

MATERIALS AND EQUIPMENT STANDARD
FOR
COAL TAR ENAMEL (HOT APPLIED)

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1. SCOPE

This Standard Specification which is generated from AWWA C203, SSPC-PS No. 10.01 and BS 4164 covers the minimum requirements for the composition, quality of enamel, properties, storage life and packaging, inspection and labeling of Coal Tar Enamel (Hot-Applied).

2. REFERENCES

Throughout this Standard the following standards and codes are referred to. The editions of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard. The applicability of changes in standards and codes that occur after the date of this Standard shall be mutually agreed upon by the company and the vendor.

SSPC (STEEL STRUCTURES PAINTING COUNCIL) VOLUME 2

SSPC-PS 10.01 "Hot-Applied Coal Tar Enamel Painting System"

SSPC-PA Guide 3 "A Guide to Safety in Paint Application"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

(Specification for Ingredients)

D388 "Classification of Coals by Rank"

(Test Methods for Properties)

D36 "Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)"

D71 "Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)"

D546 "Method for Sieve Analysis of Mineral Filler for Road and Paving Materials."

D2415 "Test Method for Ash in Coal-Tars and Pitches"

UFS (US FEDERAL STANDARDS)

(Federal Test Method Standard No. 141)

ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)

Z 129.1 "Precautionary Labeling of Hazardous Industrial Chemicals"

ANSI/AWWA
C203-86 "Standard Specification for Coal-Tar Protective Coatings and Lining, for Steel Water Pipelines Enamel and Tape-Hot-Applied"

BSI (BRITISH STANDARDS INSTITUTION)

BS410 "Specification for Test Sieves"

BS1796 "Method for Test Sieving"

BS4164

"Coal-Tar Based Hot-Applied Coating Materials for Protecting Iron and Steel Including Suitable Primers Where Required"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-TP-270

"Coatings"

3. UNITS

International system of units (SI) in accordance with IPS-E-GN-100 shall be used.

4. COMPOSITION**4.1 Ingredients and Proportions**

The coal-tar enamel of either grades (see Table 1), as specified by the purchaser shall consist of a uniform mixture of modified coal-tar and inert non-fibrous filler. The fineness of the inert non-fibrous filler shall be such to pass 90% by weight (minimum) through 75 microns (200 mesh) standard sieve opening when tested by the ASTM D546.

4.2 Percentage

The enamel shall contain 100% by weight of nonvolatile film forming solids (coal-tar and filler).

5. QUALITY OF ENAMEL

The quality of coal-tar enamel is affected by the quality of the coal that is carbonized and by the temperature of carbonization, as well as by the subsequent methods of pitch processing and by the particulars of formulation. To meet the basic quality requirements, coal-tar shall be produced from coal that has a minimum heating value of 30000 Jul/g (13000 Btu/Lb) on a moisture-and mineral-mater-free basis (ASTM D388) and that has been carbonized in a slot-type coke oven at a temperature of not less than 900°C.

6. PROPERTIES**6.1 Requirements**

The coal-tar enamel shall comply with the requirements for the appropriate grade given in Table 1 and, in conjunction with appropriate primer, (IPS-M-TP-280 coal-tar primer (Cold Applied) and/or IPS-M-TP-275 fast drying synthetic primer for use with hot applied coal tar & asphalt enamels), shall also comply with the requirements for the appropriate grade given in Table 2. The coal-tar enamel shall also meet the requirements of sections 6.2 through 6.7.

6.2 Odor

The odor shall be normal for the materials permitted (ASTM Standard D1296).

6.3 Color

The color shall be black.

6.4 Compatibility

There shall be no evidence of incompatibility of any of the ingredients of enamel when two parts of the enamel are melted together.

6.5 Pot Life

The pot life of the enamel in molten state shall be 12 hours minimum.

6.6 Application Temperature

The application temperature of enamel shall be within 220 to 260°C.

6.7 Other Properties

The enamel and primer shall also meet all the requirements specified in AWWA C203 and BS 4164 latest editions.

TABLE 1 - PROPERTIES OF ENAMEL

CHARACTERISTICS	REQUIREMENTS			ASTM METHOD	BS 4164 METHOD
	GRADE 105/15	GRADE 105/8	GRADE 120/5		
FILLER CONTENT BY IGNITION, % BY WEIGHT	25 TO 35	25 TO 35	25 TO 35	D 2415	APPENDIX B
FINENESS FILLER, THROUGH 75 MICRONS (200 MESH), % BY WEIGHT	90 Min.	90 Min.	90 Min.	D 546	BS 1796
DENSITY AT 25°C g/cm ³	1.4 TO 1.6	1.4 TO 1.6	1.4 TO 1.6	D 71	APPENDIX C
SOFTENING POINT (RING AND BALL) °C	105 TO 116	105 TO 116	120 TO 130 *	D 36	APPENDIX D
PENETRATION ** 25°C, 100 g 45°C, 50 g	10 TO 20 15 TO 55	5 TO 12 8 TO 30	1 TO 9 3 TO 16	AWWA C203	APPENDIX E
FLOW TIME, SECONDS 230°C 240°C	9 TO 16 ---	9 TO 16 ---	--- 9 TO 24	--- ---	APPENDIX F

* The softening point range for this grade may be exceeded by agreement between the manufacturer and the purchaser.

