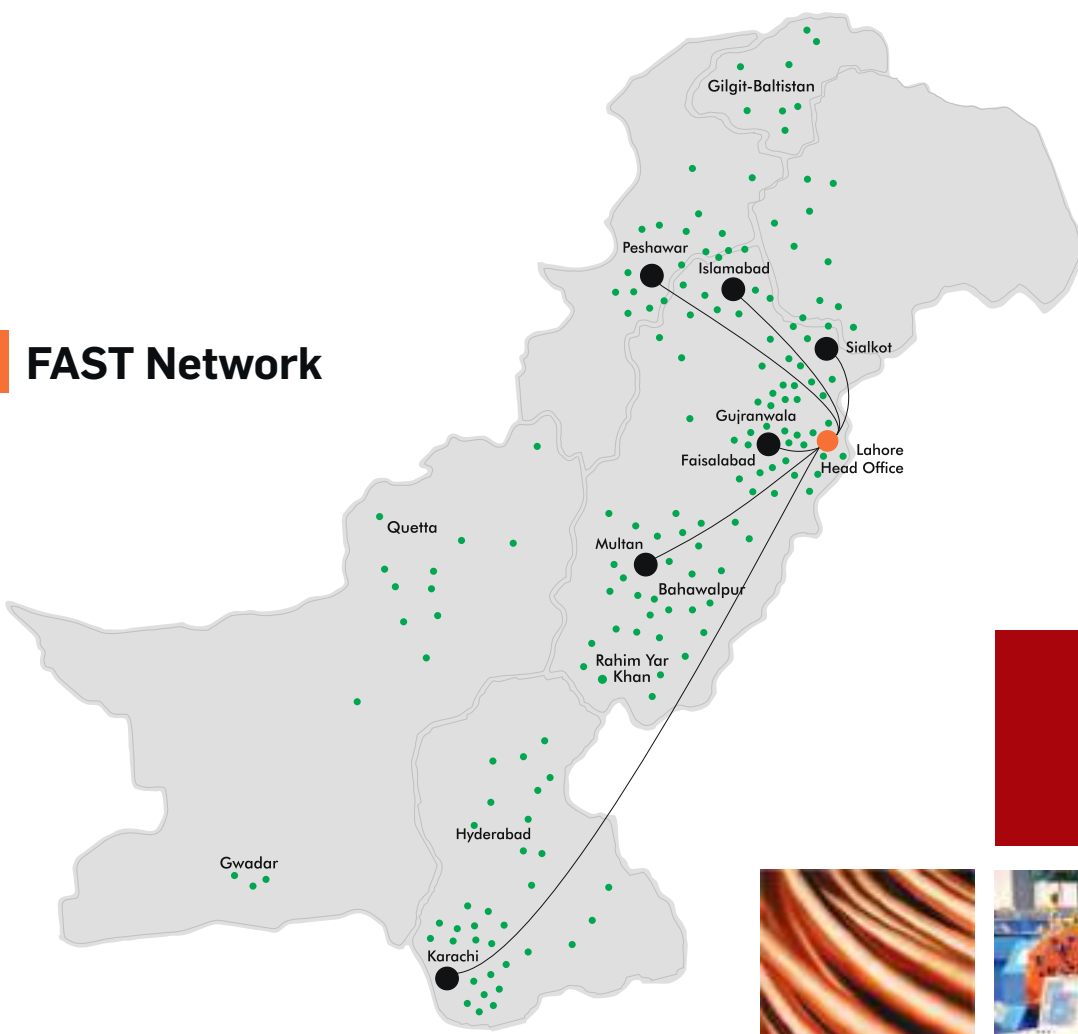
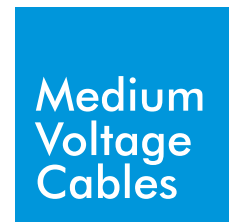


# PRODUCT CATALOG

## FAST Network



Conductors



Medium Voltage Cables



CABLES



Medium Voltage Cables  
Conductors



UAN: 111-000-343  
www.fast-cables.com

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MRK/PM/PCM/25/01





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FAST's journey began nearly four decades ago with a mission to promote industrialization in Pakistan and contribute towards the socio-economic uplift of fellow citizens. We started by manufacturing electrical cables and conductors under the Fast Cables brand, which has since become a trusted household name, endorsed for its "REAL Quality" and reliability. The trust and confidence placed in our brand by architects, engineers, and end users have been instrumental in our expansion into new business verticals such as Metals, PVC, and LED Lights.

Today, we are recognized as the leading and most innovative manufacturer of electric cables and conductors serving a diverse range of industries, commercial enterprises, and consumer needs. The growing demand for our products has led to the integration of Metal and PVC plants within our existing production facility, thus enhancing our production capacity to meet additional customer requirements. Further, our commitment to promoting "Made in Pakistan" products has inspired us to enter the LED lighting market. Following extensive research and development, we have launched Fast Lights, designed to add a sparkle into our valued customers' lives.

At FAST, our customers are the forefront of all our operations. We are committed to achieving 'Customer Delight' by delivering superior quality products alongside efficient pre-sales and post-sales services. Driven by a passion for excellence, our dedication to providing premium products will remain our guiding principle as we look to the future.

# About Us

## Vision

Empower communities for sustainable development.

## Mission



To be the market leader by delivering excellence through innovation and capacity building of all stakeholders.

## Values

F

FOCUSED ON CUSTOMERS

A

AUTHENTIC

S

SUSTAINABLE

T

TEAMWORK



# Certifications

# Quality



BASEC



UL



KEMA Gold



VEIKI-VNL



TUV Austria



CE



PNAC



ISO



PSQCA

We deliver products designed and manufactured to the highest international standards. The quality of our cables is ensured by stringent monitoring at every phase of production, from the procurement of raw materials to in-process testing and 100% testing of the finished products before delivery. This allows us to ensure that all cables manufactured at our plants are fully compliant with the national and international standards.

Our manufacturing plants are equipped with the latest laboratory testing facilities and employ highly experienced technical staff. The laboratory equipment goes through periodic third party inspection and calibration by regulatory bodies. We offer our customers free 'testing and inspection before delivery' facility at our testing laboratory. Such a facility allows them to comply with their internal SOP's without incurring any additional cost.



Certification status of each product can be verified through its corresponding certificate.

FAST CABLES



# MEDIUM VOLTAGE CABLES

## MEDIUM VOLTAGE CABLES

### SINGLE CORE CABLE

|                                                 |    |  |
|-------------------------------------------------|----|--|
| Unarmoured, XLPE                                |    |  |
| Standard IEC 60502-2                            |    |  |
| ■ Cu or Al - XLPE - Cu - PVC or PE              | 08 |  |
| ■ Cu or Al - XLPE - Cu - PO                     | 13 |  |
| Flame retardant, Halogen free                   |    |  |
| ■ Cu or Al - XLPE - Cu - PE                     | 15 |  |
| Total Watertight                                |    |  |
| Armoured, XLPE                                  |    |  |
| Standard IEC 60502-2                            |    |  |
| ■ Cu or Al - XLPE - Cu - ATA or AWA - PVC or PE | 17 |  |

### THREE CORE CABLE

|                                                 |    |  |
|-------------------------------------------------|----|--|
| Unarmoured, XLPE                                |    |  |
| Standard IEC 60502-2                            |    |  |
| ■ Cu or Al - XLPE - Cu - PVC or PE              | 22 |  |
| Armoured, XLPE                                  |    |  |
| Standard IEC 60502-2                            |    |  |
| ■ Cu or Al - XLPE - Cu - STA or SWA - PVC or PE | 27 |  |

### THREE CORE BUNDLE CABLE

|                                    |    |  |
|------------------------------------|----|--|
| XLPE, Without Messenger            |    |  |
| Standard IEC 60502-2               |    |  |
| ■ Cu or Al - XLPE - Cu - PVC or PE | 32 |  |
| XLPE, With Messenger               |    |  |
| Standard IEC 60502-2               |    |  |
| ■ Al - XLPE - Cu - PVC or PE       | 34 |  |





APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV. Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.

CABLE DESIGNATION

- A: Cu / XLPE / Cu Tape screen / PVC or PE
- B: Cu / XLPE / Cu Wire screen / PVC or PE
- C: Al / XLPE / Cu Tape screen / PVC or PE
- D: Al / XLPE / Cu Wire screen / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi conductive screen over the insulation (strippable)<sup>1</sup>, applied by simultaneous extrusion in just one operation.

Metallic Screen

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.

Poly Propylene tape is applied over the screen.

Or Copper tape screen – a copper tape, helically applied with overlap.

Oversheath

Extruded PVC or PE.



MEDIUM VOLTAGE CABLES

Cu or Al - XLPE - Cu - PVC or PE  
Single Core Cable  
Unarmoured - XLPE Insulation - IEC 60502-2

MEDIUM VOLTAGE CABLES

Cu or Al - XLPE - Cu - PVC or PE  
Single Core Cable  
Unarmoured - XLPE Insulation - IEC 60502-2

GENERAL CHARACTERISTICS

|                                                     |                                                                                                                   |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Construction and test standards                     | IEC 60228 · IEC 60502-2                                                                                           |
| Rated voltage U <sub>0</sub> / U(Um)                | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV · 12/20 (24) kV · 18/30 (36) kV                                  |
| Standard cross-section of wire screen (mm²)         | 16 · 25 · 35                                                                                                      |
| Test voltage                                        | 3.5 x U <sub>0</sub>                                                                                              |
| Conductor maximum operating temperature             | 90°C                                                                                                              |
| Maximum short-circuit temperature                   | 250°C (t ≤ 5s)                                                                                                    |
| Minimum bending radius – during installation (mm)   | 25 x d                                                                                                            |
| Minimum bending radius – after installation (mm)    | 20 x d                                                                                                            |
| Maximum pulling force over conductor (N)            | Copper – 50 x S   · Aluminium – 30 x S                                                                            |
| Flame retardant (for PVC oversheath)                | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm)                         |
| Fire retardant (for PVC oversheath. upon agreement) | IEC 60332-3-24 · EN 60332-3-24 (bunch of cables vertically mounted on a ladder, length of charred cable ≤ 2.5 cm) |

S – conductor cross-section (mm)   · d – cable outer diameter (mm)

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS    Copper conductor constructions

| Voltage                 |         | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |            | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|-------------------------|---------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|------------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U (kV) | Um (kV) |                         |                          |                        |                      | In air (A)                | Buried (A) |                                        |                                            |                            |            |             |
| Copper conductor        |         |                         |                          |                        |                      |                           |            |                                        |                                            |                            |            |             |
| 3.6/6                   | 7.2     | 25                      | 13.8                     | 20.0                   | 655                  | 157                       | 144        | 3.6                                    | 2.0                                        | 0.7270                     | 0.41       | 0.27        |
|                         |         | 35                      | 14.8                     | 21.0                   | 770                  | 190                       | 171        | 5.0                                    | 2.9                                        | 0.5240                     | 0.39       | 0.30        |
|                         |         | 50                      | 16.0                     | 22.5                   | 905                  | 229                       | 202        | 7.1                                    | 4.1                                        | 0.3870                     | 0.37       | 0.33        |
|                         |         | 70                      | 17.6                     | 24.0                   | 1120                 | 286                       | 246        | 10.0                                   | 5.8                                        | 0.2680                     | 0.35       | 0.38        |
|                         |         | 95                      | 19.4                     | 26.0                   | 1400                 | 350                       | 293        | 13.6                                   | 7.8                                        | 0.1930                     | 0.33       | 0.43        |
|                         |         | 120                     | 20.8                     | 28.0                   | 1675                 | 406                       | 332        | 17.2                                   | 9.9                                        | 0.1530                     | 0.32       | 0.48        |
|                         |         | 150                     | 22.3                     | 29.0                   | 1930                 | 461                       | 372        | 21.4                                   | 12.3                                       | 0.1240                     | 0.31       | 0.51        |
|                         |         | 185                     | 23.8                     | 30.5                   | 2305                 | 526                       | 418        | 26.5                                   | 15.3                                       | 0.0991                     | 0.30       | 0.54        |
|                         |         | 240                     | 26.6                     | 33.5                   | 2885                 | 630                       | 483        | 34.3                                   | 19.8                                       | 0.0754                     | 0.29       | 0.60        |
|                         |         | 300                     | 28.6                     | 37.0                   | 3555                 | 731                       | 541        | 42.9                                   | 24.8                                       | 0.0601                     | 0.28       | 0.63        |
|                         |         | 400                     | 32.6                     | 40.5                   | 4505                 | 851                       | 608        | 57.2                                   | 33.0                                       | 0.0470                     | 0.28       | 0.66        |
|                         |         | 500                     | 36.0                     | 44.0                   | 5480                 | 956                       | 675        | 71.5                                   | 41.2                                       | 0.0366                     | 0.27       | 0.69        |
|                         |         | 630                     | 40.0                     | 47.5                   | 7110                 | 1095                      | 753        | 90.1                                   | 52.0                                       | 0.0283                     | 0.27       | 0.76        |
| 6/10                    | 12      | 25                      | 15.6                     | 22.0                   | 730                  | 170                       | 155        | 3.6                                    | 2.0                                        | 0.7270                     | 0.47       | 0.23        |
|                         |         | 35                      | 16.6                     | 23.0                   | 835                  | 205                       | 180        | 5.0                                    | 2.9                                        | 0.5240                     | 0.44       | 0.25        |
|                         |         | 50                      | 17.8                     | 24.5                   | 985                  | 245                       | 215        | 7.1                                    | 4.1                                        | 0.3870                     | 0.42       | 0.28        |
|                         |         | 70                      | 19.4                     | 26.0                   | 1210                 | 310                       | 260        | 10.0                                   | 5.8                                        | 0.2680                     | 0.39       | 0.31        |
|                         |         | 95                      | 21.2                     | 28.0                   | 1500                 | 375                       | 315        | 13.6                                   | 7.8                                        | 0.1930                     | 0.38       | 0.35        |
|                         |         | 120                     | 22.6                     | 30.0                   | 1760                 | 435                       | 355        | 17.2                                   | 9.9                                        | 0.1530                     | 0.36       | 0.38        |
|                         |         | 150                     | 24.1                     | 31.0                   | 2040                 | 495                       | 395        | 21.4                                   | 12.3                                       | 0.1240                     | 0.35       | 0.41        |

| Voltage                 |         | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |            | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|-------------------------|---------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|------------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U (kV) | Um (kV) |                         |                          |                        |                      | In air (A)                | Buried (A) |                                        |                                            |                            |            |             |
| Copper conductor        |         |                         |                          |                        |                      |                           |            |                                        |                                            |                            |            |             |
| 6/10                    | 12      | 185                     | 25.8                     | 32.5                   | 2405                 | 570                       | 450        | 26.5                                   | 15.3                                       | 0.0991                     | 0.34       | 0.45        |
|                         |         | 240                     | 28.2                     | 35.5                   | 2990                 | 670                       | 520        | 34.3                                   | 19.8                                       | 0.0754                     | 0.33       | 0.50        |
|                         |         | 300                     | 30.4                     | 38.0                   | 3640                 | 770                       | 580        | 42.9                                   | 24.8                                       | 0.0601                     | 0.32       | 0.54        |
|                         |         | 400                     | 33.4                     | 41.5                   | 4580                 | 890                       | 650        | 57.2                                   | 33.0                                       | 0.0470                     | 0.31       | 0.60        |
|                         |         | 500                     | 36.4                     | 44.5                   | 5530                 | 1020                      | 740        | 71.5                                   | 41.2                                       | 0.0366                     | 0.30       | 0.66        |
|                         |         | 630                     | 40.5                     | 48.0                   | 7140                 | 1190                      | 830        | 90.1                                   | 52.0                                       | 0.0283                     | 0.26       | 0.78        |
| 8.7/15                  | 17.5    | 25                      | 17.8                     | 24.5                   | 820                  | 170                       | 155        | 3.6                                    | 2.0                                        | 0.7270                     | 0.47       | 0.18        |
|                         |         | 35                      | 18.8                     | 25.5                   | 930                  | 205                       | 180        | 5.0                                    | 2.9                                        | 0.5240                     | 0.44       | 0.20        |
|                         |         | 50                      | 20.0                     | 26.5                   | 1075                 | 245                       | 215        | 7.1                                    | 4.1                                        | 0.3870                     | 0.42       | 0.22        |
|                         |         | 70                      | 21.6                     | 28.5                   | 1320                 | 310                       | 260        | 10.0                                   | 5.8                                        | 0.2680                     | 0.39       | 0.25        |
|                         |         | 95                      | 23.4                     | 30.5                   | 1595                 | 375                       | 315        | 13.6                                   | 7.8                                        | 0.1930                     | 0.38       | 0.27        |
|                         |         | 120                     | 24.8                     | 32.0                   | 1880                 | 435                       | 355        | 17.2                                   | 9.9                                        | 0.1530                     | 0.36       | 0.30        |
|                         |         | 150                     | 26.3                     | 33.5                   | 2145                 | 495                       | 395        | 21.4                                   | 12.3                                       | 0.1240                     | 0.35       | 0.32        |
|                         |         | 185                     | 28.0                     | 35.0                   | 2535                 | 570                       | 450        | 26.5                                   | 15.3                                       | 0.0991                     | 0.34       | 0.34        |
|                         |         | 240                     | 30.4                     | 37.5                   | 3130                 | 670                       | 520        | 34.3                                   | 19.8                                       | 0.0754                     | 0.33       | 0.38        |
|                         |         | 300                     | 32.6                     | 40.5                   | 3775                 | 770                       | 580        | 42.9                                   | 24.8                                       | 0.0601                     | 0.32       | 0.42        |
|                         |         | 400                     | 35.6                     | 43.5                   | 4720                 | 890                       | 650        | 57.2                                   | 33.0                                       | 0.0470                     | 0.31       | 0.43        |
|                         |         | 500                     | 38.6                     | 47.0                   | 5685                 | 1020                      | 740        | 71.5                                   | 41.2                                       | 0.0366                     | 0.30       | 0.47        |
|                         |         | 630                     | 42.6                     | 50.5                   | 7315                 | 1190                      | 830        | 90.1                                   | 52.0                                       | 0.0283                     | 0.28       | 0.52        |
| 12/20                   | 24      | 35                      | 21.2                     | 27.5                   | 1025                 | 198                       | 183        | 5.0                                    | 2.9                                        | 0.5240                     | 0.46       | 0.16        |
|                         |         | 50                      | 22.4                     | 29.0                   | 1170                 | 238                       | 216        | 7.1                                    | 4.1                                        | 0.3870                     | 0.44       | 0.18        |
|                         |         | 70                      | 24.0                     | 31.0                   | 1425                 | 296                       | 263        | 10.0                                   | 5.8                                        | 0.2680                     | 0.42       | 0.20        |
|                         |         | 95                      | 25.8                     | 32.5                   | 1705                 | 361                       | 314        | 13.6                                   | 7.8                                        | 0.1930                     | 0.41       | 0.21        |
|                         |         | 120                     | 27.2                     | 34.5                   | 2000                 | 417                       | 355        | 17.2                                   | 9.9                                        | 0.1530                     | 0.40       | 0.23        |
|                         |         | 150                     | 28.7                     | 35.5                   | 2270                 | 473                       | 398        | 21.4                                   | 12.3                                       | 0.1240                     | 0.39       | 0.25        |
|                         |         | 185                     | 30.4                     | 37.0                   | 2660                 | 543                       | 448        | 26.5                                   | 15.3                                       | 0.0991                     | 0.37       | 0.27        |
|                         |         | 240                     | 32.8                     | 39.5                   | 3250                 | 641                       | 517        | 34.3                                   | 19.8                                       | 0.0754                     | 0.36       | 0.30        |
|                         |         | 300                     | 35.0                     | 42.5                   | 3920                 | 735                       | 581        | 42.7                                   | 24.8                                       | 0.0601                     | 0.35       | 0.33        |
|                         |         | 400                     | 38.0                     | 45.5                   | 4880                 | 845                       | 658        | 57.2                                   | 33.0                                       | 0.0470                     | 0.33       | 0.37        |
|                         |         | 500                     | 41.0                     | 49.0                   | 5855                 | 956                       | 740        | 71.5                                   | 41.2                                       | 0.0366                     | 0.32       | 0.40        |
|                         |         | 630                     | 45.0                     | 52.5                   | 7510                 | 1095                      | 829        | 90.1                                   | 52.0                                       | 0.0283                     | 0.31       | 0.45        |
| 18/30                   | 36      | 50                      | 27.8                     | 34.5                   | 1630                 | 248                       | 232        | 7.1                                    | 4.1                                        | 0.3870                     | 0.48       | 0.14        |
|                         |         | 70                      | 29.4                     | 36.0                   | 1900                 | 307                       | 284        | 10.0                                   | 5.8                                        | 0.2680                     | 0.46       | 0.16        |
|                         |         | 95                      | 31.2                     | 38.0                   | 2250                 | 373                       | 339        | 13.6                                   | 7.8                                        | 0.1930                     | 0.44       | 0.17        |
|                         |         | 120                     | 32.6                     | 39.5                   | 2540                 | 429                       | 385        | 17.2                                   | 9.9                                        | 0.1530                     | 0.43       | 0.18        |
|                         |         | 150                     | 34.1                     | 41.0                   | 2970                 | 484                       | 430        | 21.4                                   | 12.3                                       | 0.1240                     | 0.41       | 0.19        |
|                         |         | 185                     | 35.8                     | 42.0                   | 3410                 | 552                       | 484        | 26.5                                   | 15.3                                       | 0.0991                     | 0.40       | 0.21        |
|                         |         | 240                     | 38.2                     | 45.0                   | 4040                 | 649                       | 559        | 34.3                                   | 19.8                                       | 0.0754                     | 0.38       | 0.23        |
|                         |         | 300                     | 40.4                     | 48.0                   | 4730                 | 737                       | 627        | 42.9                                   | 24.8                                       | 0.0601                     | 0.37       | 0.25        |
|                         |         | 400                     | 43.4                     | 51.0                   | 5740                 | 861                       | 701        | 57.2                                   | 33.0                                       | 0.0470                     | 0.36       | 0.27        |
|                         |         | 500                     | 46.4                     | 54.5                   | 6850                 | 993                       | 786        | 71.5                                   | 41.2                                       | 0.0366                     | 0.35       | 0.30        |
|                         |         | 630                     | 50.4                     | 58.0                   | 8350                 | 1139                      | 875        | 90.1                                   | 52.0                                       | 0.0283                     | 0.33       | 0.33        |

