SUNFLAG STEEL

BIS Approved
NABL Accreditated Chem & Mech Labs.
ISO 9001 & IATF16949 Certified by UL DQS
ISO 14001 & OHSAS 18001 Certified by TUV Nord
AD 2000 Merkblatt WO /PED Certified by TUV Nord

BEARING STEELS

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PROCESS	EQUIPMENT	KEY PROCESS CHARACTERISTICS	EFFECT ON PRODUCT QUALITY
PRIMARY MELTING	EAF WITH EBT AND LOAD CELL ELECTRIC ARE FERVOCE WITH ELECTRIC BOTTOM TAPPING AND LOAD CELL	• GOOD CARBON BOIL • SLAG FREE TAPPING • LM WEIGHT MONITORING • LIQUID METAL	• FREE FROM UNDESIRABLE TRAMP ELEMENTS • LOW TRAMP ELEMENTS DUE TO USE OF OWN VIRGIN • RAW MATERIAL, SUCH AS DRI, PIG IRON. LOW PHOSPHORUS LEVEL TO IMPROVE COLD FORGEABILITY. • LOW N2 LEVEL AT TAPPING STAGE, • CONTROLLED FEO IN SLAG TO ENSURE LOW O2 FOR SUBSEQUENT STEEL REFINING
SECONDARY REFINING	LADLE REFINING FURNACE WITH COMPUTRISED FERROALLY FEEDING SYSTEM	• ARGON PURGING • MICROPROCESSOR BASED FERROALLOY ADDITION SYSTEM • CONTROLLED POWER INPUT	• ACHIEVEING FINAL PRODUCT CHEMISTRY WITH HIGH REPETABILITY. • PREDICTABLE ALLOY RECOVERY AND LESS FORMATION OF DEOXIDATION OF PRODUCTS. HIGH BASICITY FOR DEEP DESUL PHURISATION AND INCLUSION REMOVAL. FACILITY FOR TRIM ADDITION TO ACHIEVE CLOSE RANGE OF TARGET CHEMISTRY.
DEGASSING	STATIC TANK TYPE VACUUM DEGASSING	• HIGH SUCTION CAPACITABILITY TO • ACHIEVE VACUUM <1 m bar • ARGON PURGING/RINSING	• REDUCTION IN DISSOLVE GAS LEVELS O2,N2,H2 • SIGNIFICANT REDUCTION IN SULPHUR LEVEL • COMPLETE HOMOGENISATION OF CHEMISTRY AND TEMPERATURE FOR SMOOTH CASTING.
WIRE INJECTION	3 STRAND WIRE INJECTION EQUIPMENT FOR CARBENSULPHOR AND ALLUMINIUM	FINE ADJUSTMENT OF C & S & ALLUMINIUM	PRECISE CONTROL OF C ,S AND ALUMINIUM.
CASTING	CONTINOUS CASTER 3 STRANDS WITH AMLC/EMS, SUBMERGED NOZZLE CASTING AND LEVEL 2 AUTOMATION	• BASIC REFRACTORIES. • CONTROL ON SUPER HEAT, • CASTING SPEED, • UNIFORM SECONDARY COOLING, • STABLE CASTING	• IMPROVED SURFACE QUALITY OF BLOOMS • NO MACROINCLUSIONS DUE TO CLOSED STREAM CASTING THROUGH AMLC • CAST BLOOM FREE FROM HARMFUL SURFACE AND SUB SURFACES DEFECTS
BILLET INSPECTION	• OPTICAL EMMISSION SPECTROMETER • GAS ANALYSERS • MACRO TEST • AUTO GRINDING OF SURFACE • MAGNA FLUX ON ROLLED BILLET	• CHEMISTRY, • GAS LEVELS , • INTERNAL AND SURFACE QUALITY AS PER CUSTOMER SPEC	CONFORMANCE TO CUSTOMER SPECIFICATION.
BAR AND SECTION ROLLING MILL	• WALKING HEARTH REHEATING FURNACE, • AIR:FUEL RATIO CONTROL, • 24 STDS FIXED PASS LAY OUT WITH 10 STD FINISHING BLOCK OF TUNGSTON CARBIDE ROLL GROOVE, • VARIABLE REDUCTION MILL (VRM) WITH HOUSINGLESS STANDS AND HIGH STIFFNESS	• ROLLING TEMPERATURE, CONTROL FURNACE RESIDENCE TIME, • PRIMARY SCALE REMOVAL, • OVAL-ROUND PASS SEQUENCE AND INTERSTAND TENSION CONTROL WITH LOOPERS. • INPUT OUTPUT TEMERATURE CONTROL, • PLANNED PASS SCHEDULING • HORIZONTAL VERTICAL HORIZONTAL STAND CONFIGURATION IN VRM	• UNIFORM SURFACE APPEARANCE, • CLOSE DIMENSIONAL TOLERENCE, • FREEDOM FROM HARMFUL SURFACE DEFECTS , • COMPACT LAYING OF TURNS LEADING TO COMPACT COILS, • CONTROL ON SURFACE DECARBURISATION. • CAPABILITY TO ROLL ROUND 15-56 MM, COIL 5.5-38MM , HEX 13.3-38 MM AND FLAT IN DIFFERENT SIZES. • DIMENSIONAL TOLERENCES OF 1/4 TH OF STANDARD "DIN 1013" WITH MINIMUM SIZE VARIATION ALONG THE LENGTH OF BAR
BLOOMING MILL	• WALKING HEARTH REHEATING FURNACE, • THERMAL IMAGING CAMERA, • AIR:FUEL RATIO CONTROL, • HYDRAULIC SCALE BREAKER , • 2 HIGH REVERSABLE MILL WITH MECHANISED FEEDING • AUTOSCREWDOWN MECHANISM WITH HOT SAW CONTROLLED COOLING FACILITY	• ROLLING TEMPERATURE, • FURNACE RESIDENCE TIME	• FLEXIBILITY TO ROLL SQUARES AND ROUNDS • FREE FROM HARMFUL SURFACE DEFECTS • DIMENSIONAL CONTROL AS PER TOLERENCE, • PROPER END CUTTING, • GOOD STRAIGHTNESS IN AS ROLLED CONDITION
ALLOY STEEL MILL	• PLC CONTROLLED PUSHER TYPE FURNACE, • THREE HIGH ROUGHING STAND, • TWO THREE HI INTERMEDICATE STAND AND • TWO HIGH FINISHING STAND, • HOT SAW FACILITY AND RAKETYPE COOLING BED	• GOOD TEMPERATURE CONTROL, GOOD FINISH QUALITY	• DEFINE ROLL PASS DESIGN, BOX PASSES, • DI & SQ FOLLOWED BY OVAL ROUND SEQUENCE IN INTERMEDIATE AND FINISHING.

