



شرکت ملی گاز ایران
مدیریت پژوهش و فناوری
امور تدوین استانداردها

IGS

دستور العمل

سیستم پوششی پلی اتیلن سه لایه

3-Layer Polyethylene Coating System



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شرکت ملی گاز ایران

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ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۶۹۴ مورخ ۱۳۹۵/۵/۱۷ هیأت مدیره، نامه شماره گ. ۶۰۷۰۱/۰۰۰/۹ مورخ ۹۵/۰۵/۰۴ مدیر پژوهش و فناوری درمورد تصویب نهایی استانداردها به شرح زیر مطرح و مورد تصویب قرار گرفت.

۱. مشخصات فنی سیستم پوششی پلی اتیلن سه لایه IGS-C-TP-010(1)
 ۲. مشخصات فنی خرید دستگاه فشرده ساز لوله‌های پلی اتیلن IGS-M-PL-024(0)
 ۳. دستورالعمل، ارزیابی و صدور گواهینامه صلاحیت جوشکاران لوله و اتصالات پلی اتیلن به روش الکتروفیوژن (حذف تبصره بند ۴-۴ بشرح پیوست) IGS-C-DN-002(2)
- این مصوبه در حکم مصوبه مجمع عمومی شرکت‌های تابعه محسوب و برای کلیه شرکت‌های تابعه لازم الاجرا می‌باشد.

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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 specification covers the minimum requirements for material, qualification, surface preparation, application, testing and inspection of three-layer polyethylene-based coatings to be used for external corrosion protection of underground steel pipeline systems. The coating shall be plant-applied and suitable for operating temperature from -30°C to +80°C (T_{max}).

Note1: Pipes coated in accordance with this standard are considered suitable for further protection by means of cathodic protection.

Note2: This standard withdraws and replaces IGS-E-TP-010-1, IGS-E-TP-010-2 and IGS-C-TP-010-Amnd2 standards.

2. REFERENCES

Throughout this standard specification, the following standards and codes are referred to, the edition of them, that are in effect at the time of issue of this standard specification (2015) shall, to the extent specified herein, form part 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 manufacturer or supplier.

2.1 Normative references

ASTM D638(2014) "Standard test method for tensile properties of plastics"

ASTM D746 (2014) "Standard test method for brittleness temperature of plastics and elastomers by impact"

ASTM D792 (2013) "Standard test methods for density and specific gravity (relative density) of plastics by displacement"

ASTM D1238 (2013) "Standard test method for melt flow rates of thermoplastics by extrusion plastometer"

ASTM D1505 (2010) "Standard test method for density of plastics by the density-gradient technique"

ASTM D1525 (2009) "Standard test method for vicat softening temperature of plastics"

ASTM D1603 (2014) "Standard test method for carbon black content in olefin plastics"

ASTM D1693 (2015) "Standard test method for environmental stress-cracking of ethylene plastics"

ASTM D2240(2015) "Standard test method for rubber property – Durometer hardness"

ASTM D3418 (2015) "Standard test method for transition temperatures and enthalpies of fusion and crystallization of polymers by differential scanning calorimetry"

ASTM D3895 (2014) "Standard test method for oxidative-induction time of polyolefins by differential scanning calorimetry"

ASTM D4138 (2013) "Standard practice for measurement of dry film thickness of protective coating systems by destructive, cross-sectioning means"

ASTM D4940 (2015) "Standard test method for conductimetric analysis of water soluble ionic contamination of blasting abrasives"

CSA Z245.20 Series-14 (2014) "Plant-applied external coatings for steel pipe"

EN 10204 (2004) "Metallic products – Type of inspection documents"

IGS-C-PL-001(0) "Loading, Handling and Storage of Externally Coated Pipes"

IGS-M-PL-001-1(0) (2012) "SMLS/HFW Carbon Steel Pipes, Grade B, Sizes: 1/2 to 4 inch."

IGS-M-PL-001-2(0) (2013) "SMLS/HFW/SAWL/SAWH Carbon Steel Pipes, Grades B to X80, Sizes: 6 to 56 inch."

ISO 306 (2013) "Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)"

ISO 527-1 (2012) "Plastics – Determination of tensile properties – Part 1: General principles"

ISO 527-2 (2012) "Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics"

ISO 527-3 (1995) "Plastics – Determination of tensile properties – Part 3: Test conditions for films and sheets"

ISO 868 (2003) "Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)"

ISO 1133-1 (2011) "Plastics – Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics– Part 1: Standard method"

ISO 1183-1 (2012) "Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method"

ISO 1183-2 (2004) "Plastics – Methods for determining the density of non-cellular plastics – Part 2: Density gradient column method"

ISO 1183-3 (1999) "Plastics – Methods for determining the density of non-cellular plastics – Part 3: Gas pycnometer method"

ISO 2808 (2007) "Paints and Varnishes – Determination of Film Thickness"

ISO 3146 (2000) "Plastics – Determination of melting behavior (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods"

ISO 6964 (1986) "Polyolefin pipes and fittings – Determination of carbon black content by calcination and pyrolysis – Test method and basic specification"

ISO 8501-1 (2007) "Preparation of Steel Substrates before Application of Paints and Related Products – Visual Assessment of Surface Cleanliness – Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings"