ALUMINIUM CONDUCTOR CONSTRUCTIONS

| Voltage             |      | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |        | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|---------------------|------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|--------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>o</sub> / U  | Um   |                         |                          |                        |                      | In air                    | Buried |                                        |                                            |                            |            |             |
| (kV)                | (kV) | (mm <sup>2</sup> )      | (mm)                     | (mm)                   | (kg/km)              | (A)                       | (A)    | (kA)                                   | (kA)                                       | (Ω/km)                     | (mH/km)    | (μF/km)     |
| Aluminium conductor |      |                         |                          |                        |                      |                           |        |                                        |                                            |                            |            |             |
| 3.6/6               | 7.2  | 25                      | 13.8                     | 20.0                   | 505                  | 121                       | 111    | 2.3                                    | 1.3                                        | 1.2000                     | 0.41       | 0.27        |
|                     |      | 35                      | 14.8                     | 21.0                   | 560                  | 147                       | 132    | 3.2                                    | 1.9                                        | 0.8680                     | 0.39       | 0.30        |
|                     |      | 50                      | 16.0                     | 22.0                   | 615                  | 176                       | 156    | 4.7                                    | 2.7                                        | 0.6410                     | 0.37       | 0.33        |
|                     |      | 70                      | 17.6                     | 24.0                   | 705                  | 221                       | 191    | 6.5                                    | 3.8                                        | 0.4430                     | 0.35       | 0.38        |
|                     |      | 95                      | 19.4                     | 25.5                   | 830                  | 270                       | 227    | 8.9                                    | 5.1                                        | 0.3200                     | 0.33       | 0.42        |
|                     |      | 120                     | 20.8                     | 27.5                   | 950                  | 315                       | 260    | 11.2                                   | 6.5                                        | 0.2530                     | 0.32       | 0.47        |
|                     |      | 150                     | 22.3                     | 29.0                   | 1055                 | 357                       | 290    | 14.1                                   | 8.1                                        | 0.2060                     | 0.31       | 0.51        |
|                     |      | 185                     | 23.8                     | 30.5                   | 1205                 | 411                       | 326    | 17.4                                   | 10                                         | 0.1640                     | 0.30       | 0.55        |
|                     |      | 240                     | 26.6                     | 33.5                   | 1425                 | 489                       | 378    | 22.5                                   | 13                                         | 0.1250                     | 0.29       | 0.60        |
|                     |      | 300                     | 28.6                     | 37.0                   | 1695                 | 571                       | 426    | 28.1                                   | 16.3                                       | 0.1000                     | 0.28       | 0.63        |
|                     |      | 400                     | 32.6                     | 40.0                   | 2055                 | 670                       | 484    | 37.6                                   | 21.8                                       | 0.0778                     | 0.28       | 0.66        |
|                     |      | 500                     | 36.0                     | 43.5                   | 2450                 | 782                       | 544    | 47.0                                   | 27.2                                       | 0.0605                     | 0.27       | 0.69        |
|                     |      | 630                     | 40.0                     | 49.0                   | 3040                 | 925                       | 617    | 59.2                                   | 34.3                                       | 0.0469                     | 0.26       | 0.79        |
| 6/10                | 12   | 25                      | 15.6                     | 22.0                   | 575                  | 130                       | 115    | 2.3                                    | 1.3                                        | 1.2000                     | 0.47       | 0.23        |
|                     |      | 35                      | 16.6                     | 23.0                   | 630                  | 155                       | 140    | 3.2                                    | 1.8                                        | 0.8680                     | 0.44       | 0.25        |
|                     |      | 50                      | 17.8                     | 24.5                   | 700                  | 185                       | 165    | 4.7                                    | 2.7                                        | 0.6410                     | 0.42       | 0.28        |
|                     |      | 70                      | 19.4                     | 26.0                   | 795                  | 235                       | 200    | 6.5                                    | 3.8                                        | 0.4430                     | 0.39       | 0.31        |
|                     |      | 95                      | 21.2                     | 28.0                   | 925                  | 285                       | 240    | 8.9                                    | 5.1                                        | 0.3200                     | 0.38       | 0.33        |
|                     |      | 120                     | 22.6                     | 29.5                   | 1040                 | 330                       | 275    | 11.2                                   | 6.5                                        | 0.2530                     | 0.36       | 0.38        |
|                     |      | 150                     | 24.1                     | 31.0                   | 1165                 | 375                       | 305    | 14.1                                   | 8.1                                        | 0.2060                     | 0.35       | 0.41        |
|                     |      | 185                     | 25.8                     | 32.5                   | 1305                 | 430                       | 345    | 17.4                                   | 10                                         | 0.1640                     | 0.34       | 0.45        |
|                     |      | 240                     | 28.2                     | 35.0                   | 1525                 | 510                       | 400    | 22.5                                   | 13                                         | 0.1250                     | 0.33       | 0.50        |
|                     |      | 300                     | 30.4                     | 38.0                   | 1785                 | 585                       | 450    | 28.1                                   | 16.3                                       | 0.1000                     | 0.32       | 0.54        |
|                     |      | 400                     | 33.4                     | 41.0                   | 2125                 | 710                       | 520    | 37.6                                   | 21.8                                       | 0.0778                     | 0.31       | 0.60        |
|                     |      | 500                     | 36.4                     | 44.5                   | 2500                 | 810                       | 590    | 47.0                                   | 27.2                                       | 0.0605                     | 0.30       | 0.66        |
|                     |      | 630                     | 40.5                     | 49.0                   | 3070                 | 960                       | 670    | 59.2                                   | 34.3                                       | 0.0469                     | 0.28       | 0.78        |
| 8.7/15              | 17.5 | 25                      | 17.8                     | 24.5                   | 665                  | 130                       | 115    | 2.3                                    | 1.3                                        | 1.2000                     | 0.47       | 0.18        |
|                     |      | 35                      | 18.8                     | 25.5                   | 720                  | 155                       | 140    | 3.2                                    | 1.9                                        | 0.8680                     | 0.44       | 0.20        |
|                     |      | 50                      | 20.0                     | 26.5                   | 785                  | 185                       | 165    | 4.7                                    | 2.7                                        | 0.6410                     | 0.42       | 0.22        |
|                     |      | 70                      | 21.6                     | 28.5                   | 900                  | 235                       | 200    | 6.5                                    | 3.8                                        | 0.4430                     | 0.39       | 0.25        |
|                     |      | 95                      | 23.4                     | 30.0                   | 1020                 | 285                       | 240    | 8.9                                    | 5.1                                        | 0.3200                     | 0.38       | 0.27        |
|                     |      | 120                     | 24.8                     | 32.0                   | 1160                 | 330                       | 275    | 11.2                                   | 6.5                                        | 0.2530                     | 0.36       | 0.30        |
|                     |      | 150                     | 26.3                     | 33.5                   | 1270                 | 375                       | 305    | 14.1                                   | 8.1                                        | 0.2060                     | 0.35       | 0.32        |
|                     |      | 185                     | 28.0                     | 35.0                   | 1435                 | 430                       | 345    | 17.4                                   | 10                                         | 0.1640                     | 0.34       | 0.34        |
|                     |      | 240                     | 30.4                     | 37.5                   | 1665                 | 510                       | 400    | 22.5                                   | 13                                         | 0.1250                     | 0.33       | 0.36        |
|                     |      | 300                     | 32.6                     | 40.5                   | 1815                 | 585                       | 450    | 28.1                                   | 16.3                                       | 0.1000                     | 0.32       | 0.42        |
|                     |      | 400                     | 35.6                     | 43.5                   | 2270                 | 710                       | 520    | 37.6                                   | 21.8                                       | 0.0778                     | 0.31       | 0.43        |
|                     |      | 500                     | 38.6                     | 46.5                   | 2655                 | 810                       | 590    | 47.0                                   | 27.2                                       | 0.0605                     | 0.30       | 0.47        |
|                     |      | 630                     | 42.6                     | 51.5                   | 3240                 | 960                       | 670    | 59.2                                   | 34.3                                       | 0.0469                     | 0.28       | 0.52        |

| Voltage             |      | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |        | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|---------------------|------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|--------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>o</sub> / U  | Um   |                         |                          |                        |                      | In air                    | Buried |                                        |                                            |                            |            |             |
| (kV)                | (kV) | (mm <sup>2</sup> )      | (mm)                     | (mm)                   | (kg/km)              | (A)                       | (A)    | (kA)                                   | (kA)                                       | (Ω/km)                     | (mH/km)    | (μF/km)     |
| Aluminium conductor |      |                         |                          |                        |                      |                           |        |                                        |                                            |                            |            |             |
| 12/20               | 24   | 35                      | 21.2                     | 27.5                   | 815                  | 159                       | 142    | 3.2                                    | 1.9                                        | 0.8680                     | 0.44       | 0.17        |
|                     |      | 50                      | 22.4                     | 28.5                   | 880                  | 190                       | 167    | 4.7                                    | 2.7                                        | 0.6410                     | 0.42       | 0.18        |
|                     |      | 70                      | 24.0                     | 30.5                   | 1005                 | 235                       | 204    | 6.5                                    | 3.8                                        | 0.4430                     | 0.40       | 0.21        |
|                     |      | 95                      | 25.8                     | 32.5                   | 1130                 | 287                       | 244    | 8.9                                    | 5.1                                        | 0.3200                     | 0.38       | 0.23        |
|                     |      | 120                     | 27.2                     | 34.0                   | 1275                 | 330                       | 277    | 11.2                                   | 6.5                                        | 0.2530                     | 0.36       | 0.25        |
|                     |      | 150                     | 28.7                     | 35.5                   | 1395                 | 375                       | 309    | 14.1                                   | 8.1                                        | 0.2060                     | 0.35       | 0.27        |
|                     |      | 185                     | 30.4                     | 37.0                   | 1565                 | 428                       | 350    | 17.4                                   | 10                                         | 0.1640                     | 0.34       | 0.29        |
|                     |      | 240                     | 32.8                     | 39.5                   | 1785                 | 505                       | 405    | 22.5                                   | 13.0                                       | 0.1250                     | 0.33       | 0.32        |
|                     |      | 300                     | 35.0                     | 42.5                   | 2065                 | 578                       | 455    | 28.1                                   | 16.3                                       | 0.1000                     | 0.32       | 0.35        |
|                     |      | 400                     | 38.0                     | 45.5                   | 2425                 | 674                       | 520    | 37.6                                   | 21.8                                       | 0.0778                     | 0.30       | 0.39        |
|                     |      | 500                     | 41.0                     | 48.5                   | 2825                 | 778                       | 592    | 47.0                                   | 27.2                                       | 0.0605                     | 0.30       | 0.43        |
|                     |      | 630                     | 45.0                     | 53.5                   | 3425                 | 896                       | 672    | 59.2                                   | 34.3                                       | 0.0469                     | 0.28       | 0.49        |
| 18/30               | 36   | 50                      | 27.8                     | 34.0                   | 1330                 | 200                       | 165    | 4.7                                    | 2.7                                        | 0.6410                     | 0.46       | 0.14        |
|                     |      | 70                      | 29.4                     | 36.0                   | 1470                 | 250                       | 205    | 6.5                                    | 3.8                                        | 0.4430                     | 0.43       | 0.16        |
|                     |      | 95                      | 31.2                     | 37.5                   | 1650                 | 305                       | 245    | 8.9                                    | 5.1                                        | 0.3200                     | 0.41       | 0.17        |
|                     |      | 120                     | 32.6                     | 39.5                   | 1786                 | 350                       | 275    | 11.2                                   | 6.5                                        | 0.2530                     | 0.39       | 0.19        |
|                     |      | 150                     | 34.1                     | 41.0                   | 2040                 | 395                       | 310    | 14.1                                   | 8.1                                        | 0.2060                     | 0.38       | 0.20        |
|                     |      | 185                     | 35.8                     | 42.5                   | 2250                 | 455                       | 350    | 17.4                                   | 10                                         | 0.1640                     | 0.37       | 0.21        |
|                     |      | 240                     | 38.2                     | 45.0                   | 2510                 | 540                       | 410    | 22.5                                   | 13                                         | 0.1250                     | 0.36       | 0.24        |
|                     |      | 300                     | 40.4                     | 48.0                   | 2810                 | 584                       | 465    | 28.1                                   | 16.3                                       | 0.1000                     | 0.34       | 0.26        |
|                     |      | 400                     | 43.4                     | 51.0                   | 3290                 | 681                       | 531    | 37.6                                   | 21.8                                       | 0.0778                     | 0.33       | 0.29        |
|                     |      | 500                     | 46.4                     | 54.0                   | 3750                 | 792                       | 605    | 47.0                                   | 27.2                                       | 0.0605                     | 0.32       | 0.31        |
|                     |      | 630                     | 50.4                     | 59.0                   | 4360                 | 933                       | 684    | 59.2                                   | 34.3                                       | 0.0469                     | 0.30       | 0.35        |

Other compositions are available, contact [info@fast-cables.com](mailto:info@fast-cables.com) for information.

Current carrying capacity calculated considering the following conditions:  
Maximum conductor temperature = 90°C  
Cables in air: Ambient temperature = 30°C  
Cables directly buried: Ground temperature = 15°C    • Depth of laying = 0.5 m    • Thermal resistivity of soil = 1.5 K.m/W



APPLICATION

Cable for power distribution and power supply stations, halogen free and flame retardant used in Utility and Industrial applications, for rated voltages up to 18/30kV.  
Applicable for installations where it is necessary to guarantee improved fire behaviour. Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.  
Special oversheath compound guarantees low water absorption properties and improved mechanical performance (tear resistance, tensile strength and elongation at break) compared to LSHF standard materials.

CABLE DESIGNATION

Cu / XLPE / Cu Tape screen / PO  
Al / XLPE / Cu Tape screen / PO  
Cu / XLPE / Cu Wire screen / PO  
Al / XLPE / Cu Wire screen / PO

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation.

Metallic Screen

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.  
Poly Propylene tape is applied over the screen.  
Or Copper tape screen – a copper tape, helically applied with overlap.

Oversheath

Polyolefin type DMZ2 according to HD 620 S2 – LSHF – Low Smoke Halogen Free thermoplastic compound. Flame retardant.

GENERAL CHARACTERISTICS

|                                             |                                                                                     |
|---------------------------------------------|-------------------------------------------------------------------------------------|
| Construction and test standards             | IEC 60228                                                                           |
|                                             | IEC 60502-2                                                                         |
| Rated voltage U <sub>0</sub> / U(Um)        | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV ·<br>12/20 (24) kV · 18/30 (36) kV |
| Standard cross-section of wire screen (mm²) | 16 · 25 · 35                                                                        |
| Test voltage                                | 3.5 x U <sub>0</sub>                                                                |
| Conductor maximum operating temperature     | 90°C                                                                                |

|                                                                    |                                                                                           |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Maximum short-circuit temperature                                  | 250°C (t ≤ 5s)                                                                            |
| Minimum bending radius – during installation (mm)                  | 25 x d                                                                                    |
| Minimum bending radius – after installation (mm)                   | 20 x d                                                                                    |
| Maximum pulling force over conductor (N)                           | Copper – 50 x S<br>Aluminium – 30 x S                                                     |
| Flame retardant                                                    | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm) |
| S – conductor cross-section (mm²)<br>d – cable outer diameter (mm) |                                                                                           |

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Dimensional and electrical characteristics can be consulted in the corresponding table (whether copper or aluminium conductors) of single core XLPE unarmoured cables. (Refer pages 11, 12, 13 & 14)



APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV. Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.

CABLE DESIGNATION

Cu / XLPE / Cu Tape Screen / PE  
Al / XLPE / Cu Tape Screen / PE

CONSTRUCTION CHARACTERISTICS

**Conductor**  
Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

**Insulation**  
Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi-conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation.

**Metallic Screen**  
Copper tape, longitudinally applied over insulation. Cross-section area of tape in accordance with short circuit current.

