

TECHNICAL INFORMATION FOR MEDIUM VOLTAGE POWER CABLES UP TO 33 kv.



BRB
Cables



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SUSTAINED CURRENT RATING

The current Rating given in various tables are based on the following assumptions:

- 1) Maximum Conductor temperature for continuous operation = 90° C
- 2) Ground Temperature = 20° C
- 3) Thermal Resistivity of Soil = 100° C.cm/W
- 4) Ambient Air Temperature = 30° C
- 5) Depth of Laying (to the highest point of cables laid direct in ground):
 - a) Upto 6 / 10 kV grade = 900 mm
 - b) For 8.7 / 15 kV & above = 1050 mm
- 6) Type of Installation :
 - a) 3 Core cables : Installed singly
 - b) Single core cables : Three cables in Trefoil touching formation
- 7) Type of Bonding : Solid bonded.

CORRECTION FACTORS

(1) Cables laid direct in Ground:

(a) Correction factors for variation in Ground Temperature :

Table : A

| | | | | | | | |
|-------------------------|------|------|------|------|------|------|------|
| Ground Temperature (°C) | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| Rating Factor | 1.04 | 1.00 | 0.96 | 0.93 | 0.89 | 0.85 | 0.81 |

(b) Correction factors for variation in Thermal Resistivity of Soil :

Table : B

| | | | | | | |
|---------------------------------------|------|------|------|------|------|------|
| Thermal Resistivity of Soil (°C.cm/W) | 100 | 120 | 150 | 200 | 250 | 300 |
| Rating Factor | 1.00 | 0.94 | 0.84 | 0.75 | 0.68 | 0.62 |

(c) Correction factors for various depth of Laying:

Table : C

| Depth of Laying (cm) | Upto 6 / 10 Kv | 8.7 / 15 kV & above |
|----------------------|----------------|---------------------|
| 90 | 1.00 | - |
| 105 | 0.99 | 1.00 |
| 120 | 0.98 | 0.99 |
| 150 | 0.96 | 0.97 |
| 180 and above | 0.95 | 0.96 |

(d) Group Rating Factors

Table : D

| Number of Cables/ circuits. in group | Multicore cables in horizontal formation | | | Multicore cables in trefoil touching formation | | | Single core cables in trefoil touching formation | | |
|--------------------------------------|--|---------|-----------|--|-----------|-----------|--|-----------|-----------|
| | Touching | s=15 cm | s = 30 cm | Touching | s = 15 cm | s = 30 cm | Touching | s = 15 cm | s = 30 cm |
| 2 | 0.79 | 0.82 | 0.86 | - | - | - | 0.78 | 0.82 | 0.85 |
| 3 | 0.69 | 0.72 | 0.76 | - | - | - | 0.68 | 0.71 | 0.76 |
| 4 | 0.62 | 0.66 | 0.72 | 0.60 | 0.64 | 0.69 | 0.61 | 0.65 | 0.71 |
| 6 | 0.54 | 0.59 | 0.65 | 0.51 | 0.55 | 0.60 | 0.53 | 0.57 | 0.64 |

(2) Cables laid on racks in air

(a) Rating factors for variation in ambient air temperature

Table : E

| Ambient Air temperature (°C) | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|------------------------------|------|------|------|------|------|------|------|
| Rating Factor | 1.07 | 1.04 | 1.00 | 0.96 | 0.91 | 0.86 | 0.83 |

(b) Group Rating factors

Table : F

| Number of Cables/ circuits. in group | Multicore cables (touching) | | | | Multicore cables in (Spacing between cables equal diameter of cable) | | | | Single core cables in trefoil touching formation (Spacing between circuits equal to twice the diameter of cable) | | | |
|--------------------------------------|-----------------------------|------|------|------|--|------|------|------|--|------|------|------|
| | Number of racks | | | | Number of racks | | | | Number of racks | | | |
| | 1 | 2 | 3 | 6 | 1 | 2 | 3 | 6 | 1 | 2 | 3 | 6 |
| 1 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2 | 0.84 | 0.80 | 0.78 | 0.76 | 0.98 | 0.95 | 0.94 | 0.93 | 0.98 | 0.95 | 0.94 | 0.93 |
| 3 | 0.80 | 0.76 | 0.74 | 0.72 | 0.96 | 0.93 | 0.92 | 0.90 | 0.96 | 0.93 | 0.92 | 0.90 |
| 6 | 0.76 | 0.71 | 0.70 | 0.68 | 0.93 | 0.90 | 0.89 | 0.87 | - | - | - | - |

MAXIMUM SHORT CIRCUIT CURRENT RATING OF CONDUCTOR

Maximum Conductor temperature under normal operation = 90° C

Maximum Conductor temperature during short circuit = 250° C

| | | | | | | |
|--|-----|-----|-----|-----|-----|-----|
| Cond. Temperature at the beginning of Short Ckt (°C) | 90 | 80 | 70 | 65 | 60 | 50 |
| Short circuit current (A/mm ²) | 143 | 149 | 154 | 157 | 159 | 165 |

The Short circuit current for any duration (upto 5 sec) can be obtained from the following formula.

$$I_{sc} = \frac{KA}{\sqrt{t}}$$

Where, I_{sc} = short circuit current, kA.

t = duration of Short circuit (Sec.)

