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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

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DEPARTMENT ORDER)
No. 64)
Series of 2008-12-11)
X-X-X-X-X-X-X-X)

SUBJECT : DPWH Standard Specifications for
Protective Coating for Concrete,
Item 729

In line with the mandate of the Department in providing effective standard specifications to be used in the implementation of various infrastructure projects and in view of the need of setting standard specifications for Protective Coating for Concrete, the attached **DPWH Standard Specifications for Protective Coating for Concrete, Item 729**, is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the revised edition of the DPWH Standard Specifications (Volume II-Highways, Bridges and Airports).

This Order shall take effect immediately.

HERMOGENES E. ERDANE, JR.
Secretary



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DPWH STANDARD SPECIFICATIONS FOR
ITEM 729 – PROTECTIVE COATING FOR CONCRETE

729.1 Description

This item shall consist of furnishing and placing protective coating for bridge decks, curbs, sidewalks, concrete portions of bridge railings and other concrete structures, in order to protect them from physical damage and against chemical attack on its surfaces by acids, alkalis, salt solutions, or a wide variety of organic chemicals in accordance with this specification and in conformity with the types, grades and classes specified in the Plans, or as directed by the Engineer.

729.2 Materials Requirements

729.2.1 Classes and Characteristics of Protective Coating

(a) Coatings, such as inorganic silicate cementitious products, sulphur concrete, polysulfides, and others offer protection to concrete exposed to atmospheric and aggressive environments such as secondary containment structures.

(b) *Cementitious coatings*

Protective coatings that are in the form of decorative products which are usually modified with latex for use in mild chemical exposure conditions. Certain inorganic silicate cements may be used to waterproof concrete from the positive or negative side.

(c) *Thin film urethanes*

Protective coatings (up to 0.13 mm (5 mils) per coat) that are used to seal concrete for nondusting, cleanability, graffiti resistance, and resistance to mild chemicals. They are used for dry interior exposures on walls and floors that have moderate physical abuse and for exterior weathering. Urethanes are available in two (2) forms: aliphatic urethanes for color and gloss retention in exterior sunlight exposure and aromatic urethanes for exposures other than sunlight and Ultraviolet (UV) light, or where ambering and chalking are acceptable.

(d) *Epoxy polyesters*

Protective coatings that are composed of thin film coatings (up to 0.08 mm (3 mils) per coat) designed for color, non-dusting, cleanability, and

resistance to water for a brief period. They are used primarily for interior and exterior exposures on walls that experienced little physical abuse.

(e) *Latexes*

Protective coatings that are used for color, appearance, and cleanability. For exterior use, acrylic latexes provide improved color and gloss retention (vinyl latexes are not normally recommended because they tend to hydrolyze under high pH situations). Elastomeric formulations (e.g., acrylic, silicone), which provide waterproofing and crack bridging properties, are also available.

(f) *Chlorinated rubbers*

Protective coatings that are thin film coatings designed for color, no dusting, cleanability and resistance to water and mild chemicals. Chlorinated rubbers may chalk on exterior weathering exposures unless modified.

(g) *Epoxies*

Protective coating consisting of two component products that are available in thin film (less than 0.25 mm (10 mils)) and thick film (0.25 mm to 1.27 mm (10 mils to 50 mils)) coatings. Epoxies have excellent adhesion to dry concrete and epoxies have the ability to seal porous concrete and bug holes. Epoxies also exhibit good chemical resistance, hardness, and abrasion resistance. Epoxies are typically used for interior chemically and physically abused conditions because they tend to chalk and fade in atmospheric and sunlight exposures. Epoxy formulations that develop good adhesion to wet surfaces are also available.

(h) *Epoxy phenolics*

Protective coatings consisting of two component products similar to epoxies. They are phenolic modified to improve their chemical resistance. They are normally used for severe chemical environments and as floor coatings.

(i) *Aggregate-filled epoxies*

Protective coatings that are thick film coatings (3.18 mm (125 mils) or more thickness) that are usually applied by spray, trowel, or aggregate broadcast methods. They are normally used in areas of severe physical abuse. These epoxies are also resistant to mild and severe chemicals and are excellent floor coatings for areas of severe physical abuse. Floor toppings can be made aesthetically pleasing through selection of the appropriate color and type of aggregates.

