Cable Lore

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FLEXIBILITY AND POWER CABLES

Cable flexibility is a nebulous characteristic. It is one of the most common adjectives used in describing a cable construction but, surprisingly, there really is no standard for comparison. Many specifications have been written for flexible cables, yet no standard test method has been devised to measure degree or magnitude. Certain assumptions have been made concerning elements that would provide flexibility; for example; reducing the size of individual wires, therefore increasing the number of wires required to fabricate any given Awg size. This axiom is true to a point but loses validity when insulations and jackets are applied to furnish a completed cable. Consider, for example, a No. 16, 2/C Type SO Cord. The general assumption is made that No. 34 wire conductors are more flexible than No. 30 wire conductors. The validity of this assumption in a completed cord can be easily tested by bending a short section of cord, then remove the copper completely and bend the remaining components. The odds are good that you will not notice any difference. The explanation is simple. The energy required to bend the components other than copper is so great in comparison to that required to bend the conductor alone that the use of smaller wires is not significant. It is common practice in structural design to stiffen a member by putting the material into tube form. While not highly desirable, this phenomena occurs when extruded tubular coverings are placed over conductors or cable assemblies.

When flexibility is required in a cable design the rigidity or stiffness of any covering utilized must be given serious consideration. For many years insulations and jackets were compounds of natural rubber, an elastomeric material with inherent flexibility. Special compounding and processing were required to obtain rigid or stiff compounds. Herein lies the best guess why flexibility standards were never developed. Everyone used the same basic material resulting in just about the same degree of flexibility. This was expected as the "norm" and handling and installation procedures developed around this "norm". Synthetic elastomers came along and were developed along this same "norm".

The rapid advance of polymer technology has made available a large number of attractive materials suitable for cable coverings. Some of these can be classified as semi-rigid. Their use in a completed cable results in a stiffer cable. Since this is a major change from what has been traditional, the importance of flexibility should be evaluated. In many instances the desire for cable flexibility is a matter of personal judgement and choice. One good guideline, however, is the fact that complaints are extremely rare stating that a cable was too flexible. Perhaps the best basis for evaluating the efficacy of flexibility in a power cable is to review some of the advantages:

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(1) Easier to handle during reeling and unreeling operation — always a good feature to minimize damage and in the long run more economical because special equipment is not required.

(2) Easier to train into position during installation, especially in the tight places. Fits in with one of the fundamental reasons for insulating a cable —TO SAVE SPACE.

(3) Terminating in cabinets, switch boxes and receptacles of limited volume:
When a pipe wrench or similar device is required something has got to give — it might be the shielding system!

(4) Any cable construction that can yield to bending and retain its integrity is conducive to a reliable installation. An unyielding construction would be more difficult to install and hence would tempt the workmen to employ undesirable or dangerous practices or shortcuts.

(5) Easy handling materials are generally preferred by craftsmen required to manually install or subject them to further fabrication.

The above advantages lead to a positive conclusion that flexibility in a cable is not only desirable but contributes to successful service life.

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