



*Israel Electric Corporation Ltd.
Grid Engineering Division
Distribution Engineering Unit*

Edition: 2

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NPS – 329

Specification for LV, single Cu core, **flexible** cable



THE ISRAEL ELECTRIC CORPORATION LTD.

Distribution Engineering Unit

Specification No. NPS – 329

for

Single Core, Copper Conductor

Flexible Cable

1X50 and 1X150 mm²

of

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

This issue supersedes specification NPS – 329/1

Haifa, Israel

July, 2020



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Prepared by: A. Lavian

Approved by: D.Toledano





1 - General

Scope

This specification defines the technical requirements for single core, copper conductor, flame retardant, heavy duty **flexible** power cables, for rated voltage U_0/U : 0.6/1 kV

2 - The IEC Co. catalogue Numbers

The IEC Co. catalogue numbers vs relevant conductor cross-section:

Table 1:

The IEC Co. Cat. No.	Conductor Cross Section (mm ²)	Insulation Colour
5256796	50	brown (BR)
5256797	50	blue (BU)
5256798	150	brown (BR)
5256810	150	blue (BU)

3 - Documents to be Supplied with the Proposal

- 3.1 Complete and fill in “Questionnaire”;
- 3.2 Type test certificate of one of the proposed cables; The Bidder shall submit type test report that was performed on similar* cable to be supply to the IEC Co.
- 3.3 Declaration and commitment as required in the threshold conditions
- 3.3 Cross-section drawings including dimensions;
- 3.4 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.
- 3.6 Document approving experience (filled-in appendix E): the manufacturer actively produced and supplied the proposed cables or similar* cables during a period of at least



3 years within the last 7 years preceding the date of the bid. Additionally, The Proposer shall supply reference list indicating the quantities of the cables manufactured and sold during these years;

* Similar cable: same construction, same cross-section or higher, same voltage, class 5 or 6.

** All the above documents shall be in English.

4 - Standards

- 4.1 Standards referenced in this specification and in supplement to this specification, form an integral part of this specification;
- 4.2 All the standards referred to the most current issue, including all amendments and supplements, as of the date of the bid;
- 4.3 The cables that are provided under this specification shall be designed, manufactured inspected, tested and preserved in compliance with the standards as specified herein;
- 4.4 In case of differences between the present specification and the above standards, the present specification prevails.

Relevant standards:

Israeli Standard SI 60228 (IEC Publication 60228) "Conductors of Insulated Cables";

Israeli standard SI 60502-1 (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 ($U_m = 1.2$ kV);

IEC Publication 60332-1-2 Tests on electric and optical fiber cables under fire conditions

CENELEC HD 603 S1 "Distribution Cables of Rated Voltage 0.6/1 kV";

CENELEC HD 605 A1 Additional test methods;

DIN VDE 0472 p. 803-B Testing of cables, wires and flexible cords, oil immersion;

IEC Publication 61138-3 "Cables for Portable Earthing and Short-Circuiting Equipment"

DIN 46391 "Delivery Drums"



5 - Technical Requirements

5.1 Operating Temperatures

- * Maximum rated conductor temperature: 90°C.
- * Short circuit maximum conductor temperature (for duration up to 5 sec): 250°C

5.2 - Construction

The cable will be according Israeli standard SI 60502-1 and CENELEC HD 603-1 part 3 and according to the following:

5.2.1 Conductor

5.2.1.1 Material

The conductors shall be composed of fine flexible electrolytic annealed copper wires, bunch stranded as per **class 6** according to SI 60228.

5.2.1.2 Dimensions and maximum diameter of the conductor shall be according to table 2:

Table 2:

Number of cores/ Nominal cross Section (mm ²)	Max diameter of individual strand (mm)	Nominal conductor diameter (mm)	Maximum conductor diameter (mm)	Max conductor DC resistance at 20°C (Ω/km)
1 x 50	0.21	11.3	11.6	0.379
1 x 150	0.31	15.3	15.5	0.129

5.3 Insulation

5.3.1 The insulation shall be one of the following types:

- Elastomeric insulation compound based on a cross-linked ethylene propylene rubber EPR or EPDM;
- Cross-linked silicone rubber insulation compound (SiR)
- Special designed flexible cross-linked PE insulation compound (XLPE)

5.3.2 The insulation flexibility shall comply para. 5.3.2 of IEC 61138-3 (test specified in 3.2 of IEC 60245-2):



Required values: Max. Distance I' for $50 \text{ mm}^2 = 0.15 \text{ m}$, for $150 \text{ mm}^2 = 0.35 \text{ m}$.

5.3.3 The insulation shall meet RoHS and REACH regulations.

5.3.4 The nominal thickness of the insulation, not including the thickness of any separator shall be according to table 3 (SI 60502-1 table 5).

Table 3:

Nominal cross section [mm ²]	Nominal thickness of the insulation [mm]
1 x 50	1.0
1 x 150	1.4

5.3.5 The colour of the insulation shall be brown (BR) or blue (BU) – see table 1.

The colouring will be throughout the whole insulation length.

