AEROSPACE
MATERIAL SPECIFICATIONS
SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 6378

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Revised

STEEL
0.95Cr - 0.2Mo (0.38 - 0.45C) (SAE 4140 Modified)
Die Drawn and Tempered, 130,000 psi Yield

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. FORM: Bars.

3. APPLICATION: Primarily for parts such as shafts, axles, pins, fasteners, gears, and screw machine parts which are normally used at hardness of Rockwell C 30 - 36.

4. COMPOSITION:

Carbon	0.38 - 0.45
Manganese	0.75 - 1.00
Silicon	0.20 - 0.35
Phosphorus	0.040 max
Sulphur	0.040 max
Chromium	0.80 - 1.10
Molybdenum	0.15 - 0.25

4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2259, paragraph titled "Low Alloy Steels".

5. CONDITION: Heavily drafted, elevated temperature die drawn, straightened, and tempered.

5.1 Temperatures for die drawing shall be selected significantly above room temperature but below the transformation range to produce a uniform structure of deformed pearlite and ferrite providing good machinability.

6. TECHNICAL REQUIREMENTS:

6.1 Tensile Properties:

Tensile Strength, psi	150,000 min
Yield Strength at 0.2% Offset or at 0.0130 in. in 2 in. Extension Under Load (E = 29,000,000), psi	130,000 min
Elongation, % in 4D	10 min
Reduction of Area, %	35 min

6.1.1 Tensile test specimens shall be taken at the center on sizes 1-1/2 in. round or smaller and at mid-radius on sizes larger than 1-1/2 in. round.

6.2 Hardness: Shall be not lower than Brinell 302 or equivalent across the section.

6.2.1 In event of disagreement between tensile strength and hardness values, when the latter is not determined as Brinell hardness, the tensile strength values shall govern.

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6.3 Grain Size: Predominantly 5 or finer with occasional grains as large as 3 permissible, ASTM E112-58T, Appendix III, Section A1, Treatment (1) (McQuaid - Ehn test).

6.4 Decarburization:

6.4.1 Bars ordered ground, turned, or polished shall be free from decarburization on such ground, turned, or polished surfaces.

6.4.2 Decarburization of bars to which 6.4.1 is not applicable shall be not greater than the following:

Nominal Diameter or Distance Between Parallel Sides Inches	Depth of Decarburization Inch
0.375 and under	0.010
Over 0.375 to 0.500, incl	0.012
Over 0.500 to 0.625, incl	0.014
Over 0.625 to 1.000, incl	0.017
Over 1.000 to 1.500, incl	0.020
Over 1.500 to 2.000, incl	0.025
Over 2.000 to 2.500, incl	0.030
Over 2.500 to 3.000, incl	0.035
Over 3.000 to 3.500, incl	0.040

6.4.3 Unless otherwise agreed upon by purchaser and vendor, decarburization shall be measured by the microscopic method, or by Rockwell Superficial 30-N scale hardness method, or equivalent hardness testing method, on hardened specimens. Depth of decarburization, when measured by a hardness method, is defined as the depth below which there is no further increase in hardness; such measurements shall be far enough away from any nearby intersecting surface to be uninfluenced by any decarburization or lack of decarburization thereon.

6.4.3.1 When determining the depth of decarburization, it is permissible to disregard local areas provided the decarburization of such areas does not exceed the above limits by more than 0.005 in. and the width is 0.065 in. or less.

7. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

7.1 Material shall be subject to magnetic particle inspection in accordance with the latest issue of AMS 2301, unless such inspection be waived.

8. TOLERANCES:

Nominal Diameter Inches	Tolerance, Inch Minus Only
1.000 and under	0.006
Over 1.000 to 3.500, incl	0.008