**NA2XS(F)2Y/ N2XS(F)2Y 26/45(52) kV Cables**

**Applications**

This specification covers medium-voltage cables, for rating voltage of 26/45 kV, having XLPE (cross-linked polyethylene) insulation.

The cables covered by this specification are designed to be used mainly in utilities,

for transmission and distribution lines having working voltage 26/45 kV, for outdoor or indoor installation. They may be use at a maximum conductor working temperature of 90°C.

They may be used inside stations or sub-stations.

They may also be used in conjunction with overhead transmission lines.

**Mandatory conditions for the supply of cable manufactured abroad:**

- **Eur1 or U.S. Certificate of origin.**
- **An Israeli manufacturer is not obligated by this requirement.**

**1. Reference Standards and documents**

The cables covered by this specification are manufactured and tested as per the following references:

| | | |
|---|---|---|
| 2.1 | IEC 60840 | Power cables with extruded insulation and their accessories for rated voltagesabove 30 kV (Um = 36 kV) up to 150 kV (Um = 170 kV) – Test methods and requirements |
| 2.2 | HD 632 | Power cables with extruded insulation and their accessories for rated voltages above 36 kV (Um = 42 kV) up to 150 kV (Um = 170 kV) |
| 2.3 | IEC 60183 | Guidance for the selection of high-voltage A.C. cable systems |
| 2.4 | IEC 60228 | Conductors of insulated cables |
| 2.5 | IEC 60229 | Electric Cables – Tests on extruded oversheaths with a special protective function. |
| 2.6 | IEC 61443 | Short-circuits temperature limits of electric cables with rated voltages above 30kV(Um=36kV) |
| 2.7 | IEC 60811 series | Common test methods for insulation and sheathing materials of electrical and optical cables |

## 2. Medium-Voltage Cables Construction

### 2.1 Conductor

Conductors used in Medium-Voltage Cables construction are stranded from aluminum or copper wires. Conductors have a cross-sectional area up to and including 800 $mm^2$ and are class 2, compact-round stranded.

### 2.2 Conductor screen

An extruded layer of semi-conductive, cross-linked polymer, firmly bonded to the insulation, is applied over the conductor.

### 2.3 Insulation

An extruded layer of extra-clean XLPE (cross-linked polyethylene) is subsequently applied.

### 2.4 Insulation screen

An extruded layer of semi-conductive cross-linked polymer firmly bonded to the insulation. Note: Conductor screen, insulation and insulation screen are extruded in a single operation.

### 2.5 Metal screen

A semi-conductive tape is helically applied around the completed insulated core, as bedding between insulation screen and metal screen components.

Metal screen is built from copper round wires and copper equalizing tape.

### 2.6 Longitudinal water-blocking barrier

A semi-conductive and swelling tape is helically applied around the screened core.

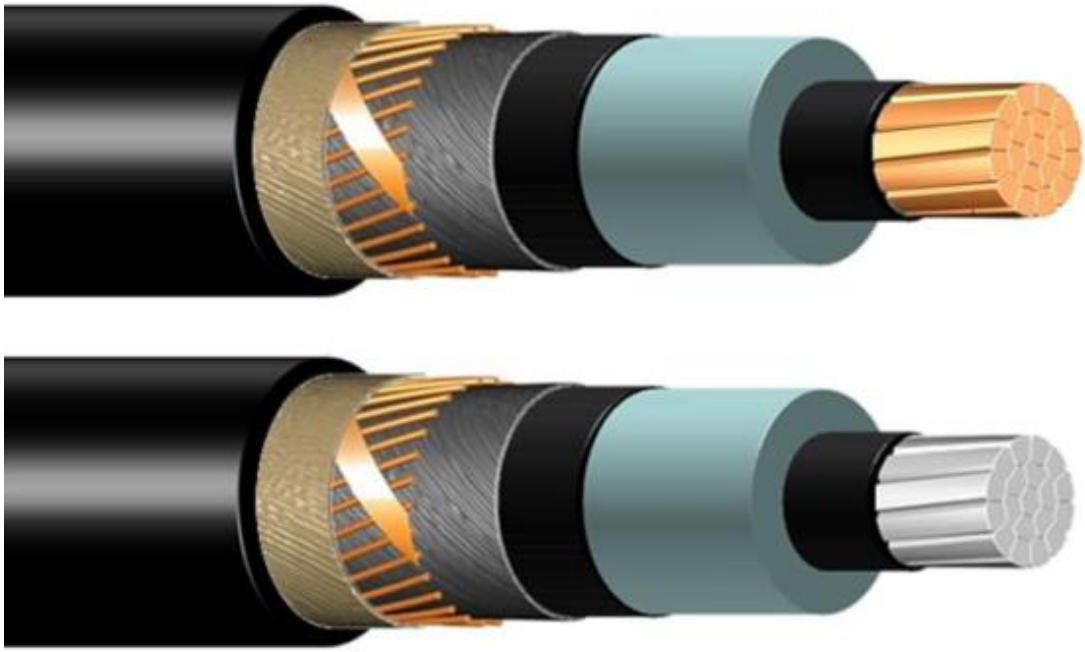
### 2.7 Outer protective sheath

A black HDPE sheath is extruded overall.

