IGS-M-IT-008(1)	Sep. 2016
Approved	مصوب

شرکت ملی گازایران

مدیریت پژوهش و فنآوری

امورتدوین استانداردها

IGS

مشخصات فنی خرید

کابلهای مخابراتی (خطوط تلفن و انتقال اطلاعات)

Communication Cables
(Telephone and Data Transmission)

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شرکت ملی گازایران

دفترمدیرعامل

تاریخ : ۱۳۹۵/۱۱/۲۶
شماره : گ ۰/دب ۰/۳۱۷- ۱۷۸۲۲

ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۷۱۶ مورخ ۱۳۹۵/۱۰/۲۶ هیات مدیره ، نامه شماره گ۹/۱۴۳۷۱۰/۰۰۰ مورخ ۹۵/۱۰/۱۸ مدیر پژوهش و فناوری درمورد تصویب نهایی استاندارد تحت عنوان "مشخصات فنی خرید کابل‌های مخابراتی" (خطوط تلفن و انتقال اطلاعات) به شماره استاندارد ((IGS-M-IT-008(1)) مطرح و مورد تصویب قرارگرفت .

این مصوبه برای کلیه شرکت‌های فرعی لازم اجرا می‌باشد .

الهام ملکی
دبیر هیات مدیره

رونوشت : مدیرعامل محترم شرکت ملی گاز ایران و رییس هیات مدیره
: اعضای محترم هیات مدیره
: مشاور و رییس دفتر محترم مدیر عامل
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FOREWORD

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experiences in natural gas industry at national and international levels. Iranian Gas Standards (IGS) are prepared, reviewed and amended by technical standard committees within NIGC Standardization division and submitted to the NIGC's "STANDARDS COUNCIL" for approval.IGS Standards are subject to revision, amendment or withdrawal, if required. Thus the latest edition of IGS shall be checked/ inquired by NIGC employees and contractors. This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division. The technical standard committee welcomes comments and feedbacks about this standard, and may revise this document accordingly based on the received feedbacks.

GENERAL DEFINITIONS:

Throughout this standard the following definitions, where applicable, should be followed:

1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.

2- "COMPANY": refers to National Iranian Gas Company (NIGC).

3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to NIGC whether as the prime producer or manufacturer or a trading firm.

4- "SHALL ": is used where a provision is mandatory.

5- "SHOULD": is used where a provision is advised only.

6- "MAY": is used where a provision is completely discretionary.

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CONTENT **PAGE**

1. SCOPE

1.1 This standard is applicable for indoor, outdoor and buried cables intended for the interconnection of the following:
Transmission equipments;
Telephone and computer equipments;
Equipments for data processing;
Internal wiring of telecommunication and electronic equipments

This standard is applicable to wires with solid or stranded conductor, polyvinyl chloride (PVC) or polyethylene (PE) insulated, in singles, pairs and triples

2. REFERENCES

Throughout this standard specification the following standards and codes are referred to the edition of these standards and codes that are in effect at the time of issues of this standard specification.
The applicability of changes in standards and codes that occur after the date of standards that referred shall be mutually agreed upon by the purchaser and supplier / or manufacturer.

2.1. IEC 60189-1(2007), Low-Frequency Cables and Wires with PVC Insulation and PVC Sheath Part 1: General Test and Measuring Methods Incorporating Amendment
2.2.IEC 60189-2 (2007)Low-Frequency Cables and Wires With PVC Insulation and PVC Sheath – Part 2: General test and Measuring Methods
2.3.IEC 60189-3(2007) Low-Frequency Cables and Wires With PVC Insulation and PVC Sheath – Part 3: Equipment Wires With Solid or Stranded Conductor Wires, PVC Insulated in Singles, Pairs and Triples
2.4.IEC 60189-0-1(2000) Radio-Frequency Cables - Part 0: Guide to the Design of Detail Specifications Section 1 - Coaxial Cables Edition 2.1; Edition 2: 1990 Consolidated with Amendment
2.5.IEC 60708-1(1981) Low-Frequency Cables with Polyolefin Insulation and Moisture Barrier Polyolefin Sheath Part 1: General Design Details and Requirements First Edition; Amendment
2.6.IPS M-EL-271 (1393) Low Voltage Cables and Wires
2.7.IPS M-EL-272(1393) Medium and High Voltage Power Cables
2.8.IEC 60096-2(1988) Radio-Frequency Cables Part 2: Relevant Cable Specifications First Edition; Consolidated Reprint Consisting of Publication 60096-2 and Supplements 96-2A: 1965, 96.