5.4 Outer sheath

5.4.1 The outer sheath shall be flame retardant, lead free, shall endure oil and abrasion, made of PVC, ST2 and shall meet RoHS and REACH regulations.

5.4.2 The nominal and minimum thickness of the outer sheath shall be as specified in table 4 hereafter (according to sub-clause 13.3 of SI 60502-1);

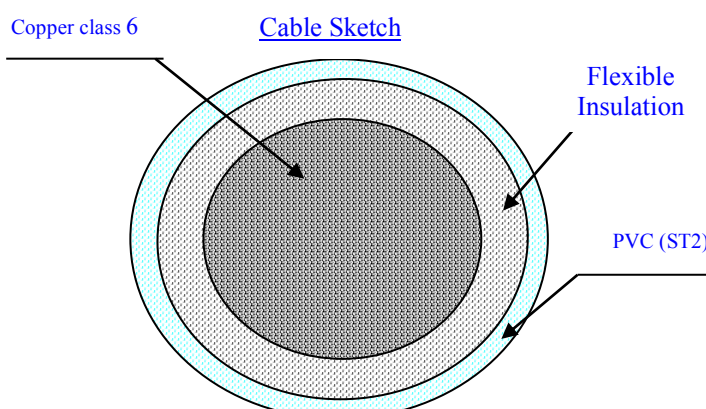
5.4.3 The average of the measured outer sheath wall values, rounded to 0.1 mm, shall be not less than the nominal thickness (t_n) and the smallest value (t_m) measured shall not fall below the nominal thickness by more than $0.1 \text{ mm} + 15\%$ of the nominal value;

Table 4

Nominal cross-section (mm ²)	Nominal outersheath thickness - t_n (mm)	Minimum outersheath thickness* - t_m (mm)
1x50	1.4	1.09
1x150	1.7	1.35

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

5.4.4 The color of the outer sheath shall be either yellow (YE) or orange (OR).





5.5 **Other requirements**

5.5.1 **Minimum bending radius**

The max. permissible bending radius shall be 4 times the cable diameter.

5.5.2 **Tensile strength**

The permissible pulling force (σ) shall be $>20 \text{ N/mm}^2$ in reference to the total copper cross-section of the conductors.

5.5.3 **Cable weight**

Max. net weight of the cable, not including drum and covers should be as specified in table 5:

Table 5:

Nominal Cross section [mm²]	Max Weight [kg/km]
1 x 50	600
1 x 150	1640



6 - Tests

9.1 General

Tests shall be performed in accordance with the requirements of the standards prescribed under clause 3 of this specification and will meet their latest published recommendations, by and at the expense of the Contractor.

9.2 Type Tests

Within **3 months** from the date on which a binding contractual obligation has been created, 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 authorized laboratory (ISO/IEC 17025 or EN 45011 approved).

The type test shall be performed according to clause 17 & 18 of SI 60502-1.

Exemptions:

In case that the Bidder 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 Bidder can introduce type test report if it was approved by the IECo. in the former supply.

9.3 Sample and Routine Tests

The Contractor shall perform and submit test reports for all sample and routine tests for each cable that is wrapped on each drum according clause 15 of SI 60502-1.

The Contractor shall submit to the IECo. 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.

9.4 Acceptance Test

Acceptance tests shall be performed according to clause 16 of SI 60502-1.

In case of any exceptions, i.e. the cable under test will not meet all the requirements of this paragraph, the IECo. will have the right to reject the consignment.



9.5 Flexibility Test

The test shall be performed according to IEC 61138-3 clause 5.3.2

7 - Marking

Throughout the whole cable length, at distances not exceeding 50 cm, the following marks shall be indelibly printed, preferably embossed:

1. Manufacturer's name or trade mark
2. Code designation + FR1
3. "[1 x cross section in mm ²] - 0.6/1 kV "
4. Batch No.
5. "Property of the ISRAEL ELECTRIC Corp."
6. Running length (in meters) - every one meter
7. Year of production

8 - Packaging

- 8.1 The cables shall be furnished in lengths of **500 (±5)** meters wound on seaworthy wooden drums.
- 8.2 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.
- 8.3 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.
- 8.4 In order to install an electronic drum-locator device, a niche of 130 X 65 mm with depth of 20 mm should be carved out on the side of one of the flanges. About 300 mm from the exterior line.
- 8.5 The cables shall be supplied with hermetically sealed watertight stop ends that shall prevent the ingress of humidity and fine dust into the cable.



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8.6 The loosed cable end shall be fastened to the drum's flange using a proper steel strap.

8.7 The following data shall be printed legibly on a tag strongly attached on each drum:

1.	Manufacturer's Name
2.	Drum Serial No.
3.	Flexible N2XY RoHS REACH, FR1
4.	Cable Length
5.	Cable Standard
6.	The IECo. Specification No. (NPS-329)
7.	The IECo. Order No.
8.	Manufacturing Date
9.	1 X Cross Sectional Area in mm ²
10.	Gross Weight
11.	The IECo. Catalog No.



