

SCOPE

- I ↗ 1.1 This practice covers the selection and application of exterior paint and protective coating systems for structures and equipment. Requirements for protective wrapping systems and galvanizing of structures are also covered.
- I * 1.2 **An asterisk (*)** indicates that a decision by the Purchaser is required or that additional information is furnished by the Purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I ↗ 2.1 **Table 1** lists the standards and specifications which shall be used with this practice **as specified** by the Purchaser.

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TABLE 1

STANDARDS AND SPECIFICATIONS	
ASME / AWWA Standards	
C203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied
C215	Extruded Polyolefin Coatings for the Exterior of Steel Water Pipe
ASTM Standards	
A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
D2240	Rubber Property - Durometer Hardness
D2583	Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
D3363	Film Hardness by Pencil Test
D4263	Indicating Moisture in Concrete by the Plastic Sheet Method
D4417	Field Measurement of Surface Profile of Blast Cleaned Steel
D4752	Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
D5402	Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
F1869	Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
NACE Standards	
TM-01	Visual Standards
RP0274	High Voltage Electrical Inspection of Pipeline Coatings
RP0287	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
RP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
RP0198	The Control of Corrosion Under Thermal Insulation and Fireproofing Materials - A Systems Approach
RP0394	Application, Performance, and Quality Control of Plant-Applied Fusion-Bonded Epoxy External Pipe Coating
SSPC Specifications	
PA 1	Shop, Field and Maintenance Painting
PA 2	Measurement of Dry Film Thickness with Magnetic Gages
PA Guide 3	A Guide to Safety in Paint Application
PS Guide 8	Guide to Topcoating Zinc-Rich Primers
AB 1	Mineral and Slag Abrasives
AB 2	Specification for Cleanliness of Recycled Ferrous Metallic Abrasives
AB 3	Newly Manufactured or Re-Manufactured Steel Abrasives
SP 1	Solvent Cleaning
SP 3	Power Tool Cleaning
SP 5	White Metal Blast Cleaning
SP 6	Commercial Blast Cleaning
SP 8	Pickling
SP 10	Near-White Blast Cleaning
SP 11	Power Tool Cleaning to Bare Metal
SP 13	Surface Preparation of Concrete
VIS I-89	Visual Standard for Abrasive Blast Cleaned Steel
Vis 3	Visual Standard for Power and Hand Tool Cleaned Steel

- I * 2.2 Other National standards or codes may be substituted for those listed in **Table 1** **as directed** by the Purchaser.

- R ♦ *2.3 The Vendor shall prepare a detailed "Painting Schedule" including (but not limited to) the information listed below, for approval by the Owner's Engineer.
- Detailed scope
 - Surface preparation.
 - Materials.
 - Application.
 - Inspection procedures and documentation.
 - Provisions for handling and storage of paints and coatings at the site.
 - Plans for conformance to national, state or local environmental law.

DEFINITIONS

- I 3.1 **Bare surfaces** as used in this practice are defined as surfaces, equipment, or structures that are not insulated or fireproofed.
- I 3.2 **Marine atmosphere** as used in this practice is defined as containing a high concentration of chlorides and water in the air.
- I ♦ 3.3 **Intermittent service** (see [Table 2](#)) is one in which the process temperature cycles on a recurrent basis, into and out of the 25 - 300°F (-4°C to 150°C) range.

DOCUMENTATION

- R ♦ 4.1 Vendor shall submit **proof of certification** by the Society for Protective Coatings (SSPC) to SSPC QP1 or QP3, as applicable, or equivalent.
- R 4.2 Vendor shall submit a list of its most recent **industrial experience** plus names and telephone numbers of people who can verify this experience.
- R 4.3 Vendor shall submit **plans for Quality Assurance and Quality Control** plus the names of their **coating inspectors** and the degree of their training.