**Oversheath**  
Extruded PE

GENERAL CHARACTERISTICS

|                                                   |                                                                                  |
|---------------------------------------------------|----------------------------------------------------------------------------------|
| Construction and test standards                   | IEC 60228                                                                        |
|                                                   | IEC 60502-2                                                                      |
| Rated voltage U <sub>0</sub> / U(Um)              | 3.6/6 (7.2) kV • 6/10 (12) kV • 8.7/15 (17.5) kV • 12/20 (24) kV • 18/30 (36) kV |
| Test voltage                                      | 3.5 x U <sub>0</sub>                                                             |
| Conductor maximum operating temperature           | 90°C                                                                             |
| Maximum short-circuit temperature                 | 250°C (t ≤ 5s)                                                                   |
| Minimum bending radius – during installation (mm) | 25 x d                                                                           |
| Minimum bending radius – after installation (mm)  | 20 x d                                                                           |
| Maximum pulling force over conductor (N)          | Copper – 50 x S                                                                  |
|                                                   | Aluminium – 30 x S                                                               |

S – conductor cross-section (mm<sup>2</sup>)  
d – cable outer diameter (mm)  
Several compositions are available. contact info@fast-cables.com for information.

APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications. for rated voltages up to 18/30kV. Suitable for fixed installations. indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried. Cable is both longitudinally and radially watertight and therefore best suitable for wet conditions.

CABLE DESIGNATION

Cu / XLPE / Cu Wire screen / Cu tape / PE  
Al / XLPE / Cu Wire screen / Cu tape / PE

CONSTRUCTION CHARACTERISTICS

**Conductor**  
Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

**Insulation**  
Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation.

**Metallic Screen**  
Annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.

**Over Sheath:**  
Extruded PE oversheath, type ST7.

GENERAL CHARACTERISTICS

|                                                          |                                                                                  |
|----------------------------------------------------------|----------------------------------------------------------------------------------|
| Construction and test standards                          | IEC 60228                                                                        |
|                                                          | IEC 60502-2                                                                      |
| Rated voltage U <sub>0</sub> / U(Um)                     | 3.6/6 (7.2) kV • 6/10 (12) kV • 8.7/15 (17.5) kV • 12/20 (24) kV • 18/30 (36) kV |
| Standard cross-section of wire screen (mm <sup>2</sup> ) | 16 • 25 • 35                                                                     |
| Test voltage                                             | 3.5 x U <sub>0</sub>                                                             |
| Conductor maximum operating temperature                  | 90°C                                                                             |



APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV. Suitable for fixed installations, directly buried. Good mechanical protection.

CABLE DESIGNATION

- A: Cu / XLPE / Cu Wire screen / Aluminium Tape armour / PVC or PE
- B: Cu / XLPE / Cu Tape screen / Aluminium Tape armour / PVC or PE
- C: Al / XLPE / Cu Wire screen / Aluminium Wire armour / PVC or PE
- D: Al / XLPE / Cu Tape screen / Aluminium Wire armour / PVC or PE
- E: Al / XLPE / Cu Tape screen / Aluminium Tape armour / PVC or PE
- F: Al / XLPE / Cu Wire screen / Aluminium Tape armour / PVC or PE
- G: Cu / XLPE / Cu Tape screen / Aluminium Wire armour / PVC or PE
- H: Cu / XLPE / Cu Wire screen / Aluminium Wire armour / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 as per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation

Metallic Screen

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.

A wrapping Poly Propylene tape is applied over the screen.

Or Copper tape screen – a copper tape, helically applied with overlap.

Inner Sheath

Extruded PVC.

Armour

Two aluminium tapes helically applied.

Or Aluminium wires, helically applied, tightened with Poly Propylene tapes.

Oversheath

Extruded PVC, or PE.



GENERAL CHARACTERISTICS

|                                                     |                                                                                                                   |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Construction and test standards                     | IEC 60228 · IEC 60502-2                                                                                           |
| Rated voltage U <sub>0</sub> / U(Um)                | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV · 12/20 (24) kV · 18/30 (36) kV                                  |
| Standard cross-section of wire screen (mm²)         | 16 · 25 · 35                                                                                                      |
| Test voltage                                        | 3.5 x U <sub>0</sub>                                                                                              |
| Conductor maximum operating temperature             | 90°C                                                                                                              |
| Maximum short-circuit temperature                   | 250°C (t ≤ 5s)                                                                                                    |
| Minimum bending radius – during installation (mm)   | 20 x d                                                                                                            |
| Minimum bending radius – after installation (mm)    | 15 x d                                                                                                            |
| Maximum pulling force over conductor (N)            | Copper – 50 x S · Aluminium – 30 x S                                                                              |
| Flame retardant (for PVC oversheath)                | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm)                         |
| Fire retardant (for PVC oversheath. upon agreement) | IEC 60332-3-24 · EN 60332-3-24 (bunch of cables vertically mounted on a ladder, length of charred cable ≤ 2.5 cm) |

S – conductor cross-section (mm²) · d – cable outer diameter (mm)

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Copper conductor constructionsCu / XLPE / Cu Wire screen / Aluminium Tape armour or AWA / PVC

| Voltage                 |         | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |      | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|-------------------------|---------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U (kV) | Um (kV) |                         |                          |                        |                      | (mm <sup>2</sup> )        | (mm) |                                        |                                            |                            |            |             |
| Copper conductor        |         |                         |                          |                        |                      |                           |      |                                        |                                            |                            |            |             |
| 3.6/6                   | 7.2     | 25                      | 13.8                     | 25                     | 890                  | 157                       | 144  | 3.6                                    | 2.0                                        | 0.7270                     | 0.41       | 0.27        |
|                         |         | 35                      | 14.8                     | 26                     | 1010                 | 190                       | 171  | 5.0                                    | 2.9                                        | 0.5240                     | 0.39       | 0.30        |
|                         |         | 50                      | 16.0                     | 27                     | 1180                 | 229                       | 202  | 7.1                                    | 4.1                                        | 0.3870                     | 0.37       | 0.33        |
|                         |         | 70                      | 17.6                     | 29                     | 1460                 | 286                       | 246  | 10.0                                   | 5.8                                        | 0.2680                     | 0.35       | 0.38        |
|                         |         | 95                      | 19.4                     | 31                     | 1780                 | 350                       | 293  | 13.6                                   | 7.8                                        | 0.1930                     | 0.33       | 0.43        |
|                         |         | 120                     | 20.8                     | 33                     | 2140                 | 406                       | 332  | 17.2                                   | 9.9                                        | 0.1530                     | 0.32       | 0.48        |
|                         |         | 150                     | 22.3                     | 35                     | 2500                 | 461                       | 372  | 21.4                                   | 12.3                                       | 0.1240                     | 0.31       | 0.51        |
|                         |         | 185                     | 23.8                     | 37                     | 2920                 | 526                       | 418  | 26.5                                   | 15.3                                       | 0.0991                     | 0.30       | 0.54        |
|                         |         | 240                     | 26.6                     | 39                     | 3580                 | 630                       | 483  | 34.3                                   | 19.8                                       | 0.0754                     | 0.29       | 0.60        |
|                         |         | 300                     | 28.6                     | 42                     | 4310                 | 731                       | 542  | 42.9                                   | 24.8                                       | 0.0601                     | 0.28       | 0.63        |
|                         |         | 400                     | 32.6                     | 47                     | 5440                 | 851                       | 608  | 57.2                                   | 33.0                                       | 0.0470                     | 0.28       | 0.66        |
|                         |         | 500                     | 36.0                     | 51                     | 6600                 | 956                       | 675  | 71.5                                   | 41.2                                       | 0.0366                     | 0.27       | 0.69        |
|                         |         | 630                     | 40.0                     | 55                     | 8170                 | 1095                      | 753  | 90.1                                   | 52.0                                       | 0.0283                     | 0.27       | 0.76        |



| Voltage            |      | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |        | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|--------------------|------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|--------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U | Um   |                         |                          |                        |                      | In air                    | Buried |                                        |                                            |                            |            |             |
| (kV)               | (kV) | (mm <sup>2</sup> )      | (mm)                     | (mm)                   | (kg/km)              | (A)                       | (A)    | (kA)                                   | (kA)                                       | (Ω/km)                     | (mH/km)    | (μF/km)     |
| Copper conductor   |      |                         |                          |                        |                      |                           |        |                                        |                                            |                            |            |             |
| 6/10               | 12   | 25                      | 15.6                     | 27                     | 1020                 | 170                       | 155    | 3.6                                    | 2.0                                        | 0.7270                     | 0.47       | 0.23        |
|                    |      | 35                      | 16.6                     | 28                     | 1120                 | 205                       | 180    | 5.0                                    | 2.9                                        | 0.5240                     | 0.44       | 0.25        |
|                    |      | 50                      | 17.8                     | 30                     | 1310                 | 245                       | 215    | 7.1                                    | 4.1                                        | 0.3870                     | 0.42       | 0.28        |
|                    |      | 70                      | 19.4                     | 31                     | 1580                 | 310                       | 260    | 10.0                                   | 5.8                                        | 0.2680                     | 0.39       | 0.31        |
|                    |      | 95                      | 21.2                     | 34                     | 2000                 | 375                       | 315    | 13.6                                   | 7.8                                        | 0.1930                     | 0.38       | 0.35        |
|                    |      | 120                     | 22.6                     | 36                     | 2310                 | 435                       | 355    | 17.2                                   | 9.9                                        | 0.1530                     | 0.36       | 0.38        |
|                    |      | 150                     | 24.1                     | 38                     | 2640                 | 495                       | 395    | 21.4                                   | 12.3                                       | 0.1240                     | 0.35       | 0.41        |
|                    |      | 185                     | 25.8                     | 39                     | 3080                 | 570                       | 450    | 26.5                                   | 15.3                                       | 0.0991                     | 0.34       | 0.45        |
|                    |      | 240                     | 28.2                     | 42                     | 3740                 | 670                       | 520    | 34.3                                   | 19.8                                       | 0.0754                     | 0.33       | 0.50        |
|                    |      | 300                     | 30.4                     | 44                     | 4440                 | 770                       | 580    | 42.9                                   | 24.8                                       | 0.0601                     | 0.32       | 0.54        |
|                    |      | 400                     | 33.4                     | 48                     | 5520                 | 890                       | 650    | 57.2                                   | 33.0                                       | 0.0470                     | 0.31       | 0.60        |
|                    |      | 500                     | 36.4                     | 52                     | 6670                 | 1020                      | 740    | 71.5                                   | 41.2                                       | 0.0366                     | 0.30       | 0.66        |
|                    |      | 630                     | 40.5                     | 56                     | 8220                 | 1190                      | 830    | 90.1                                   | 52.0                                       | 0.0283                     | 0.26       | 0.78        |
| 8.7/15             | 17.5 | 25                      | 17.8                     | 30                     | 1130                 | 170                       | 155    | 3.6                                    | 2.0                                        | 0.7270                     | 0.47       | 0.18        |
|                    |      | 35                      | 18.8                     | 31                     | 1220                 | 205                       | 180    | 5.0                                    | 2.9                                        | 0.5240                     | 0.44       | 0.20        |
|                    |      | 50                      | 20.0                     | 33                     | 1410                 | 245                       | 215    | 7.1                                    | 4.1                                        | 0.3870                     | 0.42       | 0.22        |
|                    |      | 70                      | 21.6                     | 35                     | 1770                 | 310                       | 260    | 10.0                                   | 5.8                                        | 0.2680                     | 0.39       | 0.25        |
|                    |      | 95                      | 23.4                     | 37                     | 2120                 | 375                       | 315    | 13.6                                   | 7.8                                        | 0.1930                     | 0.38       | 0.27        |
|                    |      | 120                     | 24.8                     | 39                     | 2440                 | 435                       | 355    | 17.2                                   | 9.9                                        | 0.1530                     | 0.36       | 0.30        |
|                    |      | 150                     | 26.3                     | 40                     | 2780                 | 495                       | 395    | 21.4                                   | 12.3                                       | 0.1240                     | 0.35       | 0.32        |
|                    |      | 185                     | 28.0                     | 42                     | 3220                 | 570                       | 450    | 26.5                                   | 15.3                                       | 0.0991                     | 0.34       | 0.34        |
|                    |      | 240                     | 30.4                     | 45                     | 3900                 | 670                       | 520    | 34.3                                   | 19.8                                       | 0.0754                     | 0.33       | 0.38        |
|                    |      | 300                     | 32.6                     | 48                     | 4760                 | 770                       | 580    | 42.9                                   | 24.8                                       | 0.0601                     | 0.32       | 0.42        |
|                    |      | 400                     | 35.6                     | 51                     | 5710                 | 890                       | 650    | 57.2                                   | 33.0                                       | 0.0470                     | 0.31       | 0.43        |
|                    |      | 500                     | 38.6                     | 55                     | 6880                 | 1020                      | 740    | 71.5                                   | 41.2                                       | 0.0366                     | 0.30       | 0.47        |
|                    |      | 630                     | 42.6                     | 59                     | 8460                 | 1190                      | 830    | 90.1                                   | 52.0                                       | 0.0283                     | 0.28       | 0.52        |
| 12/20              | 24   | 35                      | 21.2                     | 34                     | 1440                 | 198                       | 183    | 5.0                                    | 2.9                                        | 0.5240                     | 0.46       | 0.16        |
|                    |      | 50                      | 22.4                     | 36                     | 1640                 | 238                       | 216    | 7.1                                    | 4.1                                        | 0.3870                     | 0.44       | 0.18        |
|                    |      | 70                      | 24.0                     | 37                     | 1920                 | 296                       | 263    | 10.0                                   | 5.8                                        | 0.2680                     | 0.42       | 0.20        |
|                    |      | 95                      | 25.8                     | 40                     | 2290                 | 361                       | 314    | 13.6                                   | 7.8                                        | 0.1930                     | 0.41       | 0.21        |
|                    |      | 120                     | 27.2                     | 41                     | 2620                 | 417                       | 355    | 17.2                                   | 9.9                                        | 0.1530                     | 0.40       | 0.23        |
|                    |      | 150                     | 28.7                     | 43                     | 2960                 | 473                       | 398    | 21.4                                   | 12.3                                       | 0.1240                     | 0.39       | 0.25        |
|                    |      | 185                     | 30.4                     | 45                     | 3420                 | 543                       | 448    | 26.5                                   | 15.3                                       | 0.0991                     | 0.37       | 0.27        |
|                    |      | 240                     | 32.8                     | 48                     | 4250                 | 641                       | 517    | 34.3                                   | 19.8                                       | 0.0754                     | 0.36       | 0.30        |
|                    |      | 300                     | 35.0                     | 51                     | 4990                 | 735                       | 581    | 42.9                                   | 24.8                                       | 0.0601                     | 0.35       | 0.33        |
|                    |      | 400                     | 38.0                     | 54                     | 5980                 | 845                       | 658    | 57.2                                   | 33.0                                       | 0.0470                     | 0.33       | 0.37        |
|                    |      | 500                     | 41.0                     | 57                     | 7120                 | 956                       | 740    | 71.5                                   | 41.2                                       | 0.0366                     | 0.32       | 0.40        |
|                    |      | 630                     | 45.0                     | 61                     | 8720                 | 1095                      | 829    | 90.1                                   | 52.0                                       | 0.0283                     | 0.31       | 0.45        |
| 18/30              | 36   | 50                      | 27.8                     | 43                     | 2180                 | 248                       | 232    | 7.1                                    | 4.1                                        | 0.3870                     | 0.48       | 0.14        |
|                    |      | 70                      | 29.4                     | 45                     | 2510                 | 307                       | 284    | 10.0                                   | 5.8                                        | 0.2680                     | 0.46       | 0.16        |
|                    |      | 95                      | 31.2                     | 47                     | 2900                 | 373                       | 339    | 13.6                                   | 7.8                                        | 0.1930                     | 0.44       | 0.17        |

| Voltage            |      | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |        | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|--------------------|------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|--------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U | Um   |                         |                          |                        |                      | In air                    | Buried |                                        |                                            |                            |            |             |
| (kV)               | (kV) | (mm <sup>2</sup> )      | (mm)                     | (mm)                   | (kg/km)              | (A)                       | (A)    | (kA)                                   | (kA)                                       | (Ω/km)                     | (mH/km)    | (μF/km)     |
| Copper conductor   |      |                         |                          |                        |                      |                           |        |                                        |                                            |                            |            |             |
| 18/30              | 36   | 120                     | 32.6                     | 49                     | 3250                 | 429                       | 385    | 17.2                                   | 9.9                                        | 0.1530                     | 0.43       | 0.18        |
|                    |      | 150                     | 34.1                     | 50                     | 3640                 | 484                       | 430    | 21.4                                   | 12.3                                       | 0.1240                     | 0.41       | 0.19        |
|                    |      | 185                     | 35.8                     | 52                     | 4120                 | 552                       | 484    | 26.5                                   | 15.3                                       | 0.0991                     | 0.40       | 0.21        |
|                    |      | 240                     | 38.2                     | 56                     | 4990                 | 649                       | 559    | 34.3                                   | 19.8                                       | 0.0754                     | 0.38       | 0.23        |
|                    |      | 300                     | 40.4                     | 58                     | 5780                 | 737                       | 627    | 42.9                                   | 24.8                                       | 0.0601                     | 0.37       | 0.25        |
|                    |      | 400                     | 43.4                     | 61                     | 6780                 | 861                       | 701    | 57.2                                   | 33.0                                       | 0.0470                     | 0.36       | 0.27        |
|                    |      | 500                     | 46.4                     | 65                     | 8000                 | 993                       | 786    | 71.5                                   | 41.2                                       | 0.0366                     | 0.35       | 0.30        |
|                    |      | 630                     | 50.4                     | 69                     | 9690                 | 1139                      | 875    | 90.1                                   | 52.0                                       | 0.0283                     | 0.33       | 0.33        |