ISO 8502-6 (2006) "Preparation of Steel Substrates before Application of Paints and Related Products – Tests for the Assessment of Surface Cleanliness – Part 6: Extraction of Soluble Contaminants for Analysis – The Bresle Method"

ISO 8502-9 (1998) "Preparation of Steel Substrates before Application of Paints and Related Products – Tests for the Assessment of Surface Cleanliness – Part 9: Field Method for the Conductometric Determination of Water-soluble Salts"

ISO 8503-4 (2012) "Preparation of Steel Substrates before Application of Paints and Related Products – Surface Roughness Characteristics of Blast-Cleaned Steel Substrates – Part 4: Method for the Calibration of ISO Surface Profile Comparators and for the Determination of Surface Profile – Stylus Instrument Procedure"

ISO 8503-5 (2003) "Preparation of Steel Substrates before Application of Paints and Related Products – Surface Roughness Characteristics of Blast-Cleaned Steel Substrates – Part 4: Replica Tape Method for the Determination of the Surface Profile"

ISO 10474 (2013) "Steel and steel products – Inspection documents"

ISO 11124-1 (1993) "Preparation of Steel Substrates before Application of Paints and Related Products – Specifications for Metallic Blast-Cleaning Abrasives – Part 1: General Introduction and Classification"

ISO 11124-2 (1993) "Preparation of Steel Substrates before Application of Paints and Related Products – Specifications for Metallic Blast-Cleaning Abrasives – Part 2: Chilled-Iron Grit"

ISO 11124-3 (1993) "Preparation of Steel Substrates before Application of Paints and Related Products – Specifications for Metallic Blast-Cleaning Abrasives – Part 3: High-Carbon Cast-Steel Shot and Grit"

ISO 11124-4 (1993) "Preparation of Steel Substrates before Application of Paints and Related Products – Specifications for Metallic Blast-Cleaning Abrasives – Part 4: Low-Carbon Cast-Steel Shot"

ISO 11127-6 (2011) "Preparation of Steel Substrates before Application of Paints and Related Products – Test Methods for Non-metallic Blast-Cleaning Abrasives – Part 6: Determination of Water-soluble Contaminants by Conductivity Measurement"

ISO 11357-1 (2009) "Plastics – Differential scanning calorimetry (DSC) – Part 1: General principles"

ISO 11357-3 (2011) "Plastics – Differential scanning calorimetry (DSC) – Part 3: Determination of temperature and enthalpy of melting and crystallization"

ISO 11357-6 (2008) "Plastics – Differential scanning calorimetry (DSC) – Part 6: Determination of oxidation induction time"

ISO 15512 (2014) "Plastics – Determination of water content"

ISO 17855-2 (2016) "Plastics – Polyethylene (PE) moulding and extrusion materials – Part 2: Preparation of test specimens and determination of properties"

ISO 18553 (2002) / Amd 1 (2007) "Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds"

ISO21809-1 (2011) "Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 1: Polyolefin coatings (3-layer PE and 3-layer PP)"

ISO21809-2 (2014) "Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 2: Single layer fusion-bonded epoxy coatings"

ISO/TS 29001 (2010) "Petroleum, petrochemical and natural gas industries – Sector-specific quality management systems – Requirements for product and service supply organizations"

SSPC-AB 1 (2015) "Abrasive Specification No. 1 – Mineral and Slag Abrasives"

SSPC-AB 2 (2015) "Abrasive Specification No. 2 – Cleanliness of Recycled Ferrous Metallic Abrasive"

SSPC-AB 3 (2004) "Abrasive Specification No. 3 – Ferrous Metallic Abrasive"

SSPC-SP 1 (2015) "Surface Preparation Specification No. 1 –Solvent Cleaning"

2.2 Informative references

DNV-RP-F106 (2011) "Factory applied external pipeline coatings for corrosion control"

SHELL DEP 31.40.30.31-Gen. (2011) "External polyethylene and polypropylene coating for line pipe (Amendments/supplements to ISO/DIS 21809-1:2009"

TOTAL GS EP COR 220 (2009) "Three layer polyethylene external coating for pipelines"

3. DEFINITIONS

Adhesion

Bond between coating and substrate after environmental testing

Applicator

Company that undertakes the coating application

Application procedure specification (APS)

Document describing procedures, methods, equipment and tools used for coating application

Batch

Quantity of material produced in a continuous manufacturing operation using raw materials of the same source and grade

Batch certificate

Certificate of analysis issued by the manufacturer

Cutback

Length of pipe left uncoated at each end for joining purposes

Holiday

Coating discontinuity that exhibits electrical conductivity when exposed to a specific voltage

Inspection and testing plan (ITP)

Document providing an overview of the sequence of inspections and tests, including appropriate resources and procedures

Manufacturer

Company responsible for the manufacture of coating material(s)

Manufacturer's specification

Document that specifies the characteristics, test requirements and application recommendations for the coating materials

Operating temperature

Maximum and/or minimum temperature that can be endured by a pipeline (component) and/or pipeline system during operation, and that shall be within the design temperature range

Peel strength

Force required for peeling the coating from the substrate

Pipe diameter length

Any length along the pipe axis equal to the specified outside diameter of the pipe