

Carbon Steel Bright Bar M1020 Grade Data Sheet

Grade M1020

Grade M1020 carbon steel bar is a merchant grade plain carbon steel bar containing nominally 0.20% carbon. M1020 has wider chemical composition limits than grade 1020. Grade M1020 is supplied based on it meeting specified chemical composition requirements only.

Related Specifications

Bar in grade M1020 is supplied in accordance with the requirements of AS1443 Grade M1020.

Chemical Composition (%)

C	Si	Mn	P	S
0.15 - 0.25	≤ 0.35	0.30 - 0.90	≤ 0.050	≤ 0.050

Conditions of Supply – Typical Mechanical Properties

Grade M1020 is not guaranteed to meet any specified minimum mechanical properties and the values in the table below reflect typical properties only. These values reflect grade D3 (AS 1443) for cold drawn sections and grade T3 (AS 1443) for turned and polished sections. Brinell Hardness (HB) limits are not specified in AS 1443.

Condition	Diameter (mm)	Tensile Strength (MPa)	Yield Stress (MPa)	Elongation (% in 50mm)	Hardness (HB)
Cold Drawn	Up to 16mm inclusive	480 min	380 min	12 min	142 min
	>16mm to 38mm inclusive	460 min	370 min	12 min	135 min
	>38mm to 100mm inclusive	430 min	340 min	13 min	126 min
Cold Finished / Turned and Polished	To 50mm inclusive	410 min	250 min	22 min	119 min
	>50mm to 250mm inclusive	410 min	230 min	22 min	119 min

M1020 can be supplied as D3 or T3 (or equivalent) with guaranteed mechanical properties on special order request.

Conditions of Supply – Finish, Dimensions and Tolerances

Surface Finish

Bright round bar up to 63.5mm diameter is all cold drawn. Bright round bars 63.5-100mm diameter are cold drawn or smooth-turned and polished. Bright round bars over 100mm diameter are all smooth-turned and polished. All hexagon bar and all square bar is cold drawn. Flat Bar is cold drawn and supplied sharp-edged or round edged.

Diameter and A/F Tolerances

Round Bar: Cold drawn h10; Smooth-turned and polished h11 or h10; Ground h8.

Square Bar, Hexagon Bar & Flat Bar: h11.

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Straightness – Maximum Deviation from a Straight Line

Rolled Bar: 1 in 1000mm.

Square Bar, Hexagon Bar & Flat Bar: 1 in 375mm.

Other tolerances may be supplied for more critical applications upon enquiry.

Length Tolerances

Mill lengths (3.5 to 6.0m): ± 250mm max.

Set lengths (3.0 to 7.0m): -0/+40mm max., tolerance is possible subject to enquiry.

Surface Hardening

The following temperature ranges are applicable for the respective heat treatment operations.

Annealing	Normalising	Carburising	Tempering
870 - 910°C	890 - 940°C	880 - 980°C	150 - 200°C

Grade M1020 is not a case-hardening steel, however, it may be case hardened by the blank carburising process. It should be taken into account that Carbon content varies between 0.15% and 0.25%, therefore the result of the blank carburising process may greatly vary. If surface hardening is critical then the test certificate should be checked. Grade M1020 is not suitable for through-hardening, flame or induction hardening due to the low carbon content of this steel.

Welding

M1020 can be readily welded by all conventional welding processes, MIG, TIG, MMAW etc. Pre-or post-heating is normally not necessary as part of the welding procedure. Preheat heavier sections. Do not weld components after blank carburising.

Applications of Grade M1020

Suitable for general engineering applications where the lower strength of this grade is sufficient. Grade M1020 is not able to be through-hardened and is not hardenable by either flame or induction hardening processes. It can be case hardened by a blank carburising process. Applications such as fasteners of various types, engineering applications where strength is not the major consideration (shafts, jack handles, threaded bar) and a grade is required that can be readily welded.

Possible Alternative Grades

Grade	Why it might be chosen instead of M1020
1214FM	Where welding and bending are not required and improvement in machinability is required.
M1030	Where higher strength is required, and welding and bending may be required. Pre-and post-heat may be required as part of the welding procedure, whereas M1020 can be readily welded without pre-and post-heating.
1040/1045	Further increase in strength required above that of M1030, and the lower ductility and toughness of 1040/1045 can be tolerated. Welding of 1040 or 1045 requires pre-and post-heat as part of the weld procedure.

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