High Tensile Round Bar Finishing — Tolerances & Surface Comparison

Material: High Tensile Alloy Steel (typically 4140 to AS 1444:2007) **Common Supply Condition:** Hardened & Tempered ("Condition T")

Bar Finish Types

Feature	Peeled & Polished Round Bar	Centreless Ground Round Bar
Manufacturing Process	Hot rolled bar is *peeled* (outer decarburised layer removed by cutting tool), then *polished* to improve finish.	Bar is *centreless ground* between rotating wheels to precise size and surface finish.
Surface Finish	Bright, smooth surface — visually clean but with fine machining marks.	Very smooth, almost mirror-like finish (Ra typically $\leq$ 0.4 µm).
Typical Tolerance (Diameter)	±0.15 mm up to 25 mm dia ±0.20 mm for 25–50 mm dia ±0.25 mm for 50–100 mm dia	ISO h8 or better (e.g. ±0.014 mm for 25 mm dia, ±0.022 mm for 50 mm dia).
Roundness & Straightness	Good — suitable for general machining and mechanical applications.	Excellent — suitable for bearing fits, hydraulic rods, and precision shafts.
Common Diameters Available	10 mm – 200 mm (varies by supplier)	6 mm – 100 mm (typically limited to smaller sizes).
Applications	Shafts, bolts, bushes, general engineering.	Hydraulic piston rods, linear shafts, precision machine components.
Finish Colour (Typical)	Bright silver / metallic sheen.	Highly reflective bright finish.
Cost	Lower.	Higher, due to extra processing.

Example: Tolerances (Nominal 4140 Round Bar)

Nominal Dia (mm)	Peeled & Polished Tolerance (mm)	Centreless Ground Tolerance (ISO h8)
10	±0.15	+0 / –0.021
15	±0.15	+0 / –0.024
20	±0.15	+0 / –0.027
25	±0.15	+0 / –0.030

Nominal Dia (mm)	Peeled & Polished Tolerance (mm)	Centreless Ground Tolerance (ISO h8)
30	±0.20	+0 / –0.033
35	±0.20	+0 / –0.036
40	±0.20	+0 / –0.039
45	±0.20	+0 / –0.042
50	±0.20	+0 / –0.045

Peeled & Polished Tolerances for Larger Diameters (increments of 10mm)

Nominal Dia (mm)	Peeled & Polished Tolerance (mm)
60	±0.25
70	±0.25
80	±0.25
90	±0.25
100	±0.25
110	±0.30
120	±0.30
130	±0.30
140	±0.30
150	±0.30
160	±0.30
170	±0.30
180	±0.30
190	±0.30
200	±0.30
210	±0.30

Summary

- **Peeled & Polished** bars are economical, accurate enough for most engineering work.
- **Centreless Ground** bars are used where *tight dimensional accuracy* or *superior finish* is critical.

Reference Standards

- AS 1444:2007 – *Wrought alloy steels*
- ISO 286-2 – *Linear tolerances for shafts (h8/h9)*
- Typical supplier tolerances based on Australian industry practice.