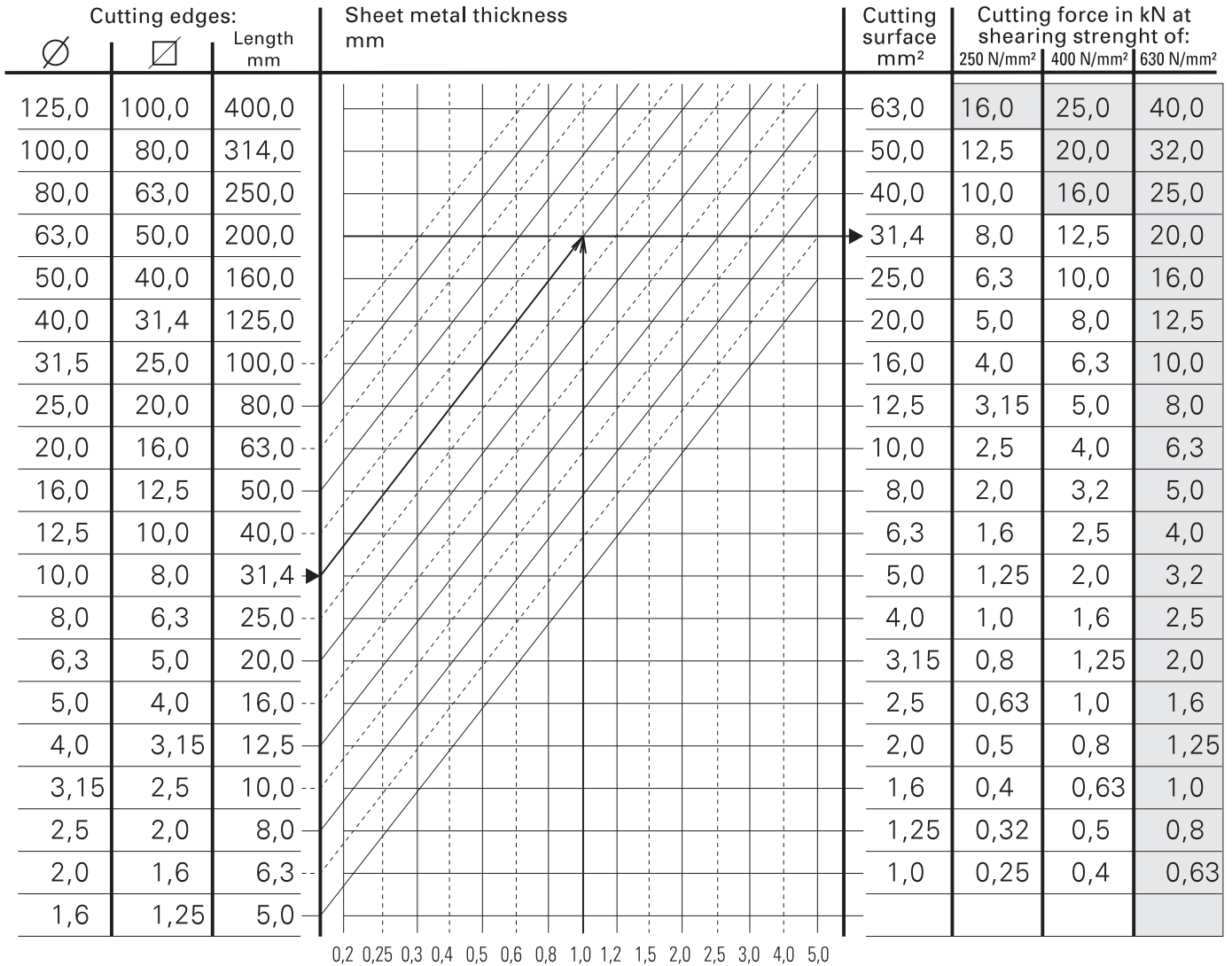



For long lifetime and trouble-free operation, the **HAPRO** Punching Presses are designed for cutting forces of nominal 14kN. A short-term overload is normally without demaging consequence, but should be avoided. For selection of desired application tools and the corresponding cutting forces, the following diagram can be used.

The size of the cutting force depends on the cutting material, the length of its cutting edges, the thickness of material, the shape and condition of the cutting edges of upper and lower die.
The diagram values are valid for parallel cutting edges on upper and lower dies.



Example:
 Hole ∅: **10mm** ⇒ Cutting edges: 31,4mm ⇒
 Thickness: **1,0mm** ⇒ Cutting surface: 31,4mm² ⇒
 Shearing Strength: 250N/mm² **Cutting Force 8kN/mm²**

 Working in this area creates trouble and reduces lifetime of tooling.

| Shearing strength of sheet metal | | | |
|----------------------------------|---------------|----------------|-------------------------------------|
| Sheet metal grades | Specification | Metal Code No. | Shearing strength N/mm ² |
| Sheet Spring Steel | 38Si7 | 1.5023 | 944 |
| Sheet Steel, stainless | X5CrNi 18 10 | 1.4301 | 480 |
| Sheet Steel, strong | St52-3G | 1.0570G | 416 |
| Sheet Steel, soft | St37-2G | 1.0037G | 300 |
| Sheet Brass, hard | CuZn37 (F45) | 2.0321 | 360 |
| Sheet Brass, soft | CuZn37 (F30) | 2.0321 | 240 |
| Sheet Aluminum, hard | AlCuMg1 | 3.1325 | 304 |
| Sheet Aluminum, soft | AlMg1 | 3.3315 | 112 |

The quality WS of the HAPRO Punchtools is designed for shearing strength up to 400N/mm². This provides with proper application for long lifetime also on individual production and small-lot runs.

Subject to change without notice