

ASTM A320 Grades L70, L71, L72 and L73 — Material Data Sheet

ASTM A320 / ASME SA-320 · UNS G41400 · G40370 · G41370 · G87400 · AISI 4140 · 4037 · 4137 · 8740

The L7-family steels impact tested at -100 °F instead of -150 °F

Same steels and strength as L7, L7A, L7B and L7C, but Charpy tested at -100 °F — the economical A320 grades when the design temperature does not go all the way to -150 °F.

TENSILE (<=2½ IN.)	125 ksi min	CHARPY IMPACT	20 ft·lbf avg at -100 °F
YIELD (<=2½ IN.)	105 ksi min	COMPANION NUT	ASTM A194 7 (or A320 L43 / L73)
HARDNESS	321 HBW / 35 HRC max	HEAT TREATMENT	Q&T, 1100 °F min temper

Nominal composition

■ Fe balance ~ 97.3% ■ Cr ~ 0.95% ■ Mn ~ 0.88% ■ C, P, S, Si, Mo trace

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

Chemical composition — ASTM A320 L70 (Cr-Mo, typically AISI 4140/4142/4145)

Element	Symbol	Min %	Max %
Carbon	C	0.38	0.48
Manganese	Mn	0.75	1.00
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Chromium	Cr	0.80	1.10
Molybdenum	Mo	0.15	0.25

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/in³ (7.85 g/cm³)
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 at 1100 °F (593 °C) minimum. Charpy impact tested per lot at -100 °F.

Mechanical properties — ASTM A320 L70, L71, L72 and L73

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
L70, L71, L72, L73 — 2½ and under	125	105	16	50	321 HBW / 35 HRC

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.

Chemical composition — ASTM A320 L71 (AISI 4037)

Element	Symbol	Min %	Max %
Carbon	C	0.35	0.40
Manganese	Mn	0.70	0.90
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Molybdenum	Mo	0.20	0.30

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.

Chemical composition — ASTM A320 L72 (AISI 4137)

Element	Symbol	Min %	Max %
Carbon	C	0.35	0.40
Manganese	Mn	0.70	0.90
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Chromium	Cr	0.80	1.10
Molybdenum	Mo	0.15	0.25

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.

Chemical composition — ASTM A320 L73 (AISI 8740)

Element	Symbol	Min %	Max %
Carbon	C	0.38	0.43
Manganese	Mn	0.75	1.00
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Nickel	Ni	0.40	0.70
Chromium	Cr	0.40	0.60
Molybdenum	Mo	0.20	0.30

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.

Charpy V-notch impact requirements — ASTM A320 L70 / L71 / L72 / L73

Grade	Test temperature	Specimen	Energy, average of three (ft·lbf)	Energy, single specimen min (ft·lbf)
L70 / L71 / L72 / L73	-100 °F (-73 °C)	10 × 10 mm	20	15
L70 / L71 / L72 / L73	-100 °F (-73 °C)	10 × 7.5 mm	16	12

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
ASME B31.3	Process piping — low-temperature toughness requirements

Forms we supply in A320 L70–L73

- Full-thread studs and stud bolts
- Double-end and tap-end studs
- Hex and heavy hex bolts
- Socket head cap screws
- Threaded rod (cut and rolled thread)
- Machined components from certified bar

Typical applications

- Refrigeration and cold-service piping to -100 °F
- Cold-climate flange and valve bolting
- Propane, butane and ammonia systems
- Any L7 application with a minimum design temperature above -100 °F