** For static conditions above -15°C (5°F), use enamel with 5-10 Penetration at 25°C; below -15°C and above -23°C use 10-15 penetration; and below -23°C and above -29°C use 15-20 penetration enamel. (Static conditions are those conditions under which the article is not being handled).

TABLE 2 - PROPERTIES OF ENAMEL ON PRIMED METAL

TEST	GRADE 105/15	GRADE 105/8	GRADE 120/5	METHOD	
				AWWA	BS 4164
SAG, MAXIMUM, mm 70°C 24 h 80°C 24 h	1.5 ---	1.5 ---	--- 1.5	AWWA C203	APPENDIX G
LOW TEMPERATURE CRACKING AND DISBONDING -30°C -25°C -20°C	NONE --- ---	--- NONE ---	--- --- ---	a AWWA C203	APPENDIX H
BEND AT 0°C FIRST CRACK, MINIMUM, mm INITIAL AFTER HEATING DISBONDED AREA, MAXIMUM, mm ² INITIAL AFTER HEATING	20 15 2000 3000	15 10 3000 5000	--- --- --- ---	--- 	APPENDIX J
IMPACT DISBONDED AREA, MAXIMUM mm ² 0°C * 25°C	15000 ---	--- 1000	--- ---	AWWA 203	APPENDIX K
PEEL, INITIAL AND DELAYED, MAXIMUM, mm 30°C 40°C 50°C 60°C 70°C	3.0 3.0 3.0 --- ---	--- 3.0 3.0 3.0 ---	--- --- --- 3.0 3.0		APPENDIX L
CATHODIC DISBONDING IN 28 DAYS MAXIMUM, mm	5	5	5	---	APPENDIX M

* If the test specimen fails the impact test at 0°C, two further test specimens shall be prepared from the same sample as the failed test specimen and both shall be tested at 0°C. The material shall be deemed to comply with the requirements of the impact test provided both of the test specimens pass the test.

7. STORAGE LIFE AND PACKAGING

7.1 Condition in Container

The properties of enamel (see Section 6) shall not change after storage of at least 24 months from date of delivery, in a full tightly covered container.

7.2 Packaging

The coal-tar enamel shall be supplied in non contaminated steel drums containing not more than 200 liters.

8. INSPECTION

8.1 All materials supplied under this Specification shall be subject to timely inspection by the purchaser or his authorized representative. The manufacturer shall replace such material as is found defective under this Specification. In case of dispute the arbitration or settlement procedure established in the procurement documents shall be followed.

8.2 Samples of any or all ingredients used under this coating system should be supplied upon request along with the supplier's name and identification for the materials.

8.3 Unless otherwise specified, the methods of sampling and testing should be in accordance with US Federal Test Method Standard No. 141, or applicable methods of the American Society for Testing and Materials, or BS 4164.

9. LABELING

9.1 Labeling Standard

Labeling shall be in accordance with ANSI Z129-1 "Precautionary Labeling of Hazardous Industrial Chemicals".

9.2 Marking of Containers

Each container shall be legibly marked with the following information:

Name: Coal-Tar Enamel (Hot-Applied)
Specification: IPS-M-TP-290
MESC No. :
Maximum temperature resistance
Pot life (hours)
Color: Black
Grade Number of Enamel (e.g. grade 120/5)
Lot Number
Stock Number
Date of Manufacture
Quantity of Enamel in Container:
Information and Warning, if Required,
Manufacturer's Name and Address:
Design guide: For the guidance on the usage of this coating for various applications/environments reference shall be made to IPS-E-TP-270.

9.3 Directions for Use

In addition to the manufacturer's instructions for use, the following directions shall also be supplied with each container of coal-tar, enamel:

These materials are heavy-duty products for application at a minimum thickness of 2.4 mm to provide long term protection underground and in submarine installations.

They are applied to iron and steel used over a wide range of service temperatures. They are particularly suitable for flood-coating previously primed products. Agitation of enamel materials in the molten state is necessary to prevent set-

ting of the filler. When these materials are applied externally to pipes it is usual to incorporate one or more reinforcing layers of inert fabric.

All materials should be applied in accordance with the manufacturer's instructions. The Enamel used shall provide a bond between the metal and the coating material that will enable the requirements given in Table 2 of the IPS-M-TP-290 Standard to be complied with if all the qualities of the coating material are adequate. Care should be exercised to ensure there is no mixing of materials from different sources or different types. In particular, it should be recognized that the chemical and physical characteristics of bitumen-based coatings differ from those of coal-tar based coatings and that the two kinds of coating should not be blended in protective coatings.

It is also essential to clean out plant thoroughly when the use of coal-tar coating materials follows that of bitumen coating materials or vice versa.

9.4 Direction for Safety

The following directions for safety shall be supplied with each container of enamel.

- The Coatings are hazardous because of their flammability and potential toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and should include, but not be limited to, the provisions of SSPC-PA Guide 3, "A Guide to Safety in Paint Application".
- The coatings specified herein may not comply with some air pollution regulations because of their hydrocarbon solvent content.
- Ingredients in this coating which may pose a hazard include hydrocarbon solvent and coal tars. This coating may contain low concentrations (less than 1% by weight) of materials that are suspected carcinogens. Applicable regulations governing safe handling practices shall apply to the use of this coating.
- Hot enamels are applied at temperatures ranging from 220 to 260°C and extreme care must be used when melting and handling.