### 2.8 Constructive options

**Conductor:** water-blocked conductor

## Typical Drawing of Medium-Voltage Cables



## NA2XS(F)2Y 26/45(52) kV ALUMINUM CONDUCTOR

## Construction and Dimensional Data

| Conductor Cross-Sectional Area | Conductor dc resistance at 20°C (max.) | Conductor Diameter (Approx.) | Insulation Thickness (Nom.) | Metal Screen Cross-Sectional Area | Outer Protective Sheath Thickness (Nom.) | Overall Diameter | Min. Bending Radius - Static *(1)* | Min. Bending Radius - Dynamic *(2), (3)* | Completed Cable Weight (approx.) |
|---|---|---|---|---|---|---|---|---|---|
| mm² | - | mm | mm | mm² | mm | mm | mm | mm | kg/km |
| 150 | 0.206 | 14.5 | 10.5 | 25 | 2.5 | 46.5 | 700 | 1165 | 1,870 |
| 185 | 0.164 | 16.3 | 10.5 | 25 | 2.5 | 48.0 | 720 | 1200 | 2,045 |

*Remarks:*

*(1)– Minimum bending radius for permanent training;*

*(2)– Minimum bending radius for pulling in duct;*

*(3) – The sidewall pressure shall be kept below the value of 1000 daN/m (10 kN/m).*

## Continuous current ratings

| Conductor/ Metal Screen Cross-Sectional Area | Direct Buried, Touching-Trefoil *(1), (4), (7)* | Direct Buried, Spaced Flat-Parallel *(1), (5), (7)* | Buried in Ducts, Spaced Flat-Parallel *(2), (6), (7)* | In Free Air *(3), (4), (7)* | In Free Air *(3), (5), (7)* |
|---|---|---|---|---|---|
| mm² | A | A | A | A | A |
| 150/25 | 280 | 291 | 278 | 380 | 431 |
| 185/25 | 317 | 328 | 313 | 437 | 494 |

*Remarks:*

*(1)– Direct Buried, burial depth = 0.8 m, native soil thermal resistivity = 1.5 K*m/w, soil ambient temperature = 20°C;*

*(2)– Buried in single way ducts, burial depth = 0.8 m, native soil thermal resistivity = 1.5 K*m/w, soil ambient temperature = 20°C;*

*(3) – In Free Air, protected against direct sun radiation, ambient air temperature = 30°C*

*(4)- Touching-trefoil formation;*

*(5) – Flat-parallel formation, inter-axial spacing = 2 x D of the cable;*

*(6) – Flat-parallel formation, inter-axial spacing = 2 x D of the duct;*

*(7) – Conductor continuous working temperature = 90°C, metal screens bonded in multiple points.*

## Electrical parameters (Capacitance and Sequence Impedances)

| Conductor/ Metal Screen Cross-Sectional Area | Electrostatic Capacitance (Nom.) | **Touching Trefoil Formation** | | | | **Flat-Parallel Formation** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | R1 | X1 | R0 | X0 | R1 | X1 | R0 | X0 |
| mm² | µF/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km |
| 150/25 | 0.164 | 0.268 | 0.132 | 0.976 | 0.390 | 0.276 | 0.188 | 0.952 | 0.395 |
| 185/25 | 0.177 | 0.214 | 0.127 | 0.922 | 0.387 | 0.223 | 0.183 | 0.899 | 0.392 |

***Remarks:***

*Flat-parallel formation, inter-axial spacing = 2 x D of the cable;*

*Conductor continuous working temperature = 90°C, metal screens bonded in multiple points.*

## N2XS(F)2Y 26/45(52) kV COPPER CONDUCTOR

### Construction and Dimensional Data

| Conductor Cross-Sectional Area | Conductor dc resistance at 20°C (max.) | Conductor Diameter (Approx.) | Insulation Thickness (Nom.) | Metal Screen Cross-Sectional Area | Outer Protective Sheath Thickness (Nom.) | Overall Diameter | Min. Bending Radius - Static *(1)* | Min. Bending Radius - Dynamic *(2), (3)* | Completed Cable Weight (approx.) |
|---|---|---|---|---|---|---|---|---|---|
| mm² | - | mm | mm | mm² | mm | mm | mm | mm | kg/km |
| 95 | 0.193 | 11.7 | 10.5 | 25 | 2.5 | 43.5 | 655 | 1090 | 2,200 |

