

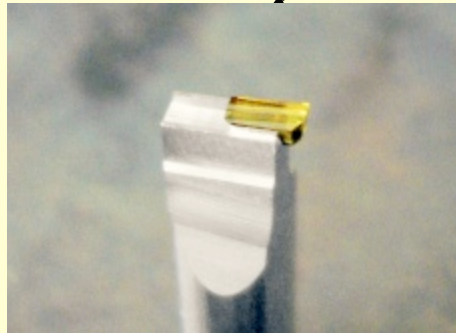
Shapes, materials and principles for vacuum brazing of diamonds

Natural diamond
MCD, CVD
solid CBN

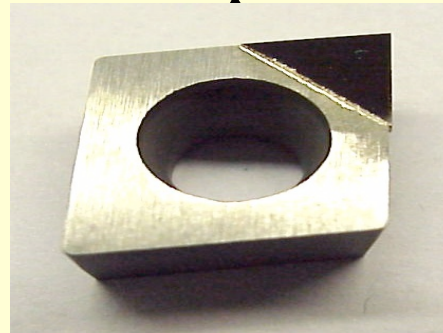
↓
Cut to raw form

↓
Brazing on shafts, i.e. of
hard metal, various sorts of steel also HSS and Kovar
copper, molybdenum, Al-bronze 75,

Please note: CVD can only be brazed onto
hard metal i.e. K10 or K20 or molybdenum



Ex. MCD on steel shaft



Ex. CVD on hard metal

CVD/ CDE

↓
Cut to raw form

↓
Brazing onto hard metal platelets i.e.
K10 ou K20 or molybdenum
Size of platelets +0.1mm



Ex. CVD on hard metal

↓
Soldering by induction or flame

↓
Grinding and polishing
to final form

↓
Grinding and polishing or
electro erosion to final form



W A B A W A S K A

vacuum brazing

Risks of different thermo dilatation properties in composite materials



Allow sufficient space in slits and holes (depending on material, shape or size of the stone + max. 0.01mm)



