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8:45 Dr. Spiff

Collet Compendium

This is a light once-over look at collets used in machining. There are so many families and styles of collets that trying to cover them all would be impossible, just including most of the common collets is still a hit and miss affair. So take this page with a "pinch of salt".

The function of a collet is to grip either the work or the tool and to do so with minimum total indicated runout (TIR). You will notice that these collets all work on the same mechanism. The collet is pulled or pushed into a tube with a chamfered or beveled mouth which forces the head of the collet to collapse around the work or tool. You can characterize collets as either pull or push types. The pull variety will have some sort of attaching mechanism, typically screw threads, which enables the user to draw the collet into the collet holder or fixture. The push variety usually has some sort of nut which slips over the collet and engages screw threads on the collet holder. When the nut is tightened, the collet is pushed into the holder, collapsing around the work or tool. Below is a table of the collets mentioned on the page and the closing "style". A click will take you to the relevant section.

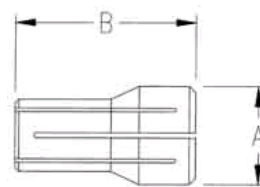
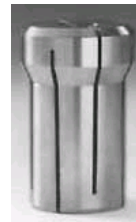
This page contains drawings, photos and other information that I have gathered from various sources. Since dimensional data is key in trying to identify a collet, that information is also provided where available. A major source of dimensional data for draw collets is found on [Pages 50 through 53](#) of Hardinge's "Spindle Tooling for Manual and CNC Lathes"®. The entire.pdf file is available at <http://www.hardingeworkholding.com/PDF/2348A.PDF>

| Push style | | Pull or Draw style |
|-------------------------------------|--|-----------------------|
| Double Angle | Morse Taper, MT | 2J |
| ER | | 3AT |
| TG | | 3J |
| FLEX | | 3C |
| AF | | 4C |
| ACCURA-FLEX | | 5C |
| Jacobs Rubber-Flex® | | 16C |
| Ortlieb | B&S 7, 9, & 22 | R-8 |
| | DIN 6499 | EM-18 |
| | DIN 6388 | |

Double Angle

.0005" TIR All collets have a 1/64 collapsibility. DA collet chucks are not designed for milling, as excessive chuck nut tightening may crack the thread area of the chuck.¹

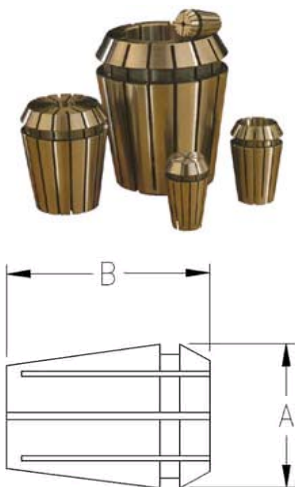
| Series | Range | DIAMETER A | LENGTH B |
|--------|----------|------------|----------|
| DA-100 | 1/16-3/8 | .769 | 1.437 |
| DA-180 | 1/4-3/4 | 1.025 | 1.639 |
| DA-200 | 1/8-9/16 | .539 | 1.187 |
| DA-300 | 3/64-1/4 | .375 | 1.000 |



ER AKA DIN 6499

Invented by Rego-Fix in 1973, this collet is supposed to have very low TIR, one manufacturer claims 0.00019 MAX TIR.² It could happen, but you can expect the price to be commensurate. Rego-Fix says that these collets "achieve greater grip strength and higher precision than double angle collets."¹ Also available to hold square stock. Sometimes called Single-Angle.³

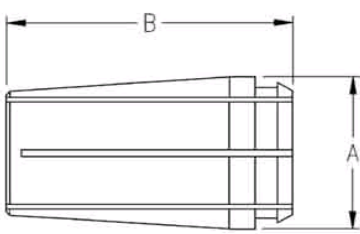
| Series | Range | DIAMETER A | LENGTH B |
|--------|------------|------------|----------|
| 11 | 1/16-1/4 | .453 | .709 |
| 16 | 1/16-13/32 | .669 | 1.063 |
| 20 | 1/16-1/2 | .827 | 1.220 |
| 25 | 1/16-5/8 | 1.024 | 1.378 |
| 32 | 3/32-3/4 | 1.299 | 1.575 |
| 40 | 1/8-1 | 1.614 | 1.811 |
| 50 | | | |



TG All collets have a 1/64 collapsibility.

NOTE! Collet must be assembled into collet nut before inserting tool or assembling onto chuck.