| Aluminium conductor constructions |      |                         |                          |                        |                      | Al / XLPE / Cu Wire screen / Aluminium Wire armour / PVC |        |                                        |                                            |                            |            |             |
|-----------------------------------|------|-------------------------|--------------------------|------------------------|----------------------|----------------------------------------------------------|--------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| Voltage                           |      | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity                                |        | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
| U <sub>0</sub> / U                | Um   |                         |                          |                        |                      | In air                                                   | Buried |                                        |                                            |                            |            |             |
| (kV)                              | (kV) | (mm <sup>2</sup> )      | (mm)                     | (mm)                   | (kg/km)              | (A)                                                      | (A)    | (kA)                                   | (kA)                                       | (Ω/km)                     | (mH/km)    | (μF/km)     |
| Aluminium conductor               |      |                         |                          |                        |                      |                                                          |        |                                        |                                            |                            |            |             |
| 3.6/6                             | 7.2  | 25                      | 13.8                     | 25                     | 760                  | 121                                                      | 111    | 2.3                                    | 1.3                                        | 1.2000                     | 0.41       | 0.27        |
|                                   |      | 35                      | 14.8                     | 26                     | 800                  | 147                                                      | 132    | 3.2                                    | 1.9                                        | 0.8680                     | 0.39       | 0.30        |
|                                   |      | 50                      | 16.0                     | 27                     | 910                  | 176                                                      | 156    | 4.7                                    | 2.7                                        | 0.6410                     | 0.37       | 0.33        |
|                                   |      | 70                      | 17.6                     | 29                     | 1020                 | 221                                                      | 191    | 6.5                                    | 3.8                                        | 0.4430                     | 0.35       | 0.38        |
|                                   |      | 95                      | 19.4                     | 31                     | 1180                 | 270                                                      | 227    | 8.9                                    | 5.1                                        | 0.3200                     | 0.33       | 0.42        |
|                                   |      | 120                     | 20.8                     | 33                     | 1400                 | 315                                                      | 260    | 11.2                                   | 6.5                                        | 0.2530                     | 0.32       | 0.47        |
|                                   |      | 150                     | 22.3                     | 35                     | 1570                 | 357                                                      | 290    | 14.1                                   | 8.1                                        | 0.2060                     | 0.31       | 0.51        |
|                                   |      | 185                     | 23.8                     | 37                     | 1740                 | 411                                                      | 326    | 17.4                                   | 10                                         | 0.1640                     | 0.30       | 0.55        |
|                                   |      | 240                     | 26.6                     | 39                     | 2040                 | 489                                                      | 378    | 22.5                                   | 13                                         | 0.1250                     | 0.29       | 0.60        |
|                                   |      | 300                     | 28.6                     | 42                     | 2400                 | 571                                                      | 426    | 28.1                                   | 16.3                                       | 0.1000                     | 0.28       | 0.63        |
|                                   |      | 400                     | 32.6                     | 47                     | 2990                 | 670                                                      | 484    | 37.6                                   | 21.8                                       | 0.0778                     | 0.28       | 0.66        |
|                                   |      | 500                     | 36.0                     | 51                     | 3510                 | 782                                                      | 544    | 47.0                                   | 27.2                                       | 0.0605                     | 0.27       | 0.69        |
|                                   |      | 630                     | 40.0                     | 55                     | 4170                 | 925                                                      | 617    | 59.2                                   | 34.3                                       | 0.0469                     | 0.26       | 0.79        |
| 6/10                              | 12   | 25                      | 15.6                     | 27                     | 860                  | 130                                                      | 115    | 2.3                                    | 1.3                                        | 1.2000                     | 0.47       | 0.23        |
|                                   |      | 35                      | 16.6                     | 28                     | 900                  | 155                                                      | 140    | 3.2                                    | 1.9                                        | 0.8680                     | 0.44       | 0.25        |
|                                   |      | 50                      | 17.8                     | 30                     | 1010                 | 185                                                      | 165    | 4.7                                    | 2.7                                        | 0.6410                     | 0.42       | 0.28        |
|                                   |      | 70                      | 19.4                     | 31                     | 1150                 | 235                                                      | 200    | 6.5                                    | 3.8                                        | 0.4430                     | 0.39       | 0.31        |
|                                   |      | 95                      | 21.2                     | 34                     | 1400                 | 285                                                      | 240    | 8.9                                    | 5.1                                        | 0.3200                     | 0.38       | 0.33        |
|                                   |      | 120                     | 22.6                     | 36                     | 1550                 | 330                                                      | 275    | 11.2                                   | 6.5                                        | 0.2530                     | 0.36       | 0.38        |
|                                   |      | 150                     | 24.1                     | 38                     | 1700                 | 375                                                      | 305    | 14.1                                   | 8.1                                        | 0.2060                     | 0.35       | 0.41        |
|                                   |      | 185                     | 25.8                     | 39                     | 1910                 | 430                                                      | 345    | 17.4                                   | 10                                         | 0.1640                     | 0.34       | 0.45        |
|                                   |      | 240                     | 28.2                     | 42                     | 2200                 | 510                                                      | 400    | 22.5                                   | 13                                         | 0.1250                     | 0.33       | 0.50        |
|                                   |      | 300                     | 30.4                     | 44                     | 2510                 | 585                                                      | 450    | 28.1                                   | 16.3                                       | 0.1000                     | 0.32       | 0.54        |
|                                   |      | 400                     | 33.4                     | 48                     | 3070                 | 710                                                      | 520    | 37.6                                   | 21.8                                       | 0.0778                     | 0.31       | 0.60        |
|                                   |      | 500                     | 36.4                     | 52                     | 3570                 | 810                                                      | 590    | 47.0                                   | 27.2                                       | 0.0605                     | 0.30       | 0.66        |
|                                   |      | 630                     | 40.5                     | 56                     | 4210                 | 960                                                      | 670    | 59.2                                   | 34.3                                       | 0.0469                     | 0.28       | 0.78        |

| Voltage                    |            | Conductor cross-section<br>-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity  |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance  | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                                           |                                  |                                |                                 | In air<br>(A)                                                                                                 | Buried<br>(A) |                                                |                                                    |                                      |                                                                                                |                        |
| Aluminium conductor        |            |                                                           |                                  |                                |                                 |                                                                                                               |               |                                                |                                                    |                                      |                                                                                                |                        |
| 8.7/15                     | 17.5       | 25                                                        | 17.8                             | 30                             | 960                             | 130                                                                                                           | 115           | 2.3                                            | 1.3                                                | 1.2000                               | 0.47                                                                                           | 0.18                   |
|                            |            | 35                                                        | 18.8                             | 31                             | 1000                            | 155                                                                                                           | 140           | 3.2                                            | 1.9                                                | 0.8680                               | 0.44                                                                                           | 0.20                   |
|                            |            | 50                                                        | 20.0                             | 33                             | 1110                            | 185                                                                                                           | 165           | 4.7                                            | 2.7                                                | 0.6410                               | 0.42                                                                                           | 0.22                   |
|                            |            | 70                                                        | 21.6                             | 35                             | 1340                            | 235                                                                                                           | 200           | 6.5                                            | 3.8                                                | 0.4430                               | 0.39                                                                                           | 0.25                   |
|                            |            | 95                                                        | 23.4                             | 37                             | 1520                            | 285                                                                                                           | 240           | 8.9                                            | 5.1                                                | 0.3200                               | 0.38                                                                                           | 0.27                   |
|                            |            | 120                                                       | 24.8                             | 39                             | 1680                            | 330                                                                                                           | 275           | 11.2                                           | 6.5                                                | 0.2530                               | 0.36                                                                                           | 0.30                   |
|                            |            | 150                                                       | 26.3                             | 40                             | 1850                            | 375                                                                                                           | 305           | 14.1                                           | 8.1                                                | 0.2060                               | 0.35                                                                                           | 0.32                   |
|                            |            | 185                                                       | 28.0                             | 42                             | 2060                            | 430                                                                                                           | 345           | 17.4                                           | 10                                                 | 0.1640                               | 0.34                                                                                           | 0.34                   |
|                            |            | 240                                                       | 30.4                             | 45                             | 2370                            | 510                                                                                                           | 400           | 22.5                                           | 13                                                 | 0.1250                               | 0.33                                                                                           | 0.36                   |
|                            |            | 300                                                       | 32.6                             | 48                             | 2840                            | 585                                                                                                           | 450           | 28.1                                           | 16.3                                               | 0.1000                               | 0.32                                                                                           | 0.42                   |
|                            |            | 400                                                       | 35.6                             | 51                             | 3260                            | 710                                                                                                           | 520           | 37.6                                           | 21.8                                               | 0.0778                               | 0.31                                                                                           | 0.43                   |
|                            |            | 500                                                       | 38.6                             | 55                             | 3780                            | 810                                                                                                           | 590           | 47.0                                           | 27.2                                               | 0.0605                               | 0.30                                                                                           | 0.47                   |
|                            |            | 630                                                       | 42.6                             | 59                             | 4460                            | 960                                                                                                           | 670           | 59.2                                           | 34.3                                               | 0.0469                               | 0.28                                                                                           | 0.52                   |
| 12/20                      | 24         | 35                                                        | 21.2                             | 34                             | 1220                            | 159                                                                                                           | 142           | 3.2                                            | 1.9                                                | 0.8680                               | 0.44                                                                                           | 0.17                   |
|                            |            | 50                                                        | 22.4                             | 36                             | 1340                            | 190                                                                                                           | 167           | 4.7                                            | 2.7                                                | 0.6410                               | 0.42                                                                                           | 0.18                   |
|                            |            | 70                                                        | 24.0                             | 37                             | 1490                            | 235                                                                                                           | 204           | 6.5                                            | 3.8                                                | 0.4430                               | 0.40                                                                                           | 0.21                   |
|                            |            | 95                                                        | 25.8                             | 40                             | 1690                            | 287                                                                                                           | 244           | 8.9                                            | 5.1                                                | 0.3200                               | 0.38                                                                                           | 0.23                   |
|                            |            | 120                                                       | 27.2                             | 41                             | 1870                            | 330                                                                                                           | 277           | 11.2                                           | 6.5                                                | 0.2530                               | 0.36                                                                                           | 0.25                   |
|                            |            | 150                                                       | 28.7                             | 43                             | 2030                            | 375                                                                                                           | 309           | 14.1                                           | 8.1                                                | 0.2060                               | 0.35                                                                                           | 0.27                   |
|                            |            | 185                                                       | 30.4                             | 45                             | 2260                            | 428                                                                                                           | 350           | 17.4                                           | 10                                                 | 0.1640                               | 0.34                                                                                           | 0.29                   |
|                            |            | 240                                                       | 32.8                             | 48                             | 2720                            | 505                                                                                                           | 405           | 22.5                                           | 13                                                 | 0.1250                               | 0.33                                                                                           | 0.32                   |
|                            |            | 300                                                       | 35.0                             | 51                             | 3070                            | 578                                                                                                           | 455           | 28.1                                           | 16.3                                               | 0.1000                               | 0.32                                                                                           | 0.35                   |
|                            |            | 400                                                       | 38.0                             | 54                             | 3520                            | 674                                                                                                           | 520           | 37.6                                           | 21.8                                               | 0.0778                               | 0.30                                                                                           | 0.39                   |
|                            |            | 500                                                       | 41.0                             | 57                             | 4030                            | 778                                                                                                           | 592           | 47.0                                           | 27.2                                               | 0.0605                               | 0.30                                                                                           | 0.43                   |
|                            |            | 630                                                       | 45.0                             | 61                             | 4730                            | 896                                                                                                           | 672           | 59.2                                           | 34.3                                               | 0.0469                               | 0.28                                                                                           | 0.49                   |
|                            |            | 18/30                                                     | 36                               | 50                             | 27.8                            | 43                                                                                                            | 1890          | 200                                            | 165                                                | 4.7                                  | 3.5                                                                                            | 0.6410                 |
| 70                         | 29.4       |                                                           |                                  | 45                             | 2080                            | 250                                                                                                           | 205           | 6.5                                            | 3.8                                                | 0.4430                               | 0.43                                                                                           | 0.16                   |
| 95                         | 31.2       |                                                           |                                  | 47                             | 2300                            | 305                                                                                                           | 245           | 8.9                                            | 5.1                                                | 0.3200                               | 0.41                                                                                           | 0.17                   |
| 120                        | 32.6       |                                                           |                                  | 49                             | 2500                            | 350                                                                                                           | 275           | 11.2                                           | 6.5                                                | 0.2530                               | 0.39                                                                                           | 0.19                   |
| 150                        | 34.1       |                                                           |                                  | 50                             | 2710                            | 395                                                                                                           | 310           | 14.1                                           | 8.1                                                | 0.2060                               | 0.38                                                                                           | 0.20                   |
| 185                        | 35.8       |                                                           |                                  | 52                             | 2960                            | 455                                                                                                           | 350           | 17.4                                           | 10                                                 | 0.1640                               | 0.37                                                                                           | 0.21                   |
| 240                        | 38.2       |                                                           |                                  | 56                             | 3460                            | 540                                                                                                           | 410           | 22.5                                           | 13                                                 | 0.1250                               | 0.36                                                                                           | 0.24                   |
| 300                        | 40.4       |                                                           |                                  | 58                             | 3860                            | 584                                                                                                           | 465           | 28.1                                           | 16.3                                               | 0.1000                               | 0.34                                                                                           | 0.26                   |
| 400                        | 43.4       |                                                           |                                  | 61                             | 4320                            | 681                                                                                                           | 531           | 37.6                                           | 21.8                                               | 0.0778                               | 0.33                                                                                           | 0.29                   |
| 500                        | 46.4       |                                                           |                                  | 65                             | 4900                            | 792                                                                                                           | 605           | 47.0                                           | 27.2                                               | 0.0605                               | 0.32                                                                                           | 0.31                   |
| 630                        | 50.4       |                                                           |                                  | 69                             | 5690                            | 933                                                                                                           | 684           | 59.2                                           | 34.3                                               | 0.0469                               | 0.30                                                                                           | 0.35                   |

Current carrying capacity calculated considering the following conditions:  
Maximum conductor temperature = 90°C  
Cables in air: Ambient temperature = 30°C  
Cables directly buried: Ground temperature = 15°C • Depth of laying = 0.5 m • Thermal resistivity of soil = 1.5 K.m/W

APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV, Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.

CABLE DESIGNATION

- A: Cu / XLPE / Cu Tape screen / PVC or PE
- B: Cu / XLPE / Cu Wire screen / PVC or PE
- C: Al / XLPE / Cu Tape screen / PVC or PE
- D: Al / XLPE / Cu Wire screen / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and Semi-conductive screen over the insulation (strippable), applied by simultaneous extrusion in just one operation.

Metallic Screen over each conductor

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.

Or Copper tape screen – a copper tape, helically applied with overlap.

Screened conductors are stranded together with Cu Tape. A Poly Propylene tape is applied over this core.

Fillers

Extruded polymeric material.

Oversheath

Extruded PVC or PE.

Optionally, a Low Smoke Halogen Free thermoplastic compound can be used for cables with need for improved fire behaviour.

GENERAL CHARACTERISTICS

|                                             |                                                    |
|---------------------------------------------|----------------------------------------------------|
| Construction and test standards             | IEC 60228                                          |
|                                             | IEC 60502-2                                        |
| Rated voltage U <sub>0</sub> / U(Um)        | 3.6/6 (7.2) kV • 6/10 (12) kV • 8.7/15 (17.5) kV • |
|                                             | 12/20 (24) kV • 18/30 (36) kV                      |
| Standard cross-section of wire screen (mm²) | 16 • 25 • 35                                       |
| Test voltage                                | 3.5 x U <sub>0</sub>                               |



|                                                     |                                                                                                                   |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Conductor maximum operating temperature             | 90°C                                                                                                              |
| Maximum short-circuit temperature                   | 250°C (t ≤ 5s)                                                                                                    |
| Minimum bending radius – during installation (mm)   | 20 x d                                                                                                            |
| Minimum bending radius – after installation (mm)    | 15 x d                                                                                                            |
| Maximum pulling force over conductor (N)            | Copper – 50 x S<br>Aluminium – 30 x S                                                                             |
| Flame retardant (for PVC oversheath)                | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm).                        |
| Fire retardant (for PVC oversheath. upon agreement) | IEC 60332-3-24 · EN 60332-3-24 (bunch of cables vertically mounted on a ladder, length of charred cable ≤ 2.5 cm) |

S – conductor cross-section (mm<sup>2</sup>)  
d – cable outer diameter (mm)

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Copper conductor constructions

| Voltage                 |         | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |            | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|-------------------------|---------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|------------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U (kV) | Um (kV) |                         |                          |                        |                      | In air (A)                | Buried (A) |                                        |                                            |                            |            |             |
| Copper conductor        |         |                         |                          |                        |                      |                           |            |                                        |                                            |                            |            |             |
| 3.6/6                   | 7.2     | 25                      | 13.8                     | 39                     | 1820                 | 142                       | 132        | 3.6                                    | 2.0                                        | 0.7270                     | 0.38       | 0.27        |
|                         |         | 35                      | 14.8                     | 40                     | 2140                 | 170                       | 157        | 5.0                                    | 2.9                                        | 0.5240                     | 0.36       | 0.30        |
|                         |         | 50                      | 16.0                     | 43                     | 2640                 | 204                       | 186        | 7.1                                    | 4.1                                        | 0.3870                     | 0.34       | 0.33        |
|                         |         | 70                      | 17.6                     | 47                     | 3430                 | 253                       | 227        | 10                                     | 5.8                                        | 0.2680                     | 0.32       | 0.38        |
|                         |         | 95                      | 19.4                     | 52                     | 4380                 | 304                       | 270        | 13.6                                   | 7.8                                        | 0.1930                     | 0.30       | 0.43        |
|                         |         | 120                     | 20.8                     | 55                     | 5270                 | 351                       | 307        | 17.2                                   | 9.9                                        | 0.1530                     | 0.29       | 0.48        |
|                         |         | 150                     | 22.3                     | 58                     | 6230                 | 398                       | 344        | 21.4                                   | 12.3                                       | 0.1240                     | 0.28       | 0.51        |
|                         |         | 185                     | 23.8                     | 63                     | 7580                 | 455                       | 388        | 26.5                                   | 15.3                                       | 0.0991                     | 0.28       | 0.54        |
|                         |         | 240                     | 26.6                     | 68                     | 9460                 | 531                       | 447        | 34.3                                   | 19.8                                       | 0.0754                     | 0.27       | 0.60        |
|                         |         | 300                     | 28.6                     | 74                     | 11600                | 606                       | 504        | 42.9                                   | 24.8                                       | 0.0601                     | 0.26       | 0.63        |
|                         | 400     | 32.6                    | 79                       | 14350                  | 696                  | 570                       | 57.2       | 33.0                                   | 0.0470                                     | 0.26                       | 0.66       |             |
| 6/10                    | 12      | 25                      | 15.6                     | 44                     | 2080                 | 145                       | 133        | 3.6                                    | 2.0                                        | 0.7270                     | 0.41       | 0.23        |
|                         |         | 35                      | 16.6                     | 45                     | 2440                 | 175                       | 167        | 5.0                                    | 2.9                                        | 0.5240                     | 0.39       | 0.25        |
|                         |         | 50                      | 17.8                     | 48                     | 2940                 | 210                       | 200        | 7.1                                    | 4.1                                        | 0.3870                     | 0.37       | 0.28        |
|                         |         | 70                      | 19.4                     | 52                     | 3730                 | 260                       | 245        | 10                                     | 5.8                                        | 0.2680                     | 0.35       | 0.31        |
|                         |         | 95                      | 21.2                     | 56                     | 4740                 | 320                       | 295        | 13.6                                   | 7.8                                        | 0.1930                     | 0.33       | 0.35        |
|                         |         | 120                     | 22.6                     | 60                     | 5660                 | 365                       | 335        | 17.2                                   | 9.9                                        | 0.1530                     | 0.32       | 0.38        |
|                         |         | 150                     | 24.1                     | 63                     | 6640                 | 415                       | 375        | 21.4                                   | 12.3                                       | 0.1240                     | 0.31       | 0.41        |
|                         |         | 185                     | 25.8                     | 67                     | 7980                 | 470                       | 420        | 26.5                                   | 15.3                                       | 0.0991                     | 0.30       | 0.45        |
|                         |         | 240                     | 28.2                     | 72                     | 9890                 | 560                       | 485        | 34.3                                   | 19.8                                       | 0.0754                     | 0.29       | 0.50        |
|                         |         | 300                     | 30.4                     | 77                     | 11940                | 630                       | 540        | 42.9                                   | 24.8                                       | 0.0601                     | 0.28       | 0.54        |
|                         | 400     | 33.4                    | 82                       | 14600                  | 696                  | 645                       | 57.2       | 33.0                                   | 0.0470                                     | 0.26                       | 0.59       |             |