*Remarks:*

*(1)– Minimum bending radius for permanent training;*

*(2)– Minimum bending radius for pulling in duct;*

*(3) – The sidewall pressure shall be kept below the value of 1000 daN/m (10 kN/m).*

### Continuous current ratings

| Conductor/ Metal Screen Cross-Sectional Area | Direct Buried, Touching-Trefoil *(1), (4), (7)* | Direct Buried, Spaced Flat-Parallel *(1), (5), (7)* | Buried in Ducts, Spaced Flat-Parallel *(2), (6), (7)* | In Free Air *(3), (4), (7)* | In Free Air *(3), (5), (7)* |
|---|---|---|---|---|---|
| mm² | A | A | A | A | A |
| 95/25 | 285 | 295 | 282 | 377 | 425 |

*Remarks:*

*(1)– Direct Buried, burial depth = 0.8 m, native soil thermal resistivity = 1.5 K*m/w, soil ambient temperature = 20°C;*

*(2)– Buried in single way ducts, burial depth = 0.8 m, native soil thermal resistivity = 1.5 K*m/w, soil ambient temperature = 20°C;*

*(3) – In Free Air, protected against direct sun radiation, ambient air temperature = 30°C*

*(4)- Touching-trefoil formation;*

*(5) – Flat-parallel formation, inter-axial spacing = 2 x D of the cable;*

*(6) – Flat-parallel formation, inter-axial spacing = 2 x D of the duct;*

*(7) – Conductor continuous working temperature = 90°C, metal screens bonded in multiple points.*

### Electrical parameters (Capacitance and Sequence Impedances)

| Conductor/ Metal Screen Cross-Sectional Area | Electrostatic Capacitance (Nom.) | Touching Trefoil Formation | | | | Flat-Parallel Formation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | R1 | X1 | R0 | X0 | R1 | X1 | R0 | X0 |
| mm² | µF/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km | Ω/km |
| 95/25 | 0.144 | 0.250 | 0.141 | 0.958 | 0.396 | 0.259 | 0.197 | 0.935 | 0.401 |

***Remarks:***

*Flat-parallel formation, inter-axial spacing = 2 x D of the cable;*

*Conductor continuous working temperature = 90°C, metal screens bonded in multiple points.*

### SHORT-CIRCUIT LIMITS

During the short-circuit working, the current-carrying components of the cable may reach a high temperature which could endanger the polymeric materials used for insulation.

In order to prevent this, the fault-current and/or fault-duration shall be limited to the values specified in the following tables:

### SHORT-CIRCUIT CURRENT IN CONDUCTOR

| Conductor Cross-Sectional Area | COPPER CONDUCTORS (N2XS(F)2Y cables) | | | | ALUMINUM CONDUCTORS (NA2XS(F)2Ycables) | | | |
|---|---|---|---|---|---|---|---|---|
| | Fault duration (s) | | | | Fault duration (s) | | | |
| | 0.5 | 1 | 1.5 | 2 | 0.5 | 1 | 1.5 | 2 |
| | Fault-Current (max.) | | | | Fault-Current (max.) | | | |
| mm² | kA | kA | kA | kA | kA | kA | kA | kA |
| 95 | 19.0 | 13.5 | 11 | 9.5 | 12.5 | 9.0 | 7.5 | 6.5 |
| 120 | 24.5 | 17 | 14 | 12 | 16 | 11.5 | 9.5 | 8.0 |
| 150 | 30.5 | 21.5 | 17.5 | 15 | 20 | 14 | 11.5 | 10 |
| 185 | 37.5 | 26.5 | 21.5 | 18.4 | 24.5 | 17.5 | 14.5 | 12.5 |

### SHORT-CIRCUIT CURRENT IN METAL SCREEN

| Metal Screen Cross-Sectional Area | Fault duration (s) | | | |
|---|---|---|---|---|
| | 0.5 | 1 | 1.5 | 2 |
| | Fault-Current | | | |
| mm² | kA | kA | kA | kA |
| 25 | 4.5 | 3.2 | 2.6 | 2.3 |

**quotation**

| **Conductor Cross** | Length | Price [meter] | Price [Total] |
|---|---|---|---|
| **1x95+25 N2XS(F)2Y** | 3000m | | |

** The goods will be supplied in three  cable drums, each drum containing  1000±2.5% meter of cable.