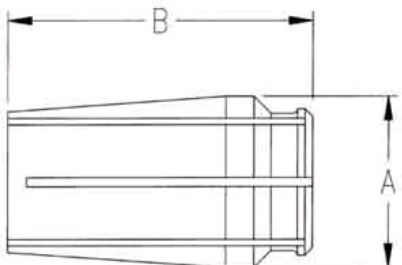
| Series | Range | DIAMETER A | LENGTH B |
|--------|------------|------------|----------|
| 75 | 1/8 - 3/4 | 1.062 | 1.844 |
| 100 | 3/32 - 1 | 1.379 | 2.375 |
| 150 | 1/2 - 11/2 | 2.00 | 3.00 |



FLEX, AF, ACCURA-FLEX

ACCURA-FLEX is a trade name of Universal/TDS. An interesting feature is that the collet "snaps" into the collet nut when the collet is assembled in the holder. See also [TG collets](#)

| Series | Range | DIAMETER A | LENGTH B |
|--------|-----------|------------|----------|
| 25 | 5/64 -1/4 | .438 | 1.000 |
| 38 | 5/64 -3/8 | .563 | 1.030 |
| 50 | 1/8 -1/2 | .720 | 1.160 |
| 75 | 1/8 -3/4 | 1.131 | 2.020 |
| 100 | 3/8 -1 | 1.446 | 2.500 |




Jacobs Rubber-Flex®

The following blurb is stolen from the Jacobs Website:

"Unique in design and operation, the Jacobs® Rubber-Flex® Collet can generate two to three times the gripping power of a conventional split-steel collet. Gripping force is uniform and parallel throughout the collet contact length and not concentrated at the nose or back as is frequently the case with split-steel collets (see illustration below). Construction is of durable synthetic rubber compound permanently bonded to hardened steel jaw insert surfaces and through-holes. It is unaffected by heat, coolants and cutting compounds and retains its flexibility over a long service life as compared to spring tempered metal designs."

A significant difference between all-metal collets and the Jacobs Rubber-Flex® is the range of sizes that one Jacobs can hold. For instance it takes 5 Jacobs collets to go from 1/16 to 5/8, while you would need ~20 5C collets to cover the same range. The down-side is this is a

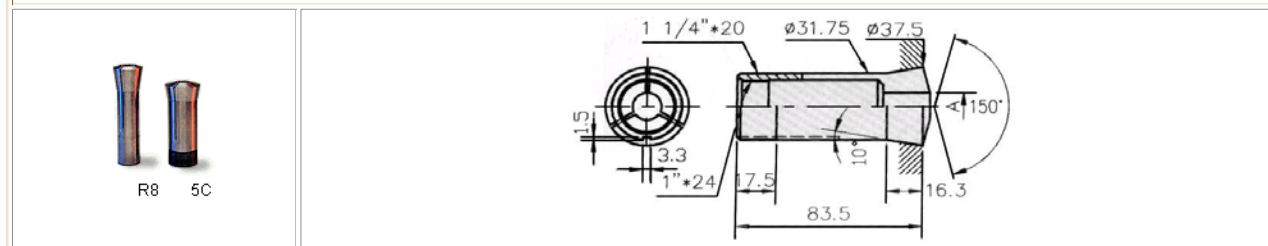
proprietary design so there are no second sources for either the collets or the fixtures.

|  | Jacobs Part Num. & Range | | | |
|---|--------------------------|------------|------|---------------|
| | J910 | 1/16 - 1/8 | J915 | 5/8 - 3/4 |
| | J911 | 1/8 - 1/4 | J916 | 3/4 - 7/8 |
| | J912 | 1/4 - 3/8 | J917 | 7/8 - 1 |
| | J913 | 3/8 - 1/2 | J918 | 1 - 1 1/8 |
| | J914 | 1/2 - 5/8 | J919 | 1 1/8 - 1 1/4 |
| | | | J920 | 1 1/4 - 1 3/8 |

5C*

The "big boy" of collets, not because of size, but because this is probably the most widely used and manufactured collet other than the R-8. In addition, there are lots of accessories that use this collet, including lathe chucks and spin-index fixtures. Bob Neidorff advises that these collets are used in Southbend 10" and larger lathes, Logan 11" and larger lathes, Hardinge lathes, and Monarch lathes as well as many spin/index fixtures. The photo below shows the difference between the R-8 and the 5C. You may notice that the 5C can have both internal and external threads whereas the R-8 only has internal threads.

**(the "C" stands for cataract, named for the waterfalls seen from the window of the original Hardinge factory in Chicago) ²*



4C


| DIA. | LOA | Thread | Awaiting photo and drawing |
|-------|-----|------------|----------------------------|
| 0.950 | 3" | 15/16 - 20 | |

3C



used in Southbend 9" lathes

| DIA. | LOA | Thread | Awaiting photo and drawing |
|-------|----------|----------|----------------------------|
| 0.650 | 2 11/16" | 5/8 - 26 | |

16C

| | |
|---|------------------|
|  | Awaiting drawing |
|---|------------------|

3J/2J

| Series | | All dimensions in inches. | | | |
|--------|---|---------------------------|-------|-----------------------|---------------|
| | | Range | LOA | Back Bearing Diameter | Thread |
| 3J |  | 1/16" to 1-3/4" | 3.750 | 2.000 | 1.988-20 RH |
| 2J |  | ??? to 1 3/8" | 3.25 | 1 5/8" | 1.611 x 18 RH |

3AT

Used in Logan 9" & 10" lathes

| Awaiting picture | Range | LOA | Back Bearing Diameter | Thread |
|------------------|-------|---------|-----------------------|------------|
| | 3/4" | 2 5/16" | 11/16" | .637-26 RH |

B&S 7, 9, & 22

These look like "push" collets. What do you think?

