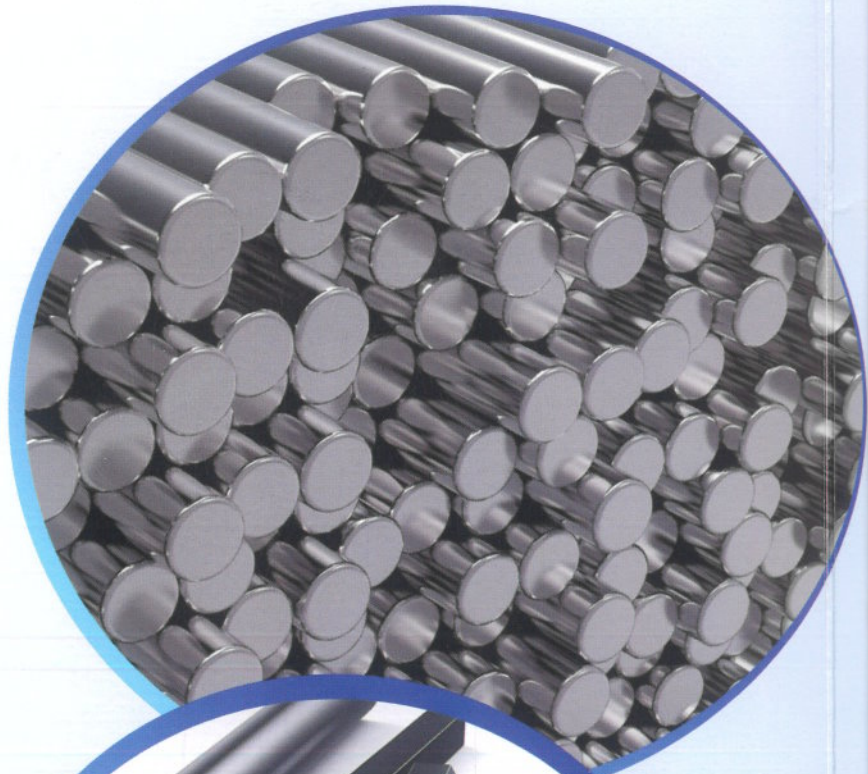


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QUALITY REQUIREMENT FOR FREE CUTTING STEELS

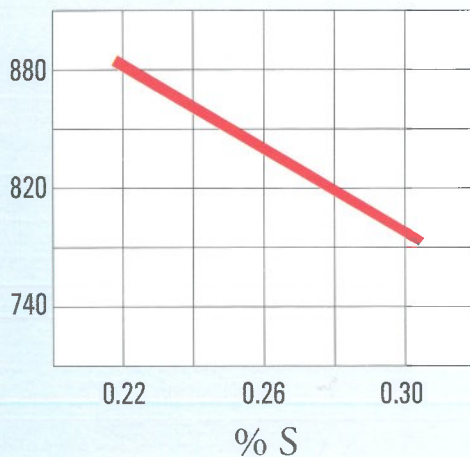
- Uniform distribution of MnS
- Hardness
- Microstructure
- Dimensional quality
- Straightness



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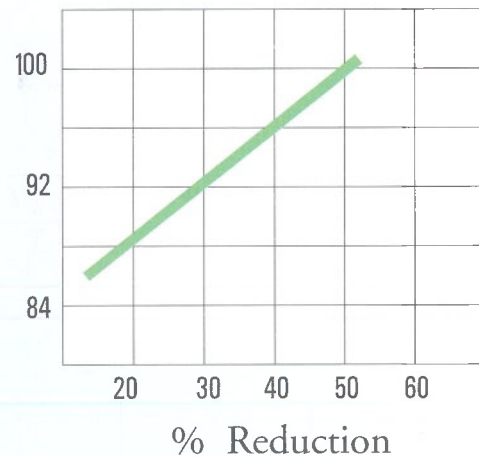
TYPICAL CO-RELATION OF MACHINING PARAMETERS WITH ELEMENTAL LEVELS

Machining (Force) Torque



Effect of 'S' content on the machining torque.