A = Area of Conductor

K = Constant, Cu/PVC = 0.115

Cu/XLPE = 0.143

Al/PVC = 0.076

Al/XLPE = 0.094



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VOLTAGE DROP PER CORE / PER AMP. / PER KM:

| Conductor Area | 3.6/6(7.2) kV | | 6/10(12)kV | | 8.7/15(17.5)kV | | 12/20(24) kV | | 18/30(36) kV | |
|----------------|---------------|----------|-------------|----------|----------------|----------|--------------|----------|--------------|----------|
| | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured |
| No.xSqmm | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A |
| 1x25 | 0.948 | 0.950 | 0.949 | 0.951 | 0.950 | 0.952 | - | - | - | - |
| 1x35 | 0.688 | 0.691 | 0.689 | 0.692 | 0.691 | 0.694 | 0.692 | 0.695 | - | - |
| 1x50 | 0.514 | 0.517 | 0.515 | 0.519 | 0.516 | 0.520 | 0.518 | 0.521 | 0.521 | 0.525 |
| 1x70 | 0.364 | 0.369 | 0.366 | 0.370 | 0.367 | 0.372 | 0.369 | 0.374 | 0.373 | 0.378 |
| 1x95 | 0.271 | 0.277 | 0.273 | 0.279 | 0.276 | 0.282 | 0.278 | 0.284 | 0.283 | 0.288 |
| 1x120 | 0.223 | 0.229 | 0.225 | 0.231 | 0.228 | 0.234 | 0.230 | 0.236 | 0.236 | 0.241 |
| 1x150 | 0.189 | 0.196 | 0.191 | 0.199 | 0.195 | 0.202 | 0.197 | 0.204 | 0.203 | 0.210 |
| 1x185 | 0.161 | 0.169 | 0.163 | 0.172 | 0.166 | 0.174 | 0.169 | 0.176 | 0.175 | 0.184 |
| 1x240 | 0.135 | 0.144 | 0.138 | 0.147 | 0.141 | 0.150 | 0.144 | 0.152 | 0.151 | 0.159 |
| 1x300 | 0.121 | 0.129 | 0.122 | 0.131 | 0.125 | 0.134 | 0.128 | 0.138 | 0.135 | 0.144 |
| 1x400 | 0.108 | 0.117 | 0.109 | 0.118 | 0.113 | 0.123 | 0.116 | 0.125 | 0.123 | 0.131 |
| 1x500 | 0.100 | 0.111 | 0.101 | 0.111 | 0.104 | 0.114 | 0.107 | 0.116 | 0.113 | 0.122 |
| 1x630 | 0.093 | 0.103 | 0.094 | 0.103 | 0.097 | 0.106 | 0.099 | 0.108 | 0.106 | 0.114 |
| 1x800 | 0.088 | 0.098 | 0.089 | 0.098 | 0.092 | 0.101 | 0.094 | 0.103 | 0.101 | 0.109 |
| 1x1000 | 0.085 | 0.094 | 0.085 | 0.095 | 0.088 | 0.097 | 0.090 | 0.099 | 0.096 | 0.104 |

| Conductor Area | 3.6/6(7.2) kV | | 6/10(12)kV | | 8.7/15(17.5)kV | | 12/20(24) kV | | 18/30(36) kV | |
|----------------|---------------|----------|-------------|----------|----------------|----------|--------------|----------|--------------|----------|
| | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured | Un-Armoured | Armoured |
| No.xSqmm | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A | V/core/A |
| 3x25 | 0.946 | 0.946 | 0.947 | 0.947 | 0.948 | 0.948 | - | - | - | - |
| 3x35 | 0.686 | 0.686 | 0.687 | 0.687 | 0.688 | 0.688 | 0.690 | 0.690 | - | - |
| 3x50 | 0.511 | 0.511 | 0.512 | 0.512 | 0.514 | 0.514 | 0.515 | 0.515 | 0.519 | 0.519 |
| 3x70 | 0.360 | 0.360 | 0.362 | 0.362 | 0.364 | 0.364 | 0.366 | 0.366 | 0.370 | 0.370 |
| 3x95 | 0.267 | 0.267 | 0.269 | 0.269 | 0.272 | 0.272 | 0.274 | 0.274 | 0.279 | 0.279 |
| 3x120 | 0.218 | 0.218 | 0.221 | 0.221 | 0.223 | 0.223 | 0.225 | 0.225 | 0.231 | 0.231 |
| 3x150 | 0.184 | 0.184 | 0.186 | 0.186 | 0.189 | 0.189 | 0.192 | 0.192 | 0.198 | 0.198 |
| 3x185 | 0.155 | 0.155 | 0.158 | 0.158 | 0.161 | 0.161 | 0.164 | 0.164 | 0.170 | 0.170 |
| 3x240 | 0.130 | 0.130 | 0.132 | 0.132 | 0.135 | 0.135 | 0.138 | 0.138 | 0.145 | 0.145 |
| 3x300 | 0.114 | 0.114 | 0.116 | 0.116 | 0.119 | 0.119 | 0.122 | 0.122 | 0.129 | 0.129 |



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