9 - Quality Requirements

- 9.1 For quality system and other specific quality requirements, see Appendix B: Q-APP-02-PR R04.
- 9.2 The Proposer shall submit with his proposal the following (In English or Hebrew):
1. Quality system Certificate;
 2. Quality manual;
 3. Certificates that demonstrate the Bidder's compliance with the requirements specified or implied in this specification;
 4. Example of an inspection & test plan and/or Quality plan which pertain to the cables to be supplied;
 5. Formal confirmation that he will conform to the requirements of Q-APP-02-PR R04.



10 PROTOTYPE APPROVAL

10.1 Prototype approval for new suppliers.

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

10.1.1 In a period of max three (3) months from the date on which a binding contractual obligation has been created, and before production for IEC of all ordered items, the Contractor shall perform Prototype Approval

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

10.1.3 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.

10.1.4 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 final approval of the prototype.

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

10.2 Prototype approval for existing suppliers.



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

10.2.1 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.



11 – Questionnaire

Tender No.: _____

Name of Proposer: _____

Subject	Insert all data in this column
Manufacturer's name and origin	
Specify the standards that the cable will comply:	
1 – Cable	
1.1 Coding	
1.2 Rating voltage (U_0/U) (kV)	
1.3 Current rating in air (at 35°C) (A)	
1.4 Short circuit rating current for 1 sec duration (kA)	
1.5 Cable weight (kg/km)	
1.6 Flame retardant	(Yes / No)
1.7 Bending radius (mm)	
1.8 Max permissible operating temp. on conductor (°C)	
1.9 Max permissible short circuit temp. on conductor up to 5 sec. (°C)	
1.10 Tensile strength (N)	
2 – Conductor	
2.1 Material and class	
2.2 Nominal cross-sectional area (mm ²)	
2.3 Number of fine wires X cross section	
2.4 Max diameter of individual strand (mm)	
2.5 DC resistance at 20°C (Ohm/km)	
3 - Insulation	
3.1 Material/type	
3.2 Nominal thickness (mm)	



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3.3 Insulation color	
4 - Over sheath	
4.1 Material/type	
4.2 Nominal/Minimum thickness (mm)	
4.3 Overall diameter (mm)	
4.4 Over sheath color	
5 - Marking imprinted according subclause 7	(Yes / No)
6 - Drum	
6.1 Material	
6.2 Weight of empty drum (kg)	
6.3 Flange diameter (mm)	
6.4 Spindle diameter (mm)	
6.5 Overall Width (mm)	
6.6 Gross weight (drum with cable) (kg)	
6.7 Length of cable per drum (m)	
7 - Packing	
7.3 The drum shall be protected as required in clause 8.1	(Yes / No)
7.1 A tag with all details as required in subclause 8.7 shall be attached	(Yes / No)
7.2 The cable shall have sealing caps	(Yes / No)
8 - Attached Documents	
8.1 Valid ISO 9001 certificate	(Yes / No)
8.2 Type test and flexibility test approval	(Yes / No)
8.3 Certificate issued by the Standards Institution of Israel	(Yes / No)
8.4 Reference list of experience	(Yes / No)
8.5 RoHS and REACH approval	(Yes / No)



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Proposer's address:			
Email address:			
Contact :		Tel. No. :	
Cellular :		Fax. No. :	
Date:		Signature:	



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Appendix "A"

TEST REQUIREMENTS for LOW VOLTAGE CABLES



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Appendix "B"

SPECIFICATION for ACCEPTANCE TESTS of LOW VOLTAGE CABLES

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Appendix "C"

ORGANIZATION, QUALITY AND SAFETY DIVISION

QUALITY CONTROL UNIT

APPENDIX FOR CONTRACTS / ORDERS

Quality requirements: Q-APP-02-PR R04

QUALITY REQUIREMENTS

Attached in separate file



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Appendix. D – Schedule for prototype approval

Remarks:

- Starting point is the date on which a binding contractual obligation has been created, as specified in the invitation to submit proposal.
- One month before performance of the type tests the contractor shall submit the final test schedule.

No.	STAGE	Week											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Submitting of: 1. Cross-section drawings including dimensions 2. Test plan: - The name of the performer laboratory and address (country, city, etc.) - List of tests - Plan and schedule of the type test												
2	Israel Electric Corp. approval of the above documents after clarifications												
3	Execution and submission of the type test report for the proposed item												
4	Israel Electric Corp. approval of Type Test Reports												

- The period of time for the delivery approval from the starting point as indicated above will not take more than three 3 months

Signature: _____

Date: _____



APPENDIX "E" - 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 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 prior to submission.

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

6. I hereby undertake to provide, upon IEC's request and at its sole discretion, any other documents (reference list, quantity, dates of supply, letter of recommendations etc) or other information requested for this Tender for purposes of proving said experience.

Signature

Date