

ASTM F436 Hardened Steel Washers — Material Data Sheet

ASTM F436 / F436M · Carbon steel (Type 1) or weathering steel (Type 3), through hardened
Hardened flat and beveled washers for high-strength bolting, 38 to 45 HRC

The hardened washer for structural and high-strength bolting: through hardened to 38 to 45 HRC, flat, clipped or beveled, plain or galvanized — required under the turned element of A325 and A490 assemblies.

HARDNESS, THROUGH HARDENED	38–45 HRC	STYLES	Circular · clipped · extra thick · beveled
HARDNESS, HOT-DIP GALVANIZED	26–45 HRC	TYPES	1 carbon steel · 3 weathering
CARBURIZED SURFACE	69–73 HRA (79–83 HR15N)	USED WITH	A325, A490, A354, A449 assemblies

Nominal composition

■ Fe balance ~ 98.8% ■ 0.040, 0.050, —, —, —, — trace

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

Chemical composition — ASTM F436 Type 1 and Type 3 (heat analysis)

Element	Type 1	Type 3	—
Phosphorus, max	0.040	0.040	
Sulfur, max	0.050	0.050	
Silicon	—	0.15–0.35	
Chromium	—	0.45–0.65	
Nickel	—	0.25–0.45	
Copper	—	0.25–0.45	

Values per ASTM F436/F436M-19 Table 1 (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	29.0 × 10 ⁶ psi (200 GPa)
THERMAL EXPANSION (68–212 °F)	6.5 µin/in·°F
MAGNETIC	Yes

Heat treatment

Through hardened by quenching and tempering, or carburized and hardened in the permitted sizes. Hot-dip galvanized washers are tested after coating.

Hardness — ASTM F436 hardened washers

Washer type and finish	Hardness	—	—	—	—
Through hardened, plain or mechanically galvanized	38–45 HRC				
Through hardened, hot-dip galvanized	26–45 HRC				
Carburized (sizes permitted), surface	69–73 HRA				
Carburized, core	30 HRC / 65 HRA min				

Values per ASTM F436/F436M-19 clause 6.1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM F436 / F436M	Hardened steel washers, inch and metric
ASTM F3125	Structural bolt assemblies that require F436 washers
ASME B18.21.1	Plain washer dimensions (non-hardened)
RCSC SPECIFICATION	Washer requirements in structural joints

Forms we supply in F436 washers

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

Typical applications

- Structural bolted connections under the turned element
- High-strength bolting of machinery bases
- Beveled washers on sloping flanges and channels
- Galvanized assemblies for outdoor structures