

ASTM A320 Grade L1 — Material Data Sheet

ASTM A320 / ASME SA-320 · Low-carbon boron steel

Low-carbon boron steel, quenched and tempered, Charpy impact tested at -100 °F with a 40 ft·lbf requirement

A boron-treated low-carbon steel for small low-temperature bolting — L7 strength in sizes to 1 in. with twice the impact energy requirement.

TENSILE (<=1 IN.)	125 ksi min	CHARPY IMPACT	40 ft·lbf avg at -100 °F
YIELD (<=1 IN.)	105 ksi min	COMPANION NUT	ASTM A194 7 (or A320 L43 / L73)
HARDNESS	No maximum specified	HEAT TREATMENT	Quenched and tempered

Nominal composition

■ Fe balance ~ 98.5% ■ Mn ~ 1.05% ■ C, P, S, Si, B trace

Midpoints of the specification ranges, for orientation only. Limits are in the table.

Chemical composition — ASTM A320 L1 (low-carbon boron steel)

Element	Symbol	Min %	Max %
Carbon	C	0.17	0.24
Manganese	Mn	0.70	1.40
Phosphorus	P	—	0.035
Sulfur	S	—	0.050
Silicon	Si	0.15	0.30
Boron	B	0.001	0.003

Values per ASTM A320/A320M-26, Tables 1, 2 and 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.7 × 10 ⁶ psi (205 GPa)
MAGNETIC	Yes (ferromagnetic)

Heat treatment

Reheated above the upper critical temperature, liquid quenched and tempered. Charpy impact tested per lot at -100 °F.

Mechanical properties — ASTM A320 L1

Nominal diameter (in.)	Tensile strength, min (ksi)	Yield strength 0.2% offset, min (ksi)	Elongation in 2 in., min (%)	Reduction of area, min (%)	Hardness, max
1 and under	125	105	16	50	Not specified

Values per ASTM A320/A320M-26, Tables 1, 2 and 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. No minimum tempering temperature or hardness maximum is specified for L1.

Charpy V-notch impact requirements — ASTM A320 L1

Grade	Test temperature	Specimen	Energy, average of three (ft·lbf)	Energy, single specimen min (ft·lbf)
L1	-100 °F (-73 °C)	10 × 10 mm	40	30
L1	-100 °F (-73 °C)	10 × 7.5 mm	32	24

Values per ASTM A320/A320M-26, Tables 1, 2 and 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A320 / ASME SA-320	Alloy-steel and stainless steel bolting for low-temperature service
ASTM A194 GRADE 7	Ferritic nuts required by A320 clause 10.1 (A320 L43 or L73 nuts are the alternative); nut material is impact tested and marked L

Forms we supply in A320 L1

- Full-thread studs
- Hex bolts and cap screws
- Socket head cap screws
- Machined components from certified bar

Typical applications

- Small-diameter low-temperature bolting to 1 in.
- Instrument, valve and small flange hardware on cold service
- Applications where high impact energy is specified