

SPECIFICATION NO. CN-NNN-I

DATE 2-4-75

# NUCLEAR SAFETY RELATED

DUKE POWER COMPANY

CATAWBA NUCLEAR STATION

UNIT 1-2

Title: Nuclear Coating Specification No. CN-NNN-I

Class I Coatings

## REVISION LOG

1 3-1-75  
2 11-1-75  
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# NUCLEAR SAFETY RELATED

DUKE POWER COMPANY

DESIGN ENGINEERING DEPARTMENT

NUCLEAR COATING SPECIFICATION NO. CN-NNN-I

By: Design Engineering      Date: 2-4-75      Revised: 11-1-75

## 1. SCOPE

- 1.1 This specification defines the method of surface preparation, materials, application, inspection and record requirements for coating carbon steel surfaces cleaned to meet a minimum DP-SP5-Immersion (White Metal Blast Cleaning) rated as Class I Surface Areas of a nuclear power plant.
- 1.2 Class I surfaces are exposed areas in the Containment and Reactor Buildings and the interior of tank linings of the reactor coolant system, that must withstand a DBA and LOCA.
- 1.3 Examples: As a shop or field primer for liner plate, polar cranes, structural steel tanks, steam generators to be stored outside for extended periods of time prior to installation. Also as a prime coat for operating temperatures up to 900°F.

## 2. ATTACHMENTS

- 2.1 The following Duke Power Company attachments are attached to and made a part of this specification:
- 2.1.1 Approved Materials
  - 2.1.2 Surface Preparations
  - 2.1.3 Application Procedures
  - 2.1.4 Workmanship Standards
  - 2.1.5 Inspection Standards
  - 2.1.6 Record Requirements
  - 2.1.7 Duke Power Company Field Data Sheet VII A

## 3. COATING MATERIALS

- 3.1 Coating materials shall be in strict accordance with Duke Power Company Standard Approved Materials for System CN-NNN-I.

## 4. COATING SYSTEM

- |     |                     |  |           |
|-----|---------------------|--|-----------|
| 4.1 | Surface Preparation | DP-SP5-Immersion White Metal Blast Cleaning        |           |
| 4.2 | Prime Coat          | DP#12 Inorganic Ethyl Silicate<br>Zinc Rich Primer | @ 2.0 DFT |
|     |                     | Minimum  | 2.0 DFT   |
|     |                     | Maximum  | 6.0 DFT   |

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## 5. SURFACE PREPARATION

- 5.1 Surface preparation shall be in strict accordance with Duke Power Company Standard Surface Preparation DP-SP5-Immersion,

## 6. APPLICATION

- 6.1 Application shall be in strict accordance with Duke Power Company Application Procedures for DP#12,

## 7. MIXING AND THINNING

- 7.1 Mixing and thinning shall be in strict accordance with Duke Power Company Data Sheets VII A, manufacturer's recommendations and SSPC-PA-1-64 Paint Application Specifications No. 1, Shop, Field, and Maintenance Painting.

## 8. EQUIPMENT

- 8.1 Equipment shall be in strict accordance with manufacturer's recommendations and SSPC-PA-1-64 Paint Application Specifications No. 1, Shop, Field, and Maintenance Painting.

## 9. WORKMANSHIP

- 9.1 Workmanship shall be in strict accordance with Duke Power Company Workmanship Standards for Nuclear Exposures.

## 10. INSPECTION

- 10.1 Inspection shall be in strict accordance with Duke Power Company Inspection Standards for Nuclear Exposures.

## 11. RECORD REQUIREMENTS

- 11.1 Records for all Class I Level Vendor Coating work shall be in strict accordance with Duke Power Company Nuclear Coating Certification Specification CN-MMM-I.
- 11.2 The vendor is to complete the Duke Power Company Design Engineering Department Vendor Coating Information Form #1 and return it with his bid proposal to Duke Power Company.
- 11.3 Records for all Class I Level Field Applied Coating work shall be in strict accordance with Duke Power Company Construction Procedure M-20.

