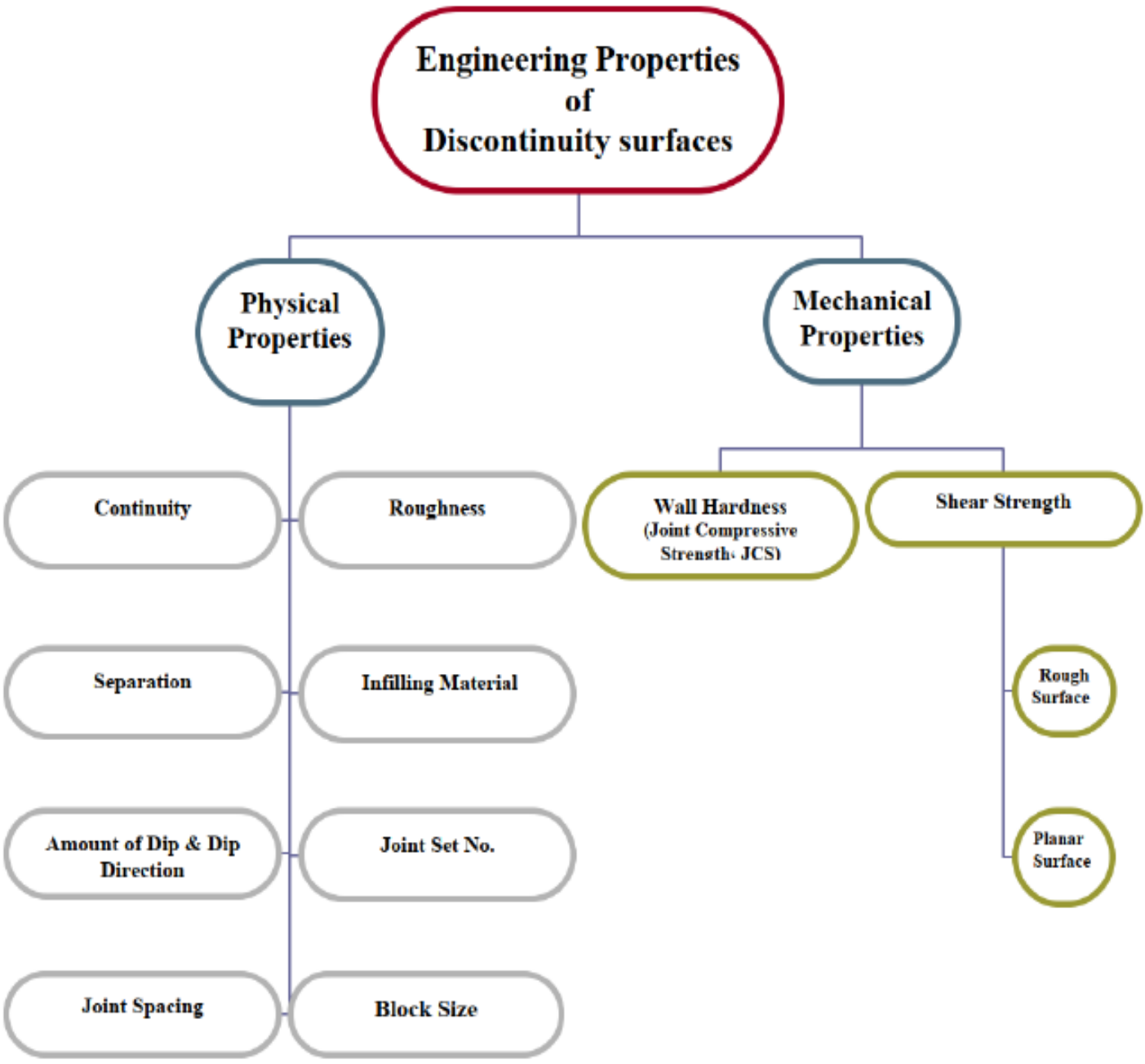
Engineering Properties for discontinuity surfaces

Engineering Properties for discontinuity surfaces divided into:

1- Physical properties
2- Mechanical properties



A-Physical Properties for discontinuity surfaces

1- Roughness
2- Continuity
3- Separation (Aperture)
4- Infilling materials
5- Amount of Dip & Dip Direction
6- Joint Set No.
7- Joint Spacing or Fracture Intercept
8- Block Size

1- **Roughness**: the shape of discontinuity surface measured with **Profile Roughness gauge**. Its description depends on the origin of discontinuity surface, is it formed by **tension** or **shear** or **compression** action. There are originally three types:

