BENDING, TRAINING, AND RACKING UNDERGROUND SECONDARY CABLE (SERVICES AND/OR BUS TIES)

TRAINING AND RACKING OF CABLE

Safe minimum bending radius, cable creepage and splicing requirements must be considered when training and racking cables.

The locations of cables in manholes and vaults are determined by the ducts they occupy. The cables should always be fanned out from the duct mouth so they do not cross other ducts or cables. This allows access to other ducts for cable replacement and inspection. Cables with bends starting at duct mouth must have a cable protector (mucket) installed. Newly trained cable will tend to straighten out. If the bend is too near the duct mouth, the bend will spread into the duct which will eventually cause sheath damage at the duct edge. Minimum bend radius shall be five inches. Generally, secondary cables (bus ties and services) will be in the uppermost ducts because only the upper ducts are available in the older handholes. Neutrals should be brought down to the ground bus as close to the duct as possible.

CABLE SUPPORTS - WALL MOUNTED

The most common type of cable support is a rack assembly consisting of a rack back or stanchion bolted on the wall with slots or holes where the hooks (steps) can be attached. The hooks vary in length. The spacing of the stanchions is determined by the number and the weight of cables to be supported. The maximum spacing should be about six feet. If primary cables are supported on the same rack backs, refer to Construction Guideline U4-3/NCI-170 for primary cable racking.

Wall-mounted supports for vertical runs (refer to Construction Guideline NCI-160) may be used in spot-network vaults for network protector or service leads.

CABLE SUPPORTS - OVERHEAD MOUNTED

Trapeze-type cable supports (Construction Guideline NCI-110) may also be used in spot-network vaults for network protector and/or service leads. All three phases MUST be threaded equally through each support to cancel the magnetic fields.

CABLE TRAYS

Aluminum cable trays may also be used in dry spot-network vaults. The trays may be supported from the wall, floor or ceiling depending upon the routing of the cables and the vault configuration. Their size will depend upon the number of conductors to be installed.

CABLE SPACING, PHASING AND ARRANGEMENT (Refer to Construction Guideline NCI-160)

When installing service cables, protector leads or bus ties on hangers or rack backs, three cables shall be grouped or bundled together -- one from each phase -- just as if they were installed in conduit. This configuration reduces magnetic fields and tends to balance the reactance in phase cables which, in turn, equalizes currents in each cable. Figures 1 through 6 show how the cables shall be grouped and the air space between groups. Every attempt should be made to group or bundle cables this way for the length of the run except if the run requires separating phases for current transformers.

It is essential that air spaces be left between each group of conductors to maintain the N.E.C. "in air" rating of the conductor. The air space should be a minimum of 1-1/2 times the diameter of the conductors. Each conductor must be secured to the support to prevent any movement during short circuit conditions.

Between supports, the air spaces on horizontal runs should be "filled" with vertical pieces of PVC conduit, cut to length, and held in place with cable ties. Install two spacers per air space between each support point (trapeze, hook, etc.) equally spaced apart and from supports.

METERING CURRENT TRANSFORMERS

When metering current transformers (C.T.'s) are installed inside the vault, the individual phase conductors MUST be bundled together into a cylindrical bundle, fed through the C.T.'s and then reshaped as before. No more than 10 feet, each side of the C.T.'s, should be used for the transition area. Refer to Construction Guideline NCI-160

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