3. DEFINITIONS

For the purposes of this Standard, the following definitions apply.

3.1. Conductor

Part of the cable or wire intended to carry electric current. The conductor may be:

a) Solid - made of a single strand of circular cross-section;

b) Stranded - made of several strands of circular cross-section assembled either by laying up concentrically or by bunching, and without insulation between them,

3.2. Indoor Cables

The cables that are used in controllable environmental condition such as temperature, humidity, pressure and other effective factors on cables.

3.3. Outdoor Cables

The cables that are used in uncontrollable environmental condition such as temperature, humidity, wind, pressure and other effective factors on cables.

3.4. Low-Frequency wire

Insulated conductor or assembly of several insulated conductors, laid up together and which may be provided with a screen.

The wire may be:

a) single - consists of a single insulated conductor;

b) multiple - consists of several insulated conductors, the number of which shall not exceed five;

Note. - The following designations are used:

Pair - for multiple wire with two conductors;

Triple - for multiple wire with three conductors;

Quad - for multiple wire with four conductors;

Quintuple - for multiple wire with five conductors.

3.5. Low-Frequency Cables

3.5.1. Sheathed Cable

Assembly of insulated conductors enclosed in a common continuous protective covering, having a certain degree of flexibility.

3.5.2. Unsheathed Cable

Assembly of more than five insulated conductors held together.

3.6. Cable Construction *and* Dimensions

3.6.1. Conductor Material

The conductor shall consist of annealed copper, uniform in quality and free from defects.

3.6.2. Type of Conductor
The conductor shall consist of a single strand, circular in section.

3.6.3. Conductor Finish
The conductor may be either plain or tinned.
The conductor is designated by its nominal diameter.

3.7. Insulation
The insulation is a material that applied to fit closely to the conductor without adhering to it.

3.7.1. Insulation Thickness
The insulation shall be perfectly continuous having a thickness as uniform as possible.
The minimum thickness of the insulation shall be measured in accordance with the method
Publication 60189-1.

3.7.2. Application of the Insulation
The stripping properties of the insulation shall be checked in accordance with the method specified in Sub-clause 3.4.1 of IEC Publication 60189-1.
It shall be possible to strip the insulation, from the conductor easily and without damage to the insulation to the conductor, or to the tinning, if any.
In particular cases, however, for example where wires are to be used employing wire wrapping techniques, or where mechanical stripping devices are being used, a controlled method of test may be required. In such cases, by agreement between purchaser and manufacturer, the method specified in Sub-clause 3.4.2 of IEC Publication 60189-1 shall be adopted.

3.7.3. Color of Insulation
The insulated conductors shall be colored by one or two different colors.
Colors shall correspond reasonably with the standard colors shown in IEC Publication 60304: Standard Colors for Insulation for Low-frequency Cables and Wires.

4. TECHNICAL SPECIFICATION
This standard shall be used in conjunction with IEC Publication 60189 – 1, 2, 3.
The color codes of wires shall be according to IEC 60708.
The specification of CCTV and Fiber Optic Cables is not covered by this standard**.**

5 . INDOOR CABLES

5.1 Insulated Wires, Non-sheathed (for Equipments and Panel Connection.)

5.1.1 Insulated wires with solid conductors. Specification shall be according to IEC 60189-3 standard.

Conductor: Tinned, annealed, copper, solid conductor
Insulation: P.V.C covered with transparent nylon.
Element : single core.

5.1.2 Insulated wires with stranded conductor. According to IEC 60189-3.

Conductor: tinned, annealed, copper, stranded conductor.
Insulation: P.V.C covered with transparent nylon.
Element: single pairs.

5.1.3 Telephone wiring, (jumper wire) according to IEC 60189-1 & IEC 60189-2.

Conductor: tinned annealed copper, solid conductor.
Insulation: P.V.C.
Element : twisted pairs

5.2. P.V.C Insulated and P.V.C Sheathed Cables.

5.2.1 Telecommunication cable for indoor use, designed and tested according to IEC 60189.

Conductor: tinned annealed copper, solid conductor.
Insulation: P.V.C with color coding according to IEC 60189.
Element: twisted pair, with earthing core, and cores protection.
Screen: aluminum foil plastic tape.
Over sheath: grey or cream p.v.c.