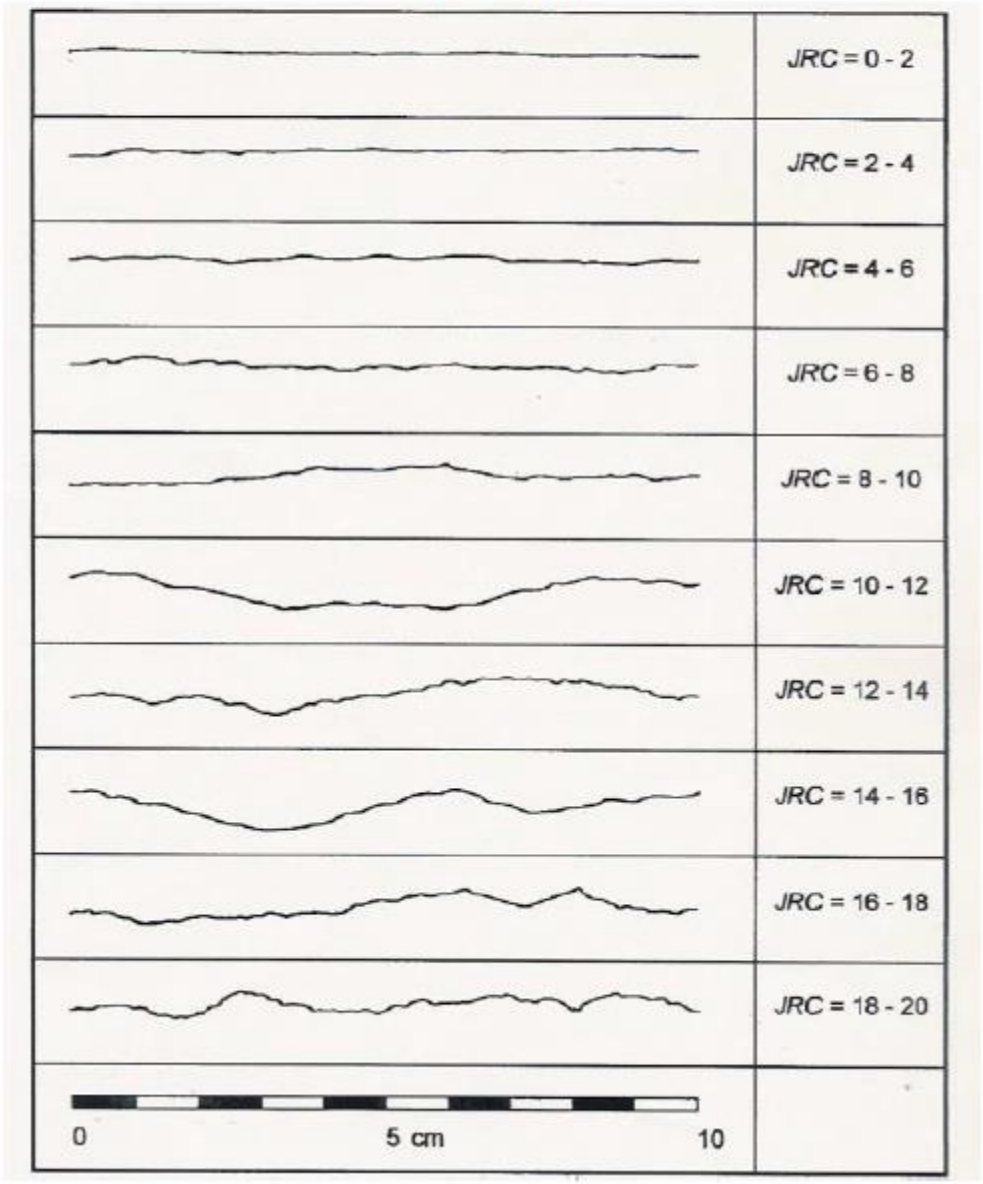
1- Smooth

2- Very Rough 

3- Rough 

As more the surface is rough its strength for slipping increases.