SELECTION OF PAINT AND COATING SYSTEMS

PAINTING SERVICE CATEGORY

- O *5.1 **The Painting Service Category** to be used for **external surface protection** of individually purchased equipment items, shop assembled sections ("modular" or "package units" furnished as subassemblies or complete), and other field erected facilities as shown in [Table 2](#) will be based on the type of atmospheric exposure. The "Category" designated includes the following conditions:

CATEGORY	DESCRIPTION	ENVIRONMENTAL CORROSION RATE	TABLE 2 REFERENCE AND SPECIAL CONDITIONS
I	Industrial Atmospheres: Class I (Mild) Class II (Normal)	1 mpy or less 3 mpy or less	Sweating pipelines and equipment shall be coated in accordance with requirements of Marine Atmospheres
II	Marine Atmosphere Severe Industrial Atmosphere	Over 3 mpy	- Bare steel flare structures, all structural components of fixed platforms, and associated bolting, shall be coated for Marine Atmosphere, except where the location is designated as CATEGORY I, Industrial (Mild) - Bare steel structures and equipment within 150 ft radius of a salt water or brackish water cooling tower shall be coated for Marine Atmosphere (regardless of other designated atmospheric exposure conditions for the location).
III	Corrosive Chemical Atmosphere	Over 3 mpy	As required, modifications of different painting systems may be specified for the specific chemical(s) handled

- I 5.2 **The selection requirements for other painting and coating systems shall be per the following Tables and other requirements of this practice.**
- a. **Table 3** - Special painting systems for controlling corrosive services.
 - b. **Table 4** - External surface protection of underground and underwater piping.
 - c. **Table 5** - Protection of concrete structures.
 - d. **Table 6** - Protection of steel piles and sheet piling for fresh and salt water marine facilities.
 - e. **Table 7** - External surface protection of mooring buoys and other floating structures for fresh and salt water marine facilities.

USE OF GALVANIZED COATINGS

- I 5.3 **Hot-dip galvanizing** may be **substituted for Category I and II painting systems** when the evaluated cost is equivalent. Galvanizing on steel products, including fasteners, shall be per **ASTM A 123**. High strength bolting (> 150,000 psi [1100 MPa] ultimate tensile strength) shall not be hot-dip galvanized, but shall be coated by mechanical galvanizing or with an inorganic zinc rich primer.

TYPES AND BRANDS OF PAINTS AND COATINGS

- R * 5.4 **If a job is contracted, a listing of acceptable brands of paints and protective coatings**, conforming to the generic descriptions per **Tables 9 and 10**, shall be **developed by the Contractor** and approved by the Owner's Engineer. The selection shall take into account the following:
- a. **Paint and protective coating brands** selected on the basis of availability and cost per mil ft² per year of life.
 - b. **Primers, finish and topcoats** for any particular system **from the same manufacturer** to assure compatibility.
 - c. **Local or federal legislation** concerning pigments, volatile organic content (VOC), or other materials restrictions.
- I * 5.5 Except where "Manufacturer Standard" is permitted, vendor's proposal to use **paints and coatings alternative to those specified** shall be submitted to Purchaser for approval.

SURFACE PREPARATION

- I 6.1 Surface preparation methods and materials for carbon steel shall take into account the following:
- a. Surface preparation, either in the shop or field, may be employed based upon an economic evaluation including local, state or federal legislation concerning blast cleaning abrasives.
 - b. Equipment and structures to be painted in the field. Where surface preparation alternatives are permitted, the Purchaser will make a surface preparation cost study and specify the optimum method to be used, taking into account:
 1. Local rules or regulations governing hygiene, environment and safety.
 2. Proximity of adjacent structures and equipment liable to damage from abrasives.
 3. Proximity of designated operating areas where personnel may be present.
 4. Any effect on coating performance.
 - c. Purchaser shall submit the results of evaluations per **Pars. 6.1.a or 6.1.b** to the Owner's Engineer.
 - d. Surfaces contaminated by oil and grease shall be Solvent Cleaned per SSPC SP1 prior to any blast cleaning.
 - e. Blasting abrasive quality shall be in accordance with SSPC AB 1, SSPC AB 2, or SSPC AB 3, as applicable.
 - f. Abrasive material for blast cleaning, consisting solely of steel shot shall not be used for surfaces to be coated with inorganic zinc-rich primers or fusion-bonded epoxy coatings. A mixture consisting of steel shot and at least 25% (wt) steel grit is acceptable.

