WORKSHOP REFERENCE · 09

Toolholding Tapers & Collets

Spindle tapers, collet ranges and shank tapers for milling, drilling and turning centres.

ER collets

ISO 15488 (DIN 6499)

Size	Collet OD mm	Clamping range mm	Each collet closes
ER8	8.5	**0.5–5**	0.5 mm
ER11	11.5	**0.5–7**	0.5 mm
ER16	17	**0.5–10**	1.0 mm
ER20	21	**1–13**	1.0 mm
ER25	26	**1–16**	1.0 mm
ER32	33	**2–20**	1.0 mm
ER40	41	**3–26**	1.0 mm
ER50	52	**6–34**	1.0 mm

Each ER collet grips over a short range below its nominal size, so Ø10 covers 9–10 mm. For through-coolant or high-speed work use sealed or precision collets.

Morse taper

ISO 296 · DIN 228

Taper	Gauge Ø D mm	Taper ratio
MT0	**9.045**	1:19.212
MT1	**12.065**	1:20.047
MT2	**17.780**	1:20.020
MT3	**23.825**	1:19.922
MT4	**31.267**	1:19.254
MT5	**44.399**	1:19.002
MT6	**63.348**	1:19.180

D is the diameter at the gauge line (the large end of the socket). All Morse tapers are close to 1:20 (about 1.5° included).

Jacobs tapers

drill chucks

Taper	Large end Ø mm
JT0	**6.350**
JT1	**9.754**
JT2	**14.199**
JT33	**15.850**
JT6	**17.170**
JT3	**20.599**

DIN B tapers

DIN 238

Taper	Large end Ø mm
B10	**10.094**
B12	**12.065**
B16	**15.733**
B18	**17.780**
B22	**21.793**
B24	**23.825**

Steep taper 7:24

ISO 7388 · MAS 403 · ANSI B5.50

Size	Gauge Ø mm	SK / DIN pull stud	BT pull stud	CAT pull stud
30	**31.75**	M12	M12	1/2-13 UNC
40	**44.45**	M16	M16	5/8-11 UNC
45	**57.15**	M20	M20	3/4-10 UNC
50	**69.85**	M24	M24	1-8 UNC

SK (DIN 69871 / ISO 7388-1), BT (MAS 403) and CAT (ANSI) share the 7:24 taper but have different flanges and pull studs, so they are not interchangeable. Pull studs vary by machine maker; check the spindle manual.

HSK hollow taper

ISO 12164 · DIN 69893

Size	Flange Ø mm	Taper Ø mm
HSK-A32	**32**	24
HSK-A40	**40**	30
HSK-A50	**50**	38
HSK-A63	**63**	48
HSK-A80	**80**	60
HSK-A100	**100**	75
HSK-A125	**125**	95

HSK clamps on the taper and the flange face at once, giving high stiffness and repeatability at speed. Form A is the common auto-change version.

Choosing a holder

ER collet chuck: versatile, wide clamping range, good for drills, taps and small cutters.
Side-lock (Weldon): cannot pull out under heavy roughing; needs a flatted shank.
Hydraulic chuck: low runout and good damping for finishing and reaming.
Shrink fit: slim, very rigid, very low runout; needs a heating unit.
Milling chuck: high grip for heavy roughing with plain shanks.

Runout matters

Every 0.01 mm of runout puts more load on one cutting edge and cuts tool life noticeably. Clean the taper and collet before every change, and torque the nut to the maker's value.

Dimensions are nominal values from the cited standards. Tool makers' catalogues give full tolerances, lengths and thread details.

(08) 9345 2099 · sales@teravin.tools
19 Delawney Street, Balcatta WA 6021
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