

# COLLETS 101 FROM

**CENTAUR**  
PRECISION TOOLS INC.

Collets 101

## DID YOU KNOW . . .

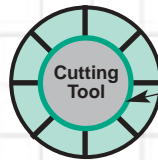
The precision and strength of a toolholding collet largely depends on the amount of surface contact maintained on the cutting tool! Did you know that **CENTAUR** is the collet manufacturer that offers the widest variety of exact size collets that maintain "Full Radius™" contact with the cutting tool!

**CENTAUR** is your best choice for precision collets for most widely used systems in inch and metric sizes, delivered **FROM STOCK!**

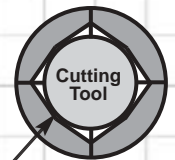
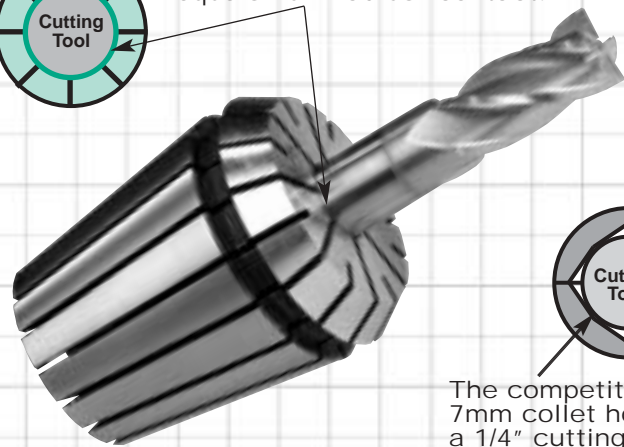
- **RD/ER** Series 8 thru 50 for a wide array of tool holders and extensions.
- **RDG/TG** Series 75, 100, 150 industry standards.
- **RDA/DA** Series 100, 180, 200, 300.
- **RDF/AF** Series 25, 38, 50, 75, 100.
- **RDO/Ortlieb** Series 16, 20, 25, 30, 35, 44.
- **Sealed Collets** for high precision performance for high pressure coolant through applications.
- **Tapping Collets** for rigid tapping and applications requiring axial compensation.

**CENTAUR** offers a complete line Precision Tooling Systems including CNC Tool Holders, VDI Tool Holders and Tapping Systems.

**CENTAUR**  
PRECISION TOOLS INC.



The "CENTAUR Green Zone" equals Full Radius™ contact!



The competition's 7mm collet holding a 1/4" cutting tool!

Visit [www.centaurltools.com](http://www.centaurltools.com) and click on Collets 101 for a comprehensive and informative section on the selection, uses and care of toolholding collet systems.

13098 SW 133rd Court • Miami, FL 33186  
Toll Free: 1-888-COL-LETS (251-5387) • Fax:(305) 251-0756

You can expect the best accuracy and longest life from Centaur Collets....

And, eliminate unnecessary downtime and reduced tool life resulting from using collets from unqualified sources.

## COLLET TYPES & RECOMMENDED APPLICATIONS:



### RDG/TG

Milling  
Drilling  
Rigid Tapping  
Coolant Through

### RDO

Woodworking Routers  
European Systems

### RD/ER

Drilling  
Milling  
Rigid Tapping  
Tapping (with Length Compensation)  
Reaming  
Boring  
Coolant Through  
External Coolant Through  
High Precision Grinding

### RDF/AF

Drilling  
Milling  
Coolant Through  
(in 50,75 & 100 series)

### RDA/DA

Drilling

## RD/ER COLLETS.....THE BEST TOOLHOLDING COLLET SYSTEM

### **Versatility:**

The RD/ER System is the most versatile Toolholding System for any operation utilizing a round shank cutting tool in a machining or turning center. This includes drilling, milling, tapping, reaming and boring. RD/ER Collets are commonly known in the industry as ER, ESX, DR, BR, and VSAC Collets. RD/ER Collets are available in the following series ranges to maximize efficiency in most applications:

