THE ISRAEL ELECTRIC CORPORATION LTD.
National Network Unit

Specification No. NPS-77

for
Single Core, Copper Conductor
Extruded Cross-Linked Polyethylene (XLPE) Insulated Power Cable

for
Rated Voltage $U_0/U = 0.6/1.0$ kV

This specification supersedes specification No. NPS-77/4

Haifa - Israel
JUNE, 2017
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Prepared by: A. Lavian  (-signed )

Approved by: Dr. N. Grinberg  (-signed )
1. **General**

1.1 **Scope**

This specification applies to unarmoured single core copper conductor power cables with blue or brown extruded solid cross-linked polyethylene insulation (XLPE) for rated voltage $U_0/U$ (Um) = 0.6/1 (1.2) kV (henceforth referred to as “Cables”).

1.2 **The IECo. cat. No.**

<table>
<thead>
<tr>
<th>Type of Cable</th>
<th>Conductor Cross Section (mm$^2$)</th>
<th>Insulation Color</th>
<th>The IEC Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2XY</td>
<td>1x50</td>
<td>Blue</td>
<td>2367548</td>
</tr>
<tr>
<td>N2XY</td>
<td>1x50</td>
<td>Brown</td>
<td>2367555</td>
</tr>
<tr>
<td>N2XY</td>
<td>1x150</td>
<td>Blue</td>
<td>2367563</td>
</tr>
<tr>
<td>N2XY</td>
<td>1x150</td>
<td>Brown</td>
<td>2367571</td>
</tr>
</tbody>
</table>

2. **Documents to be supplied with the Bid**

The Proposer shall submit all the following documents** to the IECo. with the bid documents.

2.1 Complete and fill in “Questionnaire” signed by the manufacturer;

2.2 A complete Type Test Reports, according to Israeli standard IS 1516-1(IEC standard 60502 part 1), issued within the last 7 years preceding the date of the bid, for the proposed cable or for a similar* cable

2.3 Certificate issued by the Standards Institution of Israel (SII) or any agreed accredited institution, attesting that the Manufacturer meets the requirements of the Israeli Standard IS 1516-1 for LV power cables (IEC standard 60502 part 1), or submission of declaration that the offered cables meets the requirements of the Official Israeli Standard SII 1516-1 for LV power cables (IEC standard 60502 part 1) and a commitment that three (3) month after notification of award the bidder will submit approval issued by the Standards Institution of Israel (SII) or other certified laboratory the Israeli Standard IS 1516-1 for LV power cables. (see Appendix A)

2.4 Cross-section drawings including dimensions;
2.5 Approval of conformance with ISO 9001 requirements shall be in a form of a certificate issued by a Certification Body (CB) which is accredited by an Accreditation Body (AB). The certificate should bare the logo of the CB and of its AB and/or the logo of the IAF. The certificate shall be valid on the date set for submission of the proposal. The certificate shall be valid for the scope of activities requested in the request for proposal.

2.6 Document approving experience: the manufacturer actively produced and supplied at least 150 km of the proposed cable or similar* cable during a period of at least 3 years during the last 7 years preceding the date of the bid. If required, the manufacturer shall submit reference list indicating the quantities of the cables manufactured and sold during these years;

* Similar cable: Same construction, same conductor cross-section or bigger, the conductor may be either copper or aluminum.

** All the above documents shall be in English.

3. Standards

3.1 Standards referenced in this specification and in supplement to this specification, form an integral part of this specification;

3.2 All the standards referred to the most current issue, including all amendments and supplements, as of the date of the bid;

3.3 The cables that are provided under this specification shall be designed, manufactured inspected, tested and preserved in compliance with the standards as specified herein;

3.4 In case of differences between the present specification and the above standards, the present specification prevails.

Relevant standards:

- Israeli Standard IS 65 (IEC Publication 60228) "Conductors of Insulated Cables";
- Israeli standard IS 1516-1 (IEC Publication 60502-1) "Extruded Solid Dielectric Insulated Power Cable for Rated Voltages from 1kV up to 30kV", Part 1: "Cables for rated voltage of 1 kV (Um = 1.2 kV)";
- CENELEC HD 603 S1 "Distribution Cables of Rated Voltage 0.6/1 kV";
- ISO 9001 Quality Management
4. **Technical Requirements**

4.1 **Operating Temperatures**

4.1.1 Maximum rated conductor temperature: 90°C.

4.1.2 Short circuit maximum conductor temperature (for duration up to 5 sec): 250°C

4.1.3 The conductor temperature under emergency condition: 130°C for duration of 8 hours continuously. The total duration of such overloads may exceed 100 hours per annum.

