

Ordering Information

Terms

Net 30 days
F.O.B. Cleveland, Ohio

Shortages

All claims must be made within 14 days after date of invoice.

Return Policy

Non-stock and special, made-to-order tooling cannot be returned for credit.

Standard tooling may be returned for credit less a re-stocking charge of 15%. A Return Goods Authorization (RGA) is required. We will not issue credit on used or damaged-by-use items. Returned tooling must be packaged properly to avoid damage in transit and must be shipped to us with the freight charges pre-paid. **Returns will not be accepted after 90 days from the invoice date.**

Delivery

Cleveland Steel Tool has a vast inventory of standard punches and dies ready for immediate shipment. Stock tooling can be shipped the same day. Non-stock sizes of a round, oblong, square, hexagonal and rectangular shape of standard tooling will be shipped within 48 hours.

Special Tooling

For any special, non-standard tool not listed in this catalog, please provide Cleveland Steel Tool with a sketch, blueprint or sample of your tooling for a quotation.

Minimum Orders

A minimum dollar amount applies to all orders.

Help Us Help You When Ordering

At Cleveland Steel Tool, we've built a solid reputation for delivering your tooling on time, when you need it.

If any of the following information is available, please have it handy when ordering. This will help us prepare and ship your order more accurately and efficiently.

- Machine manufacturer
- Style of punch and die (if not known, have a sample handy to refer to)
- Use of keyways and/or spots to position shapes
- Type of material being punched
- Material thickness
- Hole size (Note: hole size must be slightly larger than item being passed through material)

Helpful Terms

Clearance The amount of extra space required in the hole of the die to allow the punch to pass through to punch a hole in the material. Clearance is determined by the type and thickness of the material being punched.

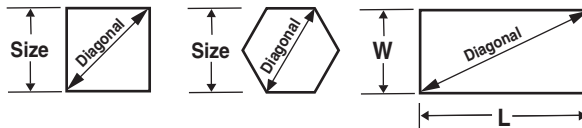
CLEARANCE GUIDE FOR PUNCHING MILD STEEL

Thickness	Clearance
3/4" and over	3/32"
1/2" through 23/32"	1/16"
3/16" through 15/32"	1/32"
3/32" through 5/32"	1/64"
15 gauge through 13 gauge	.010"
16 and lighter	.006"

CLEARANCE GUIDE FOR PUNCHING OTHER MATERIAL (%OF MATERIAL THICKNESS)

Material	Best	Maximum	Minimum
Soft Aluminum	10	15	5
1/2 Hard Brass	11	16	6
1/2 Hard Copper	12	16	8
.50C Steel	18	24	12
Stainless Steel	18	24	12

Diagonal The point-to-point measurement from opposite corners of a square, hex or rectangular punch. (See diagrams.) Important for shaped punches held by a coupling nut because the diagonal dimension is always larger than the punch size which may determine that the punch is too large to fit a coupling nut bore.



To determine the diagonal dimension of a **square punch**, multiply the size of the punch (see diagram) by 1.414.

EXAMPLE: A .500 square punch has a diagonal dimension of .707

To determine the diagonal dimension of a **hexagonal punch**, multiply the size of the punch (see diagram) by 1.155.

EXAMPLE: A .500 square punch has a diagonal dimension of .5775

To determine the diagonal dimension of a **rectangular punch**, determine the square root of the sum of "W²" and "L²" (see diagram).

$$\sqrt{W^2 + L^2}$$

EXAMPLE: A punch that measures .25 X 1, has a diagonal dimension of 1.03

(SEE PAGES 82-83 FOR REFERENCE CHARTS)

Die The female portion of the punching set-up. The hole of the die is slightly larger than the punch used. (Hole size is determined by the type and thickness of material being punched. See "Tonnage Requirement Guide for Punching Mild Steel" next page).

Eccentric/Offset A die with a hole that is not in the center of the die. This type of die is used to punch a hole close to the leg of structural materials such as angle iron, beams or channels. To use an eccentric die, the die holder must be adjustable. See page 72 for more information.

Punch The male (usually upper) portion of a punching set-up that determines the hole size.

Stripping Pulling the punch out of the material after punching.