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(This practice is appropriate for attachment to Inquiry or Purchase Document)

- I 6.2 **New concrete surfaces to be coated** other than concrete fireproofing shall be **prepared** per the following:
 - a. The concrete shall have cured for at least 30 days. Surfaces above-grade shall be tested per ASTM D4263 and have no moisture detected. On-grade slabs and surfaces below grade, shall be tested per ASTM F1869 and have a moisture vapor emission of 3 pounds or less (per 1000 square ft over 24 hours).
 - b. Surface preparation of concrete shall be in accordance with SSPC-SP 13.
 - c. Surface defects shall be patched with a material recommended by the coating manufacturer to provide a smooth surface suitable for the coating application.

APPLICATION OF PAINT, COATING AND WRAPPING SYSTEMS

MANUFACTURER'S RECOMMENDATIONS

- R 7.1 **Manufacturer's recommendations for the application of paints and coatings and SSPC PA 1** shall be followed unless modified by this practice.
- R 7.2 **Spray application must be used** with inorganic zinc-rich primers, with the exception of small areas for touch-up.

UNDERGROUND AND UNDERWATER PIPING

- R * 7.3 **Table 4** lists acceptable **external coating and wrapping systems for underground and underwater piping** with operating temperatures up to 120°F (50°C). For higher temperatures, the protective system will be specified.
Proposals for alternative coating systems shall be submitted to Purchaser for approval by the Owner's Engineer.
- R 7.4 **Underground piping joints** (including welded joints) shall not be painted, coated, or wrapped until **after** completion of field pressure testing.

WATERPROOF COATINGS AND UNDERGROUND CONCRETE STRUCTURES

- R * 7.5 **Underground air ducts for fired heaters.** **Table 5** lists acceptable **coating** systems to be applied to external concrete surfaces, **for waterproofing purposes**. Proposals for alternative coating systems shall be submitted to Purchaser for approval by Owner's Engineer.
- R 7.6 **Underground, liquid retaining, concrete structures.** A **waterproof coating** per **Table 5** shall be applied to the external surfaces of concrete structures which are to be **internally lined**. Alternatively, plastic sheeting may be used to prevent ground water permeation of the concrete.

MANUFACTURER'S STANDARD PAINTING FOR PURCHASED EQUIPMENT

- O 7.7 **Industrial Atmospheres.** Purchased equipment, limited to: machinery including drivers and auxiliaries supplied by the equipment vendor; instruments, valves; motors; transformers; and enclosures for switchgear; shall be painted by the manufacturer using its standard paint system. Damaged prime or finish coats shall be repaired with an equivalent coating.
- O 7.8 **Marine and Corrosive Chemicals Atmospheres** shall be governed by the following:
 - a. Instruments, motors, transformers and enclosures for switchgear may be coated with the manufacturer's standard paint. The manufacturer shall, however, be advised of the environment.
 - b. Purchased equipment, limited to: machinery including drivers and auxiliaries supplied by the equipment vendor; and valves; shall have the surface preparation and prime coats completed at the manufacturer's shop per **Table 2**. At the option of the Purchaser, finish coats may also be shop-applied.
 - c. Damaged coatings shall be repaired using the prescribed surface preparation and paint system.

STEEL PILES AND SHEET PILING

- R * 7.9 **Land Structures.** The need for protective coatings on steel piles (pipe or structural), and on sheet piling and structural appurtenances will be specified. Coating systems shall be per **Table 6**.
- R 7.10 **Marine facilities (fresh or salt water).** Steel piles (pipe or structural), and sheet piling and structural appurtenances, shall be coated. Coating systems shall be per **Table 6**.