| Voltage                    |            | Conductor cross-section<br>Um<br>(mm <sup>2</sup> )<br>(kV) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance<br>(mH/km) | Capacitance<br>(μF/km) |
|----------------------------|------------|-------------------------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|-----------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                                             |                                  |                                |                                 | In air<br>(A)             | Buried<br>(A) |                                                |                                                    |                                      |                       |                        |
| Copper conductor           |            |                                                             |                                  |                                |                                 |                           |               |                                                |                                                    |                                      |                       |                        |
| 8.7/15                     | 17.5       | 25                                                          | 17.8                             | 49.0                           | 2410                            | 161                       | 152           | 3.6                                            | 2.0                                                | 0.7270                               | 0.42                  | 0.18                   |
|                            |            | 35                                                          | 18.8                             | 51.5                           | 2770                            | 195                       | 180           | 5.0                                            | 2.9                                                | 0.5240                               | 0.39                  | 0.20                   |
|                            |            | 50                                                          | 20.0                             | 54.5                           | 3300                            | 230                       | 215           | 7.1                                            | 4.1                                                | 0.3870                               | 0.37                  | 0.22                   |
|                            |            | 70                                                          | 21.6                             | 58.0                           | 4120                            | 285                       | 280           | 10                                             | 5.8                                                | 0.2680                               | 0.35                  | 0.25                   |
|                            |            | 95                                                          | 23.4                             | 62.0                           | 5160                            | 338                       | 298           | 13.6                                           | 7.8                                                | 0.1930                               | 0.34                  | 0.28                   |
|                            |            | 120                                                         | 24.8                             | 66.0                           | 6070                            | 388                       | 340           | 17.2                                           | 9.9                                                | 0.1530                               | 0.32                  | 0.30                   |
|                            |            | 150                                                         | 26.3                             | 68.5                           | 7120                            | 449                       | 390           | 21.4                                           | 12.3                                               | 0.1240                               | 0.31                  | 0.32                   |
|                            |            | 185                                                         | 28.0                             | 71.5                           | 8480                            | 505                       | 437           | 26.5                                           | 15.3                                               | 0.0991                               | 0.30                  | 0.34                   |
|                            |            | 240                                                         | 30.4                             | 78.0                           | 10390                           | 580                       | 490           | 34.3                                           | 19.8                                               | 0.0754                               | 0.29                  | 0.38                   |
|                            |            | 300                                                         | 32.6                             | 84.0                           | 12520                           | 610                       | 545           | 42.9                                           | 24.8                                               | 0.0601                               | 0.28                  | 0.42                   |
|                            | 400        | 35.6                                                        | 90.5                             | 15400                          | 696                             | 645                       | 57.2          | 33.0                                           | 0.0470                                             | 0.27                                 | 0.46                  |                        |
| 12/20                      | 24         | 35                                                          | 21.2                             | 56.0                           | 3130                            | 172                       | 170           | 5.0                                            | 2.9                                                | 0.5240                               | 0.43                  | 0.17                   |
|                            |            | 50                                                          | 22.4                             | 59.0                           | 3680                            | 205                       | 200           | 7.1                                            | 4.1                                                | 0.3870                               | 0.41                  | 0.19                   |
|                            |            | 70                                                          | 24.0                             | 63.0                           | 4550                            | 253                       | 245           | 10.0                                           | 5.8                                                | 0.2680                               | 0.37                  | 0.21                   |
|                            |            | 95                                                          | 25.8                             | 67.0                           | 5620                            | 307                       | 293           | 13.6                                           | 7.8                                                | 0.1930                               | 0.36                  | 0.23                   |
|                            |            | 120                                                         | 27.2                             | 70.5                           | 6550                            | 352                       | 333           | 17.2                                           | 9.9                                                | 0.1530                               | 0.34                  | 0.25                   |
|                            |            | 150                                                         | 28.7                             | 73.5                           | 7590                            | 396                       | 373           | 21.4                                           | 12.3                                               | 0.1240                               | 0.33                  | 0.27                   |
|                            |            | 185                                                         | 30.4                             | 78.0                           | 9020                            | 469                       | 421           | 26.5                                           | 15.3                                               | 0.0991                               | 0.32                  | 0.28                   |
|                            |            | 240                                                         | 32.8                             | 82.5                           | 10950                           | 549                       | 486           | 34.3                                           | 19.8                                               | 0.0754                               | 0.31                  | 0.32                   |
|                            |            | 300                                                         | 35.0                             | 88.5                           | 13130                           | 625                       | 547           | 42.9                                           | 24.8                                               | 0.0601                               | 0.30                  | 0.35                   |
| 18/30                      | 36         | 50                                                          | 27.8                             | 75                             | 5200                            | 225                       | 205           | 7.1                                            | 4.1                                                | 0.3870                               | 0.45                  | 0.14                   |
|                            |            | 70                                                          | 29.4                             | 79                             | 6110                            | 275                       | 250           | 10.0                                           | 5.8                                                | 0.2680                               | 0.41                  | 0.16                   |
|                            |            | 95                                                          | 31.2                             | 83                             | 7290                            | 330                       | 300           | 13.6                                           | 7.8                                                | 0.1930                               | 0.39                  | 0.18                   |
|                            |            | 120                                                         | 32.6                             | 86                             | 8300                            | 380                       | 335           | 17.2                                           | 9.9                                                | 0.1530                               | 0.38                  | 0.19                   |
|                            |            | 150                                                         | 34.1                             | 90                             | 9420                            | 425                       | 375           | 21.4                                           | 12.3                                               | 0.1240                               | 0.36                  | 0.20                   |
|                            |            | 185                                                         | 35.8                             | 94                             | 10940                           | 485                       | 420           | 26.5                                           | 15.3                                               | 0.0991                               | 0.35                  | 0.21                   |
|                            |            | 240                                                         | 38.2                             | 99                             | 12970                           | 570                       | 485           | 34.3                                           | 19.8                                               | 0.0754                               | 0.34                  | 0.24                   |
|                            |            | 300                                                         | 40.4                             | 104                            | 15270                           | 640                       | 540           | 42.9                                           | 24.8                                               | 0.0601                               | 0.32                  | 0.25                   |

Current carrying capacity calculated considering the following conditions:  
Maximum conductor temperature = 90°C  
Cables in air: Ambient temperature = 30°C  
Cables directly buried: Ground temperature = 15°C    • Depth of laying = 0.5 m    • Thermal resistivity of soil = 1.5 K.m/W



ALUMINIUM CONDUCTOR CONSTRUCTIONS

| Voltage                    |            | Conductor cross-section<br>-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity ⚡ |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance ⚡<br>(mH/km) | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------------------|----------------------------------|--------------------------------|---------------------------------|-----------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|-------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                                           |                                  |                                |                                 | In air<br>(A)               | Buried<br>(A) |                                                |                                                    |                                      |                         |                        |
| Aluminium conductor        |            |                                                           |                                  |                                |                                 |                             |               |                                                |                                                    |                                      |                         |                        |
| 3.6/6                      | 7.2        | 25                                                        | 13.8                             | 39                             | 1340                            | 110                         | 103           | 2.4                                            | 1.3                                                | 1.2000                               | 0.38                    | 0.27                   |
|                            |            | 35                                                        | 14.8                             | 40                             | 1480                            | 135                         | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.36                    | 0.30                   |
|                            |            | 50                                                        | 16.0                             | 43                             | 1720                            | 160                         | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.35                    | 0.33                   |
|                            |            | 70                                                        | 17.6                             | 47                             | 2110                            | 200                         | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.32                    | 0.38                   |
|                            |            | 95                                                        | 19.4                             | 52                             | 2550                            | 240                         | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.30                    | 0.42                   |
|                            |            | 120                                                       | 20.8                             | 55                             | 2960                            | 280                         | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.29                    | 0.47                   |
|                            |            | 150                                                       | 22.3                             | 58                             | 3400                            | 315                         | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.29                    | 0.51                   |
|                            |            | 185                                                       | 23.8                             | 63                             | 3960                            | 360                         | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.28                    | 0.55                   |
|                            |            | 240                                                       | 26.6                             | 68                             | 4780                            | 425                         | 340           | 22.7                                           | 13.0                                               | 0.1250                               | 0.27                    | 0.60                   |
|                            |            | 300                                                       | 28.6                             | 74                             | 5750                            | 485                         | 405           | 28.3                                           | 16.3                                               | 0.1000                               | 0.26                    | 0.63                   |
|                            |            | 400                                                       | 32.6                             | 79                             | 7050                            | 545                         | 451           | 37.8                                           | 21.8                                               | 0.0778                               | 0.26                    | 0.66                   |
| 6/10                       | 12         | 25                                                        | 15.6                             | 44                             | 1600                            | 110                         | 111           | 2.4                                            | 1.3                                                | 1.2000                               | 0.40                    | 0.22                   |
|                            |            | 35                                                        | 16.6                             | 45                             | 1770                            | 135                         | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.39                    | 0.24                   |
|                            |            | 50                                                        | 17.8                             | 48                             | 2030                            | 160                         | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.37                    | 0.26                   |
|                            |            | 70                                                        | 19.4                             | 52                             | 2410                            | 200                         | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.34                    | 0.30                   |
|                            |            | 95                                                        | 21.2                             | 56                             | 2910                            | 240                         | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.32                    | 0.33                   |
|                            |            | 120                                                       | 22.6                             | 60                             | 3350                            | 280                         | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.31                    | 0.37                   |
|                            |            | 150                                                       | 24.1                             | 63                             | 3810                            | 315                         | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.30                    | 0.39                   |
|                            |            | 185                                                       | 25.8                             | 67                             | 4360                            | 360                         | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.29                    | 0.43                   |
|                            |            | 240                                                       | 28.2                             | 72                             | 5210                            | 425                         | 370           | 22.7                                           | 13.0                                               | 0.1250                               | 0.28                    | 0.47                   |
|                            |            | 300                                                       | 30.4                             | 77                             | 6070                            | 485                         | 425           | 28.3                                           | 16.3                                               | 0.1000                               | 0.27                    | 0.53                   |
|                            |            | 400                                                       | 33.4                             | 82                             | 7300                            | 562                         | 487           | 37.8                                           | 21.8                                               | 0.0778                               | 0.26                    | 0.59                   |
| 8.7/15                     | 17.5       | 25                                                        | 17.8                             | 49.0                           | 1920                            | 110                         | 110           | 2.4                                            | 1.3                                                | 1.2000                               | 0.43                    | 0.18                   |
|                            |            | 35                                                        | 18.8                             | 51.5                           | 2100                            | 135                         | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.41                    | 0.19                   |
|                            |            | 50                                                        | 20.0                             | 54.0                           | 2400                            | 160                         | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.39                    | 0.21                   |
|                            |            | 70                                                        | 21.6                             | 58.0                           | 2810                            | 200                         | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.36                    | 0.24                   |
|                            |            | 95                                                        | 23.4                             | 61.5                           | 3330                            | 240                         | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.34                    | 0.27                   |
|                            |            | 120                                                       | 24.8                             | 65.5                           | 3770                            | 280                         | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.33                    | 0.29                   |
|                            |            | 150                                                       | 26.3                             | 68.5                           | 4290                            | 315                         | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.32                    | 0.31                   |
|                            |            | 185                                                       | 28.0                             | 72.0                           | 4880                            | 360                         | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.31                    | 0.34                   |
|                            |            | 240                                                       | 30.4                             | 77.5                           | 5710                            | 425                         | 370           | 22.7                                           | 13.0                                               | 0.1250                               | 0.30                    | 0.37                   |
|                            |            | 300                                                       | 32.6                             | 84.0                           | 6660                            | 485                         | 425           | 28.3                                           | 16.3                                               | 0.1000                               | 0.29                    | 0.42                   |
|                            |            | 400                                                       | 35.6                             | 90.5                           | 8100                            | 562                         | 487           | 37.8                                           | 21.8                                               | 0.0778                               | 0.27                    | 0.46                   |

| Voltage                    |            | Conductor cross-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity  |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance  | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                               |                                  |                                |                                 | In air<br>(A)                                                                                                 | Buried<br>(A) |                                                |                                                    |                                      |                                                                                                |                        |
| Aluminium conductor        |            |                                               |                                  |                                |                                 |                                                                                                               |               |                                                |                                                    |                                      |                                                                                                |                        |
| 12/20                      | 24         | 35                                            | 21.2                             | 56.0                           | 2450                            | 136                                                                                                           | 132           | 3.3                                            | 1.9                                                | 0.8680                               | 0.43                                                                                           | 0.17                   |
|                            |            | 50                                            | 22.4                             | 58.5                           | 2760                            | 162                                                                                                           | 156           | 4.7                                            | 2.7                                                | 0.6410                               | 0.41                                                                                           | 0.18                   |
|                            |            | 70                                            | 24.0                             | 62.5                           | 3230                            | 200                                                                                                           | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.38                                                                                           | 0.21                   |
|                            |            | 95                                            | 25.8                             | 66.5                           | 3790                            | 242                                                                                                           | 227           | 9.0                                            | 5.1                                                | 0.3200                               | 0.36                                                                                           | 0.23                   |
|                            |            | 120                                           | 27.2                             | 70.5                           | 4240                            | 278                                                                                                           | 259           | 11.3                                           | 6.5                                                | 0.2530                               | 0.34                                                                                           | 0.25                   |
|                            |            | 150                                           | 28.7                             | 73.5                           | 4750                            | 313                                                                                                           | 289           | 14.2                                           | 8.1                                                | 0.2060                               | 0.33                                                                                           | 0.27                   |
|                            |            | 185                                           | 30.4                             | 78.0                           | 5410                            | 358                                                                                                           | 328           | 17.5                                           | 10.0                                               | 0.1640                               | 0.32                                                                                           | 0.29                   |
|                            |            | 240                                           | 32.8                             | 82.5                           | 6270                            | 422                                                                                                           | 379           | 22.7                                           | 13.0                                               | 0.1250                               | 0.31                                                                                           | 0.32                   |
|                            |            | 300                                           | 35.0                             | 88.5                           | 7250                            | 481                                                                                                           | 427           | 28.3                                           | 16.3                                               | 0.1000                               | 0.30                                                                                           | 0.35                   |
| 18/30                      | 36         | 50                                            | 27.8                             | 75                             | 4280                            | 175                                                                                                           | 160           | 4.7                                            | 2.7                                                | 0.6410                               | 0.45                                                                                           | 0.16                   |
|                            |            | 70                                            | 29.4                             | 79                             | 4800                            | 215                                                                                                           | 195           | 6.6                                            | 3.8                                                | 0.4430                               | 0.43                                                                                           | 0.17                   |
|                            |            | 95                                            | 31.2                             | 83                             | 5960                            | 260                                                                                                           | 230           | 9.0                                            | 5.1                                                | 0.3200                               | 0.41                                                                                           | 0.19                   |
|                            |            | 120                                           | 32.6                             | 86                             | 5990                            | 295                                                                                                           | 265           | 11.3                                           | 6.5                                                | 0.2530                               | 0.39                                                                                           | 0.20                   |
|                            |            | 150                                           | 34.1                             | 90                             | 6580                            | 335                                                                                                           | 295           | 14.2                                           | 8.1                                                | 0.2060                               | 0.38                                                                                           | 0.22                   |
|                            |            | 185                                           | 35.8                             | 94                             | 7320                            | 380                                                                                                           | 330           | 17.5                                           | 10.0                                               | 0.1640                               | 0.36                                                                                           | 0.23                   |
|                            |            | 240                                           | 38.2                             | 99                             | 8290                            | 445                                                                                                           | 380           | 22.7                                           | 13.0                                               | 0.1250                               | 0.35                                                                                           | 0.25                   |
|                            |            | 300                                           | 40.4                             | 104                            | 9390                            | 480                                                                                                           | 444           | 28.3                                           | 16.3                                               | 0.1000                               | 0.32                                                                                           | 0.26                   |

Current carrying capacity calculated considering the following conditions:  
Maximum conductor temperature = 90°C  
Cables in air: Ambient temperature = 30°C  
Cables directly buried: Ground temperature = 15°C • Depth of laying = 0.5 m • Thermal resistivity of soil = 1.5 K.m/W

APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV. Suitable for fixed installations, directly buried. Good mechanical protection.

CABLE DESIGNATION

- A: Cu / XLPE / Cu Tape screen / Galv. Steel Wire armour / PVC or PE
- B: Cu / XLPE / Cu Wire screen / Galv. Steel Wire armour / PVC or PE
- C: Al / XLPE / Cu Tape screen / Galv. Steel Wire armour / PVC or PE
- D: Al / XLPE / Cu Wire screen / Galv. Steel Wire armour / PVC or PE
- E: Cu / XLPE / Cu Tape screen / Steel Tape armour / PVC or PE
- F: Cu / XLPE / Cu Wire screen / Steel Tape armour / PVC or PE
- G: Al / XLPE / Cu Tape screen / Steel Tape armour / PVC or PE
- H: Al / XLPE / Cu Wire screen / Steel Tape armour / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and semi conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation.

Metallic Screen

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix. Poly Propylene tape is applied over the screen.  
Or Copper tape screen – a copper tape, helically applied with overlap.

Fillers

Extruded polymeric material.

Inner Sheath

Extruded PVC or PE.

Armour

Steel double tape, helically applied.  
Or Galvanized steel wires, helically applied.

Oversheath

Extruded PVC or PE.

Optionally, a Low Smoke Halogen Free thermoplastic compound can be used for cables with need for improved fire behaviour.