5.2.2 Telecommunication flexible cable for connecting.

Telephone sets to telephone out lets (for use as line cord) , designed and tested according to IEC-60189.
Conductor: plain annealed copper, stranded conductor with 0.22 SQMM cross section.
Insulation: PVC with color coding
Over sheath: PVC

5.3.Specific Cables For Data

Name	Typical construction	Bandwidth	Applications	Notes
Level 1		0.4MHz	Telephone and modem lines	Unsuitable for modem systems
Level 2		4MHz	Older terminal systems, e.g. IBM3270	Unsuitable for modem systems.
Cat[2].3	UTP[1]	16 MHz	1OBASE-T and 100BASE-T4 Ethernet	Unsuitable for speeds above 16 Mbit/s. Now mainly for telephone cables
Cat.4	UTP	20 MHz	16 Mbit/s Token Ring	Not commonly used
Cat.5	UTP	100 MHz	1OOBASE-TX & 1OOOBASE-T Ethernet	Common for current LANs. Superseded by Cat5e, but most Cat5 cable meets Cat5e standards
Cat.5e	UTP	100 MHz	1OOBASE-TX & 1OOOBASE-T Ethernet	Enhanced Cat5. Common for current LANs. Same construction as Cat5
Cat.6	UTP	250 MHz	1OGBASE-T Ethernet	ISO/IEC 11801 2nd Ed. (2002). Most commonly installed cable in Finland according to the 2002 standard EN 50173-1.
$Cat.6_A$	U/FTP, F/UTP	500MHz	1OGBASE-T Ethernet	Adds cable shielding. ISO/IEC 11801 2nd Ed. Am. 2. (2008), ANSI/TIA-568- C-1 (2009)
Cat7	F/FTP, S/FTP	600MHz	1OGBASE-T Ethernet. POTS/CATV/1000BASE- T over single cable.	Fully shielded cable. ISO/IEC 11801 2nd Ed. (2002)
$Cat.7_A$	F/FTP, S/FTP	1000MHz	1OGBASE-T Ethernet POTS/CATV/1000BASE-T over single cable.	Uses all four pairs. ISO/IEC 11801 2nd Ed. Am. 2. (2008)
Cat8/8.1	U/FTP, F/UTP	1600-2000MHz	40GBASE-T Ethernet POTS/CATV/1000BASE-T over single cable.	In development (ANSI/TIA-568-C.2-1, ISO/IEC 11801 3rd Ed.)
Cat.8.2	F/FTP, S/FTP	1600-2000MHz	40GBASE-T Ethernet. POTS/CATV/1000BASE-T over single cable.	In development (ISO/IEC 11801 3rd Ed.)

[1] Unshielded twisted pair
[2] Category

6. OUT DOOR CABLES

6.1. Polyethylene Insulated and P.V.C Sheathed Outdoor Cables

6.1-1.Self supporting cables (drop wire).

Conductor : solid, copper clad, steel wire conductor.
Insulation: polyethylene (P.E.).
Element: black P.V.C
Electrical data : at 20°c (approx) Loop resistance 136 ohm / km.
Attenuation at 800 HZ in air , 0.9 dB/km .
Pair capacitance at 800 HZ, 45 nf/km

6.2. Polyethylene Insulated And P.E. Sheathed.

6.2.1. Telecommunication cable for outdoor use. According to IEC 60708 and IEC 60189.
Conductor: plain, annealed , copper , solid conductor.
Insulation: P.E with color coding.
Element: twisted pair with earthing core, and tape protected cores.
Screen: aluminum foil plastic tape.
Over sheath : P.E. black color.

6.2.2 Telecommunication aerial self supporting cable.

Conductor: plain, annealed, copper, solid conductor.

Insulation: P.E.

Element: twisted pair with earthing core.
Wrapping: tape protected cores.
Screen: aluminum foil plastic tape.
Over sheath: P.E.
Supporting: stranded galvanized steel wires , for min. Tractive force stated for each item.

7. BURIED CABLES

7.1. Non – armored underground telecommunication cable. (Duct type cable) according to IEC 60708 and IEC 60189.

Conductor: plain annealed copper, solid conductor according to IEC 60189.

