

# HYDRAULIC PUNCHES

## 20 & 35 Ton



- Punch smooth, precise holes in seconds; much faster than drilling.
- Fully portable for construction, maintenance and service applications, or can be mounted on a workbench for production jobs. Has carrying handle for precise locating.
- Rugged, forged steel "C" frame for great strength and durability.
- Dual action, spring loaded stripper holds material during punching operation, strips material from punch on return. Scribe lines on stripper aid in locating the punch (HP 35 only).

- Double Acting prevents binding and speeds retraction (HP20 only).
- The PE172 electric/hydraulic pump is an ideal power source.

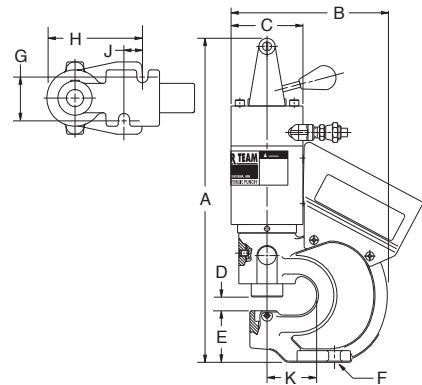
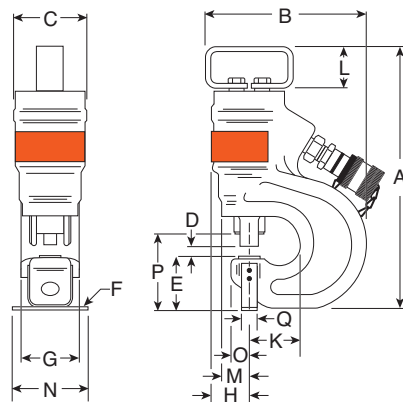
**No. HP35** – Punch only, includes metal case and die change tools. Wt., 42.5 lbs.

**No. HP35S** – Punch with punches and dies. Includes HP35 punch, metal case and 250459 punch/die set. Wt., 44.0 lbs.

**No. HP35P** – Punch set with pump. Same as HP35SP, but does not include punch/die set. Wt., 86.3 lbs. NOTE: Available in 220 volt, 50 Hz. Order with suffix "-220".

**No. HP35SP** – Punch set with pump. Includes HP35 punch, PE172 electric/hydraulic pump, 9756 hose, 9798 hose half coupler, 250459 punch/die set, metal case. Wt., 87.8 lbs. NOTE: 220 volt, 50 Hz. Order with suffix "-220".

**No. 250459** – Punch/die set for round holes. Includes one each: PD437  $\frac{7}{16}$ " punch/die, PD562  $\frac{9}{16}$ " punch/die, PD688  $\frac{11}{16}$ " punch/die, PD812  $\frac{13}{16}$ " punch/die. Wt., 1.5 lbs.



35	Order Number	Max. Oper. Press.	Max. Oil Cap.	Max. Material Thickness	Mtg. Holes																
					A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	G (in.)	H (in.)	J (in.)	K (in.)	L (in.)	M (in.)	N (in.)	O (in.)	P (in.)	Q (in.)	
	HP35	10,000 psi	4.6 cu.in.	$\frac{1}{2}$	$13\frac{3}{4}$	9	$3\frac{3}{4}$	$\frac{9}{16}$	$2\frac{7}{8}$	$\frac{1}{4}$	3	$1\frac{13}{16}$	—	$2\frac{13}{16}$	$2\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$	$\frac{7}{8}$	4	$\frac{3}{4}$	

**No. HP20** – Basic punch. Wt., 33 lbs.

**No. HP20S** – Punch frame with cylinder, valve, handle, two coupling nuts, plus five punch and die sets in 1/4", 5/16", 3/8", 7/16", and 17/32" dia. Wt., 35.0 lbs.

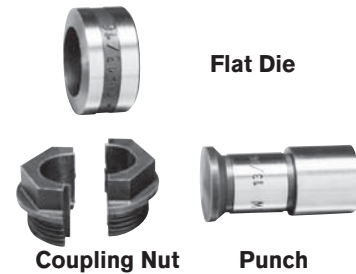
**No. HP20SP\*** – Complete punch set with PE102A pump (115V, 50/60 Hz), 9682 nipple, two 9792 female couplers and two 9793 male couplers. Also includes two 9758 10' hoses, 9680 coupling, and same punch and die sets as in HP20S (above). Tool is completely assembled and pre-filled with oil. In storage box. Wt., 83.0 lbs.



HP20



**Punch Set HP20SP**  
Includes the PE102A pump, hoses, couplers, punch and die sets in sizes 1/4", 5/16", 3/8", 7/16", and 17/32" diameter, with storage box.