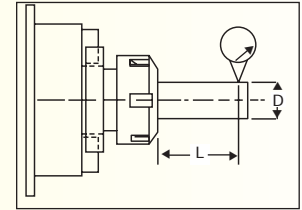
Series	Inch Capacity	Metric Capacity
RD 8	1/32-3/16	.25mm-5.0mm
RD 11	1/16-1/4	.25mm-7.0mm
RD 12	1/32-1/4	.5mm-7.0mm
RD 16	1/16-13/32	.25mm-10.0mm
RD 20	1/16-1/2	.5mm-13mm
RD 25	1/16-5/8	.5mm-16mm
RD 32	3/32-3/4	.2mm-20mm



## Highest Accuracy:

### RD/ER COLLET CONCENTRICITY - PER DIN 6499

METRIC						INCHES					
Clamping Range D		L	Maximum T.I.R.		Clamping Range D		L	Maximum T.I.R.			
			Precision DIN 6499	High Precision DIN 6499				Precision DIN 6499	High Precision DIN6499		
Min.	Max.					Min.	Max.				
1.0	1.6	6	0.015	0.008	0.039	0.063	0.236	0.0006	0.0003		
1.6	3.0	10			0.063	0.118	0.394				
3.0	6.0	16			0.118	0.236	0.630				
6.0	10.0	25			0.236	0.394	0.984				
10.0	18.0	40	0.020	0.010	0.394	0.709	1.575	0.0008	0.0004		
18.0	26.0	50			0.709	1.024	1.969				
26.0	34.0	60			1.024	1.339	2.362				



The RD system is the only popular Toolholding systems in which all components (chuck, collets and clamping nut) are standardized by DIN 6499. The accuracy of the RD/ER assembly is guaranteed to conform to the DIN 6499 Table. Most Toolholding Collet systems state the collet is .0005 or .001 T.I.R. but, that does not mean that this is the accuracy one will achieve on the cutting tool when mounted into the chuck. RD/ER systems are truly interchangeable. All manufacturers of this system should conform to the DIN6499 standard. This becomes important to users that may have toolholding systems from different Toolholding System Manufacturers. As tools are taken out of the tool crib and reassembled for different jobs, if all the RD/ER system components are in good condition, and are from Quality Toolholding System Manufacturers, the collet and tool should achieve the DIN 6499 accuracy. While other Toolholding systems may be “interchangeable”, none of the Toolholding Systems Manufacturers know the tolerances and specifications others are using for all of the components. Mixing components of Toolholding Systems other than RD/ER can have varying results.

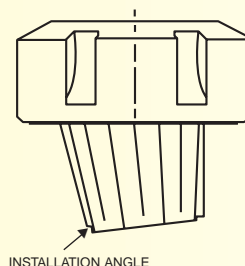
When using endmills or any round shank cutting tool, collets and collet chucks centralize the cutting tool, unlike conventional sidelock endmill holders that push the tool to the side of the bore of the holder with a set screw. This method creates a small contact area on the cutting tool and shifts the cutting tool from the true centerline of the Machine spindle. With the cutting tool off center, the cutting tool edges have an uneven load and will wear out prematurely. Collets and Collet Chucks centralizing the cutting tool will result in increased tool life, higher feed rates, better workpiece accuracy and enhanced workpiece finish. Carbide endmills are usually not supplied with a weldon or locking flat for side lock endmill holders. This is because they are not designed to be used in side lock endmill holders. Many Machinists hand grind a locking flat on to the shank of the carbide end mills to use them in side lock holders, perhaps it would be better to use them in the type of tool that they are designed to be used in.

### METHOD OF INSERTION & RELEASE FOR RD/ER COLLETS

#### INSERTING

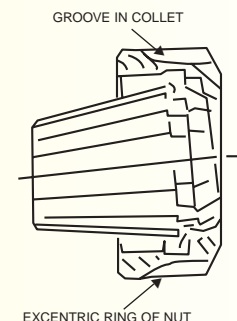
1. Insert collet into nut at angle as shown to engage extraction tongue in groove of collet.
2. Screw nut onto collet holder with collet securely in nut.
3. Insert tool to be gripped and lock nut.

**IMPORTANT:** Never screw nut onto collet unless collet is properly seated in nut.



#### RELEASING

Hold nut in vertical position and remove nut at an angle. Collet is automatically withdrawn from chuck by excentric ring of nut when unscrewed.