Roughness Types



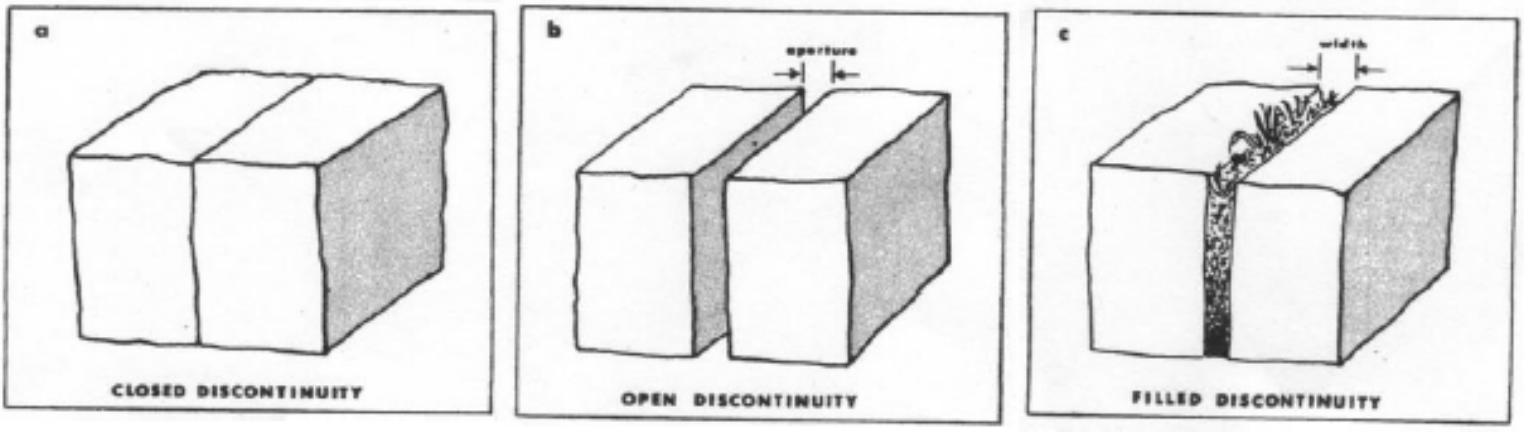
Roughness profiles and corresponding JRC values (After Barton and Choubey,1977)

2- **Continuity:** deepening of crack surface in the rock mass. Deepening increase weakens the rock mass and increases its permeability and consequently increases the effect of weathering and roughness.
3- **Separation (Aperture):** the magnitude of separation of a rock piece from a neighbored one and measured in millimeter unit (mm). The limits are described in the table below:

Aperture of discontinuity surfaces (After Geological Society of London 1977)

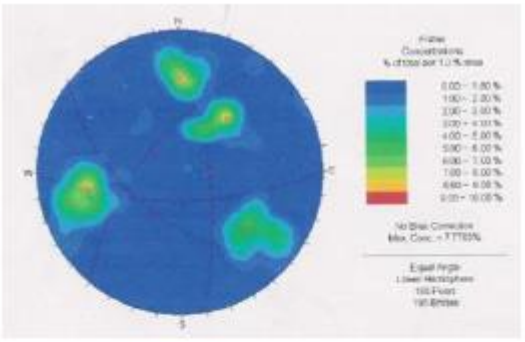
Aperture	Term
>200 mm	Wide
60 – 200 mm	Moderately wide
30 – 60 mm	Moderately narrow
6 – 20 mm	Narrow
2 – 6 mm	Very narrow
0 – 2 mm	Extremely narrow
< 2 mm	Tight

As the separation increase as the rock mass will crash.



4- **Infilling materials:** materials filling the separation between the two rock pieces. They composed mostly of the following clastic materials: sand, silt or clay according to the mineral composition of the rock mass, its weathered amount and decomposition of the overlying layer. As the infilling materials are coarse the resistance parameter of the rock for sliding increases.
5- **Amount of Dip & Dip Direction:** measured with Clar Compass as illustrated below, where the Compass measures the dip amount and dip direction of the surface immediately. It is required to measure more than 100 readings for crack surfaces in the rock mass.
6- **Joint Set No.:** can be identified throughout projecting the measured readings (in previous paragraph) onto Schmidt Net, the set groups appear in green and yellow as illustrated in the figure below. The figure shows four sets of cracks in the rock mass, their dip amounts and directions are concentrated in yellow color. The average value of each set is calculated arithmetically as well.

Figure 1.4: Geological compasses manufactured by F.W. Breithapt & Sohn, P.O. Box 10 05 69, D-3500 Kassel. W. Germany.



7- **Joint Spacing or Fracture Intercept:** the distance in centimeters between two successive cracks of the same set. Joint spacing is the distance between joints without regard to irregular fractures. Whereas the measured distances between irregular fractures are called Fracture Intercept.

8- **Block size:** measuring the dimensions of the rock mass (block) in three directions which related with the distances between cracks