

ASTM A563 Carbon and Alloy Steel Nuts (Grades A, B, C, D, DH, DH3) — Material Data Sheet

ASTM A563 / A563M — Carbon and alloy steel
Hex and heavy hex nuts for bolts from 60 to 150 ksi

The nut specification for carbon and alloy steel bolting: Grade A for A307, Grade B for cast-iron flanges, C and D for 105 to 120 ksi bolts, and DH and DH3 heat treated for A325, A490, A354 and Grade 8 — with proof stress by grade and style.

GRADE A, HEAVY HEX	100 ksi proof	GRADE D, HEAVY HEX	150 ksi proof
GRADE B, HEAVY HEX ≤1 IN.	133 ksi proof	GRADE DH / DH3, HEAVY HEX	175 ksi proof · 24–38 HRC
GRADE C / C3, HEAVY HEX	144 ksi proof	MATCHING BOLTS	A307 · A449 · A325 · A490 · A354

Nominal composition

■ Fe balance ~ 99.1% ■ 0.55, —, 0.12, 0.15 trace

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

Chemical composition — ASTM A563 Grades A / B and DH (heat analysis)

Element	Grades A, B, C (and 8S)	Grade DH (and 10S)	Grade D
Carbon, max	0.55	0.20–0.55	0.55
Manganese	—	0.60 min	0.30 min
Phosphorus, max	0.12	0.04	0.04
Sulfur, max	0.15	0.05	0.05

Values per ASTM A563/A563M-21 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Grades C3 and DH3 (weathering steel) have their own columns in the same table.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
THERMAL EXPANSION (68–212 °F)	6.5 µin/in·°F
MAGNETIC	Yes

Heat treatment

Grades A, B, C and D: not required. Grades DH and DH3: quenched and tempered at 800 °F minimum. Galvanized DH nuts are lubricated after coating; a dye to show the lubricant is an option under Supplementary Requirement S2.

Proof stress and hardness — ASTM A563 nuts by grade and style (UNC and 8 UN threads)

Grade · style · size	Proof stress, plain (ksi)	Proof stress, zinc coated (ksi)	Hardness, min	Hardness, max	—
A · hex · ¼–4	90	68	116 HBW / B68	302 HBW / C32	
A · heavy hex · ¼–4	100	75	116 HBW / B68	302 HBW / C32	
B · heavy hex · ¼–1	133	100	121 HBW / B69	302 HBW / C32	
B · heavy hex · 1½–1½	116	87	121 HBW / B69	302 HBW / C32	
C, C3 · heavy hex · ¼–4	144	144	143 HBW / B78	352 HBW / C38	
D · heavy hex · ¼–4	150	150	159 HBW / B84	352 HBW / C38	
DH, DH3 · heavy hex · ¼–4	175	150	248 HBW / C24	352 HBW / C38	
DH · hex · ¼–4	150	150	248 HBW / C24	352 HBW / C38	

Values per ASTM A563/A563M-21 Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Zinc-coated nuts of Grades A, B and DH carry the lower proof stress shown; fine-thread nuts are listed separately in the specification.

Applicable standards

ASTM A563 / A563M	Carbon and alloy steel nuts
ASME B18.2.2	Nut dimensions
ASTM F3125	Structural bolts that require Grade DH nuts
ASTM A194	Nuts for high-pressure and high-temperature bolting, the pressure-code alternative

Forms we supply in A563 nuts

- Hex and heavy hex bolts and cap screws
- Studs and threaded rod
- Nuts and washers to match
- Machined specials to drawing

Typical applications

- Nuts for A307, A449, A354 and F3125 bolts
- Structural steel connections
- Machinery and equipment bolting
- Galvanized hardware with overtapped threads