



GENERAL INSTRUCTIONS **MACHINING & SURFACE GRINDING**

ALLOW .010 GRIND STOCK ON:

DIM WITH 2 PLACE CALLOUT MARKED GRIND (G)
DIM. WITH 3 PLACE CALLOUT (.XXX)
UNLESS MARKED MACHINE TO SIZE (MTS)
DIM. WITH 4 PLACE CALLOUT (.XXXX)

HOLES: ALLOW .015" GRIND STOCK IN:

Ø WITH 4 PLACE CALLOUT (.XXXX)
Ø WITH 4 PLACE CALLOUT ALLOW .030 IF THE DETAIL IS
LONGER THAN 10" AND IS TO BE HEAT TREATED.

MACHINE TO SIZE:

ALL FRACTIONAL AND 2 PLACE (.XX) DIMENSIONS & HOLES
UNLESS MARKED GRIND (G).

TOLERANCING SYSTEM

TOLERANCES AND SURFACE ROUGHNESS UNLESS OTHERWISE SPECIFIED.

DECIMALS:

"MTS"	2 PL =	+/- .01	<u>125</u> ✓
	3 PL =	+/- .003	<u>64</u> ✓
	3 PL =	+/- .001	<u>32</u> ✓
	4 PL =	+/- .0001	<u>16</u> ✓
	5 PL =	+/- .00005	<u>8</u> ✓
	6 PL =	+/- .00002	<u>8</u> ✓

ANGLES:

X °-----	+/- 2 °	<u>125</u> ✓
X °-X'-----	+/- 0 ° -30'	<u>32</u> ✓
X ° -X' -X"-----	+/- 0 ° -0' -30"	<u>8</u> ✓
X ° -X' -X . XX"-----	+/- 0 ° -0' -5"	<u>8</u> ✓

Tap drill sizes to be used on tool steel that is to be heat treated (such as die sections, punch block, strippers, etc.) Taps listed below are oversize standards for heat treated steels.

<u>TAP SIZES</u>	<u>TAP DRILLS</u>	<u>CLEARANCE DRILLS</u>
1/2 -13 GH 5	27/64 - .421	17/32 - .531
3/8 -16 + .005	"O" - .316	13/32 - .406
5/16 -18 + .005	17/64 - .265	11/32 - .343
1/4 -20 + .005	"5" - .205	9/32 - .281
10 -32 GH7	"20" - .161	"2" - .221
8 -32 GH7	"29" - .136	"9" - .196
6 -32 GH5	"34" - .111	"19" - .166
5 -40 GH5	"37" - .104	"29" - .136
4 -40 GH5	"43" - .089	1/8 - .125

Tap drill and clearance should be as follows:

1/2 -20	7/16 Tap Drill
5/8 -18	9/16 Tap Drill
5/8 -11	17/32 Tap Drill
5/8 -24	37/64 Tap Drill

In die shoes, punch holders, and in other die parts which are not heat treated, we will use the following tap drills:

<u>Tap Size</u>	<u>Tap Drill</u>
1/2 - 13 GH3	27/64 - .421
3/8 - 16 GH3	5/16 - .312
5/16 - 18 GH3	"G" - .261
1/4 - 20 GH3	"7" - .201
10 - 32 GH3	"20" - .161
8 - 32 GH3	"29" - .136
6 - 32 GH3	"36" - .106
5 - 40 GH3	"39" - .099

On all other tap sizes, we will use chart recommended tap drills which provide approximately 75 percent full thread.

Inspection and Test

100% in house inspection/ testing from Suppliers is encouraged. Critical dimensions are verified by Penn United Technologies incoming/ receiving inspection team.

Packaging and Shipping

- A. If the product weighs 100 lbs. or greater: Place the product on a skid or in a box on a pallet. Use bubble-pak, ranpak, or shredded paper to make the parts tight in the box, and/or secure the product to the pallet by using one of the following: [stretch-wrap, and/or steel banding].
- B. If the product weighs less than 100 lbs., pack the product tight in a box with bubble-pak, ranpak, or foam and/or using skin packaging.

Product must be packed to prevent damage.