B&S 7 used in many Bridgeport M-head mills & older Clausing "Home Shop Size" Mills

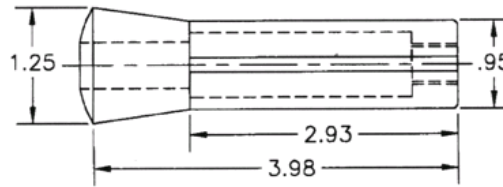
B&S 9 Used in Burke Horizontal Mills

B&S 22

**R-8**

Unlike almost all other collets, R-8 can refer to both a collet and a toolholder shank. For instance, on a mill that uses NMTB tooling, you could have both a collet holder using R-8 collets but an end-mill holder using the NMTB taper. On an R-8 tooled mill, the quill holds R-8 shank toolholders and is also the collet holder for R-8 collets. These collets will range from 1/16" to 1" and are available to hold round [max size

3/4], square [max 41/64], and hexagonal stock [max 17/32]. These are used in Bridgeport J-head mills and clones and many newer imported mill/drills.

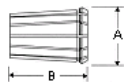


Ortlieb style Collets

From Centaur⁵ "The RDO collet system is a rigid high precision system recommended for milling. Collapse per collet: 0.5mm. RDO collets are precision manufactured to DIN 6388." There are 4 ranges, 16 through 44, with a max clamping capacity of 3/8" to 1 1/4". If anyone has more information on these collets, [drop me a line](#).



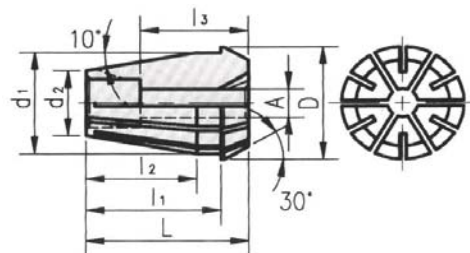
RDO/Ortlieb



| | A DIA | | B LOA | | CLAMPING RANGE | |
|--------|-------|------|-------|------|----------------|-------------|
| | mm. | in. | mm. | in. | mm. | in. |
| RDO 16 | 14.3 | .56 | 26 | 1.02 | 1 - 10 | 1/8 - 3/8 |
| RDO 20 | 20.0 | .78 | 34 | 1.33 | 1 - 15 | 1/8 - 1/2 |
| RDO 25 | 25.5 | 1.00 | 40 | 1.57 | 2 - 16 | 1/8 - 5/8 |
| RDO 35 | 35.3 | 1.39 | 52 | 2.05 | 2 - 25 | 1/8 - 1 |
| RDO 44 | 44.0 | 1.73 | 60 | 2.36 | 4 - 32 | 1/8 - 1 1/4 |

EM-18 Single Angle

Although these are called single-angle, they look like all of the other double angles. Your guess is as good as mine.




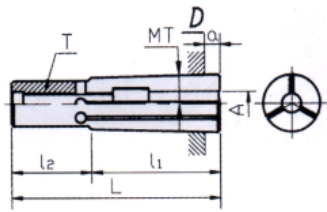
M2

May or may not be the same as MT2. Used in many Bridgeport M-head mills.

Morse Taper, MT₄

These collets which will fit into a Morse Taper spindle. The 3MT has a larger capacity, 1/4" To 3/4" than the 2MT, 1/2" max.

| | D | L | I1 | I2 | T(DRAW BAR) |
|-----|---|-------|----|----|-------------|
| 2MT | | 2 7/8 | | | 3/8-16 RH |

| 3MT | 15/16 | 3 3/8 | 2 1/16 | 1 5/16 | 1/2"W12, M12x1.75P |
|---|-------|-------|--|--------|--------------------|
|  | | |  | | |

DIN 6499 - ER in disguise

News flash just in from Rego-Fix: "Here is some information on DIN 6499: you correctly state that the ER system was invented by Rego-Fix in 1973. Initially the ER system was patented by Rego-Fix. However, Rego-Fix let the patent expire and worked with the German Committee for Normation to have the ER system standardized under DIN (Deutsche Industrie-Norm). In 1993 the Rego-Fix ER system then was standardized as DIN 6499. Therefore, DIN 6499 is synonymous with ER style."



DIN 6388

These were found on a manufacturer's web site and all lumped together as DIN 6388. But they are clearly different. If you have any light to shed on this, please drop me an [email](#).



Thanks to Bob Neidorff for sending information about which machines use which collets.

- 1 <http://www.lyndex.com/cc.html>
- 2 <http://www.hardingeworkholding.com/w1collets.html>
- 3 <http://www.tmsmith-tool.com/products/collets/sa.html>
- 4 <http://www.syic.com.tw/index2.htm>
- 5 <http://www.centaurtools.com/products/collets/collets.htm>