Diamonds should preferably have neither fractures nor cracks or inclusions

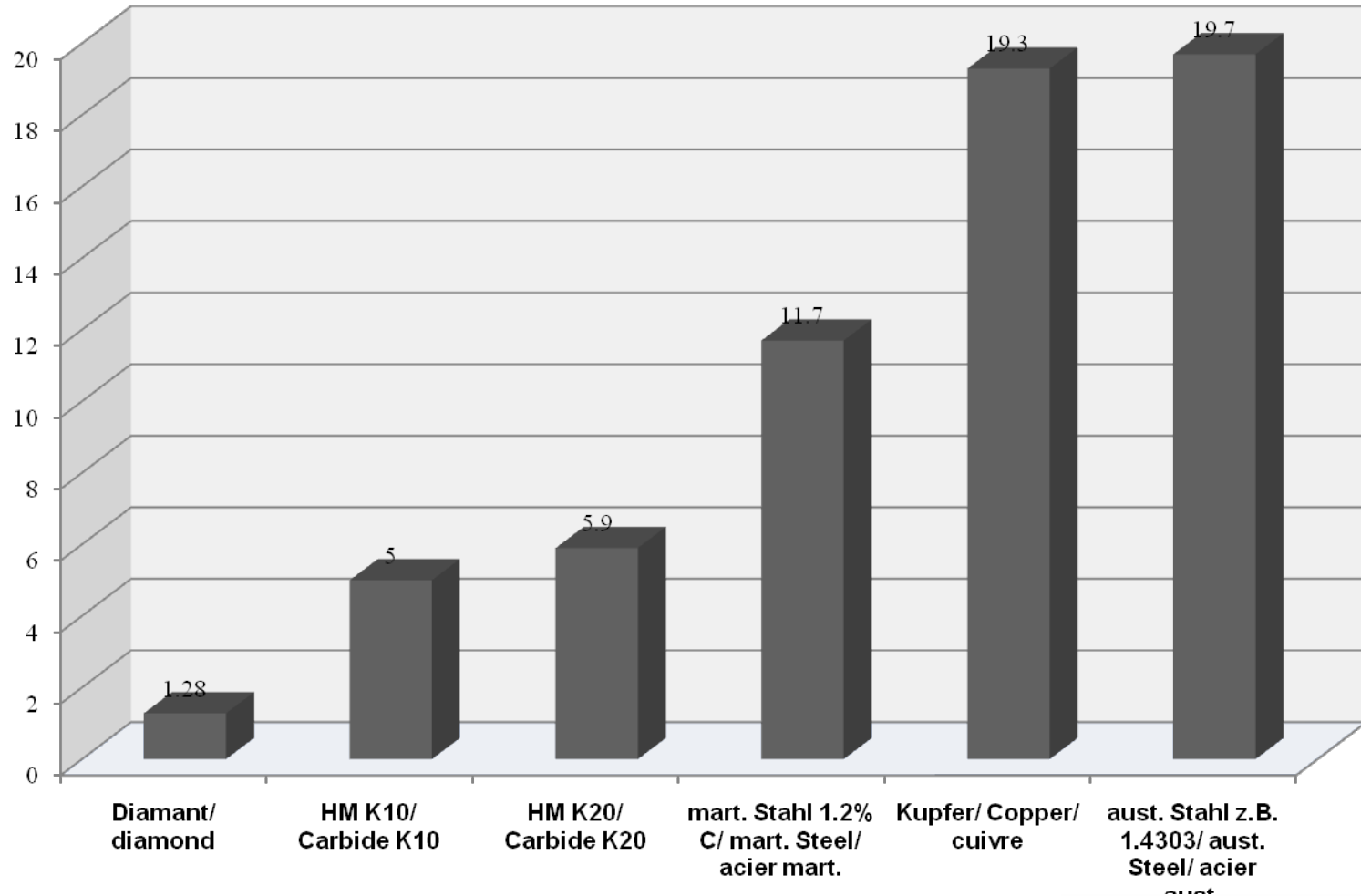


Depending on the size of the stones and the material of the support