GENERAL CHARACTERISTICS

|                                                     |                                                                                                                   |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Construction and test standards                     | IEC 60228<br>IEC 60502-2                                                                                          |
| Rated voltage U <sub>0</sub> / U(Um)                | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV · 12/20 (24) kV · 18/30 (36) kV                                  |
| Standard cross-section of wire screen (mm²)         | 16 · 25 · 35                                                                                                      |
| Test voltage                                        | 3.5 x U <sub>0</sub>                                                                                              |
| Conductor maximum operating temperature             | 90°C                                                                                                              |
| Maximum short-circuit temperature                   | 250°C (t ≤ 5s)                                                                                                    |
| Minimum bending radius – during installation (mm)   | 15 x d                                                                                                            |
| Minimum bending radius – after installation (mm)    | 12 x d                                                                                                            |
| Maximum pulling force over conductor (N)            | Copper – 50 x S<br>Aluminium – 30 x S                                                                             |
| Flame retardant (for PVC oversheath)                | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm).                        |
| Fire retardant (for PVC oversheath. upon agreement) | IEC 60332-3-24 · EN 60332-3-24 (bunch of cables vertically mounted on a ladder, length of charred cable ≤ 2.5 cm) |

S – conductor cross-section (mm²)  
d – cable outer diameter (mm)

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Copper Conductor Constructions

Cu / XLPE / Cu Tape screen / Galv. Steel Wire armour / PVC

| Voltage                 |         | Conductor cross-section | Diameter over insulation | Approx. outer diameter | Approx. weight B-PVC | Current carrying capacity |            | Cond. max. short-circuit current, t=1s | Max symmetrical short-circuit for 3 second | Cond. DC resistance @ 20°C | Inductance | Capacitance |
|-------------------------|---------|-------------------------|--------------------------|------------------------|----------------------|---------------------------|------------|----------------------------------------|--------------------------------------------|----------------------------|------------|-------------|
| U <sub>0</sub> / U (kV) | Um (kV) |                         |                          |                        |                      | In air (A)                | Buried (A) |                                        |                                            |                            |            |             |
| Copper conductor        |         |                         |                          |                        |                      |                           |            |                                        |                                            |                            |            |             |
| 3.6/6                   | 7.2     | 25                      | 13.8                     | 48                     | 3900                 | 142                       | 132        | 3.6                                    | 2.0                                        | 0.7270                     | 0.38       | 0.27        |
|                         |         | 35                      | 14.8                     | 49                     | 4300                 | 170                       | 157        | 5.0                                    | 2.9                                        | 0.5240                     | 0.36       | 0.30        |
|                         |         | 50                      | 16.0                     | 52                     | 4980                 | 204                       | 186        | 7.1                                    | 4.1                                        | 0.3870                     | 0.34       | 0.33        |
|                         |         | 70                      | 17.6                     | 56                     | 5940                 | 253                       | 227        | 10.0                                   | 5.8                                        | 0.2680                     | 0.32       | 0.38        |
|                         |         | 95                      | 19.4                     | 60                     | 7220                 | 304                       | 270        | 13.6                                   | 7.8                                        | 0.1930                     | 0.30       | 0.43        |
|                         |         | 120                     | 20.8                     | 64                     | 8300                 | 351                       | 307        | 17.2                                   | 9.9                                        | 0.1530                     | 0.29       | 0.48        |
|                         |         | 150                     | 22.3                     | 68                     | 9460                 | 398                       | 344        | 21.4                                   | 12.3                                       | 0.1240                     | 0.28       | 0.51        |
|                         |         | 185                     | 23.8                     | 72                     | 11072                | 455                       | 388        | 26.5                                   | 15.3                                       | 0.0991                     | 0.28       | 0.54        |
|                         |         | 240                     | 26.6                     | 79                     | 14150                | 531                       | 447        | 34.3                                   | 19.8                                       | 0.0754                     | 0.27       | 0.60        |
|                         |         | 300                     | 28.6                     | 86                     | 16790                | 606                       | 504        | 42.9                                   | 24.8                                       | 0.0601                     | 0.26       | 0.63        |
|                         |         | 400                     | 32.6                     | 90                     | 19840                | 696                       | 570        | 57.2                                   | 33.0                                       | 0.0470                     | 0.26       | 0.66        |

MEDIUM VOLTAGE CABLES

Cu or Al - XLPE - Cu - STA or SWA - PVC or PE  
Three Core Cable  
Armoured - XLPE Insulation - IEC 60502-2

MEDIUM VOLTAGE CABLES

Cu or Al - XLPE - Cu - STA or SWA - PVC or PE  
Three Core Cable  
Armored - XLPE Insulation - IEC 60502-2

| Voltage                    |            | Conductor cross-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity  |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance <br>(mH/km) | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                               |                                  |                                |                                 | In air<br>(A)                                                                                                 | Buried<br>(A) |                                                |                                                    |                                      |                                                                                                           |                        |
| Copper conductor           |            |                                               |                                  |                                |                                 |                                                                                                               |               |                                                |                                                    |                                      |                                                                                                           |                        |
| 6/10                       | 12         | 25                                            | 15.6                             | 52                             | 4320                            | 145                                                                                                           | 133           | 3.6                                            | 2.0                                                | 0.7270                               | 0.41                                                                                                      | 0.23                   |
|                            |            | 35                                            | 16.6                             | 54                             | 4760                            | 175                                                                                                           | 167           | 5.0                                            | 2.9                                                | 0.5240                               | 0.39                                                                                                      | 0.25                   |
|                            |            | 50                                            | 17.8                             | 57                             | 5410                            | 210                                                                                                           | 200           | 7.1                                            | 4.1                                                | 0.3870                               | 0.37                                                                                                      | 0.28                   |
|                            |            | 70                                            | 19.4                             | 61                             | 6420                            | 260                                                                                                           | 245           | 10.0                                           | 5.8                                                | 0.2680                               | 0.35                                                                                                      | 0.31                   |
|                            |            | 95                                            | 21.2                             | 65                             | 7680                            | 320                                                                                                           | 295           | 13.6                                           | 7.8                                                | 0.1930                               | 0.33                                                                                                      | 0.35                   |
|                            |            | 120                                           | 22.6                             | 69                             | 8800                            | 365                                                                                                           | 335           | 17.2                                           | 9.9                                                | 0.1530                               | 0.32                                                                                                      | 0.38                   |
|                            |            | 150                                           | 24.1                             | 74                             | 10720                           | 415                                                                                                           | 375           | 21.4                                           | 12.3                                               | 0.1240                               | 0.31                                                                                                      | 0.41                   |
|                            |            | 185                                           | 25.8                             | 78                             | 12400                           | 470                                                                                                           | 420           | 26.5                                           | 15.3                                               | 0.0991                               | 0.30                                                                                                      | 0.45                   |
|                            |            | 240                                           | 28.2                             | 83                             | 14610                           | 560                                                                                                           | 485           | 34.3                                           | 19.8                                               | 0.0754                               | 0.29                                                                                                      | 0.50                   |
|                            |            | 300                                           | 30.4                             | 89                             | 17100                           | 630                                                                                                           | 540           | 42.9                                           | 24.8                                               | 0.0601                               | 0.28                                                                                                      | 0.54                   |
| 400                        | 33.4       | 92                                            | 20350                            | 696                            | 645                             | 57.2                                                                                                          | 33.0          | 0.0470                                         | 0.26                                               | 0.59                                 |                                                                                                           |                        |
| 8.7/15                     | 17.5       | 25                                            | 17.8                             | 58                             | 5150                            | 161                                                                                                           | 152           | 3.6                                            | 2.0                                                | 0.7270                               | 0.42                                                                                                      | 0.18                   |
|                            |            | 35                                            | 18.8                             | 60                             | 5600                            | 195                                                                                                           | 180           | 5.0                                            | 2.9                                                | 0.5240                               | 0.39                                                                                                      | 0.20                   |
|                            |            | 50                                            | 20.0                             | 63                             | 6330                            | 230                                                                                                           | 215           | 7.1                                            | 4.1                                                | 0.3870                               | 0.37                                                                                                      | 0.22                   |
|                            |            | 70                                            | 21.6                             | 67                             | 7350                            | 285                                                                                                           | 280           | 10.0                                           | 5.8                                                | 0.2680                               | 0.35                                                                                                      | 0.25                   |
|                            |            | 95                                            | 23.4                             | 71                             | 8670                            | 338                                                                                                           | 298           | 13.6                                           | 7.8                                                | 0.1930                               | 0.34                                                                                                      | 0.28                   |
|                            |            | 120                                           | 24.8                             | 76                             | 10630                           | 388                                                                                                           | 340           | 17.2                                           | 9.9                                                | 0.1530                               | 0.32                                                                                                      | 0.30                   |
|                            |            | 150                                           | 26.3                             | 80                             | 11890                           | 449                                                                                                           | 390           | 21.4                                           | 12.3                                               | 0.1240                               | 0.31                                                                                                      | 0.32                   |
|                            |            | 185                                           | 28.0                             | 84                             | 13620                           | 505                                                                                                           | 437           | 26.5                                           | 15.3                                               | 0.0991                               | 0.30                                                                                                      | 0.34                   |
|                            |            | 240                                           | 30.4                             | 89                             | 15900                           | 580                                                                                                           | 490           | 34.3                                           | 19.8                                               | 0.0754                               | 0.29                                                                                                      | 0.38                   |
|                            |            | 300                                           | 32.6                             | 95                             | 18470                           | 610                                                                                                           | 545           | 42.9                                           | 24.8                                               | 0.0601                               | 0.28                                                                                                      | 0.42                   |
| 400                        | 35.6       | 103                                           | 20240                            | 696                            | 645                             | 57.2                                                                                                          | 33.0          | 0.0470                                         | 0.27                                               | 0.46                                 |                                                                                                           |                        |
| 12/20                      | 24         | 35                                            | 21.2                             | 56.0                           | 6260                            | 172                                                                                                           | 170           | 5.0                                            | 2.9                                                | 0.5240                               | 0.43                                                                                                      | 0.17                   |
|                            |            | 50                                            | 22.4                             | 59.0                           | 6980                            | 205                                                                                                           | 200           | 7.1                                            | 4.1                                                | 0.3870                               | 0.41                                                                                                      | 0.19                   |
|                            |            | 70                                            | 24.0                             | 63.0                           | 8100                            | 253                                                                                                           | 245           | 10.0                                           | 5.8                                                | 0.2680                               | 0.37                                                                                                      | 0.21                   |
|                            |            | 95                                            | 25.8                             | 67.0                           | 10300                           | 307                                                                                                           | 293           | 13.6                                           | 7.8                                                | 0.1930                               | 0.36                                                                                                      | 0.23                   |
|                            |            | 120                                           | 27.2                             | 70.5                           | 11500                           | 352                                                                                                           | 333           | 17.2                                           | 9.9                                                | 0.1530                               | 0.34                                                                                                      | 0.25                   |
|                            |            | 150                                           | 28.7                             | 73.5                           | 12790                           | 396                                                                                                           | 373           | 21.4                                           | 12.3                                               | 0.1240                               | 0.33                                                                                                      | 0.27                   |
|                            |            | 185                                           | 30.4                             | 76.5                           | 14500                           | 469                                                                                                           | 421           | 26.5                                           | 15.3                                               | 0.0991                               | 0.32                                                                                                      | 0.28                   |
|                            |            | 240                                           | 32.8                             | 82.5                           | 16870                           | 549                                                                                                           | 486           | 34.3                                           | 19.8                                               | 0.0754                               | 0.31                                                                                                      | 0.32                   |
| 300                        | 35.0       | 88.5                                          | 19480                            | 625                            | 547                             | 42.9                                                                                                          | 24.8          | 0.0601                                         | 0.30                                               | 0.35                                 |                                                                                                           |                        |
| 18/30                      | 36         | 50                                            | 27.8                             | 86                             | 10410                           | 225                                                                                                           | 205           | 7.5                                            | 4.1                                                | 0.3870                               | 0.45                                                                                                      | 0.14                   |
|                            |            | 70                                            | 29.4                             | 90                             | 11630                           | 275                                                                                                           | 250           | 10.0                                           | 5.8                                                | 0.2680                               | 0.41                                                                                                      | 0.16                   |
|                            |            | 95                                            | 31.2                             | 95                             | 13210                           | 330                                                                                                           | 300           | 13.6                                           | 7.8                                                | 0.1930                               | 0.39                                                                                                      | 0.18                   |
|                            |            | 120                                           | 32.6                             | 98                             | 14500                           | 380                                                                                                           | 335           | 17.2                                           | 9.9                                                | 0.1530                               | 0.38                                                                                                      | 0.19                   |
|                            |            | 150                                           | 34.1                             | 102                            | 15880                           | 425                                                                                                           | 375           | 21.5                                           | 12.3                                               | 0.1240                               | 0.36                                                                                                      | 0.20                   |
|                            |            | 185                                           | 35.8                             | 106                            | 17740                           | 485                                                                                                           | 420           | 26.5                                           | 15.3                                               | 0.0991                               | 0.35                                                                                                      | 0.21                   |
|                            |            | 240                                           | 38.2                             | 111                            | 20180                           | 570                                                                                                           | 485           | 34.3                                           | 19.8                                               | 0.0754                               | 0.34                                                                                                      | 0.24                   |
|                            |            | 300                                           | 40.4                             | 117                            | 22920                           | 640                                                                                                           | 540           | 42.9                                           | 24.8                                               | 0.0601                               | 0.32                                                                                                      | 0.25                   |

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Aluminium conductor constructions

| Voltage                    |            | Conductor cross-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity  |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance <br>(mH/km) | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                               |                                  |                                |                                 | In air<br>(A)                                                                                                 | Buried<br>(A) |                                                |                                                    |                                      |                                                                                                           |                        |
| Aluminium conductor        |            |                                               |                                  |                                |                                 |                                                                                                               |               |                                                |                                                    |                                      |                                                                                                           |                        |
| 3.6/6                      | 7.2        | 25                                            | 13.8                             | 48                             | 3480                            | 110                                                                                                           | 103           | 2.4                                            | 1.3                                                | 1.2000                               | 0.38                                                                                                      | 0.27                   |
|                            |            | 35                                            | 14.8                             | 49                             | 3680                            | 135                                                                                                           | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.36                                                                                                      | 0.30                   |
|                            |            | 50                                            | 16.0                             | 52                             | 4120                            | 160                                                                                                           | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.35                                                                                                      | 0.33                   |
|                            |            | 70                                            | 17.6                             | 56                             | 4680                            | 200                                                                                                           | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.32                                                                                                      | 0.38                   |
|                            |            | 95                                            | 19.4                             | 60                             | 5440                            | 240                                                                                                           | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.30                                                                                                      | 0.42                   |
|                            |            | 120                                           | 20.8                             | 64                             | 6050                            | 280                                                                                                           | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.29                                                                                                      | 0.47                   |
|                            |            | 150                                           | 22.3                             | 68                             | 6680                            | 315                                                                                                           | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.29                                                                                                      | 0.51                   |
|                            |            | 185                                           | 23.8                             | 72                             | 7540                            | 360                                                                                                           | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.28                                                                                                      | 0.55                   |
|                            |            | 240                                           | 26.6                             | 79                             | 9520                            | 425                                                                                                           | 340           | 22.7                                           | 13.0                                               | 0.1250                               | 0.27                                                                                                      | 0.60                   |
|                            |            | 300                                           | 28.6                             | 86                             | 10980                           | 485                                                                                                           | 405           | 28.3                                           | 16.3                                               | 0.1000                               | 0.26                                                                                                      | 0.63                   |
|                            |            | 400                                           | 32.6                             | 90                             | 11740                           | 545                                                                                                           | 451           | 37.8                                           | 21.8                                               | 0.0778                               | 0.26                                                                                                      | 0.66                   |
| 6/10                       | 12         | 25                                            | 15.6                             | 52                             | 3820                            | 110                                                                                                           | 111           | 2.4                                            | 1.3                                                | 1.2000                               | 0.40                                                                                                      | 0.22                   |
|                            |            | 35                                            | 16.6                             | 54                             | 4080                            | 135                                                                                                           | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.39                                                                                                      | 0.24                   |
|                            |            | 50                                            | 17.8                             | 57                             | 4500                            | 160                                                                                                           | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.37                                                                                                      | 0.26                   |
|                            |            | 70                                            | 19.4                             | 61                             | 5110                            | 200                                                                                                           | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.34                                                                                                      | 0.30                   |
|                            |            | 95                                            | 21.2                             | 65                             | 5840                            | 240                                                                                                           | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.32                                                                                                      | 0.33                   |
|                            |            | 120                                           | 22.6                             | 69                             | 6500                            | 280                                                                                                           | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.31                                                                                                      | 0.37                   |
|                            |            | 150                                           | 24.1                             | 74                             | 7900                            | 315                                                                                                           | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.30                                                                                                      | 0.39                   |
|                            |            | 185                                           | 25.8                             | 78                             | 8800                            | 360                                                                                                           | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.29                                                                                                      | 0.43                   |
|                            |            | 240                                           | 28.2                             | 83                             | 9940                            | 425                                                                                                           | 370           | 22.7                                           | 13.0                                               | 0.1250                               | 0.28                                                                                                      | 0.47                   |
|                            |            | 300                                           | 30.4                             | 89                             | 11240                           | 485                                                                                                           | 425           | 28.3                                           | 16.3                                               | 0.1000                               | 0.27                                                                                                      | 0.53                   |
|                            |            | 400                                           | 33.4                             | 92                             | 12930                           | 562                                                                                                           | 487           | 37.8                                           | 21.8                                               | 0.0778                               | 0.26                                                                                                      | 0.59                   |
| 8.7/15                     | 17.5       | 25                                            | 17.8                             | 58                             | 4670                            | 110                                                                                                           | 110           | 2.4                                            | 1.3                                                | 1.2000                               | 0.43                                                                                                      | 0.18                   |
|                            |            | 35                                            | 18.8                             | 60                             | 4930                            | 135                                                                                                           | 130           | 3.3                                            | 1.9                                                | 0.8680                               | 0.41                                                                                                      | 0.19                   |
|                            |            | 50                                            | 20.0                             | 63                             | 5420                            | 160                                                                                                           | 155           | 4.7                                            | 2.7                                                | 0.6410                               | 0.39                                                                                                      | 0.21                   |
|                            |            | 70                                            | 21.6                             | 67                             | 6030                            | 200                                                                                                           | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.36                                                                                                      | 0.24                   |
|                            |            | 95                                            | 23.4                             | 71                             | 6840                            | 240                                                                                                           | 225           | 9.0                                            | 5.1                                                | 0.3200                               | 0.34                                                                                                      | 0.27                   |
|                            |            | 120                                           | 24.8                             | 76                             | 8320                            | 280                                                                                                           | 260           | 11.3                                           | 6.5                                                | 0.2530                               | 0.33                                                                                                      | 0.29                   |
|                            |            | 150                                           | 26.3                             | 80                             | 9050                            | 315                                                                                                           | 290           | 14.2                                           | 8.1                                                | 0.2060                               | 0.32                                                                                                      | 0.31                   |
|                            |            | 185                                           | 28.0                             | 84                             | 10000                           | 360                                                                                                           | 325           | 17.5                                           | 10.0                                               | 0.1640                               | 0.31                                                                                                      | 0.34                   |
|                            |            | 240                                           | 30.4                             | 89                             | 11220                           | 425                                                                                                           | 370           | 22.7                                           | 13.0                                               | 0.1250                               | 0.30                                                                                                      | 0.37                   |
|                            |            | 300                                           | 32.6                             | 95                             | 12590                           | 485                                                                                                           | 425           | 28.3                                           | 16.3                                               | 0.1000                               | 0.29                                                                                                      | 0.42                   |
|                            |            | 400                                           | 35.6                             | 103                            | 13010                           | 562                                                                                                           | 487           | 37.8                                           | 21.8                                               | 0.0778                               | 0.27                                                                                                      | 0.46                   |

| Voltage                    |            | Conductor cross-section<br>(mm <sup>2</sup> ) | Diameter over insulation<br>(mm) | Approx. outer diameter<br>(mm) | Approx. weight B-PVC<br>(kg/km) | Current carrying capacity  |               | Cond. max. short-circuit current, t=1s<br>(kA) | Max symmetrical short-circuit for 3 second<br>(kA) | Cond. DC resistance @ 20°C<br>(Ω/km) | Inductance <br>(mH/km) | Capacitance<br>(μF/km) |
|----------------------------|------------|-----------------------------------------------|----------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|----------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------|
| U <sub>0</sub> / U<br>(kV) | Um<br>(kV) |                                               |                                  |                                |                                 | In air<br>(A)                                                                                                 | Buried<br>(A) |                                                |                                                    |                                      |                                                                                                           |                        |
| Aluminium conductor        |            |                                               |                                  |                                |                                 |                                                                                                               |               |                                                |                                                    |                                      |                                                                                                           |                        |
| 12/20                      | 24         | 35                                            | 21.2                             | 56.0                           | 5630                            | 136                                                                                                           | 132           | 3.3                                            | 1.9                                                | 0.8680                               | 0.43                                                                                                      | 0.17                   |
|                            |            | 50                                            | 22.4                             | 58.5                           | 6100                            | 162                                                                                                           | 156           | 4.7                                            | 2.7                                                | 0.6410                               | 0.41                                                                                                      | 0.18                   |
|                            |            | 70                                            | 24.0                             | 62.5                           | 6830                            | 200                                                                                                           | 190           | 6.6                                            | 3.8                                                | 0.4430                               | 0.38                                                                                                      | 0.21                   |
|                            |            | 95                                            | 25.8                             | 66.5                           | 8540                            | 242                                                                                                           | 227           | 9.0                                            | 5.1                                                | 0.3200                               | 0.36                                                                                                      | 0.23                   |
|                            |            | 120                                           | 27.2                             | 70.5                           | 9270                            | 278                                                                                                           | 259           | 11.3                                           | 6.5                                                | 0.2530                               | 0.34                                                                                                      | 0.25                   |
|                            |            | 150                                           | 28.7                             | 73.5                           | 10060                           | 313                                                                                                           | 289           | 14.2                                           | 8.1                                                | 0.2060                               | 0.33                                                                                                      | 0.27                   |
|                            |            | 185                                           | 30.4                             | 76.5                           | 11070                           | 358                                                                                                           | 328           | 17.5                                           | 10.0                                               | 0.1640                               | 0.32                                                                                                      | 0.29                   |
|                            |            | 240                                           | 32.8                             | 82.5                           | 12370                           | 422                                                                                                           | 379           | 22.7                                           | 13.0                                               | 0.1250                               | 0.31                                                                                                      | 0.32                   |
|                            |            | 300                                           | 35.0                             | 88.5                           | 13830                           | 481                                                                                                           | 427           | 28.3                                           | 16.3                                               | 0.1000                               | 0.30                                                                                                      | 0.35                   |
| 18/30                      | 36         | 50                                            | 27.8                             | 86                             | 9490                            | 175                                                                                                           | 160           | 4.7                                            | 2.7                                                | 0.6410                               | 0.45                                                                                                      | 0.16                   |
|                            |            | 70                                            | 29.4                             | 90                             | 10310                           | 215                                                                                                           | 195           | 6.6                                            | 3.8                                                | 0.4430                               | 0.43                                                                                                      | 0.17                   |
|                            |            | 95                                            | 31.2                             | 95                             | 11380                           | 260                                                                                                           | 230           | 9.0                                            | 5.1                                                | 0.3200                               | 0.41                                                                                                      | 0.19                   |
|                            |            | 120                                           | 32.6                             | 98                             | 12190                           | 295                                                                                                           | 265           | 11.3                                           | 6.5                                                | 0.2530                               | 0.39                                                                                                      | 0.20                   |
|                            |            | 150                                           | 34.1                             | 102                            | 13040                           | 335                                                                                                           | 295           | 14.2                                           | 8.1                                                | 0.2060                               | 0.38                                                                                                      | 0.22                   |
|                            |            | 185                                           | 35.8                             | 106                            | 14130                           | 380                                                                                                           | 330           | 17.5                                           | 10.0                                               | 0.1640                               | 0.36                                                                                                      | 0.23                   |
|                            |            | 240                                           | 38.2                             | 111                            | 15500                           | 445                                                                                                           | 380           | 22.7                                           | 13.0                                               | 0.1250                               | 0.35                                                                                                      | 0.25                   |
|                            |            | 300                                           | 40.4                             | 117                            | 17050                           | 480                                                                                                           | 444           | 28.3                                           | 16.3                                               | 0.1000                               | 0.32                                                                                                      | 0.26                   |