# NUCLEAR SAFETY RELATED

DUKE POWER COMPANY		
DESIGN ENGINEERING DEPARTMENT		
STANDARD APPROVED MATERIALS		
BY: Design Engineering	DATE 11-1-75	REVISED _____

## SYSTEM CN-NNN-I

### 3. MATERIALS

- 3.1 The selection of materials for use in this specification by the applicator or vendor shall be those products listed in Section 3.3 unless specifically defined in Section 3.2. All materials selected shall be from one coating manufacturer.
- 3.2
- 3.3 Approved Materials
  - 3.3.1 Coatings manufactured by Mobil Chemical Company.
    - DP# 12 13-F-12 Mobil Zinc #7
    - DP#
    - DP#
    - DP#
  - 3.3.2 Coatings manufactured by Carboline Co.
    - DP# 12 Carbozinc 11
    - DP#
    - DP#
    - DP#
  - 3.3.3 Coatings manufactured by Ameron Corrosion Control
    - DP# 12 Dimetcote #6
    - DP#
    - DP#
    - DP#
  - 3.3.4 Coatings manufactured by
    - DP#
    - DP#
    - DP#
    - DP#
- 3.4 Products are as shown on Duke Power Company Field Coatings Data Sheet VIIA and Manufacturers Product Technical Bulletins.

APPROVED BY QA  
*TC Roberts* 11-18-75  
 APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

DUKE POWER COMPANY  
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By: Durwood Peach

DATE 1-1-74

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## 5. SURFACE PREPARATION DP-SP5 - IMMERSION

- 5.1 Metal surfaces shall be prepared by dry hand sandblasting or automatic blast cleaning in strict accordance with Structural Steel Painting Council SSPC-SP5-63 (White Metal Blast Cleaning).
- 5.2 Minimum cleaning is as defined in Section 2.2 of SSPC-SP5-63. If Visual Standards are necessary, they shall be established by preparing actual panels for approval by Duke Power Company or from control panels designated by Duke Power Company. SSPC-VIS-1-63T Visual Standards shall not be used to establish minimum standards.
- 5.3 No surface preparation shall be allowed when the temperature is within 5°F of the dew point or above 90% relative humidity. Surface areas exposed to condensation or moisture prior to topcoating shall be reblasted.
- 5.4 Blasting shall not be performed in the same area where coating or curing of coated surfaces are in process.
- 5.5 The surface shall be free of excessive grease or oil prior to blast cleaning. Organic solvents, alkaline solutions, steam, hot water with detergents, or other systems that completely remove dirt, oil, grease, etc., may be used.
- 5.6 Blasting equipment shall be in good operating conditions as required by the manufacturer. Traps and filters in air lines shall be frequently cleaned and checked.
- 5.7 The grit shall be sharp silica sand, steel slag grit, similar or equal to 16-35 mesh flint silica to give a 1.2 to 2.5 mils anchor pattern. No polished surfaces shall be allowed.
- 5.8 The compressed air used for nozzle blasting shall be free of detrimental amounts of condensed water and oil. Adequate separators and traps shall be used. Nozzle pressure shall not be less than 80 psi.
- 5.9 Contaminated sand or grit shall not be used for finished work.
- 5.10 Remove weld splatter and visible welding contamination. Grind sharp edges to 1/8" radius and grind welds. Skip welds should be welded solid or caulked.
- 5.11 All visible burrs, slivers, scabs, and weld splatter shall be removed after blast cleaning.
- 5.12 The prime coat shall be applied within 8 hours after blasting and/or before any rust blooms begin to form. Reblast all surfaces that exceed these conditions before applying prime coat.
- 5.13 Remove all traces of grit, dust, grease, and foreign matter after blast cleaning and prior to application of each coat of material by solvent cleaning, high pressure air or brush.

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DESIGN ENGINEERING DEPARTMENT

By: Durwood Peach

DATE 1-1-74

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6. APPLICATION FOR DP# 12

- 6.1 No material shall be applied when the surface or air temperature is below 35°F or above 110°F, when the relative humidity is above 90%, or when the temperature is within 5°F of the dew point.
- 6.2 Material shall be applied by spray application provided the minimum DFT per coat and workmanship requirements of this specification are met.
- 6.3 Minimum DFT shall be as specified in section 4 when inspected in accordance with SSPC-PA2-72.
- 6.4 All areas with DFT readings less than specified in section 4 shall be corrected as specified in section 6.7.
- 6.5 Prior to topcoating each coat shall be allowed to dry in strict accordance with the following minimum guidelines based on temperature and relative humidity unless covered by a written project variation procedure.

