Types of Conductors

Solid Conductors

- The cross – section of the solid conductors are small because it is very difficult to handle it due to higher weight.
- It may break at the some point due to wind pressure in long span (Span is defined as the distance between two towers).

Stranded Conductors

- The stranded conductors are used in the transmission line.
- Number of conductors in the stranded conductor $N = 3n (n + 1) + 1$

Where n = Number of layers

$n = 0, \quad N = 1$

$n = 1, \quad N = 7$

$n = 2, \quad N = 19$

$n = 3, \quad N = 37$

Diameter of conductor $D = (2n + 1) d$

$n = 0, \quad D = d$

$n = 1, \quad D = 3d$

$n = 2, \quad D = 5d$

$n = 3, \quad D = 7d$

- The stranded conductor has greater flexibility as compared to solid conductors.

Hollow Conductors

- The diameter of hollow conductor is large as compared to solid conductors for same current capacity.
- The corona loss is eliminated due to large diameter of conductor.
- The skin effect of hollow conductor is less as compared to stranded conductor.

- The inductance of the hollow conductor is less as compared to solid conductor.
- As the diameter of conductor increases, it exposes higher weight due to wind pressure and ice accumulated on the conductor surface.

Bundle Conductors

- It is defined as the two or more than two conductors per phase.
- They are used for transmitting power for long distances.
- The sub conductors are separated by equal distance.

Advantages of Bundle Conductors

- Low corona loss due to large cross section of area
- Low inductance per phase due to higher GMR (Geometric Mean Radius) which reduces net reactance of the conductor.

- The power transmission capacity increases as the reactance of the line decreases.

$$P = V_S V_R / X$$

- Lower voltage regulation due to low inductive reactance
- Reduced radio interference with communication lines

Disadvantages of Bundle Conductors

- Charging kVA increases
- Size of tower increases due to large space between conductors
- Wind and ice loading increases due to large diameter of conductor

Questions

- Give reason : The cross section of the solid conductor is kept small.
- Calculate the number of conductor and diameter of conductor for 3 layer in the stranded conductor.
- List the advantages of hollow conductor as compared to solid conductor.

Questions

- Define : Bundle conductor
- List the advantages and disadvantages of bundle conductor as compared to solid conductors.
- Describe the effect of bundle conductor on power transmission line capacity.