



شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

راهنمای انتخاب پوشش

راهنمای انتخاب پوشش خارجی برای خطوط لوله گاز (مدفون)

Recommended Practice for Selection of Suitable External Coatings for Underground (Buried) Gas Pipelines

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باسلام،

به استحضار می‌رساند در جلسه ۱۳۴۷ مورخ ۱۳۸۷/۱۰/۱ هیأت مدیره، نامه شماره گ/۱۱۰۴۸۱/۰۰۰/۹ مورخ ۸۷/۹/۱۳ آن مدیریت در مورد دستورالعمل راهنمای انتخاب انواع پوشش‌های خطوط لوله گاز از جمله قیر اصلاح شده (با نام تجاری بیتوسیل) و پلی اتیلن سه لایه با حضور رئیس امور تدوین استانداردها و رئیس امور بازرسی فنی شرکت انتقال گاز مطرح و مورد تصویب قرار گرفت.

همچنین مقرر گردید انتخاب نهایی پوشش خطوط لوله اجرایی با رعایت استانداردهای مندرج در دستورالعمل فوق الذکر به عهده هیأت مدیره شرکت زیربست باشد و در پیمانهای اجرایی خطوط لوله نیز با پیشنهاد طراح و تأیید نهایی هیأت مدیره شرکت زیربست انجام پذیرد.

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FOREWORD

This standard is intended to be mainly used by NIGC and contractors and has been prepared on interpretation recognized standards , technical documents , knowledge , backgrounds and experiences in gas industries 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 users .

This standard must not be modified or altered by the end users within NIGC and her contractors . Any deviation from normative references and/or well known manufacturers specifications must be reported to Standardization division .

Any comments from concerned parties on NIGC distributed IGS are welcome to technical standards committees and will receive serious attention and consideration should a revision to standards is recommended .

GENERAL DEFINITIONS :

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

- 1- "STANDARDIZATION DIV." has been organized to deal with all aspects of industrial standards in NIGC . Therefore , all queries for clarification or amendments are requested to be directed to mentioned div.
- 2- "COMPANY" : refers to national Iranian gas company .
- 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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CONTENT	PAGE
0. INTRODUCTION	1
1. SCOPE	3
2. REFERENCES	3
3. DEFINITIONS	5
4. GENERAL REQUIREMENTS	5
5. MANDATORY REQUIREMENTS	7
6. SELECTION REQUIREMENTS	7
Annex A – "ACS-15"	16
Annex B – "PIPELINE REHABILITATION COATING SYSTEMS"	17
Annex C – "TP 206 (ALEYSKA SHEAR STRESS TEST)"	19

0. INTRODUCTION

The majority of gas transmission and distribution pipework and associated fittings is buried and therefore needs to be protected against corrosion.

All metallic pipelines should be provided with an external coating and, for buried or submerged sections, cathodic protection.

The possibility of external corrosion occurring shall be determined on the basis of pipeline operating temperatures and the external conditions along the pipeline.

Typical environments which shall be considered when evaluating the possibility of external corrosion include:

- Atmosphere (marine/industrial/rural);
- Sea water (tidal zone/shore approach);
- Fresh or brackish water;
- Marshes and swamps;
- River crossings;
- Dry or wet soil;
- Inside tunnels, sleeves or caissons.
- Human Interference

Environmental parameters which should be considered include:

- ambient air temperatures;
- resistivity, salinity and oxygen content of the environment;
- bacterial activity;
- water current (ground water depth);
- degree of burial;
- potential in-growth of tree roots;
- potential soil pollution by hydrocarbons and other pollutants.

The evaluation of corrosion measures should take into account the probable long-term corrosiveness of the environment rather than be solely confined to the as-installed corrosiveness. For a pipeline on land, due consideration should be given to any known planned changes in the use of the land traversed by the pipeline route which may alter the environmental conditions and thus soil corrosiveness, e.g. irrigation of land previously arid or of low corrosiveness.

The possible effect of the PH of the environment and possible sources of stray and alternating currents shall be evaluated for pipelines on land.

