



pivot punch corporation

# Feasibility of Piercing Ratio Holes In Various Types and Thicknesses of Material

## USING PIVOT WHIPSLEEVE STRAIGHT GROUND PUNCHES

While it has been proven that any material that has a shearing strength of 50,000 psi or less can be satisfactorily punched with Pivot Whipsleeve Straight Ground Punches (which have a compressive strength of 405,250 psi), it is desirable to know the normal expectant life of the punch.

Following is a formula that is based upon our experience as a conservative estimate, to determine if a hole can be safely pierced in any specific material and, if so, to then determine the minimum potential production in thousands of holes per grind.

(1) To determine the shearing pressure required as compared to the compressive strength of the punch (resultant factor), use this formula:

$$R = \frac{405,250 \times D}{4 \times T \times S}$$

**405,250** = Compressive strength, Pivot Whipsleeve Straight Ground Punches

**D** = Diameter of hole to be pierced

**T** = Thickness of material

**S** = Shearing strength of material

**R** = Resultant factor

If the resultant factor (R) is one (1) or greater, the hole can be safely pierced. (See examples below)

Examples of Formula:

Pierce .06 dia. holes through .12 thick soft carbon steel (1020)?

$$R = \frac{405,250 \times D}{4 \times T \times S} \quad R = \frac{405,250 \times .06}{4 \times .12 \times 44,000} \quad R = 1.5$$

Yes (R exceeds 1.0). Expected minimum production: 70-100,000

Pierce .09 dia. holes through .09 dia. stainless steel?

$$R = \frac{405,250 \times D}{4 \times T \times S} \quad R = \frac{405,250 \times .09}{4 \times .09 \times 100,000} \quad R = 1.01$$

Yes (R exceeds 1.0). Expected minimum production: 15-25,000

Pierce .25 holes through .375 hard brass sheet?

$$R = \frac{405,250 \times D}{4 \times T \times S} \quad R = \frac{405,250 \times .25}{4 \times .375 \times 40,000} \quad R = 1.68$$

Yes (R exceeds 1.0). Expected minimum production: 100-500,000

Note: Obviously the above factors are based upon proper alignment and normal die construction including adequate stripping pressure.

Resultant Factor	Production (Holes Per Grind)
1.00	15,000 to 25,000
1.25	25,000 to 50,000
1.50	70,000 to 100,000
1.75	500,000 to 900,000
2.00	1,000,000 and more

Material	Shearing Strength (PSI)
Carbon Steel (1020) Soft annealed steel	44,000
Carbon Steel (1018) Cold rolled steel	55,000
Nickel Steel (2320)	98,000
Nickel Chromium Steel (3140)	130,000
Stainless Steel	100,000
Structural Steel	45,000
Aluminum Sheet, soft	15,000
Aluminum Sheet, half hard	19,000
Aluminum Sheet, hard	25,000
Brass Sheet, soft	30,000
Brass Sheet, half hard	35,000
Brass Sheet, hard	40,000