

Installation Tolerances for Piston Pins / Connecting Rod Bushings (Porsche Engines)

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Dear all,

Following a customer inquiry, I have prepared a brief overview of the installation tolerances we use for piston pins in the brass or bronze bushings of connecting rod small ends on Porsche engines built by Albert Motorsport.



This overview is intended as a practical reference to ensure consistent dimensional standards for future work involving connecting rods and pistons.

Background:

The values below refer exclusively to the fit between the piston pin (wrist pin) and the bushings in the piston itself.



The data are based on proven standards from engine manufacturers and component suppliers (Mahle, JE Pistons, KS Kolbenschmidt, general mechanical engineering practice) and apply to steel or bronze bushings typically used in Porsche and other high-performance engines.

Recommended Installation Tolerances (Piston Pin ↔ Connecting Rod Bushing)

Piston Pin Ø	Bore in Connecting Rod Small End (after reaming/honing)	Theoretical Clearance	Fit Type	Notes
20 mm	20.008 - 20.015 mm	0.008 - 0.015 mm	Close sliding fit	For production and sports engines; typical for 991 GT3 R engines
21 mm	21.008 - 21.015 mm	0.008 - 0.015 mm	Close sliding fit	Requires good lubrication; standard for smaller wrist pins
22 mm	22.010 - 22.018 mm	0.010 - 0.018 mm	Precision sliding fit	Common for performance or racing engines; typical for 997 GT3 Cup engines

Piston Pin Ø	Bore in Connecting Rod Small End (after reaming/honing)		Theoretical Clearance	Fit Type	Notes
23 mm	23.010 – 23.020 mm		0.010 – 0.020 mm	Precision sliding fit	Typical for Porsche 964/993; ensure controlled oil supply

Processing Notes:

Measurement conditions:

- All dimensions refer to a measuring temperature of **20 °C**.
- Measure both pin and bushing diameters at several positions.

Bushing installation in connecting rod:

- The bushing is press-fitted with an **interference of approx. 0.03 – 0.05 mm**.
- Always ream or hone to final size after pressing in, as the bore diameter decreases slightly.

Target fit:

- The pin should **slide with slight resistance**, without binding.
- **No perceptible side play** should be present.

Material recommendation:

- High-strength **brass or bronze bushings** (e.g. CuSn8, aluminum bronze) have proven reliable.

Rule of Thumb from Porsche Engine Building:

For piston pin bushings, the general guideline is:

Clearance $\approx$ 0.0004 – 0.0008 inch per inch of pin diameter,

which corresponds to approximately **0.01 – 0.02 mm** for 20–23 mm pins.

Summary:

The specified tolerances ensure:

- a stable oil film,
- low friction and wear,
- thermally safe behavior even at high engine speeds.

For motorsport or special applications, the clearance may be **increased by approx. +0.005 mm** if required.