

Recoules™

Recoules Top Quality Drills, Reamers & Drill/Countersink Cutters

Recoules manufactures top quality drills, reamers and drill/countersink Cutters for use with Aerospace Drilling Equipment – such as our high performance Quackenbush and Doler lines.

Cutters can be made to customer specifications, or designed by Recoules for a specific application and tool.

All Recoules cutters are manufactured to order using precision machinery and highly skilled machinists.



COOPER Tools

Cutters



A1-1-N



F1-1-U



B5-1-Q



C4-1-V



C3-1-M



E1-1-R



D2-2-T

Example: **B7 - 1 - T - 1 - 2**

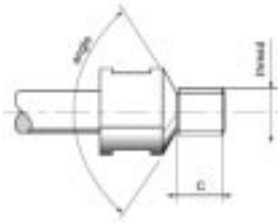
Cutter Mounting Style	Oil Hole	Type Of Cutter	Cutter Material	Specification Source
<p>Cutter Mounting Style (See page 3 for details)</p> <p>A1 = Straight Round Shank - for gripping in Chuck B1 = 1/4 - 28 External Thread with 120° taper B2 = 5/16 - 24 External Thread with 120° taper B3 = 3/8 - 24 External Thread with 120° taper B4 = 7/16 - 20 External Thread with 120° taper B5 = 9/16 - 18 External Thread with 120° taper B6 = 5/8 - 18 External Thread with 120° taper B7 = M6 x 100 External Thread with 120° taper B8 = M10 x 100 External Thread with 120° taper C1 = M6 x 100 External Thread at rear, with pilot diameter and square face, standard wrench flat C2 = M8 x 100 External Thread at rear, with pilot diameter and square face, standard wrench flat C3 = M10 x 100 External Thread at rear, with pilot diameter and square face, standard wrench flat C4 = M12 x 100 External Thread at rear, with pilot diameter and square face, standard wrench flat C5 = M16 x 100 External Thread at rear, with pilot diameter and square face, standard wrench flat D1 = 5/16-24 Pilot diameter at rear, external thread, 60° taper (PET) D2 = 3/8-24 Pilot diameter at rear, external thread, 60° taper (PET) E1 = 1/4-28 Internal thread with 60° (Spacematic) E4 = 3/8-16 Internal taper & counterbore (Spacematic) F1 = 1/4-28 E Style Cutters with stepped rear diameter F4 = 3/8-16 E Style Cutters with stepped rear diameter H2 through H7 Similar to C Style except wrench flats accept telescoping wrench</p>				
<p>Specification Source</p> <p>1 – Customer Drawing with complete specifications. 2 – Cutter design by Recoules Application information provided by customer (See page 5 for details)</p>				
<p>Cutter Material</p> <p>1 – M42 High Speed Steel 2 – Micrograin Carbide</p>				
<p>Type of Cutter (See page 4 for details)</p> <p>M Drill Only - 2 Flute N Ream Only - pre-hole required P Drill + Reamer - 2/4 style Q Square Drill (Gun Drill) R Drill + Countersink T Short Drill + Ream + Countersink U Ream + Countersink - pre-hole required V Taperlock Ream / C'sink - pre-hole req'd ("S" points are not available)</p>				
<p>Solid or Oil-hole</p> <p>1 – Solid 2 – Oil Hole (for through-the-cutter lubrication)</p>				

Cutter Mounting Styles

Mounting Style A - Straight Shank

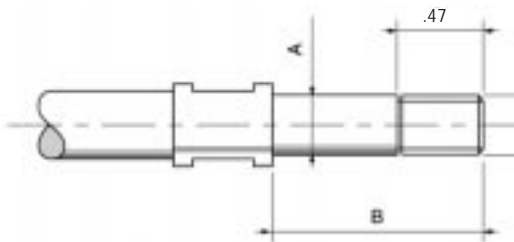


Mounting Style B - Ext'l Thread with 120° Taper



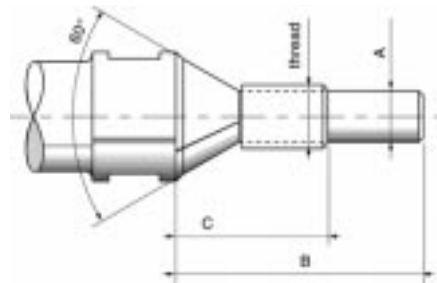
Code	Thread	C
B1	1/4-28	0.32
B2	5/16-24	0.39
B3	3/8-24	0.47
B4	7/16-20	0.47
B5	9/16-18	0.63
B6	5/8-18	0.63
B7	M6 x 100	0.32
B8	M8 x 100	0.32
B9	M10 x 100	0.39

