Feeder

Short description

A circuit, such as conductors in conduit or a busway run, which carries a large block of power from the service equipment (or genertor switchboard) to a subfeeder panel or a branch circuit panel or to some point at which the block power is broken into smaller circuits. Subfeeders originate at a distribution center other than the service equipment or generator switchboard and supply one or more other distribution panelboards, branch circuit panelboards, or branch circuits. Code rules on feeders also apply to subfeeders. Feeders and subfeeders must be capable in carrying the amount of current required by the load, plus any current that may be required in the future. Selection of the size of a feeder depends upon the size and nature of the known load as computed from the branch circuits, the unknown but anticipated future loads and the voltage drop.

Feeder Sizing according to the NEC Sections

1.) The feeder conductor ampacity shall be at least equal to 125% of a continuous load (NEC Section 220-10b).

2.) The total load on any overcurrent device located in a panelboard must not exceed 80% of the rating of the overcurrent device (NEC Section 384-16c).

3.) Circuit conductors shall be protected against overcurrent in accordance to their ampacities, but where the ampacity of the conductor does not correspond with the standard ampere rating of a fuse or a circuit breaker,

the next higher rating shall be permitted only if this rating does not exceed 800 amperes (NEC Section 240-3).

4.) Circuit conductors shall be protected against overcurrent in accordance to their ampacities, but where the ampacity of the conductor does not correspond with the standard ampere rating of a fuse or a circuit breaker, the next higher rating shall be permitted only if this rating does not exceed 800 amperes (NEC Section 240-3).

5.) These normal ampacities may have to be reduced or derated where there are more than three conductors in a cable or raceway (Note 8 to Tables 310-16 through 310-19). This means a change in ampacities of circuit conductors.

6.) The current permitted to be carried by the branch circuit conductors or feeder may have to be reduced if the load is continuous. This does not mean a change in the ampacities of the conductors but the rule refers to a limit of the load to be carried by the conductors. The change of ampacity of conductors because more than 3 conductors are installed in a cable or raceway is distinctly different from limiting the load (NEC Section 210-22c).

Parallel feeders are feeders with more than one conductor per phase. The ampacity of the parallel conductors is equal to the ampacity of one multiplied by the number of conductors in parallel. Parallel conductors shall be of the same size, length and type.

Example 1

Determine the minimun size of the conductor that could be used to supply a lighting load of 30 kVA fed by a 240 V, 3-Phase, 3 wire feeder operating at 80% power factor? Following NEC Sections results are:

1.) Feeder Amps = (30,000)/(220 x 1.732) = 78.73 A

2.) Feeder Size = 1.25 x 78.73 = 98.41 (recommended 25 mm^2 PVC insulated cables)

- Ampacity 100 A
- Max Load Allowed = 100 x 0.80 = 80 A

3.) Feeder Protection = Feeder Ampacity = 100 A

- Use 100 A Circuit breaker or Fuse, rated 240 V, 3 poles

4.) The Busbar in the panelboard shall have a minimum ampacity of 100 A

5.) The mains of the Panelboard shall be rated at 100 A, 3-poles, 240 V

6.) The equipment grounding (4th wire) is recommended 16 mm^2 PVC insulated cable. (Reminder: the system in this example is a 3-phase 3 wire. The 4th wire is not a current carrying conductor but is intended for equipment grounding)

Source:

http://www.openelectrical.org/wiki/index.php?title=Feeder