The types of external corrosion damage to be considered shall include:

- general metal loss and degradation;
- localized corrosion, e.g. pitting under deposit or crevice attack;
- microbiologically induced corrosion;
- stress-corrosion cracking, e.g. carbonate / bicarbonate attack.

In a review of 50 years of literature on pipeline coatings, the following concepts emerged:

- Selection of a suitable coating and proper application of the coating both in the factory and in the field are very important for the pipelines intended service life.
- CP must supplement the coating in underground applications to ensure 100% protection.
- Field test results are more indicative of the long term suitability than laboratory tests.
- Results of adhesion tests do not correlate with those of cathodic disbondment tests.
- Cathodic disbondment tests are the best tests to measure coating performance.
- The current required for CP is the best measure of coatings performance when buried.
- Optimizing coating thickness is important.
- Soil stress on the coating is one of the main problems associated with buried pipelines.
- Resistance to cathodic disbondment and soil stresses are very important requirements of a pipe coating . For a pipe coating to be effective, it should meet these criteria: adhesion, adequate thickness, low moisture absorption / transfer, chemical resistance (especially alkalis from CP), and flexibility.
- The initial selection of a suitable coating system is very important, and also, perhaps the most important factor is that the coating system shall be applied as per the required specification.

1. SCOPE

This recommended practice defines the minimum requirements for selection of external coating systems for buried steel pipeline and piping (including associated fittings and appurtenances) and also gives guidance on the performance characteristics of these coatings.

NOTE:

1 - This standard will refer only to coating systems which are known to be successful when used by NIGC and major internationally well-known oil & gas companies.

2 - Additions will be made from time to time to the information available in order to cover products which are less widely used and new products which are considered to be of sufficient interest.

2. REFERENCES

Throughout this standard specification, the following standards and codes that are in effect at the time of issues of this specification (2008) shall, to the extent specified herein, form part of this 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 and / or manufacturer.

ISO 21809-2	Petroleum and natural gas industries – External Coatings for buried or submerged pipelines Used in pipeline transportation systems Part 2: Fusion Bonded Epoxy Coatings
ISO 13623	Petroleum and natural gas industries – pipeline transportation systems
ASTM D 1000	Test method for pressure-sensitive adhesive-coated tapes used for electrical and electronic applications
AWWA C 203	Coal tar protective coatings and linings for steel water pipeline – Enamel and tape – Hot applied
NACE RP 01 05-2005	Liquid–epoxy coatings for external repair, Rehabilitation, and weld joints on buried steel pipelines
NACE RP 04 02-2002	Field –Applied Fusion Bonded Epoxy (FBE) pipe coating system for Girth Weld Joints: Application, Performance, and Quality Control
NACE SP 01 69-2007	Control of External corrosion on Underground or Submerged Metallic piping Systems

BS 4164	Specification for coal-tar-based hot-applied coating materials for protecting iron and steel, including a suitable primer
BS 7873	Code of Practice for application and testing of hot enamel external and/or internal coating of iron and steel pipes
BS EN 10300	Bitumen hot applied material coating for external coating
BS ISO 11359	Plastics – thermomechanical analysis (TMA)
IPS-M-TP-317	Hand applied petrolatum tape and primer
IPS-M-TP-311	Cold – applied laminated plastic tape as outer – layer tape
IGS-M-TP-010-1&2	3 layer PE coating system
IGS-M-TP-014-2-A	Polymer modified bitumen membrane
IGS-M-TP-014-2-C	3ply Cold applied plastic tape
IGS-M-TP-014-4	Hand applied laminated plastic tape
IGS-M-TP-014-5	Hand applied laminated bituminous tape
IGS-M-TP-014-3(1)	High temperature heat shrinkable sleeves
IGS-M-TP-014-6	Heat shrinkable sleeves (hot melt adhesive)
IGS-M-TP-014-7	Heat shrinkable sleeves (mastic adhesive)
IGS-M-TP-016	Modified bitumen enamel coating system
IGS-M-TP-020-1	Polyurethane coating for pipeline rehabilitation

– Control of pipeline corrosion: A.W. Peabody

– Uhlig's Corrosion Handbook

– FBE : Allen Kehr