MISCELLANEOUS PROPERTIES

A.C./D.C. RATIOS

Copper conductors 60 Hertz (65°C)

To determine the effective 60 Hertz a-c resistance, multiply the d-c resistance values corrected for the proper temperature, by the a-c/d-c ratio given in the following table. Note the special conditions below the table.

Conductor Size	Column 1 Standard Conductor	Column 2 All Strandings
Up to 3 AWG	1.000	1.00
2 & 1 AWG	1.000	1.01
1/0 AWG	1.001	1.02
2/0 AWG	1.001	1.03
3/0 AWG	1.002	1.04
4/0 AWG	1.004	1.05
250 KCMIL	1.005	1.06
300 KCMIL	1.006	1.07
350 KCMIL	1.009	1.08
400 KCMIL	1.011	1.10
500 KCMIL	1.018	1.13
600 KCMIL	1.025	1.16
750 KCMIL	1.039	1.21
1000 KCMIL	1.067	-

Use Column 1 for:
1) Single conductor non-metallic sheathed cables — in air or non-metallic conduit.
2) Multi-conductor non-metallic sheathed cables - in air or non-metallic conduit.
NOTE: Column 1 includes skin effect only. For close spacing such as multi-conductor cables or several cables in the same conduit, there will be an additional apparent resistance due to proximity loss.
Use Column 2 for:
1) Multi-conductor non-metallic sheathed cables in metal conduit.
2) Two or more single-conductor non-metallic sheathed cables in same metal conduit.

Charging Current:

The charging current I of a single conductor insulated power cable can be obtained from formula 1:

Formula 1:

$I = 2 \pi f C e \times 10^{-3}$ milliamperes per 1000 foot

Where:

C = Capacitance, picofarads per foot
e = Voltage, conductor to neutral, kilovolts
f = Frequency, Hz

Formula 2:

KVA = I x e x 10^{-3} kilovolt-amperes per 1000 foot

To determine the required KVA of an A-C Test Set use formulas 1 & 2, where e = the test voltage in kilovolts.

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Capacitance:

The capacitance of a single conductor shielded cable is represented by the formula:

C = 7.35 (SIC) / (log (D/d))

Where:

C = capacitance of cable in picofarads per foot
SIC = dielectric constant of the insulation
D = diameter over the insulation
d = diameter under insulation

Typical Values of SIC:

Polyvinyl Chloride (PVC)	5.0 - 8.0
Ethylene-Propylene Rubber Insulation (EPR)	3.0
Polyethylene Insulation (PE)	2.5
Cross Linked Polyethylene (XLP)	2.3

Power Factor:

Typical Power Factor (%) Of:
1/0 AWG 1/C XLP and EPR 15KV 100% Tape Shielded Cable
XLP: less than 0.1%
EPR: less than 0.5%

Insulation Resistance:

The insulation resistance (IR) of a cable can be estimated by the formula:

IR = K log (D/d)

Where:

K = specific insulation resistance in megohms- 1000 feet at 60°F
D = diameter over the insulation
d = diameter under insulation
IR = insulation resistance in megohms - 1000 feet for the particular cable construction. IR is inversely proportional to the cable length so that a 500 foot length will have twice the IR of 1000 feet and similarly 2000 feet will have one half the IR of 1000 feet.

Typical Values of K:

Ethylene Propylene Rubber Insulation (EPR)	50,000
Polyvinyl Chloride (PVC)	2,000
Cross Linked Polyethylene (XLP)	100,000