we use either a more ductile and softer braze or a less ductile but harder braze.



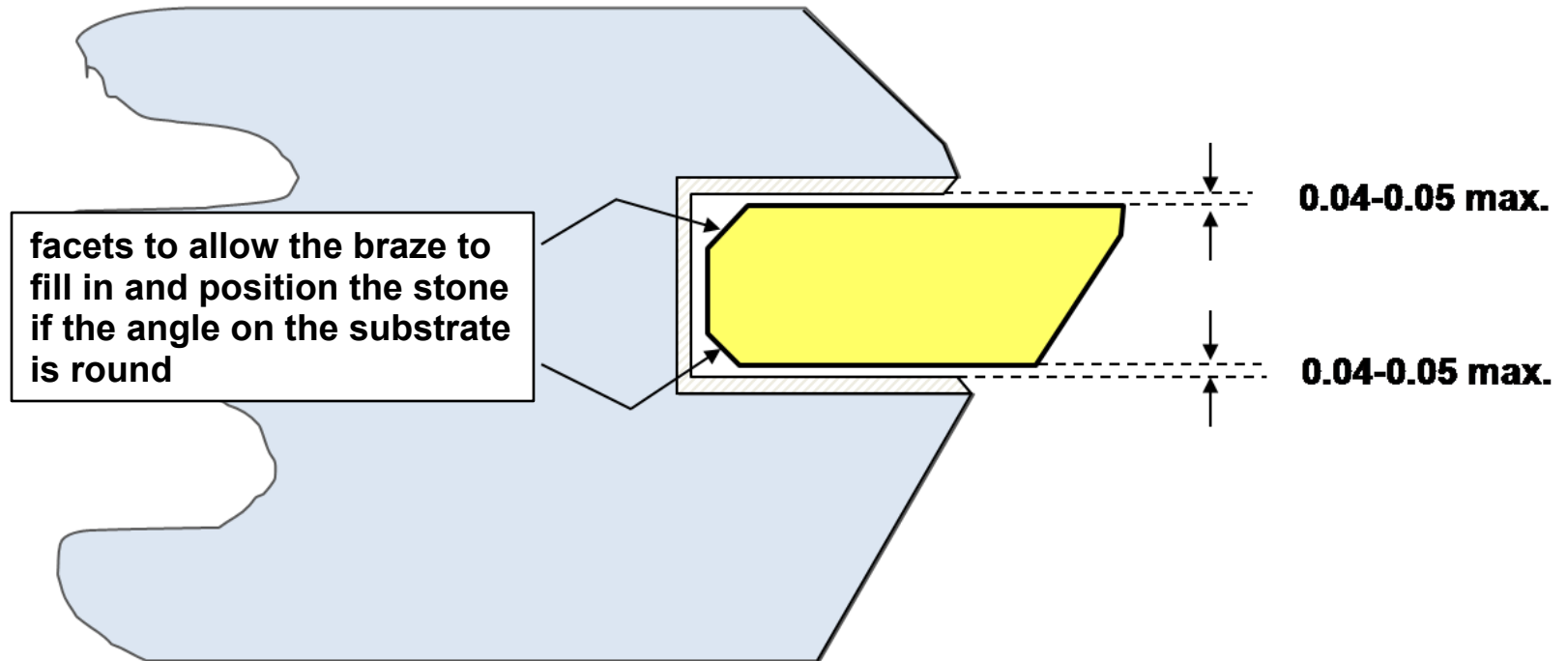
Dangers caused by different thermal expansion coefficients