Surface Hardness HB



Free machining steels are generally used after cold processing such as drawing, peeling, grinding etc. The extent of cold work employed in converting black bar of free machining steel into bright bar, decides its surface hardness, which in turn is responsible for its machining performance.

CERTIFICATION OF QUALITY

- Surface condition : Free from defects
- Macro etch test (ASTM: E-381)
- Spark/Spectral test - 100% bars
- As rolled hardness - Free Cutting Steels \leq 150 BHN
- Inclusion rating - (ASTM - E-45) 2.5 max each - B, C,D
- Micro structure - Sulphide morphology (Aspect Ratio)

INTERNATIONAL SPECIFICATIONS OF FREE CUTTING STEELS

Country	Grade	Chemistry	Chemistry					
			C	Mn	Si	P	S	Pb
IS (Indian)	11C10S25	Min	0.08	0.80	-	-	0.20	-
		Max	0.15	1.20	0.10	0.06	0.30	-
BS (British)	220M07	Min	-	0.90	-	-	0.20	-
		Max	0.15	1.30	-	0.07	0.30	-
EN (British)	ENIA-Pb	Min	0.07	0.80	-	0.040	0.26	0.15
		Max	0.15	1.20	0.10	0.090	0.35	0.35
AISI (American)	12L14	Min	-	0.85	-	0.04	0.26	0.15
		Max	0.15	1.15	0.10	0.09	0.35	0.35
JIS (Japanese)	SUM24L	Min	-	0.85	-	0.04	0.26	0.10
		Max	0.15	1.15	0.10	0.09	0.35	0.35
DIN (German)	9SMn28K	Min	-	0.86	-	-	0.24	0.15
		Max	0.16	1.35	0.06	0.11	0.36	0.35
ASTM (American)	1215	Min	-	0.75	-	0.040	0.260	-
		Max	0.09	1.05	-	0.090	0.350	-

INTERNATIONAL SPECIFICATIONS OF SEMI FREE CUTTING STEELS

Country	Grade	C	Mn	Si	P	S	A1
DIN (German)	SU1A28	-/0.18	0.70/1.05	-/0.45	-/0.060	0.08/0.15	0.020/0.050
	R10S10U	-/0.18	0.70/1.05	-/0.45	-/0.060	0.08/0.15	0.020/0.050
	45S20U	0.39/0.53	0.66/1.15	0.07/0.33	-/0.065	0.15/0.28	-
SAE (American)	SAE1117	0.14/0.20	1.00/1.30	-	0.040 Max	0.080/0.130	-
	SAE1118	0.14/0.20	1.30/1.60	-	0.040 Max	0.080/0.130	-
	SAE1137	0.32/0.39	1.35/1.65	-	0.040 Max	0.080/0.130	-
	SAE1141	0.37/0.45	1.35/1.65	-	0.040 Max	0.080/0.130	-
	SAE1144	0.40/0.48	1.35/1.65	-	0.040 Max	0.240/0.33	-
EN (British)	EN8M	0.35/0.45	1.00/1.30	0.25 Max	0.060 Max	0.120/0.200	-

SIZES AND CONDITIONS OF SUPPLY

Condition of Supply	Shapes	Sizes
1. Black	Hex	15.5 mm - 38 mm A/F
	Round	5.5 mm - 100 mm dia
	WRD	5.5 mm - 38 mm dia
2. Drawn	Hex	14 mm - 36 mm A/F
	Round	10mm - 50 mm dia
3. Peeled & Ground	Round	10 mm - 90 mm dia



BIS Approved
NABL Accredited Chem & Mech Labs.
ISO 9001 & IATF 16949 Certified by UL DQS
ISO 14001 & ISO 45001 Certified by TUV Nord
AD 2000 Merkblatt WG / PED Certified by TUV Nord

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