Calculating Conduit Capacity

One Cable Type in Conduit

The following information is to provide you with a quick and easy reference for conduit fill requirements. This information is to be used as a general guideline. Each installation has different restrictions for installation environments and/or local codes to follow.

The Conduit Capacity Chart provided on the following page is for applications when only one type of cable is to be used in a conduit. For example, if you know the diameter of the cable you will be installing, use the cable O.D. column, and find the exact or next largest diameter cable O.D.. Next, follow this row over to the number of cables you need to install in a conduit. Then follow this column to the top of the chart and read the conduit size required for the number of cables you need to install.

Multiple Types of Cable in One Conduit

If you will be mixing various cable diameters in a conduit, then this overall chart does not apply. You will have to use the following guidelines to calculate the conduit fill requirements.

To determine the conduit size required for a particular installation of cable follow these steps:

1. Square the O.D. of each cable and total the results.
2. Multiply the total by .7854*. This is the total area of the cables in square inches.
3. From the Permissible Area row on the Conduit Capacity Chart shown on the following page, select the conduit size with an area equal to or greater than the total area you calculated.

* See Important Notes and Installation Suggestions

** Permissible Area to be occupied (sq. in.) is based on the NEC standard of 40% fill, which applies to three or more non-lead covered cable installed in the same conduit.

Important Notes and Installation Suggestions

- A single cable is permitted to occupy 53% and two cables are limited to 31% conduit fill. For a single cable use .5927 in step 2, for two cables use 1.1034, and three or more cables use .7854.
- This chart is based on the maximum number of cable permitted in conduit under the National Electrical Code, and is calculated on the area of the cable with 40% of the conduit filled. For conduit runs of 50 to 100 feet, the installed number should be reduced by 15%, or use the next larger size conduit. If more than two 90 degree bends are to be used in the conduit run, or if the run is to be over 100 feet in length, insert a pull box.
- An anti-friction agent is recommended in pulling operations.

  *CAUTION: Select an anti-friction agent which is suitable for the cable jacket material. The electronic characteristics of unjacketed cable may change due to the application of anti-friction agents.

  * COLD ENVIRONMENT PRECAUTION: Due to the nature of PVC compounds to become non-pliable when stored or handled in ambient temperatures of 32 degrees F or less, we recommend the following:

"Prior to installation, condition the cable for at least 24 hours at room temperature to provide the best flex properties for ease of installation."

- Permissible area chart does not apply to metallic and non-metallic surface raceways; consult the NEC for recommendations.

THE NATIONAL ELECTRICAL CODE FORBIDS THE INSTALLATION OF COMMUNICATION CABLE IN THE SAME CONDUIT AS POWER CABLE.

Pulling Tensions

Under the stress of approximately 15,000 lbs./sq. in. annealed copper will begin to permanently stretch. The table below lists the absolute maximum recommended pulling tensions for conductor sizes. For multiple conductor cable, multiply the appropriate value by the total number of conductors. These pulling tensions must be equally distributed among the conductors.

THESE LIMITS MUST NEVER BE EXCEEDED EVEN MOMENTARILY! DON'T JERK THE CABLE!

The electronic characteristics of a cable may change due to excessive tension and crushing.

Gauge	Max. Pulling Tension
24 AWG	4 lbs.
22 AWG	7 lbs.
20 AWG	12 lbs.
18 AWG	19 lbs.
16 AWG	30 lbs.
14 AWG	48 lbs.
12 AWG	77 lbs.