4.2 **Construction**

4.2.1 **Conductor**

4.2.1.1 Material: The conductor shall be made of plain annealed copper;

4.2.1.2 Form: The conductor shall be compacted stranded.

4.2.1.3 Dimensions: Table 2 sets out the shape, cross-sectional areas and characteristics of the conductors covered by this specification (acc. IS 65).

<table>
<thead>
<tr>
<th>Nominal Cross-Section (mm²)</th>
<th>Minimum Number of Wires</th>
<th>Max. DC Resistance at 20°C (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>6</td>
<td>0.387</td>
</tr>
<tr>
<td>150</td>
<td>18</td>
<td>0.124</td>
</tr>
</tbody>
</table>

4.2.2 **Insulation**

4.2.2.1 The insulation shall be of extruded cross-linked polyethylene (XLPE).

4.2.2.2 Nominal and minimum thickness values of the insulation, not including the thickness of any separator or sheath over the insulation, shall be as specified in Table 3 hereafter (in compliance with IS 1516-1 table 6)

Table 3

<table>
<thead>
<tr>
<th>Nominal Cross-Section (mm²)</th>
<th>Nominal Insulation Thickness (mm)</th>
<th>Minimum Insulation Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1.0</td>
<td>0.80</td>
</tr>
<tr>
<td>150</td>
<td>1.4</td>
<td>1.16</td>
</tr>
</tbody>
</table>
4.2.3 **Core Identification**

The color of the core insulation shall be blue or brown as specified in table 1 for the specific IECo. cat. №.

4.2.4 **Oversheath**

4.2.4.1 The oversheath shall be of polyvinyl chloride (PVC/A), ST2 type (acc. IS 1516-1 tables 3 and 4);

4.2.4.2 The nominal and minimum thickness of the oversheath shall be as specified in table 4 hereafter (according to sub-clause 13.3 of IS 1516-1);

4.2.4.3 The average of the measured oversheath wall values, rounded to 0.1 mm, shall be not less than the nominal thickness \( t_n \) and the smallest value \( t_m \) measured shall not fall below the nominal thickness by more than 0.1 mm + 15% of the nominal value;

<table>
<thead>
<tr>
<th>Nominal Cross-Section (mm(^2))</th>
<th>Nominal Oversheath Thickness - ( t_n ) (mm)</th>
<th>Minimum Oversheath Thickness(^*) - ( t_m ) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x50</td>
<td>1.4</td>
<td>1.09</td>
</tr>
<tr>
<td>1x150</td>
<td>1.6</td>
<td>1.26</td>
</tr>
</tbody>
</table>

\* \( t_m \geq t_n - (0.1 + 0.15 t_n) \)

4.2.4.4 The color of the oversheath shall be green.
5. **Tests**

5.1 **Type Test**

Within **3 months** after notification of award, the Contractor shall submit type test report that was performed on the first manufactured batch of the cable to be supply to the IECo.

The type test shall be performed according to Annex "A" in an independent authorized laboratory (ISO/IEC 17025 or EN 45011 approved).

The IECo. reserves the right to attend during the performance of the Type Test

**Exemption:** If the Contractor had supplied identical cable to the IECo. during the last 7 years preceding the date of the present bid, and if the manufacturing method was not changed, the Contractor can introduce type test report if it was approved by the IECo. in the former supply.

5.2 **Routine Tests**

The Contractor shall perform and submit test reports for all routine tests for each cable that is wrapped on each drum.

The Contractor shall submit to IE Co. the routine test reports for approval prior to delivery of the cable

The cable shall be delivered only after approval of the routine test report of the cable.

5.3 **Acceptance Test**

Acceptance tests shall be performed according to the standards in para. 3 and shall include tests required in Routine Test, Special Test and the following tests from the Type Test: Test Strength and Elongation Tests of insulation and oversheath, before and after ageing

In case that the cable under test will not fulfill all requirements specified in Annex "B" the IECo. has the right to reject the consignment.

5.4 **The tests shall be performed by and at the expense of the Contractor. The contractor shall make all the necessary arrangements to enable the IECo.’s inspectors to be present at the tests.**

5.5 **The following data shall be indicated on each test certificate:**

- Manufacturer's name;
- Name and address of the testing laboratory;
- Serial number of the test certificate;
- The certificate issue date;
- Test report of special test shall specify the pertained batch number of the cables;
- A signature of the person responsible for tests and his position.
The test certificate should contain results for each test according to the test requirements with reference to appropriate Clauses and Sub-clauses of standards and this specification.