\*Only for steel tape armoured or SWA cables.  
Current carrying capacity calculated considering the following conditions:  
Maximum conductor temperature = 90°C  
Cables in air: Ambient temperature = 30°C  
Cables directly buried: Ground temperature = 15°C   • Depth of laying = 0.5 m   • Thermal resistivity of soil = 1.5 K.m/W

APPLICATION

Three single-core cables pre-assembled without messenger, for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV. Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.

CABLE DESIGNATION

- Cu / XLPE / Cu Tape screen / PVC or PE
- Cu / XLPE / Cu Wire screen / PVC or PE
- Al / XLPE / Cu Tape screen / PVC or PE
- Al / XLPE / Cu Wire screen / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor. XLPE (cross-linked polyethylene) insulation and Semi-conductive screen over the insulation (strippable<sup>1</sup>), applied by simultaneous extrusion in just one operation.

Metallic Screen

- Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.  
Poly Propylene tape is applied over the screen.
- Or Copper tape screen – a copper tape, helically applied with overlap.

Oversheath

Extruded PVC type ST2 or PE type ST7.





GENERAL CHARACTERISTICS

|                                                   |                                                                                            |
|---------------------------------------------------|--------------------------------------------------------------------------------------------|
| Construction and test standards                   | IEC 60228<br>IEC 60502-2 · HD 620 S2                                                       |
| Rated voltage U <sub>0</sub> / U(Um)              | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV · 12/20 (24) kV · 18/30 (36) kV           |
| Standard cross-section of wire screen (mm²)       | 16 · 25 · 35                                                                               |
| Test voltage                                      | 3.5 x U <sub>0</sub>                                                                       |
| Conductor maximum operating temperature           | 90°C                                                                                       |
| Maximum short-circuit temperature                 | 250°C (t ≤ 5s)                                                                             |
| Minimum bending radius – during installation (mm) | 12 x D                                                                                     |
| Minimum bending radius – after installation (mm)  | 9 x D                                                                                      |
| Maximum pulling force over conductor (N)          | Copper – 50 x S<br>Aluminium – 30 x S                                                      |
| Flame retardant (for PVC oversheath)              | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm). |

s – conductor cross-section (mm²)  
d– diameter over the three cores aprox. 2.16 x d  
d-single core outer diameter (mm)

APPLICATION

Three single-core cables pre-assembled with steel messenger, for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV, Suitable for aerial installations.

CABLE DESIGNATION

Al / XLPE / Cu Tape screen / PVC or PE + Messenger  
Al / XLPE / Cu Wire screen / PVC or PE + Messenger

CONSTRUCTION CHARACTERISTICS

**Conductor**  
Aluminium conductor, circular, stranded, class 2 per IEC 60288.

**Insulation**  
Semi-conductive screen over the conductor. XLPE (cross-linked polyethylene) insulation and Semi-conductive screen over the insulation (strippable), applied by simultaneous extrusion in just one operation.

**Metallic Screen**  
**Copper wire screen** – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix. Cross-section area of screen according to client request.  
A wrapping Poly Propylene tape is applied over the screen.  
Or **Copper tape screen** – a copper tape. helically applied with overlap.

**Oversheath**  
Extruded PVC type ST2, or PE type ST7.



GENERAL CHARACTERISTICS

|                                                   |                                                                                            |
|---------------------------------------------------|--------------------------------------------------------------------------------------------|
| Construction and test standards                   | IEC 60228<br>IEC 60502-2 · HD 620 S2                                                       |
| Rated voltage $U_0/ U(Um)$                        | 3.6/6 (7.2) kV · 6/10 (12) kV · 8.7/15 (17.5) kV · 12/20 (24) kV · 18/30 (36) kV           |
| Standard cross-section of wire screen (mm²)       | 16 · 25 · 35                                                                               |
| Test voltage                                      | 3,5 x $U_0$                                                                                |
| Conductor maximum operating temperature           | 90°C                                                                                       |
| Maximum short-circuit temperature                 | 250°C (t ≤ 5s)                                                                             |
| Minimum bending radius – during installation (mm) | 12 x D                                                                                     |
| Minimum bending radius – after installation (mm)  | 9 x D                                                                                      |
| Maximum pulling force over conductor (N)          | Copper – 50 x S<br>Aluminium – 30 x S                                                      |
| Flame retardant (for PVC oversheath)              | IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm). |

s – conductor cross-section (mm²)  
d – diameter over the three cores aprox. 2.16 x d  
d-single core cable outer diameter (mm)





WAPDA SPECIFICATION CONDUCTORS

- All Aluminium Conductor(AAC)
- All Aluminium Alloy Conductor (AAAC)
- Aluminium Conductor Steel Reinforced-BS(ACSR)
- Aluminium Conductor Steel Reinforced-US(ACSR)
- AAC Insulated Conductor
- ACSR Insulated Conductor
- Factors for AAC Conductor
- Factors for ACSR Conductor



WAPDA SPECIFICATION OVERHEAD CONDUCTORS AAC P-63  
All Aluminium Conductor (AAC) P-63

| Code name | Nominal Size    | Strands and wire diameter | Dia of complete conductor | Calculated area of complete conductor | Ultimate strength | Maximum D.C resistance at 20° C | Weight |
|-----------|-----------------|---------------------------|---------------------------|---------------------------------------|-------------------|---------------------------------|--------|
|           | mm <sup>2</sup> | No/mm                     | mm                        | mm <sup>2</sup>                       | Kg                | Ohms/km                         | Kg/km  |
| Gant      | 25              | 7/2.21                    | 6.63                      | 26.85                                 | 469               | 1.0661                          | 73.4   |
| Ant       | 50              | 7/3.10                    | 9.30                      | 52.83                                 | 847               | 0.5419                          | 144.4  |
| Wasp      | 100             | 7/4.39                    | 13.17                     | 105.95                                | 1633              | 0.2702                          | 290.1  |
| Arbutus   | 400             | 37/3.72                   | 26.06                     | 402.14                                | 6304              | 0.0717                          | 1108.7 |
| Hawthorn  | 600             | 61/3.55                   | 31.95                     | 603.78                                | 8966              | 0.0479                          | 1668.1 |
| Coreopsis | 810             | 61/4.11                   | 36.99                     | 1075.06                               | 13670             | 0.0356                          | 2241.0 |

All Aluminium Alloy Conductor (AAAC) P-117-79

| Code name | Stranding and wire diameter | Dia of complete conductor | Calculated area of complete conductor | Rated ultimate strength | (Max.) D.C. resistance at 20°C | Weight |
|-----------|-----------------------------|---------------------------|---------------------------------------|-------------------------|--------------------------------|--------|
|           | No/mm                       | mm                        | mm <sup>2</sup>                       | kg                      | Ohms/km                        | Kg/km  |
| Almond    | 7/2.34                      | 7.02                      | 30.10                                 | 903                     | 1.094                          | 82     |
| Azoza     | 7/3.37                      | 10.11                     | 62.44                                 | 1873                    | 0.527                          | 171    |
| Alliance  | 7/4.77                      | 14.30                     | 125.09                                | 3753                    | 0.263                          | 342    |
| Cairo     | 19/3.98                     | 19.90                     | 236.38                                | 7091                    | 0.1740                         | 650    |
| Greely    | 37/4.02                     | 28.14                     | 469.60                                | 13835                   | 0.071                          | 1295   |



Aluminium Conductor Steel Reinforced(ACSR)P-50:88-BS

| Code name | Aluminium Conductor | Steel core | Diameter           |            | Cross Section Area |                    | Rated ultimate Tensile strength | Maximum D.C. resistance at 20 °C | Weight |
|-----------|---------------------|------------|--------------------|------------|--------------------|--------------------|---------------------------------|----------------------------------|--------|
|           |                     |            | Complete conductor | Steel core | Aluminium          | Complete conductor |                                 |                                  |        |
|           | no/mm               | no/mm      | mm                 | mm         | mm <sup>2</sup>    | mm <sup>2</sup>    | kg                              | Ohms/km                          | Kg/km  |
| Gopher    | 6/2.36              | 1/2.36     | 7.08               | 2.36       | 26.25              | 30.62              | 980                             | 1.093                            | 106    |
| Rabbit    | 6/2.35              | 1/3.35     | 10.05              | 3.35       | 52.88              | 61.69              | 1875                            | 0.543                            | 214    |
| Dog       | 6/4.72              | 7/1.57     | 14.15              | 4.71       | 104.98             | 118.53             | 3225                            | 0.273                            | 394    |
| Lynx      | 30/2.79             | 7/2.79     | 19.53              | 8.37       | 183.41             | 226.20             | 8192                            | 0.158                            | 842    |
| Cuckoo    | 24/4.62             | 7/3.08     | 27.72              | 9.24       | 402.33             | 454.48             | 12385                           | 0.072                            | 1519   |
| Rail      | 45/3.70             | 7/2.47     | 29.61              | 7.41       | 483.84             | 517.38             | 11874                           | 0.060                            | 1599   |
| Cardinal  | 54/3.38             | 7/3.38     | 30.42              | 10.14      | 484.50             | 547.30             | 15262                           | 0.060                            | 1832   |

Aluminium Conductor Steel Reinforced(ACSR)DD-PDS-7/US

| Code name | Aluminium Conductor | Steel core | Diameter           |            | Cross Section Area |                 | Rated ultimate Tensile strength | Maximum D.C. resistance at 20 °C | Weight |
|-----------|---------------------|------------|--------------------|------------|--------------------|-----------------|---------------------------------|----------------------------------|--------|
|           |                     |            | Complete conductor | Steel core | Aluminium          | Steel           |                                 |                                  |        |
|           | no/mm               | no/mm      | mm                 | mm         | mm <sup>2</sup>    | mm <sup>2</sup> | kg                              | Ohms/km                          | Kg/km  |
| Merlin    | 18/3.47             | 1/3.47     | 17.35              | 3.47       | 170.5              | 9.46            | 3936                            | 0.1691                           | 544    |
| Panther   | 30/3.00             | 7/3.00     | 21.00              | 9.00       | 212.1              | 49.48           | 9407                            | 0.1363                           | 974    |
| Osprey    | 18/4.465            | 1/4.465    | 22.35              | 4.465      | 281.9              | 15.66           | 6220                            | 0.1022                           | 898.8  |

PVC-Covered Conductors For Overhead Power Lines  
AAC Insulated Conductors DD - PD 44 : 91

| 1         | 2                      | 3                           | 4                                            | 5                                | 6                               | 7                                               | 8                                            |
|-----------|------------------------|-----------------------------|----------------------------------------------|----------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------|
| Code name | Nominal aluminium area | Stranding and wire diameter | Approximate over all diameter bare conductor | Resistance per km at 20 °C (max) | Approximate breaking load (min) | Approximate over all diameter covered conductor | Approximate mass per km of covered conductor |
|           | mm <sup>2</sup>        | mm                          | mm                                           | Ohms/ km                         | kg                              | mm                                              | Kg                                           |
| Gnat      | 25                     | 7/2.21                      | 06.63                                        | 1.0661                           | 469                             | 10.63                                           | 170                                          |
| Ant       | 50                     | 7/3.10                      | 09.30                                        | 0.5419                           | 847                             | 13.70                                           | 285                                          |
| Wasp      | 100                    | 7/4.39                      | 13.17                                        | 0.2702                           | 1633                            | 18.37                                           | 520                                          |

PVC Covered Aluminium Conductors  
Steel Reinforced  
ACSR Insulated Conductors DD - PD 67 : 95

| 1         | 2                      | 3                           | 4       | 5                                            | 6                                | 7                               | 8                                               | 9                                            |
|-----------|------------------------|-----------------------------|---------|----------------------------------------------|----------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------|
| Code name | Nominal aluminium area | Stranding and wire diameter |         | Approximate over all diameter bare conductor | Resistance per km at 20 °C (max) | Approximate breaking load (min) | Approximate over all diameter covered conductor | Approximate mass per km of covered conductor |
|           |                        | Aluminium                   | Steel   |                                              |                                  |                                 |                                                 |                                              |
|           | mm <sup>2</sup>        | mm                          | mm      | mm                                           | Ohms/ km                         | kg                              | mm                                              | Kg                                           |
| Gopher    | 25                     | 6/2.36                      | 1/2.36  | 7.08                                         | 1.0930                           | 980                             | 11.1                                            | 210                                          |
| Rabbit    | 50                     | 6/3.35                      | 1/3.35  | 10.05                                        | 0.5426                           | 1875                            | 14.1                                            | 345                                          |
| Dog       | 100                    | 6/4.72                      | 7/1.57  | 14.15                                        | 0.2733                           | 3225                            | 18.2                                            | 570                                          |
| Lynx      | 175                    | 30/2.79                     | 7/2.79  | 19.53                                        | 0.1576                           | 8192                            | 23.6                                            | 1070                                         |
| Panther   | 200                    | 30/3.00                     | 7/3.00  | 21.00                                        | 0.1363                           | 9407                            | 25.0                                            | 1220                                         |
| Osprey    | 275                    | 18/4.465                    | 1/4.465 | 22.33                                        | 0.1022                           | 6220                            | 26.4                                            | 1160                                         |



Factors for AAC Conductors

| Number of wires in conductor | Standing Constant |            |
|------------------------------|-------------------|------------|
|                              | Weight            | Resistance |
| 7                            | 7.091             | 0.14470    |
| 19                           | 19.34             | 0.05357    |
| 37                           | 37.74             | 0.02757    |
| 61                           | 62.35             | 0.01676    |

Factors for ACSR Conductors

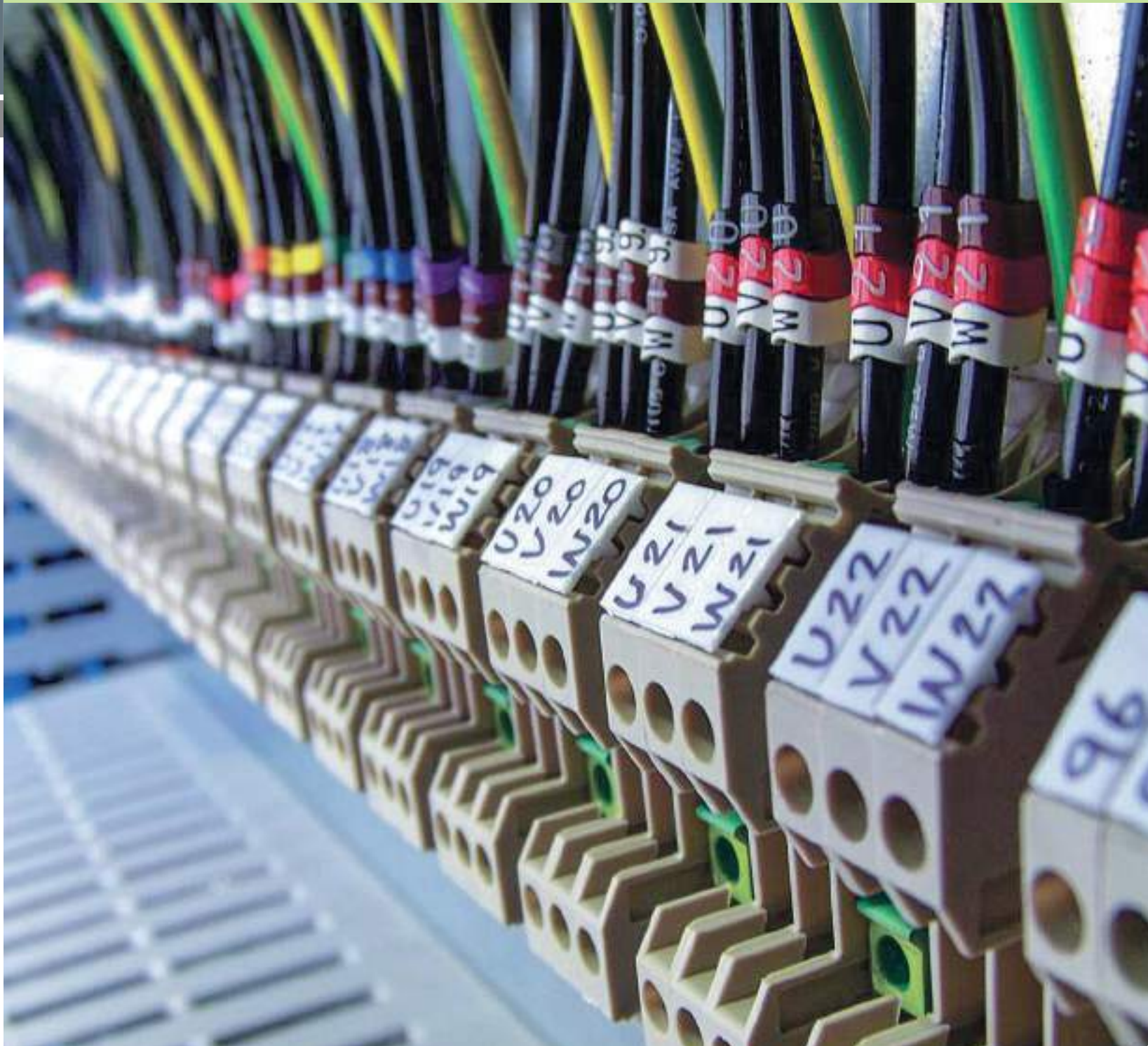
| No. of wires in conductor |       | Weight    |       | Electrical Resistance |
|---------------------------|-------|-----------|-------|-----------------------|
| Aluminium                 | Steel | Aluminium | Steel |                       |
| 6                         | 1     | 6.091     | 1.000 | 0.1692                |
| 6                         | 7     | 6.091     | 7.032 | 0.1692                |
| 12                        | 7     | 12.26     | 7.032 | 0.08514               |
| 18                        | 1     | 18.34     | 1.000 | 0.05660               |
| 24                        | 7     | 24.50     | 7.032 | 0.04253               |
| 26                        | 7     | 26.56     | 7.032 | 0.03928               |
| 28                        | 7     | 28.61     | 7.032 | 0.03649               |
| 30                        | 7     | 30.67     | 7.032 | 0.03408               |
| 30                        | 19    | 30.67     | 19.15 | 0.03408               |
| 32                        | 19    | 32.66     | 19.15 | 0.03180               |
| 45                        | 7     | 45.98     | 7.032 | 0.02271               |
| 54                        | 7     | 55.23     | 7.032 | 0.01894               |
| 54                        | 19    | 55.23     | 19.15 | 0.01894               |

| Correction Factor for AAC,ACSR,AAAC Conductors |                               |
|------------------------------------------------|-------------------------------|
| Ambient Temperature (°C )                      | Correction factor (mutiplied) |
| 55                                             | 0.91                          |
| 50                                             | 1                             |
| 45                                             | 1.08                          |
| 40                                             | 1.15                          |
| 35                                             | 1.22                          |
| 30                                             | 1.29                          |
| 25                                             | 1.35                          |
| 20                                             | 1.41                          |
| 15                                             | 1.47                          |
| 10                                             | 1.52                          |
| 5                                              | 1.58                          |
| 0                                              | 1.63                          |
| -5                                             | 1.68                          |