Mounting Style C - External Thread with Pilot Diameter and Square Face



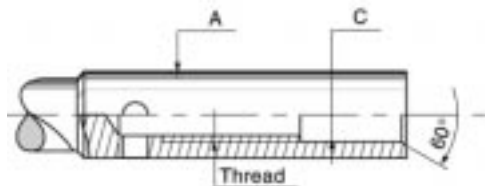
Code	Thread	A	B
C1	M6 x 100	0.244	0.98
C2	M8 x 100	0.323	1.38
C3	M10 x 100	0.402	1.38
C4	M12 x 100	0.480	1.58
C5	M16 x 100	0.638	1.58

Mounting Style D - Pilot Diameter with External Thread and 60° Taper (PET)



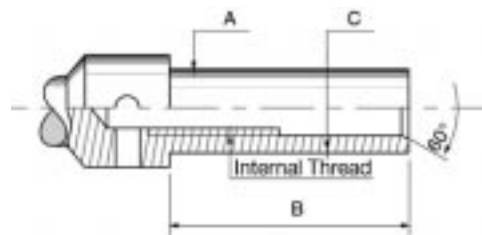
Code	Thread	A	B	C
D1	5/16 - 24	0.250	1.060	0.44
D2	3/8 - 24	0.300	1.145	0.52

Mounting Style E - Internal Thread with 60° Internal Taper & Counterbore ("Spacematic" Style)



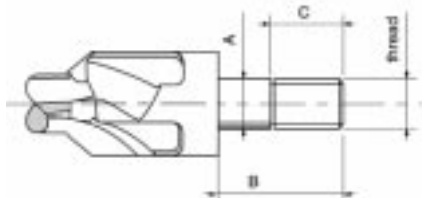
Code	Thread	A	C
E1	1/4 - 28	0.375	0.26
E2	1/4 - 28	0.500	0.26
E3	1/4 - 28	0.625	0.26
E4	3/8 - 16	0.625	0.39

Mounting Style F - Same as Style E with reduced diameter at rear for Guide Bushing



Code	Thread	A	B	C
F1	1/4 - 28	0.375	1.22	0.26
F2	1/4 - 28	0.500	1.22	0.26
F3	1/4 - 28	0.625	1.22	0.26
F4	3/8 - 16	0.625	1.22	0.39

Mounting Style H - External Thread with Pilot Diameter & Square Face Wrench Slots for telescoping Wrench



Code	Thread	A	B	C
H2	M8 x 100	0.393	0.63	0.32
H3	M10 x 100	0.492	0.78	0.39
H4	M12 x 100	0.551	0.94	0.47
H6	M14 x 100	0.630	1.10	0.55
H7	M18 x 100	0.787	1.10	0.55

Cutting Tool Geometry

Cutter M - Drill Only

Split Point is standard.



Cutter N - Ream Only: pre-hole required

Left hand spiral is standard. Chip is pushed forward and does not damage hole finish or size.



Cutter P - Drill + Reamer

Drill / Reamer produces very accurate hole in one operation. Split Point is standard.



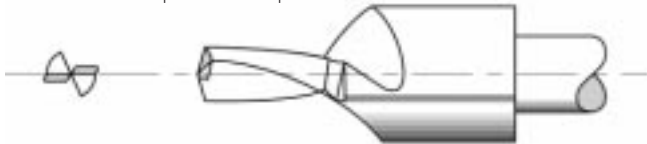
Cutter Q - Square Drill (Gun Drill type)

Square Drill is rigid and permits good lubricant and chip flow. Especially good for precision deep holes and good surface finish. Use in positive feed ADE only. Countersink is available.



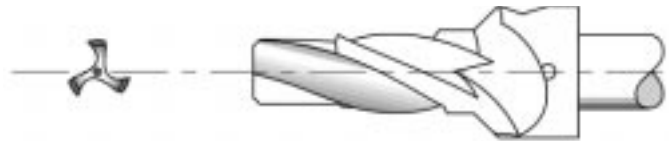
Cutter R - Drill + Countersink

Drill plus Countersink produces standard hole and countersink in one operation. Split Point is standard.



Cutter U - Ream + Countersink

Pre-hole is required. Use when one-shot is not suitable.