The chuck, collet and nut must be thoroughly cleaned before assembling to maintain accuracy. A benchtop ultrasonic cleaner will dislodge fine chips and debris or, a bottle type brush can be used for cleaning the inner diameter of the collet and a toothbrush style can be used to clean the exterior. Once assembled a normal machining environment will not affect the toolholding assembly. The collet must be installed into the nut (see assembly instructions) before engagement with the collet chuck to ensure the collet is seated into the 30 degree concave angle of the nut. Putting the collet into the chuck and then installing the nut will result in a condition that the eccentric ring of nut will engage only one side of the collet and produce poor results such as runout and drastically reduced holding strength.

Most RD/ER Collets are designed to collapse 1mm or .039. Never try to install a cutting tool with a larger shank than the maximum or nominal diameter of the collet to expand the collet. For example: If the cutting tool shank is 4.2mm a 4-3mm is not suitable. A 4.5-3.5mm collet would be required. Sealed Collets for coolant through applications do not have a collapse range, and must be used at exact size. The radius of the collet must exactly match the radius of the cutting tool shank in order to maintain a complete seal. If companies claim that they have sealed collets with a collapse range please keep in mind that if the radius does not match exactly coolant canals will be created by the mismatched radius of an improperly sized collet.

RD/ER Collets must be tightened correctly. Many machinists have been trained that nothing is ever too tight. This is particularly not true with collets and collet chucks. Overtightening a collet chuck will distort the collet and actually diminish the holding strength and accuracy. Maximum tightening torque for RD/ER Systems is as follows;

Series Size	Max. Tightening Torque (ft. lbs.)
<b>RD 11</b>	<b>20</b>
<b>RD 16</b>	<b>40</b>
<b>RD 20</b>	<b>60</b>
<b>RD 25</b>	<b>70</b>
<b>RD 32</b>	<b>80</b>
<b>RD 40</b>	<b>90</b>

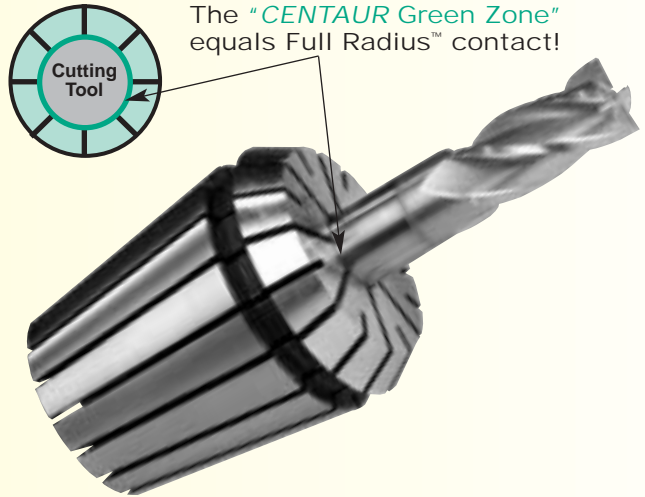


Cutting tools should be inserted into the collet the full length of the bore wherever possible. Failure to insert the cutting tool into at least 2/3 of the bore may distort the collet. Collets should be cleaned and oiled prior to storage.

RD/ER Collets are also very economical when compared with other popular collet systems. Collets work best when used at nominal or full diameter but when economy is desired this system compares very favorably with other systems. If a user would like to cover a range of 1/8-1" with a toolholding system please consider that with the RD/ER System this only requires 23 collets. With a TG system of the same capacity it takes 59 collets to cover the same range. When compared with DA collets with a capacity of 1/16-3/4" the RD/ER system only requires 18 collets while the DA needs 45 collets to cover the same range. This represents a significant cost saving while improving accuracy, and versatility.

# THE CENTAUR "GREEN ZONE"

Every collet maintains the highest accuracy and holding strength when used at the nominal diameter or full diameter. When the radius of the collet exactly matches the diameter of the cutting tool the best results such as extended tool life, higher feed rates, better part to part accuracy and superior workpiece finishes are achieved. For example, when ordering a RD/ER 16 collet for milling, many companies supply a 7-6mm tool. The full diameter of the 7-6mm collet is .276" and the collet must collapse .026" before contacting the cutting tool. This condition will reduce accuracy and holding strength.



The competition's "Red Zone" . . .  
A 7mm collet holding a 1/4" cutting tool!