Note : Conductor Operating Temperature = 80° C Maximum

| Correction Factor for AAC,ACSR,AAAC Conductors |                               |
|------------------------------------------------|-------------------------------|
| Ambient Temperature (°C )                      | Correction factor (mutiplied) |
| 55                                             | 0.89                          |
| 50                                             | 1                             |
| 45                                             | 1.10                          |
| 40                                             | 1.18                          |
| 35                                             | 1.26                          |
| 30                                             | 1.34                          |
| 25                                             | 1.41                          |
| 20                                             | 1.48                          |
| 15                                             | 1.55                          |
| 10                                             | 1.61                          |
| 5                                              | 1.67                          |
| 0                                              | 1.73                          |
| -5                                             | 1.79                          |

Note : Conductor Operating Temperature = 75° C Maximum



PROPERTIES OF ELECTRICITY

Conductance

Electricity is a subject that is frequently explained in terms of opposites. The term that is exactly the opposite of resistance is conductance. Conductance is the ability of a material to pass electrons. The unit of conductance is the mho or ohm spelled backwards. Whereas the symbol used to represent resistance is the Greek letter omega ( $\Omega$ ), the symbol used to represent conductance is the Greek letter omega upside down ( $\Uparrow$ ). The relationship that exists between resistance and conductance is reciprocal. A reciprocal of a number is obtained by dividing the number into one. In terms of resistance and conductance:

$$G = \frac{1}{R} \quad \text{or} \quad R = \frac{1}{G}$$

If the resistance of material is known, dividing its value into one will give its conductance. Similarly, if the conductance is known, dividing its value into one will give its resistance. The relative conductance of several conductors of the same length and cross section is given below with copper as a standard of 100 and the remaining metals arranged in order of descending conductance.

|                        |     |
|------------------------|-----|
| Silver.....            | 106 |
| Copper.....            | 100 |
| Copper hard drawn..... | 97  |
| Gold.....              | 78  |
| Aluminium.....         | 61  |
| Mild Steel.....        | 12  |
| Lead.....              | 8   |

Resistivity (P) and Conductivity (Y)

The resistivity P of a material is its ability to oppose the passage of electric current. Thus, if a conductor has resistance (R) , length (L), and cross sectional area A, its resistivity is expressed as:

$$P = \frac{RA}{L}$$

Conductivity is the reciprocal of resistivity.  
A substance that has a high resistivity will have a low conductivity, and vice versa.  
Thus, if a conductor has conductance G, length L, and cross-sectional area A,

$$Y = \frac{GL}{A}$$

Inductance (L) and Capacitance (C)

Inductance is the property of an electric circuit that opposes any change in the current through the circuit. That is, if the current increases, a self-induced voltage opposes the change. If current decreases, a self-induced voltage tends to prolong the current flow. The unit for measuring inductance is the henry (H). A henry is the unit employed when the induced electromotive force of one volt is produced by the inducing current changing at the rate of one ampere per second.

Capacitance, on the other hand, is the property of an electric circuit that opposes any change in the circuit, That if applied voltage is increased, capacitance opposes the change and delays the voltage increase across the circuit. The unit of measuring capacitance is the farad (F).

Reactance (X)

If the current applied to the circuit is not dc, the opposition is referred to as inductive reactance  $X_L$ . If on the other hand, the opposition is to the applied alternating EMF or voltage, it is referred to as capacitive reactance  $X_C$ . Total Reactance X equals the sum of inductive and capacitive reactance,  $X_L + X_C$ .  
Alternating current and voltage are in phase only in a circuit containing pure resistance. Current lags voltage by 90 degrees in a pure inductive circuit and leads voltage by 90 degrees in a pure capacitive circuit.

Impedance (Z)

Impedance is the total opposition to the flow of alternating current in a circuit that contains both resistance R and reactance X. It is expressed in ohms as:

$$Z = \sqrt{R^2 + X^2}$$

Ohm's law for alternating current is similar to Ohm's law for direct current, with the difference that impedance is substituted for resistance in the formula:

$$E = IZ$$

A single-phase circuit is energized by a single alternating voltage. Two phase circuits are a combination of two circuits energized by alternating voltages differing in phase by 90 degrees. Three-phase circuits are a combination of three circuits energized by alternating voltages differing in phase by 120 degrees.

Electromotive Force

- Symbol: E or V
- Units:
- 1 Volt (V) =  $10^8$  egs electromagnetic units [abvolts]
  - = 0.0033356 egs electrostatic unit [stat volt]
  - = 0.99958 international volt
- 1 kilovolt [kV] = 1000 volts
- 1 millivolt [mv] = 0.001 volt

Current

|                    |                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------|
| Symbol:I           |                                                                                                            |
| Units:             |                                                                                                            |
| 1 ampere [amp]     | =0.1 egs electromagnetic unit [abampere]<br>=2.998 X 10 <sup>9</sup> egs electrostatic units [statamperes] |
| 1 milliampere [mA] | = 1.0001 O international amperes                                                                           |
| 1 microampere [uA] | =0.001 ampere<br>=0.001 milliampere<br>= 10 <sup>-6</sup> ampere [one millionth of an ampere]              |

Frequency

|                             |                                                                     |
|-----------------------------|---------------------------------------------------------------------|
| Symbol: f                   |                                                                     |
| Units:                      |                                                                     |
| 1 cycle per second [c]      |                                                                     |
| 1 kilocycle per second [kc] | = 1000 cycles per second                                            |
| 1 megacycle per second [mc] | = 1000 kilocycles per second<br>= 10 <sup>6</sup> cycles per second |

The quantity 2πf which appears often in electrical formulas, is represented by the symbol w. The following are useful values of w.

|           |                         |
|-----------|-------------------------|
| f         | w[=2πf]                 |
| 25        | 157                     |
| 50        | 314                     |
| 60        | 377                     |
| 1,000     | 6283                    |
| 1,000,000 | 6.283 X 10 <sup>6</sup> |

Power Factor

|                                                                                                                                                                                                            |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Symbol=pf                                                                                                                                                                                                  |  |
| The power factor of an alternating current is the cosine to the angle of phase difference between current and voltage. It can also be defined as the ratio of active power to apparent power in a circuit. |  |

pf=cosØ=P/S

Approx. Voltage Drop Per Amp Per Meter for XLPE Insulated Cables Using CU Conductors

|  |                                       |
|--|---------------------------------------|
|  | Ambient Temperature: 30°C             |
|  | Conductor Operating Temperature: 90°C |

Armoured

| Nominal area<br>of conductor | * Single core                              |                                            | Three core                                 |
|------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|
|                              | Two cables spaced                          | Three cable trefoil touching               | Approximate volt drop<br>per amp per meter |
|                              | Approximate volt drop<br>per amp per meter | Approximate volt drop<br>per amp per meter |                                            |
| mm²                          | mV/A/m                                     | mV/A/m                                     | mV/A/m                                     |
| 25                           | 0.85                                       | 0.74                                       | 0.83                                       |
| 35                           | 0.64                                       | 0.56                                       | 0.62                                       |
| 50                           | 0.5                                        | 0.44                                       | 0.48                                       |
| 70                           | 0.37                                       | 0.32                                       | 0.36                                       |
| 95                           | 0.3                                        | 0.26                                       | 0.28                                       |
| 120                          | 0.25                                       | 0.22                                       | 0.24                                       |
| 150                          | 0.22                                       | 0.19                                       | 0.21                                       |
| 185                          | 0.19                                       | 0.17                                       | 0.18                                       |
| 240                          | 0.16                                       | 0.14                                       | 0.15                                       |
| 300                          | 0.15                                       | 0.13                                       | 0.13                                       |
| 400                          | 0.13                                       | 0.11                                       | 0.12                                       |
| 500                          | 0.12                                       | 0.10                                       | -                                          |
| 630                          | 0.11                                       | 0.10                                       | -                                          |

|  |                                       |
|--|---------------------------------------|
|  | Ambient Temperature: 30°C             |
|  | Conductor Operating Temperature: 90°C |

Un-Armoured

| Nominal area<br>of conductor | * Single core                              |                                            | Three core                                 |
|------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|
|                              | Two cables spaced                          | Three cable trefoil touching               | Approximate volt drop<br>per amp per meter |
|                              | Approximate volt drop<br>per amp per meter | Approximate volt drop<br>per amp per meter |                                            |
| mm²                          | mV/A/m                                     | mV/A/m                                     | mV/A/m                                     |
| 25                           | 0.85                                       | 0.74                                       | 0.82                                       |
| 35                           | 0.64                                       | 0.56                                       | 0.61                                       |
| 50                           | 0.49                                       | 0.43                                       | 0.47                                       |
| 70                           | 0.37                                       | 0.32                                       | 0.35                                       |
| 95                           | 0.29                                       | 0.25                                       | 0.27                                       |
| 120                          | 0.25                                       | 0.22                                       | 0.22                                       |
| 150                          | 0.21                                       | 0.18                                       | 0.19                                       |
| 185                          | 0.19                                       | 0.17                                       | 0.17                                       |
| 240                          | 0.16                                       | 0.14                                       | 0.14                                       |
| 300                          | 0.14                                       | 0.12                                       | 0.12                                       |
| 400                          | 0.13                                       | 0.11                                       |                                            |
| 500                          | 0.11                                       | 0.10                                       | -                                          |
| 630                          | 0.10                                       | 0.09                                       | -                                          |

\*spacings larger than one cable diameter will result in a larger voltage drop.



Approx. Voltage Drop Per Amp Per Meter for XLPE Insulated Cables Using Al Conductors

Ambient Temperature: 30°C

Conductor Operating Temperature: 90°C

Armoured

| Nominal area<br>of conductor | * Single core                              |                                            | Three core |
|------------------------------|--------------------------------------------|--------------------------------------------|------------|
|                              | Two cables spaced                          | Three cable trefoil touching               |            |
|                              | Approximate volt drop<br>per amp per meter | Approximate volt drop<br>per amp per meter |            |
| mm²                          | mV/A/m                                     | mV/A/m                                     | mV/A/m     |
| 25                           | 1.34                                       | 1.17                                       | 1.32       |
| 35                           | 1.00                                       | 0.87                                       | 0.98       |
| 50                           | 0.76                                       | 0.66                                       | 0.74       |
| 70                           | 0.55                                       | 0.48                                       | 0.54       |
| 95                           | 0.43                                       | 0.38                                       | 0.41       |
| 120                          | 0.35                                       | 0.31                                       | 0.34       |
| 150                          | 0.30                                       | 0.26                                       | 0.29       |
| 185                          | 0.26                                       | 0.23                                       | 0.24       |
| 240                          | 0.21                                       | 0.18                                       | 0.20       |
| 300                          | 0.19                                       | 0.17                                       | 0.17       |
| 400                          | 0.16                                       | 0.14                                       | -          |
| 500                          | 0.14                                       | 0.12                                       | -          |
| 630                          | 0.13                                       | 0.11                                       | -          |

Ambient Temperature: 30°C

Conductor Operating Temperature: 90°C

Un-Armoured

| Nominal area<br>of conductor | * Single core                              |                                            | Three core |
|------------------------------|--------------------------------------------|--------------------------------------------|------------|
|                              | Two cables spaced                          | Three cable trefoil touching               |            |
|                              | Approximate volt drop<br>per amp per meter | Approximate volt drop<br>per amp per meter |            |
| mm²                          | mV/A/m                                     | mV/A/m                                     | mV/A/m     |
| 25                           | 1.34                                       | 1.17                                       | 1.31       |
| 35                           | 1.00                                       | 0.87                                       | 0.97       |
| 50                           | 0.76                                       | 0.66                                       | 0.73       |
| 70                           | 0.55                                       | 0.48                                       | 0.53       |
| 95                           | 0.42                                       | 0.37                                       | 0.40       |
| 120                          | 0.35                                       | 0.31                                       | 0.33       |
| 150                          | 0.30                                       | 0.26                                       | 0.28       |
| 185                          | 0.25                                       | 0.22                                       | 0.23       |
| 240                          | 0.21                                       | 0.18                                       | 0.19       |
| 300                          | 0.18                                       | 0.16                                       | 0.16       |
| 400                          | 0.16                                       | 0.14                                       | -          |
| 500                          | 0.14                                       | 0.12                                       | -          |
| 630                          | 0.12                                       | 0.10                                       | -          |

\*spacings larger than one cable diameter will result in a larger voltage drop.

Rating factors for ambient air temperatures other than 30°C to be applied to the current-carrying capacities for cables in free air, on tray & clipped directly

| Ambient<br>temperature (°C ) | Insulation            |
|------------------------------|-----------------------|
|                              | 90°C Thermoset (XLPE) |
| 10                           | 1.15                  |
| 15                           | 1.12                  |
| 20                           | 1.08                  |
| 25                           | 1.04                  |
| 30                           | 1                     |
| 35                           | 0.96                  |
| 40                           | 0.91                  |
| 45                           | 0.87                  |
| 50                           | 0.82                  |
| 55                           | 0.76                  |
| 60                           | 0.71                  |
| 65                           | 0.65                  |

Rating factors for ambient ground temperatures other than 20°C to be applied to the current-carrying capacities for cables burried direct in the ground or in an underground conduit system according to BS EN 50086-2-4

| Ambient<br>temperature (°C ) | Insulation            |
|------------------------------|-----------------------|
|                              | 90°C Thermoset (XLPE) |
| 10                           | 1.07                  |
| 15                           | 1.04                  |
| 20                           | 1.00                  |
| 25                           | 0.96                  |
| 30                           | 0.93                  |
| 35                           | 0.89                  |
| 40                           | 0.85                  |
| 45                           | 0.8                   |
| 50                           | 0.76                  |
| 55                           | 0.71                  |
| 60                           | 0.65                  |
| 65                           | 0.60                  |
| 70                           | 0.53                  |
| 75                           | 0.46                  |
| 80                           | 0.38                  |

Short Circuit Rating Copper Conductor

| Characteristics                                                                             | Annealed<br>Copper                                        | Hard drawn<br>Copper                        | Cadmium<br>Copper                           | Hard drawn<br>Aluminium                     | Aluminium Alloy<br>(in BS 3242)             | Galvanized<br>Steel           |
|---------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-------------------------------|
| Conductivity percent                                                                        | 100 (average)                                             | 97 (minimum)                                | 79.2 (minimum)                              | 61 (minimum)                                | 53.5                                        | -                             |
| Volume resistivity at 20°C<br>ohm-mm <sup>2</sup> /m<br>micro ohm/inch'                     | 0.017241 (std.)<br>0.67879                                | 0.01771 (avg.)<br>0.69712                   | 0.021769 (max.)<br>0.85705                  | 0.028264 (max.)<br>0.85705                  | 0.0322 (std.)<br>1.2677                     | -                             |
| Mass resistivity at 20°C<br>Ohm/gramme/m<br>ohm-pound/mile                                  | 0.15328<br>875.2                                          | 0.15741<br>898.83                           | 0.076398<br>436.23                          | 0.076398<br>436.23                          | 0.08694<br>496.42                           | -                             |
| Resistance at 20°C<br>ohm-mm <sup>2</sup> /km<br>ohm-inch'/1000 yards                       | 17.241<br>0.024437                                        | 17.71<br>0.025096                           | 28.264<br>0.040059                          | 28.264<br>0.040059                          | 32.2<br>0.045637                            | -                             |
| Density at 20°C<br>Grams/ cm                                                                | 8.89                                                      | 8.89                                        | 8.94                                        | 2.703                                       | 2.705                                       | 7.78                          |
| Weight<br>Kg/mm/km<br>Lb/inch'/1000 yards                                                   | 8.89<br>11562                                             | 8.89<br>11562                               | 2.703<br>3516                               | 2.703<br>3516                               | 2.705<br>3518                               | 7.78<br>11562                 |
| Temperature coefficient<br>of resistance<br>at 20°C (68 F) per °C                           | 0.00393                                                   | 0.00381                                     | 0.00403                                     | 0.00403                                     | 0.0036                                      | -                             |
| Coefficient of linear<br>expansion at 20°C (68°F)<br>per' F                                 | 17×10 <sup>2</sup><br>9.44 ×10 <sup>2</sup>               | 17×10 <sup>2</sup><br>9.44×10 <sup>2</sup>  | 23×10 <sup>2</sup><br>12.78×10 <sup>2</sup> | 23×10 <sup>2</sup><br>12.78×10 <sup>2</sup> | 12.78×10 <sup>2</sup><br>23×10 <sup>2</sup> | 11.510<br>64×10               |
| Ultimate tensile stress<br>(approximate<br>kgf / mm <sup>2</sup><br>lbf / inch <sup>2</sup> | 25.3<br>3600                                              | 42.2<br>60000                               | 16.5<br>23500                               | 16.5<br>23500                               | 18.9<br>26900                               | 136<br>195000                 |
| Modulus of elasticity<br>kgf / mm <sup>2</sup><br>lb / inch <sup>2</sup>                    | 9 to 10.5 × 10 <sup>2</sup><br>13 to 15 × 10 <sup>2</sup> | 12.66×10 <sup>2</sup><br>18×10 <sup>2</sup> | 6.96×10 <sup>2</sup><br>9.9×10 <sup>2</sup> | 6.96×10 <sup>2</sup><br>9.9×10 <sup>2</sup> | 7.0×10 <sup>2</sup><br>9.9×10 <sup>2</sup>  | 20.0×10 <sup>2</sup><br>28×10 |