



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

CONSTRUCTION STANDARD
FOR
COATING & WRAPPING OF UNDERGROUND PIPING
NPCS-CS-GC-09
REVISION : 0

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CONTENTS

1

SCOPE

2

STANDARDS AND CODES

3

HOT APPLIED COAL-TAR ENAMEL SYSTEM

4

COLD APPLIED TAPE SYSTEM



1

SCOPE

This standard describes the materials, applications, handling installation and testing procedures for external coating and wrapping over Carbon Steel pipes to be laid underground for protection against corrosion, in an industrial complex.

1.1

Generally -two types of coat and wrap system are used which are as given below:

- a) Hot applied coal-tar enamel.
- b) Cold applied tape system.

This standard calls for both type of coating & wrapping.

1.2

All conflicts between the requirements of this standard, purchase order or data sheets shall be referred to purchaser for clarification before commencement of site operations.

2

STANDARDS AND CODES

- BS 4164 Specification for Coal-tar Based Hot Applied Coating Material for Protecting Iron and Steel Including Suitable Primer.
- BS 2182 Method of Testing Plastics.
- ASTM American Society for Testing of Materials.
 - D-1000 Standard Specification for Method of Testing Sensitive Adhesive Coated Tapes.
 - G-13 Specification for Test Method of Impact Resistance.
 - D-638 Standard Specification of Tensile Properties of Plastic.

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U-1004

Standard Specification for
Test Method for Initial
Tear Resistance.

- SIS

Swedish Institute of
Standards.

055900

Standard for Surface
Preparation.

3

HOT APPLIED COAL-TAR ENAMEL SYSTEM

3.1

MATERIALS

3.1 1

Prime Coat

'The primer shall be a fast-drying compound, that can be readily applied cold by brushing or spraying to produce an effective bond between the pipe Steel and the subsequent coat of enamel.

It shall be compatible with the enamel to produce the necessary bond.

The material shall not form bubbles during application that can not be easily brushed out, and shall dry hard to the touch.

'The primer shall contain no benzol or other toxic or highly volatile solvents and no added pigments or inert fillers.

3 1 2

Enamel

The enamel shall be fully plasticized and composed of a specially processed coal-tar pitch combined with an inert mineral filler.

No asphalt of either petroleum or natural base shall be acceptable as part of -the ingredients.

Unless otherwise indicated in the particular specification, the enamel shall have the characteristics shown in tables 1,2 and 3 as appropriate to the relevant grade of enamel.

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TABLE 1- CHARACTERISTICS OF COAL-TAR ENAMEL
(60°C MAX. OPERATING TEMPERATURE)

Test	Minimum	Maximum
a) Softening point (ASTM D-36-76)	88°C	100-c
b) Specific gravity 25°C (ASTM D-71-84)	1.4	1.6
c) Ash mineral filler (ASTM D-3180-84)	25%	30%
d) Penetration (ASTM D-5-83) 25°C 100gr.wt.5 secs 46°C 50 gr.wt.5 secs	2 6	7 28
e) High temperature test (SAG) 60°C for 5 hours		2 mm
f) In service tempera- ture °C	0	60
g) Low temperature test (cracking) -12°C for 6 hours	No cracking or disbonding	
h) Stripping test 25°C to 60°C (Peel)	No peeling	
i) Electrical Resista- nce test	No break-through (2.5 mm coating 10000 Volts !	

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TABLE 2- CHARACTERISTICS OF COAL-TAR ENAMEL
(80°C MAX. OPERATING TEMPERATURE)

Test	Minimum	Maximum
a) Softening point (ASTM D-36-76)	122°C	
b) Specific gravity 25°C (ASTM D-71-84)	1.40	1.60
c) Ash mineral filler (ASTM D-3180-84)	25%	32%
d) Penetration (ASTM D-5-831 25°C 100gr.wt.5 secs 46°C 50gr.wt.5 secs)	2	7 20
e) High temperature SAG test 80°C for 24 hours		2 mm
f) In service tempera- ture °C	0	80
g) Low temperature test (cracking) 6 hours at -7°C	No cracking or disbonding	
h) Stripping test 25°C to 80°C (Peel)	No peeling	
i) Electrical resista- nce test	No break-through (2.5 mm coating 10000 Volts)	

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TABLE 3- CHARACTERISTICS OF COAL-TAR ENAMEL
(100°C MAX. OPERATING TEMPERATURE)

Test	Minimum	Maximum
a) Softening point (ASTM D-36-76)	135°C	146°C
b) Specific gravity 25°C (ASTM D-71-84)	1.4	1.6
c) Ash mineral filler (ASTM D-3180-84)	25%	32%
d) Penetration (ASTM D-5-83) 25°C 100gr.wt.5 secs 46°C 50gr.wt.5 secs	4	9 16
e) High temperature test (SAG) 100°C for 24 hours	-	2 mm
f) In service tempera- ture °C	0	100
g) Low temperature test (cracking) 12°C or 6 hours	No cracking or disbonding	
h) Stripping test 25°C to 100°C (Peel)	No peeling	
i) Electrical Resista- nce test	No break-through (2.5 mm coating 10000 Volts)	

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3.1.3

Fibrous-Glass Material

It shall be a uniformly bonded tissue material, cut into suitable widths and rolled firmly and evenly on tubes. The glass fibres shall be bonded with any thermosetting resin which is inert to hot coal-tar pipeline enamels.

The material shall be free from large holes, thin spots, delaminations, tuftings, wrinkles, slugs, dust, torn edges, oil and grease.

The ends of the rolls shall be clean smooth and square-cut,, and shall show no "telescoping".

The glass material shall be sufficiently porous that it can be embedded in the coal-tar enamel as it is applied to the pipe.

Physical properties of the glass material shall be as given in Table 4.

TABLE 4- CHARACTERISTICS OF GLASS FIBRE WRAP

Weight/10 m ² , minimum	0.41 Kg
Thickness , minimum	0.5 mm
Breaking strength avg.minimum Kg/m of width.	
- Longitudinal	232 Kg/m
- Transverse	71 Kg/m
Trapezoidal Tear Strength, minimum	
- Longitudinal	0.45 Kg
- Transverse	0.9 Kg
Pliability 3 mm radius at 25°C	Pass
Moisture absorption, max.	1.0%

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31.1.4

Fibre-Glass Fabric (Outerwrap)

The fibre glass fabric wrap shall consist of chemically resistant 5% borosilicate glass fibre yarns, woven plain fabric saturated with a suitable binder wholly integrating with coal-tar. Table 5 lists the minimum requirements to be respected:

TABLE 5-CHARACTERISTICS OF FIBRE-GLASS FABRIC WRAPPING

Characteristic	Unit	Minimum	Maximum
Weight	g/m ²	225	275
Weight after ignition	g/m ²	180	-
Hydrolytic class of glass			3
Tensile strength			
- Longitudinally	N/mm	15	
- Transversally	N/mm	15	
Tensile strength submerged in water for 24hr and dried in oven for 2hr at 110°C(+5°C)			
- Longitudinally	N/mm	12	
- Transversally	N/mm	12	

Test methods shall be as per international standards suggested by manufacturer.

3 1.5

Kraft Paper

The kraft paper shall be 75 pound, 100% sulphate, smooth, or White wash as per AWWA C-203-86 section 2.11.

When unrolled at temperature from 0°C to 50°C the wrapper shall not crack or stick to such an extent as to cause breaking or tearing. The wrapper shall be purchased in tightly wound tied rolls with a 3" diameter core in widths and lengths as what will be specified at the time of purchase.

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