Insulation: polyethylene with color according to IEC 60189-2

Element : twisted pairs.

Ray- up : unit construction with sub units of 5 or 10 pairs.

Filling : Petroleum jelly with drop point temp. 70-80°c and cores protection tape.

Bedding : P.E.

Screen : aluminum according to IEC 60189.

Over sheath: black P.E with anti vermin additives.

Marking : conductor size and no. of pairs shall be embossed on the over sheath .

Electrical data: mutual capacitance 55±5 nf /km

Unbalance capacitance 800 p.f/km between pairs of each sub unit.

7.2. Direct buried armoured underground tel. Cable according to IEC 60 708 (unless otherwise specified).

Conductor: plain annealed copper, solid conductor according to IEC-60189

insulation: polyethylene color coding according to IEC 60189-2.

Element: Twisted pairs,

Lay- up: Unit construction with sub-Units of 5 or 10 pairs.

Filling: petroleum jelly with drop point temp. of 70--80°c and cores protection tape.

Bedding: P.E.

Screen: aluminum according to IEC 60189.

Inner sheath: P.E.

Armour: galvanized single steel wire.

Over sheath : black P.E with anti vermin additives.

Marking: conductor size and no. of pairs shall be embossed on the over sheath

Electrical data: mutual capacitance 55±5 nf/km unbalances capacitance 800 pf/km between pairs of each sub unit.

8. COAXIAL CABLES

The usage of coaxial telecommunication cables for transmitting signals and data shall be based on IEC 60096-0-1

9. CORE IDENTIFICATION AND CABLE MARKING

9.1. For three core cable each core shall be identified with tapes of appropriate indelible color (red, yellow, blue) or by numbers and letters (L1, L2, and L3) based on manufacturer standard.

9.2. The color of the outer sheath of all medium voltage and high voltage power cables shall be red. At least the following information shall be printed on the outer sheath of the cables, at reasonable intervals according to manufacturer standard.

- Manufacturer's name
- Year of manufacture
- Type of insulation
- Rated voltage
- Number of cores
- Size of conductors
- Length indication
- Other information requested in purchase order.

10. CABLE TESTS AND INSPECTION

10.1. Routine tests, sample tests and type tests shall be carried out at manufacturer work according to the recommendations of IEC 60502-2, and the relevant publications referred to therein.

10.2. Type tests, electrical and non-electrical, shall be performed on samples from each type of cables.

Type tests are of such a nature that, after they have been made, they need not be repeated, unless changes are made in the cable materials or design or manufacturing process which might change the performance characteristics.

10.3. Test certificates shall be submitted to purchaser in three copies.

10.4. The purchaser may appoint representative/s or third party to witness the factory tests on cables. The supplier shall inform the date of performing such tests, at least four weeks in advance.

5 The purchaser's inspectors shall be granted the right for inspection at any stage of manufacture, testing and preparation for shipment.

11. PACKING FOR SHIPMENT

11.1. The cables shall be supplied on non returnable drums with steel reinforced hub plates, the inner end of cables shall be brought out through the side of the drum/s.

11.2. Each drum shall be durably marked on the outside of the flange, with particulars of the cable i.e. voltage, length, conductor size, and cable type. The gross mass shall be shown and the direction of rolling shall be indicated by arrow.
11.3. Cable drums shall be provided with a permanently attached readily visible identification tags. Identification tags should remain intact from the time of initial dispatch at work to the final destination.
11.4. Before dispatch the manufacturer shall seal and cap both ends of cables so that to prevent the ingress of water during transportation and storage, projecting end of cables shall be protected from mechanical damage.
11.5. The cables manufacturer shall be the sole responsible for adequacy of preparation for shipment of cables.
11.6. Shipping documents with exact description for custom release shall be included.

12. GUARANTEE

12.1. All cables shall be guaranteed against defective material, poor design and workmanship.
12.2. The vendor shall guarantee the cables performance under specified conditions.
12.3. If any defect is discovered during the d.c. voltage test performed after the cable installation, the vendor shall be responsible for replacement of the cable free of charge.
Unless otherwise agreed between the cable vendor and the purchaser, the d.c. test voltage shall be equal to 4U0 and shall be applied for fifteen minutes according to the recommendations of IEC 60502-2

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