Centaur manufactures the widest variety of exact size collets in the industry to ensure you get the most out of your cutting tools, to reduce downtime and tooling costs. Centaur offer RD/ER collets in full millimeter sizes, .5mm sizes and true inch size collets in 1/32" increments from inventory. Centaur also offers Sealed High Precision Collets for coolant through applications.

Clamping Range (mm.) (in.)		METRIC SIZES			INCH SIZES		INTERNAL COOLANT COLLETS			
		STANDARD PRECISION	HIGH PRECISION	0.5 INCREMENTS	STANDARD PRECISION	METRIC	INCH			
Part No.	Part No.	Part No.	Dia. (in.)	Part No.	Dia. (mm).	Part No.	Dia. (in.)	Part No.		
1-0.5	0.039-0.019	160-001	160-901	160-101	1/16	160-501	2	160IK02	1/8	160IK501
1.5-1	0.059-0.039				3/32	160-502	3	160IK03	5/32	160IK502
2-1	0.079-0.039	160-002	160-902	160-102	1/8	160-503	4	160IK04	3/16	160IK503
2.5-1.5	0.098-0.059				5/32	160-504	5	160IK05	7/32	160IK504
3-2	0.118-0.079	160-003	160-903	160-103	3/16	160-505	6	160IK06	1/4	160IK505
3.5-2.5	0.138-0.098				7/32	160-506	7	160IK07	9/32	160IK506
4-3	0.157-0.118	160-004	160-904	160-104	1/4	160-507	8	160IK08	5/16	160IK507
4.5-3.5	0.177-0.138				9/32	160-508	9	160IK09	11/32	160IK508
5-4	0.197-0.157	160-005	160-905	160-105	5/16	160-509	10	160IK10	3/8	160IK509
5.5-4.5	0.217-0.177				11/32	160-510				
6-5	0.236-0.197	160-006	160-906	160-106	3/8	160-511				
6.5-5.5	0.256-0.217				13/32	160-512				
7-6	0.276-0.236	160-007	160-907	160-107	12-Pc. Set	160-513				
7.5-6.5	0.296-0.256									
8-7	0.315-0.276	160-008	160-908	160-108						
8.5-7.5	0.335-0.296									
9-8	0.354-0.315	160-009	160-909	160-109						
9.5-8.5	0.374-0.335									
10-9	0.394-0.354	160-010	160-910							
10 Pc. Set		160-011								

NOTE: External flow coolant collets available.

NOTE: High precision also available in inch sizes.

The Centaur RD Sealed collets are available with internal flow for oil hole tools or, with external flow (coolant canals through the collet) for use with cutting tools with or without oil holes. The external flow collets are especially beneficial for applications where there is coolant through the spindle but lower cost solid cutting tools are desired or applications where oil hole tools are used in through holes.



The external flow collets are also extremely beneficial for through holes with oil hole cutting tools, as this will ensure that the cutting is properly cooled completely throughout the entire cycle. In many applications as the cutting tool is passing through or breaking through the workpiece the coolant may be just passing through the hole, with an external flow sealed collet one can be assured the complete cutting edge and lands of the drill are cooled throughout the complete cycle.

Centaur offers the most extensive program for tapping collets in the industry. Tapping collets will allow user to convert collet chucks used for many purposes into tapping chucks.



RD/ER rigid tapping collets with square drive are available in inch or metric sizes, standard or sealed for internal or external coolant flow.

Centaur also offers RDT Tapping collets. These collets will inexpensively convert a standard collet chuck into a length compensating, Quick change tapping chuck with square drive.

Centaur manufactures each collet from high grade spring steel and are hardened and fully ground for absolute precision. Each Centaur collet is 100% inspected for the highest possible accuracy.

## RDG/TG COLLETS .....A QUALITY TOOLHOLDING SYSTEM

RDG/TG achieve higher accuracy and greater gripping strength than DA and some other popular collet systems. This system will perform well in applications up to 10,000 RPM. RDG/TG collets are also known in the industry as DF, BG, VDF, and PG collets.

### **Recommended uses:**

RDG/TG Collets are used for Milling, Drilling and Rigid Tapping. RDG/TG are available sealed for coolant through applications. RDG/TG collets. RDG/TG in 1/64" Increments or .5mm increments for metric sized tools.