6. **Marking**

   Throughout whole cable length, at intervals not exceeding 1 m, the following identification, in **white** or **black** marks shall be indelibly imprinted, embossed or by reproduction in relief on the oversheath.
   - Manufacturer’s name or trade mark (logo)
   - The structure: "N2XY - 1 x (cross-sectional area in mm²)"
   - Year of production
   - Nominal rated voltage (U₀/U =) 0.6/1.0 kV
   - "Property of the Israel Electric Corp."
   - Running length (in meters)

7. **Packaging**

   7.1 The cables shall be furnished in lengths of **500 (±5)** meters wound on seaworthy wooden drums.

   7.2 The cable on the drum shall be protected against damage by a suitable cover mounted around the drum flanges, easy to be removed, so that the drum shall be closed and the cable shall be mechanically protected from all sides.

   7.3 The supplied drums shall be according to DIN 46391: max. flange diameter of 2240 mm, min. spindle hole diameter 80 mm and max. width 1200 mm.

   7.4 In order to install an electronic drum-locator device, a niche of 130 mm X 65 mm with depth of 20 mm should be carved out on the side of one of the flanges.

   7.5 The cables shall be supplied with hermetically sealed watertight stop ends that shall prevent the ingress of humidity and fine dust into the cable.

   7.6 COT attesting the purity and composition of the conductor raw material shall be attached to each consignment.
7.7 The following data shall be printed legibly on a tag strongly attached on each drum:

a) Manufacturer's Name  
b) The IECo. Order №.

c) Drum Serial №.  
d) Manufacturing Date

e) Cable Type (NA2XY)  
f) 4 X Cross Sectional Area in mm²

g) Cable Length  
i) Gross Weight

h) Running length №. marked on each of the cable ends (the first and the last №.)

j) Cable Standard  
k) The IECo. Catalog №.

l) The IECo. specification № (NPS-76)

8. **Quality Requirements**

8.1 For quality system and other specific quality requirements, see Appendix B: Q-APP-02.

8.2 The Bidder shall submit with his proposal the following (In English):

- Quality system Certificate;
- Quality manual;
- Certificates that demonstrate the Bidder's compliance with the requirements specified or implied in this specification;
- Example of an inspection & test plan and/or Quality plan which pertain to the cable to be supplied;

Formal confirmation that he will conform to the requirements of Q-APP-02
9 PROTOTYPE APPROVAL

9.1 Prototype approval for new suppliers.

New supplier – Supplier that didn’t supply the ordered item to the IECorp. in the last five (5) years.

9.1.1 In a period of max three (3) months from notification of award, and before production for IEC of all ordered items, the Contractor shall perform Prototype Approval

9.1.2 For purposes of the Prototype approval, the manufacturer shall perform the complete type tests as required in this specification.

9.1.3 The contractor shall be responsible to conduct successfully all the necessary tests, and to deliver to the Israel Electric Corp. all the necessary required reports, in a manner, which will not interfere with or delay any of the time schedules, pertaining to any action or undertaking, required of the winning bidder, including, but not limited to delivery schedule. Such responsibility shall include proper and reasonable advance notifications to the Israel Electric Corp., prior to any action, required of it.

If type and special tests have already been conducted with reference to the identical cable which is offered by the proposed and the Israel Electric Corp. approves the reports, pertaining to such tests, the Israel Electric Corp. shall have a right (but not a duty) to waive all or part of the required tests.

9.1.4 The Israel Electric Corp. reserves the right to cancel the order for the supply of equipment if the prototype will not be approved by the Israel Electric Corp. In any case, the contractor shall not resume manufacture of the rest of the ordered equipment before receiving the Israel Electric Corporation's final approval of the prototype.

9.1.5 Required schedule up to prototype approval (after notification of award) is attached in APPENDIX: "C".

9.2 Prototype approval for existing suppliers.

Existing supplier – Supplier who supplied the ordered item to the IECorp. in the last five (5) years.

9.2.1 Existing supplier is exempted from prototype if in the technical bid the supplier will provide to IE Corp. a letter with the following data:

- The period and type of the ordered item supplied to IECorp.
- A statement that was no any changes in the production line.
### 10 - Questionnaire

<table>
<thead>
<tr>
<th>Subject</th>
<th>Insert all data in this column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer’s name and origin:</td>
<td></td>
</tr>
<tr>
<td>Specify the standards that the cable will comply with:</td>
<td></td>
</tr>
</tbody>
</table>

### 1 – Cable

| 1.1 Coding | |
| 1.2 Rating voltage \((U_0/U)\) | (kV) |
| 1.2 Current rating in soil (at 30°C, thermal resistivity: 1.5 °Km/W) | (A) |
| 1.4 Current rating in air (at 35°C) | (A) |
| 1.5 Short circuit rating current for 1 sec duration | (kA) |
| 1.6 External diameter of the cable | (mm) |
| 1.7 Bending radius | (mm) |
| 1.8 Cable weight | (kg/m) |
| 1.9 Manufacturing method | |

