Lightning Fundamentals

* Lightning enters a power system:

① Backflashover

BACKFLASHOVER EXAMPLE

Lightning Stroke

FLASHOVER

② Sheilding Failure:

SHIELDING FAILURE EXAMPLE

GroundWire

Lightning Stroke

③ Induced Flashover:

Flashover

Lighting stroke

Return Stroke
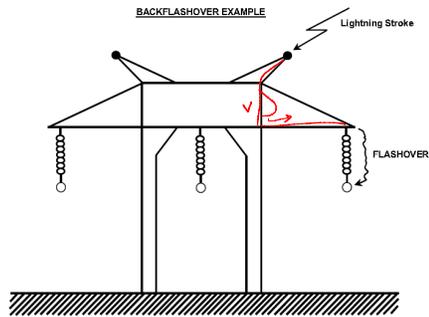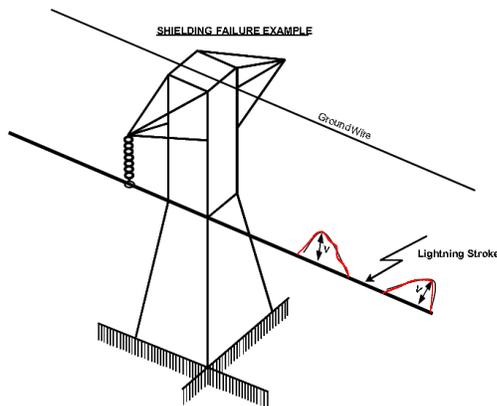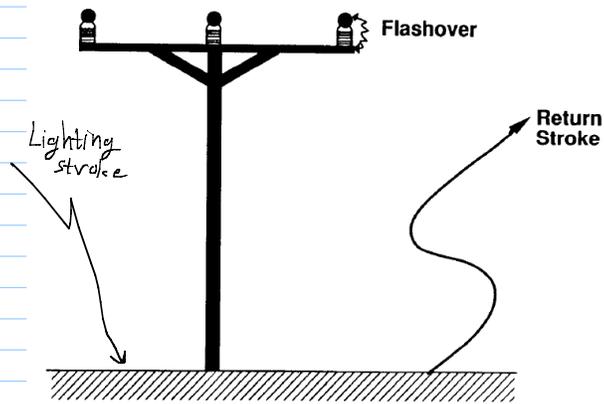
★ Calculating the number of flashes to a line per 100 km per year:

or ① $N_g = 0.04T^{1.25}$

② $N_g = 0.14T$

Where:
- N_g = ground flash density in units of # flashes per km^2 per year
- T = thunderstorm days per year (Keraunic Level)
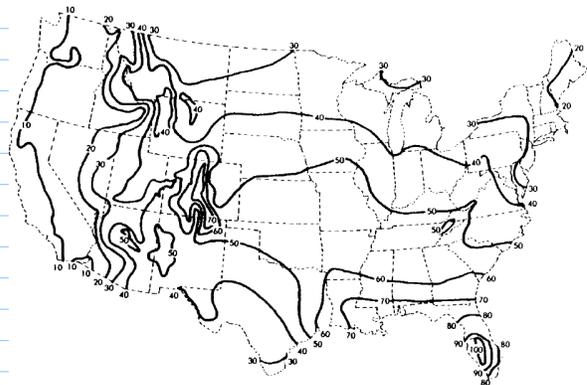
Iso-Keraunic Level

Three common relationships are:

$$① \quad N_L = \frac{N_g\left(28h^{0.6} + b\right)}{10}$$

$$② \quad N_L = 0.012T(b + 4h^{1.09})$$

$$③ \quad N_L = 0.004T^{1.35}(b + 4h^{1.09})$$

Where:

- ◆ N_L = number of flashes to a line per 100 km per year
- ◆ N_g = ground flash density in units of # flashes per km² per year
- ◆ T = thunderstorm days per year
- ◆ h = tower height in units of meters
- ◆ b = overhead ground wire (GW) separation distance in units of meters (=0 if single GW)