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شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

دستورالعمل

اپوکسی مایع برای تعویض و تعمیر پوشش خارجی خطوط لوله مدفون ،
سرجوش ها ، شیر آلات ، اتصالات و سایر اجزاء لوله کشی

Liquid Epoxy for Rehabilitation and Repair of External coating of
Buried Steel Pipelines, Field joints, valves, fittings and other
piping components



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شرکت ملی گاز ایران



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باسلام،

به استحضار می‌رساند در جلسه ۲۰۴۸ مورخ ۱۴۰۲/۱۲/۰۸ هیأت مدیره، نامه شماره ۲۰۵۳۴۷ مورخ ۱۴۰۲/۱۱/۱۱ مدیر پژوهش و فناوری درمورد تصویب نهایی مقررات فنی شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.

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Foreword

This standard specification is intended to be mainly used by N.I.G.C. and contractors, and has been prepared base on interpretation of recognized standards and technical documents, as well as knowledge, backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Specification (IGS) are prepared, reviewed and amended by technical standard committees within NIGC standardization division of research and technology management and submitted to "the standards council of NIGC" for approval.

IGSs are subjected to revision, amendment or withdrawal, if required, and thus the latest edition of IGS shall be checked / inquired by NIGC'S users.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation or conflicts between this specification and other applicable standards, codes, procedure or well-known manufacturer's specifications must be resolved in writing by the user or its representative through Manager, Engineering Department or standardization division of NIGC.

The technical standard committee welcomes comments and feedbacks from concerned or interested corporate and individuals 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 IGS specification 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, surface preparation, application, quality assurance and inspection of liquid epoxy to be used for preventing external corrosion of buried steel pipeline systems. The coating system shall be used at maximum design temperature of the pipeline limited to 80 °C (T_{max}) for applications as follow:

- Rehabilitation of buried pipelines and piping's coatings.
- Field joints and repair of buried pipelines and piping, valves, fittings and other pipeline and piping components coated with FBE or liquid epoxy or liquid polyurethane coating systems.
- New coating of buried piping, valves, fittings and other piping components.
- The epoxy shall be of the type that can be applied by using either plural component spray equipment or brushes and rollers for brush grades.

Note 1: This standard specification does not cover factory coating of line pipes.

Note 2: If the design temperature is more than 40 °C or for field joints or pipe sizes with O.D. 30" and larger, the minimum dry film thickness of coating shall be 1500 μm . For smaller sizes or lower temperatures, the minimum dry film thickness of coating shall be 800 μm .

Note 3: Manual / hand application is acceptable only for repair.

Note4: For higher design temperature(>80°C) only epoxy-Novolac coating shall be used.

Note5: This standard withdraws and replaces IGS-M-TP-027 (1).

2. REFERENCES

Throughout this standard the following dated and undated standards/codes are referred to. This referenced documents shall, to the extent specified herein, from a part of this standard. For dated references, the edition cited applies. For undated references, the latest edition of the referenced documents applies.

2.1 Normative references

ASTM D 1640 (2022) "Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature"

ASTM D 4285 (2018) "Standard Test Method for Indicating Oil or Water in Compressed Air"

ASTM D 4940 (2020) "Standard Test Method for Conduct Metric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives"

EN 10289 (2002) "Steel Tubes and Fittings for Onshore and Offshore Pipelines – External Liquid Applied Epoxy and Epoxy-Modified Coatings"

ISO 4624 (2023) "Paints and Varnishes – Pull-Off Test for Adhesion"

ISO 868 (2003) "Plastics and Ebonite – Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)"

ISO 8502-3 (2017) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for Assessment of Surface Cleanliness – Part 3: Assessment of Dust on Steel Surface Prepared for Painting (Pressure Sensitive Tape Method)"

ISO 8502-6 (2020) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for Assessment of Surface Cleanliness – Part 6: Extraction of Soluble Contaminants for Analysis – The Bresle Method"

ISO 8502-9 (2020) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for the Assessment of Surface Cleanliness – Part 9: Field Method for the Conduct Metric Determination of Water-Soluble Salts"

ISO 8503-2 (2012) "Preparation of Steel Substrates before Application of Paints and Related Products –Surface Roughness Characteristics of Blast-Cleaned Steel Substrates – Part2: Method for the Grading of Surface Profile of Abrasive Blast-Cleaned Steel – Comparator Procedure"

ISO 11124 (all parts) (2018) "Preparation of Steel Substrates before Application of Paints and Related Products –Specifications for Metallic Blast-Cleaning Abrasives"

ISO 11126 (all parts) (2018) "Preparation of Steel Substrates before Application of Paints and Related Products –Specifications for Non-metallic Blast-Cleaning Abrasives"

ISO 8501-1(2007) "Preparation of Steel Substrates before Application of Paints and Related Products – Group A. Visual Assessment of Surface Cleanliness – Part A1. Specification for Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings"

ISO 8503-5(2017) "Preparation of Steel Substrates before Application of Paints and Related Products –Surface Roughness Characteristics of Blast-Cleaned Steel Substrates – Part 5: Replica Tape Method for the Determination of the Surface Profile"

ISO 21809-3(2020) "Petroleum and Natural Gas Industries – External Coatings for Buried or Submerged Pipelines Used in Pipeline Transportation Systems – Part 3: Field Joint Coating"

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

IGS-O-TP-001 "Maintenance and Rehabilitation of Coating of Gas Pipeline Under Operation"

SHELL 31403038(2005) "Liquid Rehabilitation Coating of Onshore Pipelines"

SHELL 31403037(2008) "External Field Joint and Rehabilitation Coating Systems for Line Pipe"

2.2 Informative references

EN 10204(2006) "Metallic Products-Types of Inspection Documents"

NACE RP0105(2005) "Standard Recommended Practice for Liquid-Epoxy Coating for External Repair, Rehabilitation, and Weld Joints on Buried Steel Pipelines"

3. DEFINITIONS

Applicator

The company that applies the liquid epoxy coating system in the field.

Backfill

Material placed in a hole to fill the space around the buried pipes.

Backfill Time

Time required for the coating to dry hard enough to resist mechanical damage by the backfill soil.

Batch

Amount of materials produced within one uninterrupted production run of maximum 8 hours under constant production conditions.

Dry-to-Touch Time

Time taken by the coating to dry until it becomes tack-free

Epoxy

Thermosetting resin capable of forming tight cross-linked polymer structures characterized by toughness, strong adhesion, and low shrinkage, used especially in surface coatings and adhesives

Epoxy Novolac

Class of epoxy resin containing more than two functional groups to react with cross linking agents to generate a high degree of cross linking, generally for high temperature application

Field Joint Area (weld zone)

Uncoated area that results when two pipe sections or a pipe section and a fitting with coating cutbacks are assembled, by welding, in the field

Holiday

Discontinuity in a protective coating that exposes the unprotected surface to the environment, or a thin coating spot that cannot provide good barrier to the environment, normally detected by a low or high voltage holiday detector