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مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

مشخصات فنی خرید

لوله های غلاف برقی برای سیمهای برق

Conduits



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ابلاغ مصوبه هیأت مدیره



مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۵۹۴ مورخ ۱۳۹۳/۴/۲۹ هیأت مدیره، نامه شماره گ.۵۶۲۵۸/۰۰۰/۹ مورخ ۱۳۹۳/۴/۲۲ مدیر پژوهش و فناوری و رئیس شورای استاندارد در مورد تصویب نهایی استاندارد تحت عنوان لوله های غلاف برقی برای سیم های برق به شماره استاندارد (1) IGS-M-EL-001 مطرح و مورد تصویب قرار گرفت.



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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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1. SCOPE

This standard specifies requirements and tests for conduit systems, including conduits and conduit fittings, for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1000 V a.c. and/or 1500 V d.c. This standard applies to metallic, non-metallic and composite conduit systems (rigid conduit systems) including threaded and non-threaded entries which terminate the system. This standard does not apply to enclosures and connecting boxes which come within the scope of IEC 60670.

Note 1: Certain conduit systems may also be suitable for use in hazardous atmospheres According to: IPS-M-EL-161. Regard should then be taken of the extra requirements necessary for equipment to be installed in such conditions

Note 2: Earthing conductors may or may not be insulated.

2. NORMATIVE REFERENCES

This Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

BS EN 50086-1 & 2 "Conduit systems for electrical installation"

3. DEFINITIONS

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

3.1 Conduit System

A closed wiring system consisting of conduits and conduit fittings for the protection and management of insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced, but not inserted laterally.

3.2 Conduit

A part of a closed wiring system of general circular cross-section for insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced.

3.3 Conduit Fitting

A device designed to join or terminate one or more components of a conduit system, or change direction.

3.4 Metallic Conduit and /or Conduit Fitting

Conduit or conduit fitting which consists of metal only.

3.5 Non-Metallic Conduit and/or Conduit Fitting

Conduit or conduit fitting which consists uniquely of non-metallic material and has no metallic components whatsoever.

3.6 Composite Conduit and/or Conduit Fitting

Conduit or conduit fitting comprising both metallic and non-metallic materials.

3.7 Non-Flame Propagating Conduit and/or Conduit

Fitting conduit or conduit fitting which is liable to catch fire as a result of an applied flame, in which the flame does not propagate and which extinguishes itself within a limited time after the flame is removed.

3.8 Plain Conduit

A conduit in which the profile is even in the longitudinal section (see note 3.9).

3.9 Corrugated Conduit

A conduit in which the profile is corrugated in the longitudinal section.

Note: Both annular and helical corrugated conduits are permissible and a combination of both corrugated and plain conduit is possible.

3.10 Rigid Conduit

A conduit which cannot be bent, or only be bent with the help of a mechanical aid and with or without special treatment.

3.11 Pliable Conduit

A conduit which can be bent by hand, with a reasonable force and is not intended for frequent flexing.

3.12 Self-Recovering Conduit

A pliable conduit which deforms when a transverse force is applied for a short time and which after removal of this force returns close to its original shape within a further short time.

3.13 Material Thickness of a Plain Conduit

The average difference between the outside and inside diameter divided by two.

3.14 Material Thickness of a Corrugated Conduit

The average thickness of material measured at any point along the shape of one corrugation.

3.15 Material Thickness of a Combined Plain and Corrugated Conduit

The sum of the plain conduit material thickness and the corrugated material thickness.

3.16 Threadable Conduit and Conduit Fitting

Conduit and conduit fitting which carry a thread for connection; or in or on which a thread, can be formed.

3.17 Non-Threadable Conduit and Conduit Fitting

Conduit and conduit fitting which are suitable for connection only by means other than threads.

3.18 Conduit Joint

An interface between two or more components of a conduit system, or between a conduit system and other equipment

3.19 External Influence

Factors which may affect the conduit system.

Note: Examples of such factors are a presence of water, oil or building materials, low and high temperatures and corrosive or polluting substances.

3.20 Hot Dip Galvanizing

A coating of zinc and zinc-iron alloy layers, obtained by dipping prepared iron or steel articles in molten zinc.

Note: Under some circumstances the whole coating may consist of zinc-alloy layers.

3.21 Sherardizing

A diffusion process in which articles are heated in close contact with zinc dust and inert operating media.

Note: The process is normally carried out in a slowly rotating closed container at a temperature in the region of 385 °C. The corrosion resistance is proportional to the coating thickness which can be controlled.

4. GENERAL REQUIREMENTS

4.1 Conduit and conduit fittings within the scope of This standard shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings. When assembled in accordance with manufacturer's instructions as part of a conduit system, they shall provide mechanical and, where required, electrical protection of the insulated conductors and cables contained therein.

4.2 The protective properties of the joint between the conduit and conduit fitting shall be not less than that declared for the conduit system.

4.3 Conduit and conduit fittings shall withstand the stresses likely to occur during transport, storage, recommended installation practice and application.

5. GENERAL CONDITIONS FOR TESTS

5.1 Tests in accordance with this standard are type tests.

5.2 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (23 ± 2) °C.

5.3 Unless otherwise specified each test shall be made on three new samples.

Note: Certain tests, for instance the checking of dimensions, do not affect a change in the property of the samples and therefore these samples are considered as new samples and can be used for further tests.

5.4 Samples of non-metallic and composite conduits and conduit fittings shall be conditioned for at least 240 h., at a temperature of (23 ± 2) °C and a relative humidity between 40 % and 60 %. All tests shall be carried out immediately after general conditioning.