Flat Die

Coupling Nut

Punch

TYPICAL 20 TON STYLE TOOLING

PUNCH/DIE SETS FOR HP20 & HP35 HYDRAULIC PUNCHES

For use with HP20 Hydraulic Punch

For use with HP35 Hyd. Punch

Punch Size (in.)	Punch Style	Punch No.	Flat Die No.	Bevel Die No.	Coupling Nut No.	Punch/w Flat Die Set	Punch/w Bevel Die Set	Punch Size (in.)	INCHES		MM	
									Hole Dia.	Bolt	Hole Dia.	Bolt
1/4	Round	251970	251983	--	252001	--	--	1/4	1/4	#10	6.3	--
5/16		251971	251984	--	252001	PD313	--	5/16	5/16	1/4	7.9	--
3/8		251972	251985	251996	252001	PD375	PD375B	3/8	3/8	5/16	9.5	M8
7/16		251973	251986	251997	252001	PD437	PD437B	7/16	7/16	3/8	11.2	M10
17/32		251974	251987	251998	252001	PD531	PD531B	17/32	17/32	7/16	13.5	M12
9/16		251975	251988	251999	252001	PD562	PD562B	9/16	9/16	1/2	14.3	--
11/16		251976	251989	--	252001	PD688	--	11/16	11/16	5/8	17.5	M16
25/32		251977	251990	--	252002	PD781	--	25/32	25/32	--	19.8	M18
13/16		251978	251991	--	252002	PD812	--	13/16	13/16	3/4	20.6	--
1/2		251979	251992	--	252002	--	--	--	--	--	--	--
17/32	Square	251980	251993	--	252002	--	--	--	--	--	--	
1/4 X 3/4	Obround	251981	251994	--	252002	--	--	--	--	--	--	
3/8 X 3/4		251982	251995	--	252002	--	--	--	--	--	--	



ACCESSORIES FOR HP20 HYDRAULIC PUNCH

**No. HP20FS** – Optional foot switch mounted in foot switch guard. Supplied with 10 foot cord and male remote connector. Wt., 2.0 lbs.

**No. HP20HS** – Optional handswitch. Supplied with 10 foot cord and male remote connector. Wt., 2.0 lbs.

**No. 252000** – Optional coupling nut wrench. Makes punch/die changes easier without "rounding-off" coupling nuts. Wt., 0.5 lbs.

# MEASUREMENTS/ SPECIFICATIONS

Tons Of Pressure  
Required

## SELECTING A PUNCH

The following information is provided as a convenient general reference guide for metal punching operations.

### HOLE SIZE VS. MATERIAL THICKNESS

Punching holes in metal is the fast, economical way to get precise hole size, smoothness and minimum burr. Compressive strength of the punch steel determines that the thickness of the metal being punched must not exceed the diameter of the punch. This relationship varies with the type of material. For example: the minimum hole diameter will be 1/4" in 1/4" mild steel, 1/4" in 3/16" stainless steel, and 1/4" in 5/16" aluminum.

### MAXIMUM RATED CAPACITY

All punching tools have their maximum capacity for safe, dependable operation over a long life span. The hydraulic punches listed in this catalog have a "rated capacity" based on their design strength. Before selecting a tool, use the following charts to determine the specific tonnage required to punch the size and shape holes through the type and gauge metal considered.

### DETERMINING TONNAGES FOR ROUND HOLES

To determine tonnages for hot rolled mild steel (typically used in bar size angle iron, channels, tees and zees) with a 50,000 PSI shear strength, read directly from chart #1. Example: To punch a 3/8" diameter hole thru 3/8" thick mild steel, chart #1 shows 11.1 tons are required. For ASTM A-36 steel (typically used for structural size wide flange, H and I beams, tees and zees) with a 60,000 PSI shear strength, read direct from chart #2. Example: To punch a 1/4" round hole in 1/4" thick A-36 steel, chart #2 shows 5.9 tons of force is needed.

CHART #1 TONS OF PRESSURE REQUIRED TO PUNCH MILD STEEL													
Material		Round Hole Diameter											
Thickness		1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"
Gauge	Inches												
20	1/32	.4	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3
18	3/64	.5	.7	.9	1.2	1.4	1.6	1.9	2.1	2.4	2.6	2.8	3.1
16	1/16	.6	.9	.6	1.5	1.8	2.1	2.3	2.6	2.9	3.2	3.5	3.8
14	5/64	.7	1.1	1.2	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8
12	7/64	1.0	1.5	1.5	2.6	3.1	3.6	4.1	4.6	5.1	5.7	6.2	6.7
11	1/8	1.2	1.8	2.1	2.9	3.5	4.1	4.7	5.1	5.9	6.2	7.1	7.6
10	9/64	1.3	2.0	2.4	3.3	4.0	4.6	5.3	5.9	6.6	7.3	7.9	8.6
3/16"	3/16	--	2.8	2.6	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0
1/4"	1/4	--	--	3.7	6.1	7.4	8.6	9.8	11.1	12.3	13.5	14.7	16.0
5/16"	5/16	--	--	4.9	7.8	9.2	10.7	12.3	13.9	15.4	17.0	18.5	20.0
3/8"	3/8	--	--	--	--	11.1	12.8	14.8	16.5	18.5	20.2	22.1	23.8
1/2"	1/2	--	--	--	--	--	--	19.7	22.0	24.6	26.9	29.5	31.8

