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## GENERAL DRILLING RECOMMENDATIONS

### BEST HOLE QUALITY

- Thru-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 thru flutes, tool, 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.
- Verify cutter quality, proper lubrication rate, replace cutter before becoming dull, replace bushings and service tool regularly.
- "Two Shot" operation - drill followed by ream requires less detailed attention.
- 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 feed rates must be lowest and slowest of materials in the stack. Peck Drilling is usually advantageous.

### CUTTER MATERIAL


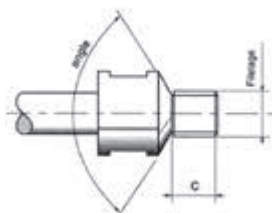
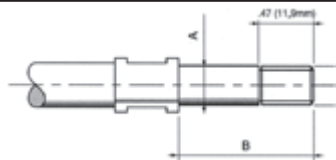
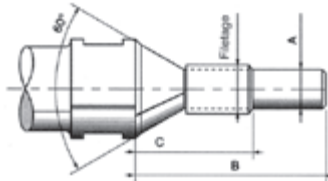
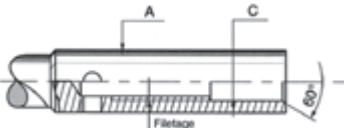
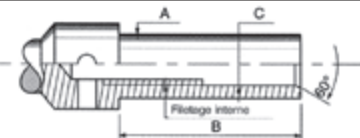
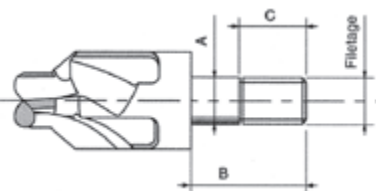
Micrograin Carbide is best for drilling / reaming titanium and carbon fiber. Can also be used for aluminum. More holes per sharpening. M42 High Speed Steel is recommended for drilling precision holes / countersinks in aluminum.

### CUTTER COSTS

Some cutter types cost much more than others. It is best to compare cutter costs by the number of holes generated per sharpening, production time, number of operations required, and quality of holes.





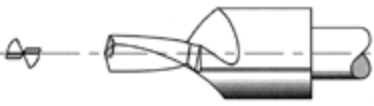


### RECONDITIONING CUTTERS

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






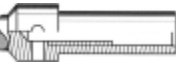

		MOUNTING STYLE	PART N°	THREAD	A		B		C	
					in	mm	in	mm	in	mm
		A	-	-	-	-	-	-	-	-
Straight shank										
External thread with 120° taper		B	B1	1/4 - 28	-	-	-	-	0.32	8.1
		B	B2	5/16 - 24	-	-	-	-	0.39	9.9
		B	B3	3/8 - 24	-	-	-	-	0.47	11.9
		B	B4	7/16 - 20	-	-	-	-	0.47	11.9
		B	B5	9/16 - 18	-	-	-	-	0.63	16
		B	B5	5/8 - 18	-	-	-	-	0.63	16
		B	B7	M6 x 100	-	-	-	-	0.32	8.1
		B	B8	M8 x 100	-	-	-	-	0.32	8.1
		B	B9	M10 x 100	-	-	-	-	0.39	9.9
External thread with pilot Diameter and square face		C	C1	M6 x 100	0.244	6.2	0.98	24.9	-	-
		C	C2	M8 x 100	0.323	8.2	1.38	35.1	-	-
		C	C3	M10 x 100	0.402	10.2	1.38	35.1	-	-
		C	C4	M12 x 100	0.48	12.2	1.58	40.1	-	-
		C	C5	M16 x 100	0.638	16.2	1.58	40.1	-	-
Pilot diameter with external thread and 60° taper (PET)		D	D1	5/16 - 24	0.25	6.4	1.06	29.9	0.44	11.2
		D	D2	3/8 - 24	0.3	7.6	1.145	29.1	0.52	13.2
Internal thread (Spacematic style)		E	E1	1/4 - 28	0.375	9.25	-	-	-	-
		E	E2	1/4 - 28	0.500	12.7	-	-	-	-
		E	E3	1/4 - 28	0.625	15.9	-	-	-	-
		E	E4	3/8 - 16	0.625	15.9	-	-	-	-
Same as style E but with cutter diameter greater than 0.19 in (4.8 mm)		F	F1	1/4 - 28	0.375	9.52	1.22	31	-	-
		F	F2	1/4 - 28	0.500	12.7	1.22	31	-	-
		F	F3	1/4 - 28	0.625	15.9	1.22	31	-	-
		F	F4	3/8 - 16	0.625	15.9	1.22	31	-	-
External thread with pilot diameter & square face location slots for telescopic wrench		H	H1	M8 x 100	10		16		8.1	
		H	H3	M10 x 100	12.5		19.8		9.9	
		H	H4	M12 x 100	14		23.9		11.9	
		H	H6	M14 x 100	16		27.9		14	
		H	H7	M18 x 100	20		27.9		14	

- The mounting style Morse taper is also available codified under CM1 - CM2 - CM3.
- All cutters are available with oil hole for Thru-coolant lubrication.



DESCRIPTION	HSS-E	CARBIDE	PCD	ATTACHMENT	CUTTER STYLE	COMMENTS
<b>Drill Only</b> 	●	●	● PCD point	All	M	Split Point is standard.
<b>Ream Only</b> <b>Pre-hole required</b> 	●	●		All	N	Left hand helix. Swarf directed away from cutter ensuring quality of surface finish and hole size.
<b>Drill + Reamer</b> 	●	●		All	P	Drill / Reamer produces high quality, accurate hole in one operation. Split Point is standard. Countersink is available.
<b>Square Drill</b> 	●	●	●	All	Q	Square Drill is strong, permits good lubrication, and swarf flow. Especially good for deep hole precision and good surface finish. Use in positive feed ADE only. Countersink is available.
<b>Drill + Countersink</b> 	●	●	● PCD point	All	R	Drill plus Countersink produces standard hole and countersink in one operation. Split point is standard.
<b>Ream + Countersink</b> <b>Pre-hole required</b> 	●	●	● PCD point	All	U	Ream-Countersink cutter with pilot for accurate alignment in pre-drilled hole.
<b>Taper-Lock Ream + Countersink</b> <b>Pre-hole required</b> 	●			B-C-D et H	V	Taper-Lock specifications are based on Briles Aerospace standards. However, many variations exist and complete specifications are required.

## ATTACHMENT

A	B	C	D	E	F	H
						

B7	1	T	1	2
CUTTER MOUNTING STYLE	OIL HOLE	TYPE OF CUTTER	CUTTER MATERIAL	SPECIFICATION SOURCE
<p><b>Cutter Mounting Style</b> (See preceding pages for details)</p>	<p><b>Solid or Oil-hole</b> 1 - Solid 2 - Oil Hole (for thru-coolant lubrication)</p>	<p><b>Type of Cutter</b> (See preceding pages for details)</p>	<p><b>Cutter Material</b> 1 - HSS-E High Speed Steel 2 - Carbide 3 - PCD</p>	<p><b>Specification Source</b> 1- Customer Drawing with complete specifications 2- Cutter design by Recoules Quackenbush Application information provided by customer</p>

- Cutters manufactured to customer specification are not guaranteed for hole diameter unless so stated.
- For optimum results, cutter must be used on specified tool, with recommended cutter lubrication, properly installed, and managed.
- Cutters will be quoted upon request. Please specify quantity. Higher quantities will yield lower unit cost.

**CUTTERS DESIGNED BY RECOULES QUACKENBUSH 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 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.

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*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.*