5.5 Unless otherwise specified, the samples for each test shall be in a clean and new condition, with all parts in place and mounted as in normal use. After checking dimensions in accordance with clause 8, and unless otherwise specified in the relevant test, the conduit fittings shall be assembled with adequate lengths of conduit of the type for which they are intended. Due regard shall be taken of the manufacturer's instructions, especially where force is required in the assembly of the joint.

5.6 Where the conduit entries are part of the detachable or loose type conduit fitting, the detachable conduit fitting shall be capable of being assembled again, after the test, according to the manufacturer's instructions without loss of the declared properties according to clause 6.

5.7 Unless otherwise specified, three samples are submitted to the tests and the requirements are satisfied if the tests are met. If only one of the samples does not satisfy a test due to an assembly or a manufacturing defect that test and any preceding one which may have influenced the result of the test shall be repeated and also the tests which follow shall be made in the required sequence on another full set of samples, all of which shall comply with the requirements. If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection.

Note: The applicant when submitting the first set of samples, may also submit the additional set of samples which may be necessary, should one sample fail. The testing station will then without further request test the additional set of samples and will reject only if a further failure occurs.

5.8 When toxic or hazardous processes are used, due regard shall be taken of the safety of the persons within the test area.

5.9 Conduit systems which are used as an integral part of other equipment shall also be tested in accordance with the relevant standard for that equipment.

6. CLASSIFICATIONS

Note: Annex A shows the classification coding format for declared properties of the conduit system, which may be incorporated in the manufacturer's literature.

6.1 According to Mechanical Properties

6.1.1 Resistance to compression:

- 1-Very light
- 2-Light
- 3-Medium
- 4 -Heavy
- 5 -Very heavy

6.1.2 Resistance to impact:

- 1-Very light
- 2-Light
- 3-Medium
- 4-Heavy
- 5-Very heavy

6.1.3 Resistance to bending:

- 1-Rigid
- 2-Pliable
- 3-Pliable/Self-recovering
- 4-Flexible

6.1.4 Tensile strength:

- 1-Very light
- 2-Light
- 3-Medium
- 4-Heavy
- 5-Very heavy

6.1.5 Suspended load capacity:

- 1-Very light
- 2-Light
- 3-Medium
- 4-Heavy
- 5-Very heavy

6.2 According to Temperature:**6.2.1 Lower temperature range****Table 1 – Lower Temperature Range**

Classification (1st Numeral)	Transport, Permanent Application & Installation not less than °C
1x	+5
2x	-5
3x	-15
4x	-25
5x	-45

6.2.2 Upper temperature range

Table 2 – Upper Temperature Range

Classification (2st Numeral)	Permanent Application & Installation not more than °C
X1	60
X2	90
X3	105
X4	120
X5	150
X6	250
X7	400

6.3 According to Electrical Characteristics:

6.3.1 With electrical continuity characteristics

6.3.2 With electrical insulating characteristics

6.4 According to Resistance to External Influences

6.4.1 Protection against ingress of solid objects:
With protection in accordance with EN 60529 to minimum of IP3X

6.4.2 Protection against ingress of water:
With protection in accordance with EN 60529 to a minimum of IPXO

6.4.3 Resistance against corrosion:

- 1- Without protection
- 2- With protection as detailed in Table 14

6.5 According to Resistance to Flame Propagation:

6.5.1 Non-flame propagating

6.5.2 Flame propagating

6.5.3 Other fire effects under consideration.

7. MARKING AND DOCUMENTATION

7.1 The conduit shall be marked on the product with:

- a)** The name or trademark of the manufacturer, or responsible vendor;
- b)** A product identification mark.

7.1.1 The conduit may also be marked with the classification code which shall be in accordance with Annex A and shall include at least the first four digits.

Note 1: The conduit shall be marked in accordance with 7.1 at regular intervals along its length of preferably 1 m but not longer than 3 m and each length shall be marked at least once.

Note 2: The manufacturer shall document for the system the minimum inside diameter and the classification in accordance with clause 6.

7.1.2 The manufacturer shall be responsible for indicating the compatibility of parts within a conduit system.

7.2 The conduit fitting shall be marked in accordance with 7.1.1, on the product wherever possible but where this is impractical then the mark may be on a label attached to the product or to the box or carton containing the fittings

7.3 Flame propagating material shall be orange in color. It shall not be colored orange by painting or other superficial means. Non-flame propagating material may be of any color except yellow, orange or red, unless clearly marked on the product to be of non-flame propagating material.

7.4 Earthing facility shall be indicated by the Symbol for protective earth in accordance with HD 243 S10, symbol IEC60417-5019a. This marking shall not be placed on easily removable parts, e.g. screws.

7.5 The marking shall be durable and easily legible. Compliance shall be checked by inspection and by rubbing the marking by hand for 15s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

Note 1: Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0, 1 %, volume, a kauri- butanol value of 29, initial boiling point 65 °C, a dry point 69 °C and specific gravity 0, 68 kg/l.

Note 2: Marking may be applied, for example, by molding, pressing, engraving, printing, adhesive labels, or water slide transfers.

Note 3: Marking made by molding, pressing or engraving is not subjected to this test. After the test the marking shall be legible.

7.6 The conduit shall be marked in accordance with 7.1 at regular intervals along its length of preferably 1 m but not longer than 3 m and each length shall be marked at least once. Compliance checked by inspection.