TONS OF PRESSURE

CHART #2 TONS OF PRESSURE REQUIRED TO PUNCH ASTM-A36 STRUCTURAL STEEL														
Material		Round Hole Diameter												
Thickness		1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	
Gauge	Inches													
12	7/64	1.2	1.9	2.5	3.1	3.7	4.3	4.9	5.6	6.2	6.8	7.4	8.0	
11	1/8	1.4	2.1	2.8	3.5	4.2	4.9	5.7	6.4	7.1	7.8	8.5	9.2	
10	9/64	--	2.4	3.2	4.0	4.8	5.6	6.4	7.2	7.9	8.7	9.5	10.3	
3/16"	3/16	--	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0	12.1	13.2	14.3	
1/4"	1/4	--	4.4	5.9	7.4	8.6	10.3	11.8	13.2	14.7	16.2	17.7	19.1	
5/16"	5/16	--	--	7.4	9.2	11.0	12.9	14.7	16.5	18.4	20.2	22.0	24.0	
3/8"	3/8	--	--	8.8	11.0	13.3	15.5	17.7	19.9	22.1	24.3	26.5	28.7	
1/2"	1/2	--	--	--	--	--	--	23.6	26.5	29.4	32.4	35.3	38.3	

TONS OF PRESSURE



# MEASUREMENTS/ SPECIFICATIONS

## Die Clearance

CHART #3 TONS OF PRESSURE REQUIRED TO SHEAR 1" LENGTH

Material Thickness	Mild Steel	Stainless Steel	Brass	TONS OF PRESSURE
3/16	4.25	7.0	3.25	
1/4	6.25	9.5	4.5	
5/16	8.0	12.0	5.5	
3/8	9.5	14.25	6.25	
7/16	11.0	16.5	7.75	
1/2	12.5	18.75	8.75	

### DETERMINING TONNAGES FOR IRREGULAR SHAPED HOLES

When punching irregular shaped holes (square, obround, etc...) multiply the length of metal to be cut by the multiplier given for a 1" length of cut in chart #3. Example: The shear length (or total

distance around a 1/2" square hole) is 2". To punch such a hole in 1/4" thick mild steel, multiply 2" x 6.25 (from chart #3) = 12.5 tons. For stainless steel this would be 2" x 9.5 = 19 tons.

### DIE CLEARANCE

The relationship of the larger die hole size to the punch size is die clearance and is stated as a percentage of the thickness of the material being punched. The range of clearances varies from 10% for thin materials to 20% for thicker materials. For 0.75" material, the total die clearance is .150".


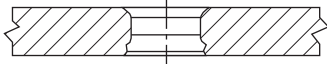

Clearance should always be specified when there is any reason for doubt (see illustrations below). Effects of die clearance are more noticeable in thicker materials (such as 0.50") than in thinner materials (such as 0.19"). When ordering die sets, specify the type and thickness of material being punched (see chart #4).

CHART #4 CLEARANCE  
FOR MILD STEEL

Material Thickness	Approximate Decimal Thickness	Overall Clearance-Add to Punch Size	TONS OF PRESSURE
7 gauge	.1793	.021	
3/16	.1875	.023	
1/4	.250	.037	
5/16	.3125	.047	
3/8	.375	.057	
1/2	.500	.075	

NOTE: Most grades of half hard aluminum use the same clearance as shown above. In many cases, your own experience may dictate that you call for clearances different from the above, especially when punching other materials such as stainless steel. Special clearances may be ordered for that purpose.

### DIE CLEARANCE HAS THE FOLLOWING EFFECTS:

Too much clearance	Too little clearance	Correct Clearance
		
<ol style="list-style-type: none"> <li>1. Extra roll-in at top of the hole.</li> <li>2. Too much burr at bottom of the hole.</li> </ol>	<ol style="list-style-type: none"> <li>1. More punching pressure needed. Can reduce tool life.</li> <li>2. High stripping force causes part distortion and extra punch wear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Straighter hole thru material.</li> <li>2. Minimum distortion at top of hole.</li> <li>3. Minimum burr at bottom of hole.</li> </ol>