TEMPERATURE

	40°F	50°F	60°F	70°F	80°F	90°F
40%	72 hr.					
50%		60 hr.				
60%			48 hr.			
70%				36 hr.		
80%					24 hr.	
90%						12 hr.

- 6.6\* Drying time for shipment or stacking together of finish coated work shall be in accordance with the following minimum guidelines unless covered by a written project variation procedure.

TEMPERATURE

	40°F	50°F	60°F	70°F	80°F	90°F
40%	12 hr.					
50%		8 hr.				
60%			6 hr.			
70%				4 hr.		
80%					2 hr.	
90%						1 hr.

\*Adequate cure can be checked by scratching primed surface with a coin. A cured zinc film will polish and an uncured zinc film will wrinkle.

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*[Signature]*  
DATE 5-11-76

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DATE 1-1-74

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## 6.7 Touch Up Procedures with DP# 12

- 6.7.1 Surface preparation of damaged or bare areas shall be in accordance with DPSP#6, except for areas previously blast cleaned to a DPSP#6 that have no signs of rust blooms which shall be cleaned to a minimum DP-SP3.
- 6.7.2 Application shall be in accordance with section 6.1 through section 6.7 for all previously primed steel not exceeding the drying times specified in section 6.5.
- 6.7.3 Application for previously primed surfaces which have exceeded drying times specified in section 6.5 shall be the same as 6.7.2 except material shall be thinned 25% to 50%.
- 6.7.4 Stacking and loading after touch up shall be in accordance with section 6.6 unless areas touched up do not make contact with other surfaces during stacking and loading.

## 7. MIXING AND THINNING

- 7.1 Prior to thinning or application, all material shall be thoroughly mixed in such a manner as to insure the breaking apart of all lumps, complete dispersion of all settled pigments, and a uniform composition.
- 7.2 Mixing and thinning shall be with a power mixer in accordance with DP Product Data Sheet VII A for DP# 12 for the product selected.
- 7.3 Mixed material shall be applied within the maximum pot life specified on DP Product Data Sheet VII A for DP# 12 for the product selected or prior to any significant change in viscosity, whichever comes first.
- 7.4 Use of additional thinner to lower the viscosity after the mixed pot life has been exceeded shall not be allowed.
- 7.5 If work is stopped for short periods of time, material will be flushed from the fluid lines and equipment cleaned.
- 7.6 Mixed material shall be strained through a 30-50 mesh strainer prior to application.

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*Durwood Peach* 1-1-74  
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WORKMANSHIP STANDARDS		
NUCLEAR EXPOSURES		
BY: Design Engineering	DATE 6-1-74	REVISED _____

9. WORKMANSHIP

- 9.1 All work shall meet the minimum requirements of the Duke Power Company Coating Specifications and referenced standards or previously agreed upon variations of these standards.
- 9.2 All work shall be supervised by qualified persons who have read and understand the Duke Power Company Standard Coating Specifications for the specific work he is responsible for supervising.
- 9.3 All work will be done by persons experienced with the specific materials being applied or used unless accompanied by someone who is experienced in the work being performed.
- 9.4 Any completed work not meeting the minimum requirements of the Duke Power Company Coating Specification shall be corrected prior to topcoating or completion of advanced stages of the operation.
- 9.5 The following standards of workmanship are considered necessary to accomplish good workmanship and shall be adhered to unless covered by a written project variation procedure.
  - 9.5.1 Coating Materials
    - 9.5.1.1 All paint materials and accessories shall be delivered to the jobsite in original, unopened containers with the manufacturer's labels and tags intact. Containers shall remain unopened until required for mixing and thinning.
    - 9.5.1.2 All paint shall be stored under cover and off the ground for no longer than the shelf life specified, and at the minimum-maximum temperatures specified on Duke Power Company Field Coatings Product Data Sheet VII A.
  - 9.5.2 Coating System
    - 9.5.2.1 Only paint materials approved in section 3 of this specification shall be allowed.
    - 9.5.2.2 The DFT of each coat and of the entire system shall meet the requirements of section 4 of this specification for both number of coats and minimum DFT.