Thermal expansion coefficients, averaged in the range from 0 to 300°C unit $10^{-6}K^{-1}$

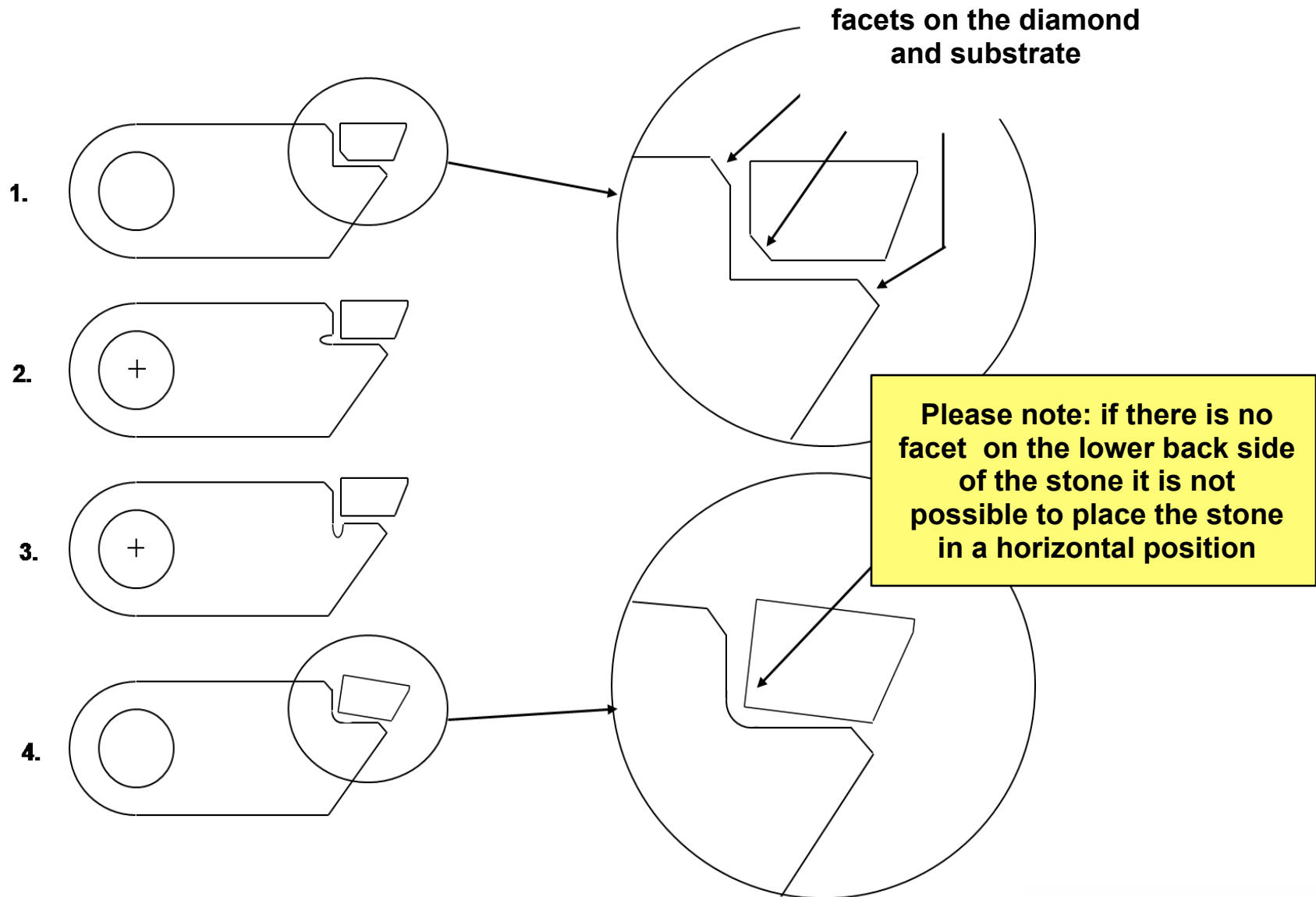


How to shape stones and substrate

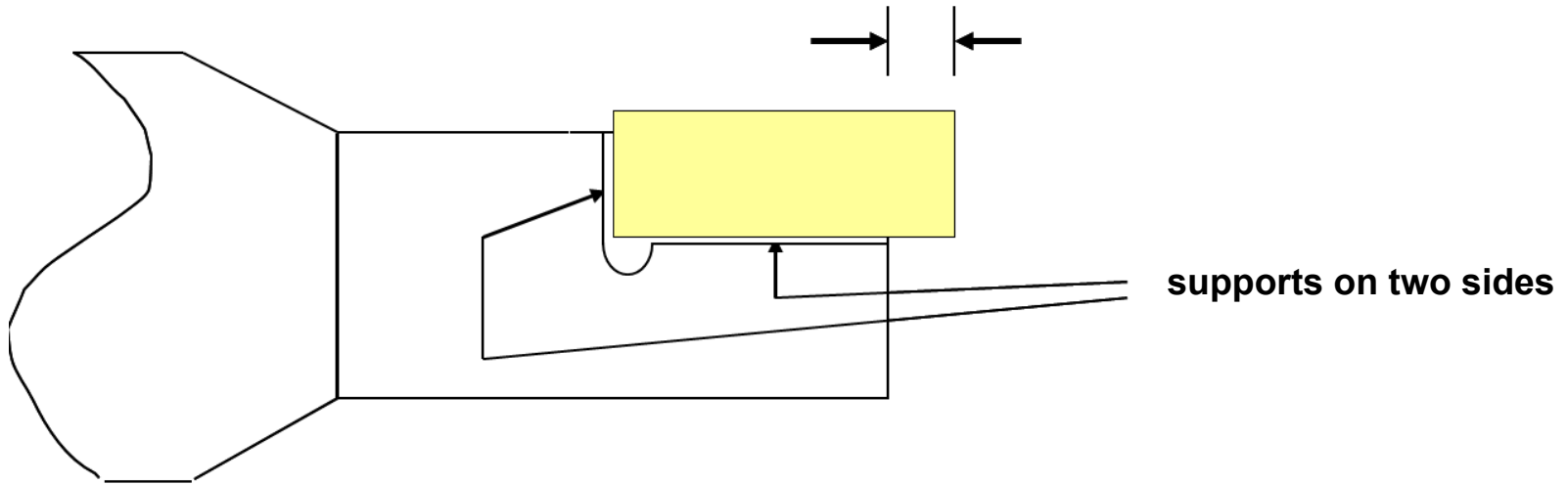
1. Please make sure the stone will fit into the position you intend and the shape of the stone and the substrate will not inhibit the fit, specially on the back sides
2. Allow space between stone and substrate of max. 0.04 – 0.05 mm on each side



