* Hardness test

Hardness : is the resistance to scratch or indentation

Three common hardness tests :

① Brinell test

② Rockwell test → B, C

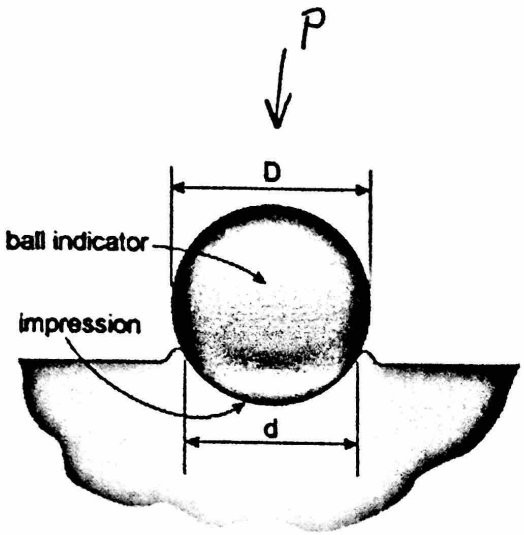
③ Vickers test

Test / Setting	Brinell Hardness Test (HB)	Vickers Hardness Test (HV)		Rockwell Hardness Test (HRC)	Rockwell Hardness Test (HRB)
		10	30		
Indenter	Ball 2.5 mm	Pyramid	Pyramid	Cone	Ball (1/16")
Preload	3	3	3	10	10
Main Load	187.5	10	30	150	100

Table 3: Universal hardness testing machine settings

* Brinell test

Indenter : Hardened steel ball



(a) Brinell indentation

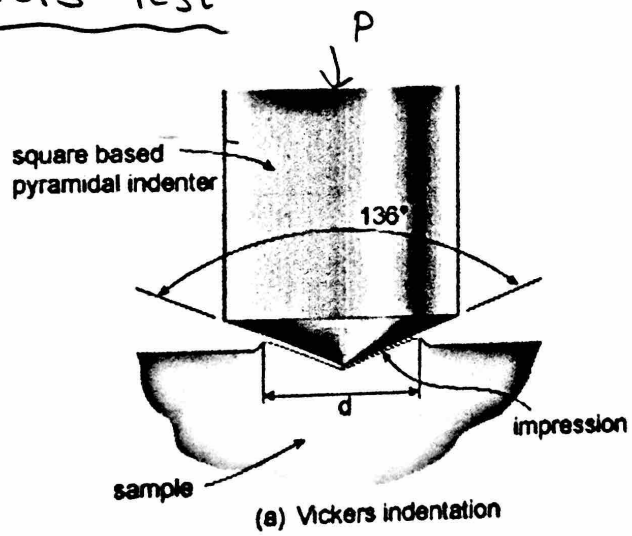
$$BHN = \frac{P}{\frac{\pi}{2} D \left[D - \sqrt{D^2 - d^2} \right]}$$

BHN : Brinell hardness number

$\sigma_{UTS} = 3.4 \sim 3.5$ BHN

Vickers test

Indenter : Squared diamond pyramid

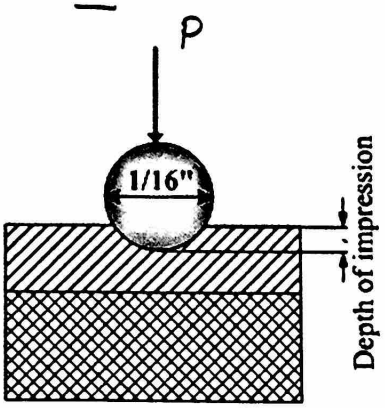


(a) Vickers indentation

$$VHN = 1.854 \frac{P}{d^2}$$

Rockwell tests

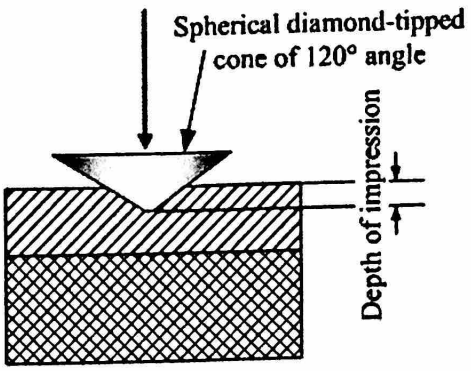
Rockwell B



Intender : Steel ball

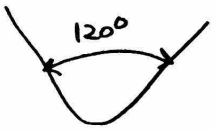
diameter $\frac{1}{16}$ inch

Rockwell C

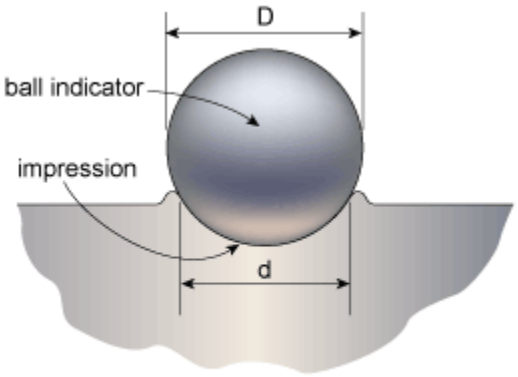


Indenter: diamond cone

$\theta = 120^\circ$

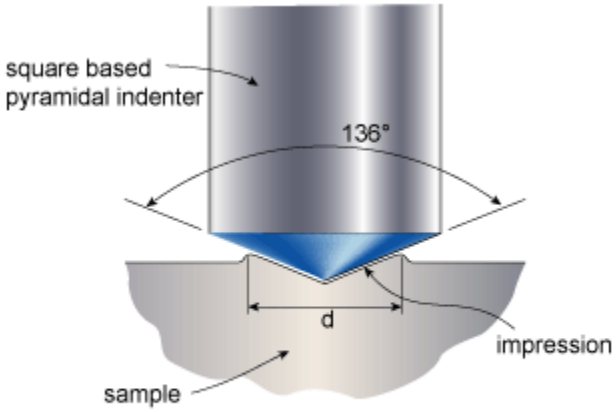


Brinell Test



(a) Brinell indentation

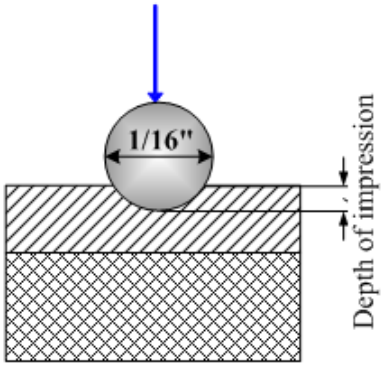
Vicker's Test



(a) Vickers indentation

Rockwell Test

Rockwell B



Rockwell C