### 2 – Conductor

| 2.1 Material | |
| 2.2 Nominal cross-sectional area and form | (mm²) |
| 2.3 Number of wires | |
| 2.5 DC resistance at 20°C | (Ω/km) |
| 2.6 Max permissible continuous temp. | (°C) |
| 2.7 Max permissible short circuit temp. | (°C) |

### 3 - Insulation

| 3.1 Material | |
| 3.2 Nominal thickness | (mm) |
### Specifications for LV, single core, copper, XLPE Power Cable

**Issued date:** June 2017

<table>
<thead>
<tr>
<th>3.3 Minimum thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4 Insulation color (Blue/Brown)</td>
</tr>
</tbody>
</table>

#### 6 - Oversheath

<table>
<thead>
<tr>
<th>6.1 Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2 Minimum thickness (mm)</td>
</tr>
<tr>
<td>6.3 Oversheath color</td>
</tr>
</tbody>
</table>

#### 7 - Marking

- embossed according clause 6 (Yes/No)

#### 8 - Drum

<table>
<thead>
<tr>
<th>8.1 Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2 Material</td>
</tr>
<tr>
<td>8.3 Weight of empty drum (kg)</td>
</tr>
<tr>
<td>8.4 Flange diameter (mm)</td>
</tr>
<tr>
<td>8.5 Barrel diameter (mm)</td>
</tr>
<tr>
<td>8.6 Overall Width (mm)</td>
</tr>
<tr>
<td>8.7 Gross weight (drum with cable) (kg)</td>
</tr>
<tr>
<td>8.8 Length of cable per drum (m)</td>
</tr>
</tbody>
</table>

- The drum shall be protected as required in para.7.2 (Yes/No)

#### 9 - Packaging

<table>
<thead>
<tr>
<th>9.1 A tag as required in sub-clause 7.6 shall be attached (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2 The cable shall have sealing caps (Yes/No)</td>
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</tbody>
</table>

#### 10 - Attached Documents

<table>
<thead>
<tr>
<th>10.1 Valid ISO 9001:2000 certificate (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.2 Catalogue (Yes/No)</td>
</tr>
<tr>
<td>10.3 Inspection and test plan, QA manual (Yes/No)</td>
</tr>
<tr>
<td>10.4 Type test report (Yes/No)</td>
</tr>
</tbody>
</table>

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Appellations A, B, C, D
The Israel Electric Corporation Ltd
Planning, Development & Technology Division
Electrical R & D Laboratory

Annex "A"

SPECIFICATION NO. S.RL 2702

TEST REQUIREMENTS for CABLES MANUFACTURED ACCORDING TO The IEC SPECIFICATION NPS – 77

Haifa - Israel
March, 2017
ANNEX "B"

ORGANIZATION, QUALITY AND SAFETY DIVISION
QUALITY CONTROL UNIT
APPENDIX FOR CONTRACTS / ORDERS
REV. 4
Volume 04 / 2011
Spec. No. Q - APP - 02

QUALITY REQUIREMENTS
**APPENDIX "C" - Schedule up to prototype approval (after notification of award)**

**Remarks:**
1. Starting point is the date on which a binding contractual obligation has been created, as specified in the invitation to submit proposal.
2. One month before performance of the type tests the contractor shall submit the final test schedule.
3. The period of time for the delivery approval from the starting point as indicated above will not take more than three 3 months

<table>
<thead>
<tr>
<th>No.</th>
<th>STAGE</th>
<th>1</th>
<th>2</th>
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<th>12</th>
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<td>Submitting of:</td>
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<tr>
<td></td>
<td>1. Cross-section drawings including dimensions</td>
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<td>2. Test plan:</td>
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<tr>
<td></td>
<td>- The name of the performer laboratory and address (country, city, etc.)</td>
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<td></td>
<td>- List of tests</td>
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<td></td>
<td>- Plan and schedule of the type test</td>
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<tr>
<td>2</td>
<td>Israel Electric Corp. approval of the above documents after clarifications</td>
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<tr>
<td>3</td>
<td>Execution and submission of the type test report for the proposed item</td>
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<tr>
<td>4</td>
<td>Israel Electric Corp. approval of Type Test Reports</td>
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</table>

Signature: ____________ Date: ____________
APPENDIX "D" - STATEMENT OF MANUFACTURING EXPERIENCE

I, ______________________________ (Enter name), do hereby state the following:

1. I am a position holder at ________________________ ("The factory") occupying the position of ______________________________ (Enter job title and description, i.e. partner, production manager, sales manager, etc.)

2. I have been occupying this position since _______________ (Enter date).

3. I give this statement in regards to I.E.C Tender number _______________ ("The Tender").

4. The facts/details given in this statement have been checked and verified by me.

5. _______________ (The factory) has experience in production of L.V Cable ________ requested in this Tender at the time of Tender proposal submission and for at least ________ years prior to submission.

________________________
Signature