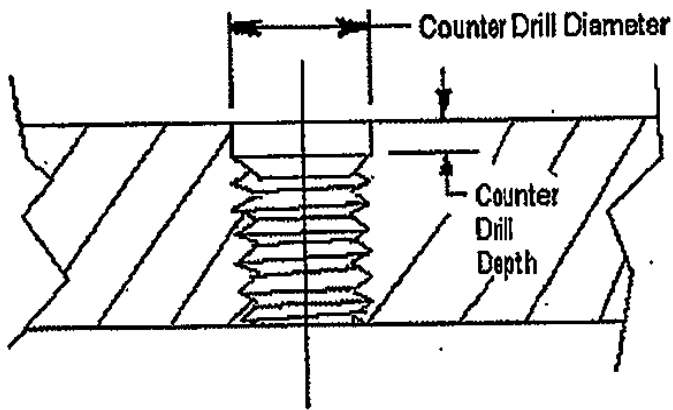
Edge breaks not specifically called out on detail prints will follow the specifications below. Be sure to check title box for edge break callouts.

3.5.9 Edge Breaks on Threaded Holes for Shoulder Bolts shall comply with the values in Table-7 and Table-8 as shown in Figure-9.

Note: This edge break applies to the side the shoulder bolt will contact. Holes intended to be used with shoulder bolts shall be identified on the print. The edge break method shown below provides the edge break to eliminate thread pulling concerns near the edge, and still allows the edge of the shoulder bolt to contact the intended surface. (The shoulder of the bolt will locate on the edge break itself, if the edge break is too large)

Figure-9

Example of Edge Break on Threaded Shoulder Bolt Hole

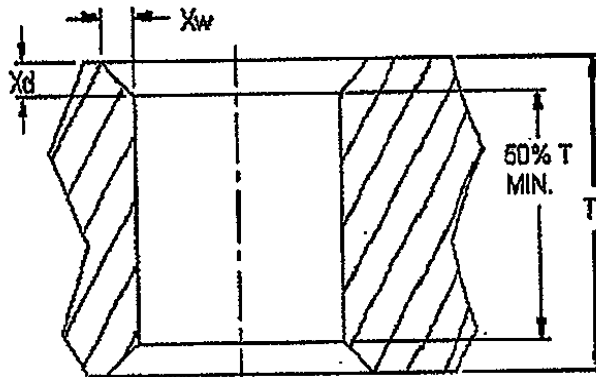


Edge breaks not specifically called out on detail prints will follow the specifications below. Be sure to check title box for edge break callouts.

3.5.6 Edge Breaks on Plain Holes and C'Bore Tops shall comply with the values in Table-4 and shown in Figure-6 below.

Figure-6

Example of Edge Break on Plain Holes



Note: The Xw or the Xd distances are not required to be equal distances. Although, this example is drawn as a chamfer, it is not required to be a chamfer.

Table-4

Edge Breaks on Plain Holes

Nominal Hole Size (Diameter)	Minimum Edge Break* Both Top & Bottom (Xw or Xd)	Maximum Edge Break* Both Top & Bottom (Xw or Xd)
Up to 0.24"	0.005"	0.020"
0.24" to 0.48"	0.005"	0.025"
0.48" and over	0.010"	0.035"

* Edge breaks shall be reduced in order to maintain 50% of the original hole depth.

Table-7
Edge Break on Threaded Hole (English Units)

Nominal Shoulder Diameter (inch)	Nominal Thread Size (inch)	Tap Drill Dia [Reference] (inch)	*C'drill Dia (inch)	*C'drill Depth (inch)
1/8	4-40	(.0890)	.096	.025 - .050
1/8	4-48	(.0935)	.096	.025 - .050
5/32	6-32	(.1065)	.120	.025 - .050
5/32	6-40	(.1130)	.120	.025 - .050
3/16	8-32	(.1360)	.149	.025 - .050
3/16	8-36	(.1360)	.149	.025 - .050
1/4	10-24	(.1495)	.177	.025 - .050
1/4	10-32	(.1590)	.177	.025 - .050
5/16	1/4-20	(.2010)	.234	.050 - .070
5/16	1/4-28	(.2130)	.234	.050 - .070
3/8	5/16-18	(.2570)	.296	.050 - .080
3/8	5/16-27	(.2720)	.296	.050 - .080
1/2	3/8-16	(.3125)	.359	.070 - .100
1/2	3/8-24	(.3320)	.359	.070 - .100
5/8	1/2-13	(.4219)	.484	.090 - .130
5/8	1/2-20	(.4531)	.484	.090 - .130
3/4	5/8-11	(.5312)	.609	.090 - .130
3/4	5/8-18	(.5781)	.609	.090 - .130
1	3/4-10	(.6562)	.734	.090 - .130
1	3/4-16	(.6875)	.734	.100 - .140
1.25	7/8-9	(.7656)	.859	.100 - .140
1.25	7/8-14	(.8125)	.859	.100 - .140

* C'Drill Diameters are approximately 1/64" below thread nominal.

Note: Tap Drill Diameters are based on 75% of full thread, Tapping - Tables 3 and 4 in Machinery's Handbook.