(j) *Thick film elastomers*

Protective coatings (up to 3.18 mm (125 mils)), such as urethane (ASTM D16 Type V) and polysulfide which are normally applied by spray, trowel, or self-leveling methods. They are normally used in areas of severe physical abuse that require a flexible coating, the rubber-like film displays excellent resistance to impact damage and the ability to bridge hairline cracks in concrete.

(k) *Epoxy- or urethane-coal tars*

Protective coatings that are moderately thick coatings (0.38 mm to 0.76 mm (15 mils to 30 mils)) with excellent water and good chemical resistance that are normally applied with a sprayer. The black color may restrict their usage for aesthetic reasons.

(l) *Vinylesters and polyesters*

Protective coatings that are moderately thick coatings (0.76 mm to 1.27 mm (30 mils to 50 mils)) with excellent resistance to acids and strong oxidizers that are applied by spray or trowel. Thicker films may be obtained with silica floor fillers and reinforcing fabric or mat.

729.3 Construction Requirements

729.3.1 Preparation of Surfaces

All concrete surfaces shall be sound, clean, and dry before protective coating is applied. Surface contaminants such as oils, dirt, curing compounds, and efflorescence which would prevent protective coating penetration, adhesion, or drying shall be removed. The use of membrane forming curing compound is not allowed wherever this treatment is to be applied. The contractor shall apply the protective coating as soon as possible after completion of a structure or portion/s thereof.

729.3.2 Application

The Contractor shall notify the Engineer at least one (1) day before beginning the application of protective coating. The manufacturer's recommended application rate and method of application shall be followed when a protective coating is applied to concrete. The surface profile and porosity will have an effect on the application rate. A test patch is useful in determining the surface preparation, application rate, and appearance of a particular concrete coating. Before the beginning of application, the Contractor shall submit to the Engineer the documentation of the procedures to be used which shall include, but not limited to, the identification of the product to be

used by brand name and name of the manufacturer and copy of the manufacturer's authorized applicator certificate for the personnel approved to perform the work.

The temperature of the concrete shall be constant or dropping when some protective coatings are applied to avoid blisters or pin holes caused by the expansion of gases inside of the concrete. The temperature of the concrete shall be above the dew point while the coating is curing to prevent water condensation on the coating.

In bridge superstructure, the protective coating shall be applied after concrete in the bridge deck has cured and has completed an initial drying period of a minimum of 14 days, unless otherwise directed by the Engineer. Also, protective coating shall be applied to exposed concrete roadway surfaces of bridge decks such as curbs, sidewalks, divisors and concrete median barriers; and to inside and top surfaces of parapets.

Coating thicknesses shall range from a few mils to 3 mm (125 mils) or more, depending on the purpose of the coating. Thin coatings (<1 mm (40 mils)) are normally used for dampproofing, mild chemical attack, and for decorative coatings. Thick coatings (>1mm (40 mils)) are used for waterproofing, as protection against severe chemical attack, and as protection from physical damage.

If excessive cracking of bridge deck(s) occurs, additional protective coating shall be applied (two coats) to the deck as specified and as directed by the Engineer.

729.4 Safety Requirements

Protective coating contains irritants, especially to the skin, eyes, and respiratory system. Persons handling these materials shall use appropriate protective clothing, including rubber or plastic gloves. If the protective coating should contact the skin, it shall be removed immediately with a dry cloth or paper towel, and the area of contact washed thoroughly with soap and water. Solvents shall not be used because they carry the irritant into the skin.

729.5 Delivery, Storage and Handling

- (a) All materials shall be kept dry, protected from weather and stored under cover.
- (b) Protective coating materials shall be stored according to manufacturer's recommendations. Do not store them near flame, heat or strong oxidants.

- (c) Repair and protective coating materials shall be handled according to their material safety data sheets.

729.6 Measurement and Payment

Protective coating shall not be measured and paid for separately, but the cost thereof shall be considered as included in the contract unit price of the items where called for.

References:

1. ASTM (American Society for Testing and Materials)
2. ACI (American Concrete Institute)
3. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects
4. Internet