Tonnage Requirement Guide for Punching Mild Steel

(Tensile strength of approximately 65,000 PSI)

ROUND HOLES

The following formula is the Cleveland Steel Tool recommended equation for computing the approximate tonnage required to punch a single round hole in mild steel.

$$\text{Punch Diameter} \times \text{Material Thickness} \times 80 = \text{Tons of Pressure Required}$$

EXAMPLE: To punch a 1/2" hole through 1/4" thick mild steel:
 $.500 \times .250 \times 80 = 10 \text{ tons}$

SHAPED HOLES

The following formula is the Cleveland Steel Tool recommended equation for computing the approximate tonnage required to punch a single shaped hole in mild steel.

$$\frac{1}{3} \text{ of Perimeter} \times \text{Material Thickness} \times 80 = \text{Tons of Pressure Required}$$

EXAMPLE: To punch a 9/16" x 1" rectangular hole through 1/2" thick mild steel:
 $(.33 \times 3.124) \times .500 \times 80 = 41 \text{ tons}$

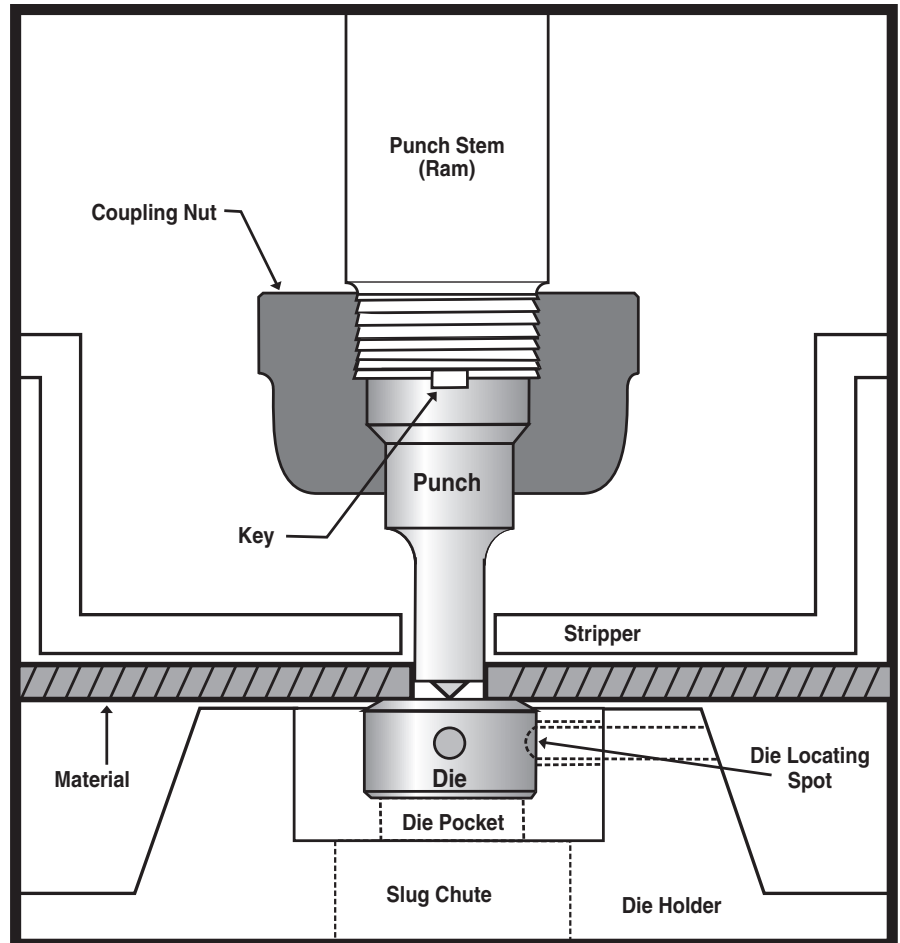
Multiplier

For punching materials with different tensile strength, first determine the tonnage required above, and use the multiplier below.

Material	Multiplier
Aluminum38
Brass70
Copper56
Steel (mild)	1.00
Steel (50% carbon).....	1.50
Steel Cold Drawn	1.20
Stainless Steel (303)	1.50

NOTE: The thickness of the material should not exceed the punch diameter being used.

A Typical Punch Set-Up



Ensure Long Life of Tooling

Every tool manufactured by Cleveland Steel Tool is made of the highest grade of tool steel. For maximum performance, certain precautionary measures must be taken:

1. Correct alignment of the punch with the die must be maintained.
2. Correct placement of the stripper must be maintained to prevent tilting or cocking of the work piece during stripping.
3. Coupling nuts and punch stems must be properly tightened to hold tooling securely.
4. Lubricate whenever possible.

CAUTION: Extreme pressures are generated in all metal punching applications. Use safety guards and all recommended safety precautions.

WARNING: It is the responsibility of the user to set up and use machine and tooling in accordance with local and national OSHA laws and ANSI B11.5 safety standards. Do not allow unqualified personnel to set up or operate machines. Use extreme care at all times.