

Session 8

Distribution Feeders and Substations: Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, and feeder-loading.

Distribution feeders play a crucial role in delivering electricity from substations to the end consumers. There are two primary types of distribution feeders: radial feeders and loop feeders. The design considerations for distribution feeders include the selection of voltage levels, feeder loading, and the choice between radial and loop configurations. Let's explore these considerations in more detail:

Radial Feeders:

Radial feeders have a single path from the substation to the load, forming a radial network configuration.

Design considerations for radial feeders involve determining the appropriate voltage level for the feeder, taking into account factors such as load demand, distance, voltage drop limits, and future growth projections.

Voltage levels for radial feeders can vary depending on the specific requirements of the distribution system. Common voltage levels include 11 kV, 22 kV, and 33 kV.

Feeder-loading in radial systems should be carefully managed to avoid overloading and voltage drop issues. Load flow studies and calculations are performed to ensure that the feeder can accommodate the expected load demand while maintaining acceptable voltage levels.

Loop Feeders:

Loop feeders provide multiple paths for power flow, forming a closed-loop network configuration.

Loop feeders offer advantages such as increased reliability, reduced voltage drop, and improved load balancing compared to radial feeders.

Design considerations for loop feeders include the determination of optimal loop lengths, the number of loops, and the placement of tie points or sectionalizing devices.

Voltage levels for loop feeders follow similar considerations as radial feeders, ensuring proper voltage levels based on load demand, distance, voltage drop limits, and future growth projections.

Feeder-loading in loop systems should be managed to maintain balanced load distribution among the different feeders. Load balancing techniques and controls are implemented to ensure equitable sharing of loads and reduce the risk of overloading.

Feeder-loading considerations for both radial and loop feeders include:

Analysis of load demand patterns and peak load periods to determine the expected loadings on the feeder.

Adequate conductor sizing to accommodate the maximum expected load demand while considering the current-carrying capacity and voltage drop limits.

Consideration of power factor characteristics and reactive power compensation to minimize losses and improve the efficiency of the distribution system.

Future growth projections to ensure that the feeder design can accommodate additional load demand without requiring significant upgrades or reinforcements.

It's important to note that the selection between radial and loop feeders depends on various factors such as reliability requirements, load characteristics, fault tolerance, cost considerations, and the specific needs of the distribution system. Distribution system planners and engineers analyze these factors to determine the most suitable feeder configuration for a given distribution network.