**COMPUTE TONNAGE FOR PUNCHING**

Ton = Required tons for punching  
P = Perimeter of the hole to be done  
E = Material thickness  
D = Material hardness in Kg/mm²

**P (PERIMETER) OF MOST COMMONLY USED HOLES**

- **Round Hole**  
  \[ P = \pi \times \phi \]  
  \[ \pi = 3.1416 \]

- **Rectangular Hole**  
  \[ P = 2 \times a + 2 \times b \]

- **Square Hole**  
  \[ P = 4 \times a \]

- **Oval Hole**  
  \[ P = (\pi \times b) + 2 \times (a - b) \]

**D (MATERIAL HARDNESS IN Kg/mm² (N/mm²))**

- **Aluminum**  
  30 Kg/mm² (300 N/mm²)
- **Brass**  
  25 Kg/mm² (250 N/mm²)
- **Cupper**  
  22 Kg/mm² (220 N/mm²)
- **Mild steel**  
  45 Kg/mm² (450 N/mm²)
- **Stainless steel**  
  65 Kg/mm² (850 N/mm²)

*Approximate average values*
EXAMPLE

Ø = Punch 18 mm
E = 10 mm
D = Mild steel 45 Kg/mm²

\[ P = \pi \times \varnothing \]
\[ P = 3.1416 \times 18 \]
\[ P = 56.54 \text{ mm} \]

Ton = \( P \times E \times D / 1000 \)
Ton = 56.54 \times 10 \times 45 / 1000
Ton = 25.44 \text{ tons} 

IMPORTANT

• In case the machine tonnage does not allow making the hole, there is the possibility of buying sloped cut punches. Resistence of material while punching is much lower.

• The diameter of the hole to be made must be always bigger than the material thickness to avoid any possible breakages. E.g.: With a 10mm punch we cannot punch a 15mm thickness sheet, on the other hand we could punch 10mm metal sheet with a 15mm diam.