

Conductors in Electrostatic Equilibrium

Conductor: A body in which charges are free to move.

Electrostatic: All charges are at rest.

Deductions from the meaning of “electrostatic”:

- $\vec{E} = 0$ inside a conductor.
- \vec{E} at the surface of a conductor is perpendicular to that surface.

Deductions from Gauss’s Law:

- All net charge resides on the surface of the conductor.
- At the surface, the magnitude of \vec{E} and the surface charge density σ are related through $E = \sigma/\epsilon_0$.

Deductions from potential:

- All points within a conductor are at the same potential.
- No field line can begin and end on the same conductor.

If the conductor contains a cavity, and there is no charge within the cavity, then $\vec{E} = 0$ within the cavity and there is no surface charge on the cavity.