APPROVED BY QA

*A. Blong*  
APPROVED BY \_\_\_\_\_ DATE 6-13-74

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WORKMANSHIP STANDARDS NUCLEAR EXPOSURES		
BY: Design Engineering	DATE <u>6-1-74</u>	REVISED _____

### 9.5.3 Surface Preparation

- 9.5.3.1 Cleaning and Painting shall be scheduled so that the dust and other contaminants from the cleaning process will not fall on newly painted surfaces.
- 9.5.3.2 Where required, imperfections, holes, stictwelds in the surface shall be filled with approved fillers or caulking.
- 9.5.3.3 Hardware, trim, underwriters labels, manufacturer's serial numbers, dials, gauges, and other items shall be removed or masked to allow proper application of the coatings and prevent damage.
- 9.5.3.4 All concrete hardners, curing agents and form release agents shall be compatible with the recommended coating system or be removed prior to any coating work.

### 9.5.4 Masking of Friction Joints and Weld Joints

- 9.5.4.1 Steel surfaces which are primed with an inorganic zinc primer shall not be masked if the following conditions are specified:
- Areas to be welded shall be primed with a fully weldable inorganic zinc primer.
  - Areas to be joined with High Tension (Friction Type) bolts such as ASTM Type A325 or A490 shall be primed with an inorganic zinc primer - either weldable or non-weldable.

Steel surfaces which are primed with an inorganic zinc primer shall be masked back two inches from edges to be welded if they are to become part of a vessel which must conform to the ASME Pressure Vessel Code.

- 9.5.4.2 Steel surfaces which are primed in the shop shall be masked as noted below if an inorganic primer is used.

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*A. Boney* 6-11-74  
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WORKMANSHIP STANDARDS NUCLEAR EXPOSURES		
BY: Design Engineering	DATE <u>6-1-74</u>	REVISED _____

- a. Areas to be welded shall be masked so that no organic coating is within six (6) inches of the weld prior to the welding operation.
- b. Areas to be joined with the High Tension (Friction Type) bolts such as ASTM Type A325 or A490 shall be masked so that no organic coating is beneath the bolts prior to joining.
- c. These requirements shall also apply to organic topcoats when shop applied or when applied prior to assembly or erection.

9.5.5 Application

- 9.5.5.1 All applied coatings shall be free of runs, sags, drops, ridges, waves, laps, bubbles, embedded foreign matter, and other indications of improper application procedures.
- 9.5.5.2 Drying time between coats shall be in accordance with section 6 of this specification, Duke Power Company Field Coatings Product Data Sheet VII A, and the Manufacturer's Product Data Sheets on the specific products in that order of priority.

9.5.6 Mixing and Thinning

- 9.5.6.1 Mixing and thinning shall be in accordance with section 6 of this specification and Duke Power Company Field Product Data Sheet VII A.

9.5.7 Equipment

- 9.5.7.1 All equipment shall meet the requirements of section 8 of this specification.
- 9.5.7.2 All equipment shall be maintained in good working order. It shall be thoroughly cleaned and inspected daily. Worn tips, spray nozzles, hoses, blast nozzles, and other parts necessary to meet good work standards shall be replaced regularly.
- 9.5.7.3 Effective oil and water separators shall be used and serviced on all air lines.

APPROVED BY QA

*G. B. [Signature]* 6-1-74  
APPROVED BY \_\_\_\_\_

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INSPECTION STANDARDS NUCLEAR EXPOSURES		
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10. INSPECTION

- 10.1 Duke Power Company, the coating manufacturer and their responsible representatives shall have access to shop or field at all times during the surface preparation, and application of coating work or to inspect work previously finished.
- 10.2 The Owner reserves the right to reject all work that does not meet the Duke Power Company Coating Specification. This may be done either at the vendor's shop or at the jobsite.
- 10.3 All or any portion of finished work not meeting the minimum standards of this specification and referenced standards shall be corrected by the applicator or vendor, unless otherwise agreed to in writing by Duke Power Company.
- 10.4 Inspection by Duke Power Company or their responsible representatives, or failure to provide inspection shall not relieve the applicator of his responsibilities to provide materials and perform the work in accordance with the Duke Power Company coating specifications.  
  
The applicator shall be required to furnish proper inspection equipment as necessary to check the minimum or maximum conditions of this specification.
- 10.5 Duke Power Company Inspection Procedures for nuclear exposures will be made available to the applicator upon written request or presented in detail at the pre-start up meeting for each project.

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*[Signature]* 6-13-74  
DATE