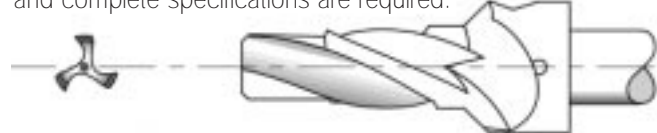
Cutter T - Short Drill + Ream + Countersink

Same as Cutter P with countersink. Accurate hole / countersink with minimum stroke. Split point is standard.



Cutter V - Taperlock Ream + Countersink

Straight pre-hole is required. Taperlock specifications are based on Briles standards. However, many variations exist and complete specifications are required.



Cutters designed by Recoules for a specific application require the following information:

Identification - Name or Number:

Customer Identification name or number

First Workpiece Material and Thickness:

Identify first material drilled

Aircraft alloy aluminum - advise alloy number

Aircraft alloy titanium - advise alloy number

Stainless Steel - advise alloy number

Mild Steel - hardness less than 28 Rc

Alloy Steel - advise alloy number & hardness

Composite - advise fiber, resin and properties

Other - advise material properties

Alloy Number _____

Thickness = _____ maximum (inch or mm)

Second Workpiece Material:

Identify second material drilled

Use same code as above

Alloy Number _____

Thickness = _____ maximum (inch or mm)

Additional Materials or Voids:

Advise if additional materials or open spaces are included.

Hole Diameter:

Advise the exact minimum and maximum acceptable hole diameter - inch or metric

Min. _____ Max. _____

Countersink - if applicable:

Advise Countersink maximum diameter and angle:

Diameter: Min. _____ Max. _____

Angle: Min. _____ Max. _____

Pre-Hole:

Yes _____ Hole diameter _____

No _____

Quantity Required:

Specify quantity or quantities to quote.

Used on ADE Tool

Peck Drill

Positive Feed

Self Clamping - Variable Spacing

Self Clamping - Concentric Collet

Portable Self Feed (CD or 21500)

Flexirec

Other _____

Model Number _____

Type of Cutter Lubrication:

Water Soluble Coolant

Water only

Acculube/Boelube type Lubricant

None

Other - Specify _____

Brand & Type _____

Additional information required:

Other hole quality parameters such as finish, roundness, straightness. Special conditions or specifications. Taperlock Group and specifications.

Recommendation for requesting Quotation: Photo copy this catalog page. Fill in the blanks for each block. Add any supplemental information needed to completely define the application requirement.

Recoules puts great emphasis on point geometry and accuracy. Split point is standard. "S" shape point is not available.

Cutter's manufactured to customer specification are not guaranteed for hole quality unless so stated. For optimum results, cutter must be used on specified tool, with recommended cutter lubrication, properly installed and managed.

Cutter's will be quoted upon request. Specify quantity(s). Higher quantities will yield lower unit cost. Cutter's cannot be returned for credit unless defective.

Through-the-Cutter lubrication is best. Lubricant is routed from rear of cutter, through the flutes and to the cutting edge where it is most beneficial.

Cutters

General Drilling Recommendations

Best Hole Quality

- Through-the-cutter lubrication; High quality cutter lubricant at manufacturer's recommended rate.
- Drill geometry with split point, 2/4 drill / reamer flute design.
- Review benefits of peck and positive feed.
- For aluminum, use high speed with low feed rate.
- For titanium, steel, etc., use machining handbook rates for initial trials.
- Verify adequate flow path for chips through flutes and fixture.
- Recondition cutters before cutting edge breaks or excessive wear occurs.
- Maintain tool in very good condition.
- Test drill in coupon (sample material) before using in production.
- Personnel must be well-trained and competent
- "One Shot" operation is usually attainable, but requires very close attention to details
- "Two Shot" operation - drill followed by ream requires less detailed attention.
- Verify Cutter quality, proper lubrication rate, replace Cutter before becoming dull, replace bushings when worn.
- Two operations will produce virtually any hole specification.

Composite Materials

These materials vary widely in fiber type, resin type and manufacturing method. Cutter lubrication is always beneficial but may not be permitted. Experimentation is required to optimize drill geometry, speeds and cutter material.

Stacks of Different Materials

Speeds and feedrates must be lowest and slowest of materials in the stack. Peck Drilling is usually advantageous.

Cutter Material

Micrograin Carbide is best for drilling / reaming titanium and carbon fiber and can also be used for aluminum. Carbide drills also produce more holes per sharpening. High Speed Steel is recommended for drilling precision holes/countersinks in aluminum.

Cutter Cost

Compare cutter costs by the number of holes generated per sharpening, production time, number of operations required and quality of holes.

Reconditioning Cutters

Reconditioning is very difficult and tedious. Close attention to detail is mandatory.



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