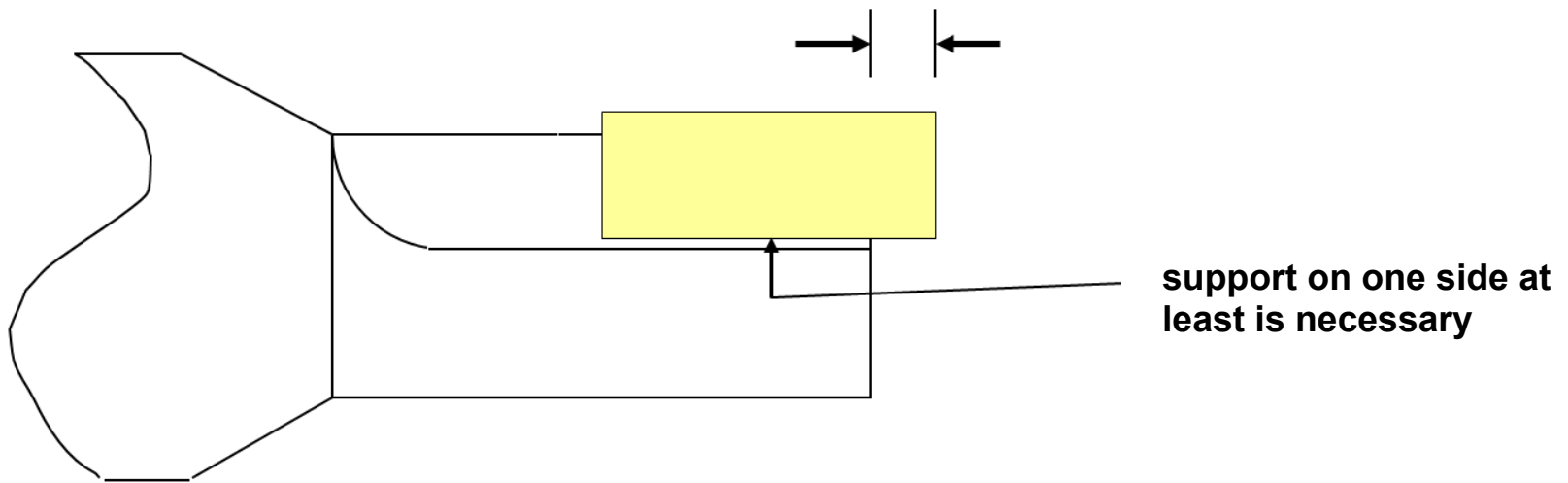
Versions of shapes of diamond and substrate



Versions of supporting the stone

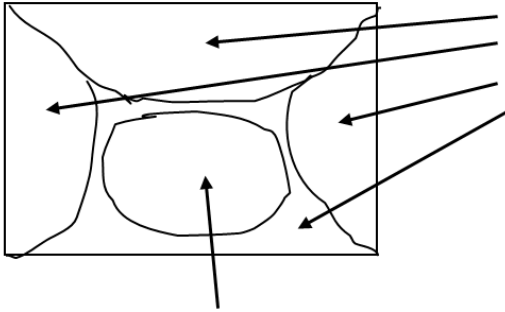


Tolerance +/- 0.1mm



Advice for natural diamonds

view from below



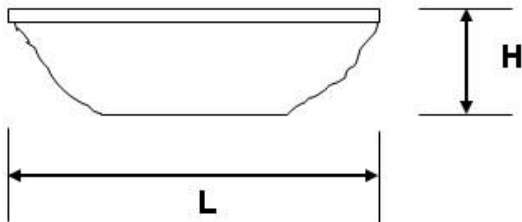
facet parallel to the table

natural facets of the diamond

The seat on the bottom may be small but must allow to position the stone parallel to the substrate

$L/H = \text{max. } 3.5$ for steel e.g. CK and
 $= \text{max. } 5$ for hard metal substrates

view from the front side



Diamonds with fractures and inclusions are susceptible to total loss by thermal stress when during the cooling process



W A B A W A S K A