### **Accuracy:**

RDG/TG Collets are within .0005 T.I.R.. The collet chucks are within .0002 T.I.R. from the cone to the collet seat bore. The nuts are designed to float to allow for centering of the collet. RDG/TG systems when properly cleaned and assembled can achieve approximately .001 T.I.R. on a cutting tool shank in the assembly at a checking point length of about 2-3 times the diameter of the cutting tool. The collapse range of the RDG/TG Collets are 1/64".

As with all Collets it is recommended that the collet be used at the nominal or largest diameter. Sealed Collets do not have a collapse range and must be used at the exact size.

### **Care and use of RDG/TG:**

The chuck, collet and nut must be thoroughly cleaned before assembling to maintain accuracy. A benchtop ultrasonic cleaner will dislodge fine chips and debris or, a bottle type brush can be used for cleaning the inner diameter of the collet and a toothbrush style can be used to clean the exterior. Once assembled a normal machining environment will not affect the toolholding assembly.

The RDG/TG Collets must be snapped into the Clamping Nut prior to installing onto the Collet Chuck. Collets can be removed from the clamping nut by holding the small end of the collet and tilting the collet angularly until it is removed from the nut. Do not attempt to remove the collet from the clamping nut by forcing the collet out from the front of the collet nut using a punch or screwdriver as this will damage the collet and clamping nut. For maximum accuracy and holding strength RDG/TG Collets must be tightened correctly, maximum tightening torque is as follows:

<b>RDG/TG 75</b>	<b>80 ft.lbs.</b>
<b>RDG/TG 100</b>	<b>90 ft.lbs.</b>
<b>RDG/TG 150</b>	<b>110 ft.lbs.</b>



## RDA/DA COLLETS..... A POPULAR SYSTEM

RDA/DA Collets are recommended for drilling. RDA/DA Collets were originally designed to clamp well on slightly uneven surfaces such as jobbers or taper length type drills. RDA/DA Collets are available in 1/64 increments and in .5mm increments for metric sizes. RDA/DA collets are also known in the industry as DA and VDA collets.

### **Recommended uses:**

RDA/DA collets are recommended for drilling only.

### **Accuracy:**

RDA/DA Collets are manufactured to within .0005 T.I.R. outer diameter to inner diameter. The length of parallelism between the two female contacting angles in the chuck controls the accuracy of the system and is held to within plus or minus .0002. The clamping nut floats slightly to allow the chuck to center the collet. Normal accuracy is approximately .001 T.I.R at the face of the collet chuck.

### **Care and use of RDA/DA Collets:**

The chuck, collet and nut must be thoroughly cleaned before assembling to maintain accuracy. A benchtop ultrasonic cleaner will dislodge fine chips and debris or, a bottle type brush can be used for cleaning the inner diameter of the collet and a toothbrush style can be used to clean the exterior. Once assembled a normal machining environment will not affect the toolholding assembly.



## RDF/AF COLLETS



This highly accurate collet system was originated by Universal Engineering. RDF/AF Collets are recommended for drilling, milling and boring applications. RDF/AF collets are also known in the industry as AF or BF collets.

RDF collets are available in 1/64" increments and limited metrics sizes. RDF collets are designed to collapse 1/64. Size ranges are as follows;

<b>Series</b>	<b>Inch Range</b>
RDF 25	1/32-1/4
RDF 38	1/16-3/8
RDF 50	7/64-1/2
RDF 75	7/64-25/32
RDF 100	13/64-1"

RDF/AF Collets in the 50, 75 and 100 series are available sealed for Coolant through applications.

## RDO Collets.....DIN 6388 Style

This high gripping strength collet system was originated in Europe and are sometimes known as Ortlieb style collets or Full Grip Collets. Many machines designed for wood working also use this system. This system is recommended for milling, drilling and boring applications. Many high production routing systems manufacturers have standardized on this system. Size Ranges are as follows;



<b>Series</b>	<b>Inch Range</b>	<b>Metric Range</b>
RDO 16 (form A style)	1/8-3/8	—
RDO 20	1/8-1/2	2mm-13mm
RDO25	1/16-5/8	2mm-16mm
RDO35	1/8-1"	2mm-25mm
RDO44	1/8-1 _	4mm-32mm

RDO 25,35 and 44 series collets are available sealed for coolant through applications.