MATERIAL SPECIFICATION FOR STRUCTURAL STEEL PLATES, BARS AND OTHER LOW CARBON MILL SHAPES WITH 50 KSI (345 MPA) YIELD STRENGTH

1.0 PURPOSE

1.1 It is the purpose of this material specification to list in concise form of the material requirement for STRUCTURAL steel for use in welded fabrication.

1.2 Product forms covered low carbon shapes including beams for use in welded fabrications. This specification suitable for use in applications requiring charpy impact testing.

1.3 This material specification is intended to aid the purchasing department in procuring and the vendor in supplying a material which meets the needs of its intended use, and the quality control department in the inspection and release of incoming material.

1.4 Equivalent or higher grades may be used by the supplier provided they meet the requirement of this specification. When substituted grades do not meet the requirements of this specification, they may be used provided the supplier informs and receives approval from SARA SAE prior to commencement of fabrication.

2.0 REQUIREMENTS

2.1 The requirements of specification SES 26-590, SES 26-740 & SES 26-744 shall apply in addition to the following specific requirements.

2.1.1 **Chemical composition**: Chemical composition limits are listed below. An analysis of each heat of steel is made by the manufacturer, preferably from a ladle sample taken at or near the time of pouring. The listed elements shall be reported in weight percent. Reporting of residual elements is not required, but total residuals must not exceed 1%.

Table 1:

ELEMENTS	COMPOSITION RANGE (%)
Carbon (C)	0.23 (max.)
Manganese (Mn)	1.50 (max.)
Silicon (Si)	0.40 (max.)
Sulphur (S)	0.050 (max.)
Phosphorus (P)	0.040 (max.)
Carbon Equivalence (CE), CE= C+Mn/6+(Cr+Mo)/5+(V+Ni+Cu)/15	0.43 (max.)

SARA SAE PRIVATE LIMITED UNIT-II 7/1-Pritam Road DEHRADUN (Uttarakhand)

2.1.2 Acceptable chemical composition for materials SAC 50, SAC 350, COS AR 50, DIN 1629-ST52.3N, VMec 134AP, COS AR 500 AND COS AR COR 350

Table 2:

ELEMENTS	COMPOSITION RANGE (%)
Carbon (C)	0.25 (max.)
Manganese (Mn)	1.60 (max.)
Silicon (Si)	1.50 (max.)
Sulphur (S)	0.035 (max.)
Phosphorus (P)	0.035 (max.)
Chromium (Cr)	0.70 (max.)
Molybdenum (Mo)	0.10 (max.)
Nickel (Ni)	0.50 (max.)
Copper (Cu)	0.50 (max.)
Aluminum (Al)	0.05 (max.)
Titanium (Ti)	0.15 (max.)
Vanadium (V)	0.12 (max.)
Niobium (Nb)	0.05 (max.)
Carbon Equivalence (CE)	0.43 (max.)

2.1.3 Carbon Equivalence (CE) shall be calculated using the following equation:

$$CE = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15$$

3.0 MECHANICAL PROPERTIES:

MECHANICAL PROPERTIES	RANGE
TENSILE STRENGTH, Min.	65,000 PSI (450 MPa) Min.
YLELD STRENGTH, Min.	50,000 (345 MPa) T < 2.5" 47,000 (324 MPa) T > 2.5"
ELONGATION (Min.) 2" or 4D	21 %
ELONGATION (Min.) 8"	18%
BRINELL HARDNESS (kg/mm²)	N.A.

4.0 HEAT TREATMENT:

4.1 Material shall be supplied in any of the following conditions.

- Annealed
- Hot rolled
- Normalized
- Quenched and tempered

SARA SAE PRIVATE LIMITED 7/1-Pritam Road DEHRADUN (Uttarakhand) UNIT-II

4.2 API 2H grade 50 shall be supplied in the normalized condition.
4.3 Parts not to be supplied in cold condition.

5.0 MARKINGS: Mill shapes shall be identified with the heat number marked with low stress or interrupted dot stamps on exterior surfaces in a non machined area. Steel tubing shall be marked according to the applicable piping specification.

6.0 **REFERENCE SPECIFICATIONES:** - the following list of typical industry specifications and grades may be used as reference specifications for purchasing, but do not necessarily meet all the requirements of this specification.

EN 10225 S355G1+ N
EN 10225 S355G1 (all grades)
EN 10113 S355NL OR ML
EN 10155 S355J2GIW (POLAND)
EN 10210 S355NH
EN 10219
BS 4360-50 (all grades)
BS 71
BS 7191 Grade 355EM (Rolled and Welded)
API 2H Grade 50 (Rolled and Welded) (USA)
API 2MT-1 (Rolled and Welded) (USA)
API 2W/Y Grade 50 (Rolled and Welded) (USA)
API 5L X52 (Seamless or Seam Welded)
ASTM A131 AH36 and EH36
ASTM A572-50 (USA)
ASTM A618-84 (USA)
ASTM A656 Grade 60 (Rolled and Welded) (USA)
ASTM A633 Grades C and D (Rolled and Welded) (USA)
ASTM A709 50W
ASTM A737 Grade B (Rolled and Welded) (USA)
ASTM A992 (USA)
DIN 17100 Grade ST 52.3N (Rolled and Welded) (USA)
DIN 17121 ST52.3 (Germany)
DIN RR ST52.3N
NFA 35-501 Grade 36.4 (Rolled and Welded) (France)
NORSOK M-120 Y04, Y05, Y06, Y07, Y20, or Y25
SAC 50
SAC 350
COS AR 50
DIN 1629-ST52
VMec 134 AP
COS AR COR 500
COS AR COR 350