BEARING STEELS

Bearing steels are special class of low alloy steels, typically with 1% carbon and 1.4% chromium. Manganese and Molybdenum are added in certin special cases. These steels find applications in automobiles, railwys, earth moving, defence, aircraft, power generations, compressor and other moving machinery parts. In view of the continious fatigue strain during service, this steel and its components demands high level of precess descipline during manufacturing.

The components for these applications are manufactured either through hot forging route or through spherodised annealing followed by cold forging route. At sunflag all the necessary facilities for manufacturing and testing of bearing steel grades have been established. Various controls are excersised during manufacture, right from selection of raw marerials and ferrow alloys required to meet the stringant quality parameter of various customer.

- Fatigue Life
- Uniform heat treatment response
- Compact ctructure with uniform grain flow and fine grain size imparting high impact toughness

Inspection activities before dispach are designed to address the verification of all the quality requirements of bearing steels any deviation observed during production process and quality testing is recorded and analysed for taking suitable corrective and preventive actions to meet the quality requirements of this critical grade steel

Sizes and condition of supply

No.	Size (mm)	Shape	Condition of supply	Application
1	12 - 60 Dia	Straight Length Round	Stress relief /spheroidised annealed	Forging of rings
2	10 - 56 Dia	Straight Length Round	Peeled and ground bars in spheroidised annealed condition	Machining of racers or cold forging of bars /rollers
3	5.5 - 38 Dia	Wire Rod Roundes	Spheroidised annealed	Machining of racers or cold forging of bars /rollers

International Specifications of Ball Bearing Steels

No.	Country	Grade		Chemistry					
				C	Mn	Si	P	S	Cr
1	U.S.A.	SAE 52100	Min	0.98	0.25	0.15	-	-	1.30
			Max	1.10	0.45	0.30	0.025	0.025	1.60
2	Germany	100Cr6	Min	0.95	0.25	0.15	-	-	1.30
			Max	1.10	0.45	0.30	0.030	0.030	1.60
3	India	103Cr2	Min	0.95	0.25	0.15	-	-	1.40
			Max	1.10	0.45	0.35	0.025	0.025	1.60
4	Japan	SUJ 2	Min	0.95	0.50	0.15	-	-	1.30
			Max	1.10	Max	0.35	0.025	0.025	1.60
5	Britain	EN31	Min	0.90	0.30	0.10	-	-	1.00
			Max	1.20	0.75	0.35	0.050	0.050	1.60

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Certification of quality :

Following important quality features are tested and certified on all Bearing Steel Heats made at Sunflag

• Chemistry	Including tramp levels and Titanium
• Gases	O_2, N_2 and H_2
• Macrostructure of bars (internal quality)	As per ASTM E-381 or as specified by the customer
• Dimensional tolerances	As specified by the customer.
• Decarburisation level	Less than 1% of diameter or as specified by the customer
• Surface quality of bar	Checked and certified on 100% basis by pickling process and 100% magnetic particle inspection.
• Non metallic inclusion level	As per ASTM-E-45 (A and B not greater than 1.0, C is 0.0 and D not greater than 0.5)
• Microstructure (Banding)	As per customer specification (As per SEP-1520 DIN Standard Chart)

Any other special testing requirement found desirable by the customer can be satisfied.

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