

Technical Specification for Plastic-Insulated Low Voltage Cables

This technical specification is valid for the business unit E.ON Sweden of the market unit E.ON Nordic

With this specification, technical determinations were made beyond existing publications.

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1 Area of Application

This technical specification is valid for low voltage cables

- AKKJ EKKJ FKKJ
- AXKJ AXQJ
- SE-N1XE-AS SE-N1XE-U SE-N1XE-R
- SE-N1XV-AS SE--N1XV-U SE-N1XV-R

Suffixes: F2 = flame retardant according to IEC 60332-1
 F4 = flame retardant according to IEC 60332-3 A, B, C, D

with rated voltage of $U_0/U (U_m)$ 0,6/1 (1,2) kV.

2 General Requirements

2.1 Standards, Regulations

The cables must comply with the requirements of the standards and regulations listed in the appendix A1, as far as no divergent requirements are made in this specification.

Generally all standards, rules, regulations, provisions and laws applying in Sweden have to be followed, even if they are not specifically required according to this specification.

The business and communication language is Swedish or English.

3 Further Requirements

3.1 Cable Construction

3.1.1 Conductors

The conductors made of aluminium or copper must be executed as stranded, annealed compacted conductors. The conductors must be circular or sector-shaped conductors.

The conductors can be made as solid conductor, if agreed.

3.1.1a Option

Copper conductors (< 16 mm²) are executed as stranded for special vibrating installations.

3.1.2 Insulation

No residues or contamination may be present in or on the insulation.

To prevent moisture penetration in joints, the insulation on the plain faces of a sector shaped conductor may not curve in.

To prevent the insulation for shrinking to much after insulation the value of allowed shrinking must not be more than 2% according to Shrinkage test HD 603-1 table 2 A type DIX 3.

3.1.3 Inner Covering

The inner covering could be made as lapped or extruded covering according to the standard.

The common inner covering may adhere slightly to the conductors. However, it must be possible to remove it completely and without tools during assembly.

The filler rope must not be hygroscopic; it must be possible to remove easily without using a knife or other sharp tools.

3.1.4 Concentric Conductors (valid for types AKKJ, AXKJ, FKKJ, EKKJ and AXQJ)

According to standard, except for the following cable types if demanded which should be as follow:

AXKJ 1 x 4 x 50/29, AXKJ 1 x 4 x 95/57, AXKJ 1 x 4 x 150/88, AXKJ 1 x 4 x 240/146

AXQJ 1 x 4 x 50/29, AXQJ 1 x 4 x 95/57, AXQJ 1 x 4 x 150/88, AXQJ 1 x 4 x 240/146

3.1.5 Outer Sheath

The outer sheath of PVC or PE must be applied continuously even, smooth and without defects. No residues or contamination may be present in or on the outer sheath.

The overall section of the cable must be circular with a maximum deviation of smaller than 5 % of the outer diameter, measured on two axes shifted by 90°.

3.1.6 Identification Marks and Symbols

The marking must be resistant to the conditions in the ground.

It shall consist of manufacturer's name, code designation, nominal cross-sectional area of conductor and metallic screen (if any), rated voltage, year of production with last two digits, length marks with indication in meters.



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PVC sheathed cables shall in addition be marked with the flame retardance class (e.g. F2 or F4 A/B/C/D).

The meter embossing must be applied continuously length without discontinuities.

Deviation of meter embossing: reasonable accuracy $\pm 0,5$ %

4 Approval and Prequalification

The conditions for the application of the product specified in this specification are the presence of a manufacturer-dependent technical product approval and the existence of a supplier inspection system.

The technical product approval may be given, if the manufacturer/supplier – at his own cost – delivers proof of the product characteristics required by the user and ensured by the manufacturer or the supplier by means of a cable sample, if he delivers proof of the aptitude for operational use by a corresponding test run or by references, if he delivers the required test certificates and if he fulfils possible requirements of the user.

The realisation of the approval inspection, or the sampling, can also be performed by an inspector named by the users.

The user is entitled to inspect or to have inspected the product characteristics compliance as well as quality parameters.

Any change to a product approved on basis of this specification is subject to new approval or renewed negotiation. This is also valid for the manufacturing process and the used materials. Changes during a standing order are only allowed by mutual consent. Precondition for the consent and the positive assessment by the user is the proof of an equivalent or higher quality, or of improved benefit, respectively, e. g. in the scope of further technical development.

In certain, justified cases, possible subcontractors have to be disclosed upon the user's request.

If the contractor announces new developments, and if these cannot be realised within an agreed deadline, the mandate may cancel the order.

4.1 Management, Quality, Environmental and Safety Control

The manufacturer has to provide proof of an integrated quality control system according to the standard EN ISO 9001, which guarantees a continuous assurance of the unchanging product properties as requested by the user and agreed upon by the manufacturer.

For the environmental safety the supplier shall present a valid control system according to EN ISO 14001.

4.2 Inspection and Testing

The buyer reserves the right to inspect the ordered cables himself or by ordered persons with respect to the compliance to all technical requirements and/or to accept them in the factory.

The acceptance of the cables ordered depends on the result of the inspections and on the content of the documents stated in paragraph 5 of this specification.

The cables must come from the current production.

Stock goods older than 18 months are only accepted in mutual consent.

5 Documentation

The delivery note, or an appendix in form of an overall list accompanying the delivery note, must include the following information apart from the standard indications:

- Cable drum number
- Delivery length of each cable drum
- Meter embossing at the outer and inner end of the cable on each cable drum

On demand of the user, the manufacturer / supplier must present the following:

- A valid QA-certificate for the manufacturing facility according to EN ISO 9001. The entity of certification must be accredited a member entity of the EAC.
- Routine tests report of each delivered cable drum
- Sample tests reports of each production lot of delivered cable types
- Type test reports
- The declaration of conformity of the manufacturer for additional requirements from this specification.

All kind of test reports are archived by the manufacturer for at least ten years.

All record, documents and descriptions as well as indication and type signs shall be executed in Swedish or English. Translations of other languages have to be handed over together with original text.

6 Packing and Transport

- The cable drums should be made according to “K” type of standard SS 8428 01. They must be in a flawless state and sufficiently smooth on the core.
- On the cable drums weatherproof and well legible labels shall be fixed, containing the information as follows:
 - cable manufacturer
 - complete cable identification according to applied standard
 - delivery length (in meter)
 - overall weight
 - cable drum number
 - rolling direction arrow
- The cable ends must be fixed in a way that the ends cannot loosen during transport. The fastening must be performed without damaging the cable.
- The cable ends must be sealed with adhesive-coated shrink caps in a water-proof, transport-safe and durable way.
- Lagging is only admissible if demanded by the user. Protection films or other packing materials are admissible.
- Delivery lengths must be complied with a maximum deviation of $\pm 0,5 \%$, if not otherwise agreed.
- Short length quantities are only accepted after previous agreement.
- If not otherwise agreed the maximum overall drum diameter shall not exceed 3,0 meter.

7 Disposal

With the delivery of the cables, the manufacturer/supplier undertakes to indicate the possibilities for disposal/recycling based upon the corresponding laws, regulations and ordinances of Sweden.

8 Appendix

8.1 A-1: Applicable Standards

General

SS 424 14 18	Power cables of rated voltage 0,6/1 kV – Specifications for design and testing
HD 605 S1	Electric cables – Additional test methods
HD 308 S2	Identification of cores in cables and flexible cords by colours
IEC 60228	Conductors of Insulated Cables
EN 60811	Insulation and sheathing materials of electric cables - Common test methods –
IEC 60332-1	Test on electric and optical fiber cables under fire conditions.
IEC 60332-3	Test on electrical cables under fire conditions.
SS 84 28 01	Dimensions of cable drums
HD 603 S1 Part 1	Power cables – part 603: Distribution cables of rated voltage U_0/U 0,6/1 kV - general requirements –
HD 604 S1 Part 1	Power cables – part 604: 0,6/1 kV and 1,9/3,3 kV Power cables with special fire performance for use in power stations - general requirements –

Type AKKJ, EKKJ and FKKJ

HD 603 S1 Part 3L	Power cables – part 603: Distribution cables of rated voltage U_0/U 0,6/1 kV - PVC insulated cables – Unarmoured Cables with concentric conductor (type 3L)
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Type SE-N1XE and SE-N1XV

HD 603 S1 Part 5O	Power cables – part 603: Distribution cables of rated voltage U_0/U 0,6/1 kV - XLPE insulated cables - Unarmoured Cables without concentric conductor (type 5O)
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Type AXKJ, EXKJ, FXKJ, AXLJ, EXLJ, FXLJ, AXQJ.

HD 603 S1 Part 5P	Power cables – part 603: Distribution cables of rated voltage U_0/U 0,6/1 kV - XLPE insulated cables - Unarmoured Cables with concentric conductor (type 5P)
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Type EXQJ, FXQJ, AXQJ

HD 604 S1 Part 3D	Power cables – part 604: Cables with copper or aluminium round or sector-shaped conductors and a concentric conductor
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