



# NACE Coating Inspector Level 1 Written Exam NACE-CIP1-001

Exam Preparation Guide  
March 2018

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## Introduction

The Coating Inspector Level 1 written exam is designed to assess whether a candidate has the requisite knowledge and skills that a minimally qualified Level 1 Coating Inspector must possess. The 100 multiple-choice questions are based on the Coating Inspector body of knowledge. A candidate should have entry level knowledge of all corrosion, surface preparation, cleanliness, environmental conditions, test instruments, coating mixtures, safety, and can perform basic and non-destructive inspections of liquid coatings applied by brush, roller or spray to steel surfaces under the supervision of a level 2 or 3 inspector when working in a shop setting or a level 3 inspector when working in a field setting.

Test Name	NACE- Coating Inspector Level 1 written Exam
Test Code	NACE-CIP1-001
Time	2 ½ hours
Number of Questions	100
Format	Computer Based Testing (CBT)

*NOTE: A pass/fail grade is provided at the end of the exam.*

## Target Audience

A Level 1 Coating Inspector is responsible for performing and documenting basic and non-destructive inspections of liquid coatings applied by brush, roller or spray to steel surfaces under the supervision of a level 2 or 3 inspector when working in a shop setting or a level 3 inspector when working in a field setting.

# Requirements

## Requirements for Coating Inspection Program Level 1- Certified

- Work Experience and Education Prerequisite
- Course
- 2 Core Exams
- Application

<b>Prerequisite</b> <i>(choose one of the following options):</i>
None required
<b>Course Requirements</b>
Successfully complete the following course: +Course - CIP Level 1
<b>Core Exam Requirements</b>
Exam - Coating Inspector Level 1 written Exam – CIP1 Exam - Coating Inspector Level 1 practical exam
<b>Application Requirements</b>
None required

### Certification renewal requirements–

- Recertification application\* required every 3 years
- 1.5 years of Corrosion work experience in Coating Inspections

Upon successful completion of requirements, the candidate will be awarded a **NACE Coating Inspector Level 1 -Certified**.

*\*Approval required*

# Exam Blue Print

NOTE: At the end of the CBT exam the candidate will receive a bar chart of strengths and weaknesses that correspond to these Domains.

## Domain 1- Safety - 2.5%

- NACE general safety statement for CIP Inspectors
- SDS overview
- Introduction to Hazcomm
- Explanation of confined space safety
- Explanation of Job and equipment specific safety and security
- Personal responsibility
- NACE general safety statement for CIP Inspectors
- SDS overview

## Domain 2- Inspection Process - 15%

- NACE view of role of CIP Inspector - including restrictions @ each level
- Purpose of Inspection – including cost justification
- Discussion of Specification – role in the inspection process
- Discussion of Product Data Sheets – role in the inspection process
- Discussion of Standards – role in the inspection process
- Discussion of Codes – role in the inspection process
- Discussion of Inspection and Test Plans – role in the inspection process
- Discussion of Pre-Job Conference – role in the inspection process
- Discussion of Visual Inspection – overall importance in the inspection process
- Discussion of Verification vs. Hold Point Inspections
- Discussion of Non-Destructive Instrument Inspection on steel substrates – hands on use of instruments and the role in the inspection process
- Discussion of Documentation – role in the inspection process, types of reports and basic reporting principles

## Domain 3- Corrosion - 5%

- Definition of corrosion
- General explanation of a corrosion cell
- Corrosion on steel structures
- Explanation of Galvanic Corrosion and the basic galvanic series
- Common service environments
- Introduction to the factors influencing corrosion rates
- Introduction to the basic types of corrosion – general, localized
- Effects of corrosion – safety, cost, appearance
- Corrosion control - types and methods, including the role of protective coating systems, and introduction to corrosion control programs

## Domain 4- Environmental Controls and Inspection - 5%

- Explanation of effect of Air, and Surface Temperature, Relative Humidity and Dew Point, and wind speed on surface preparation and coating operations
- Discussion of ASTM 337
- Explanation, demonstration and use of Sling Psychrometers and Surface Temperature Thermometers
- Explanation, demonstration and use of Electronic Hygrometers
- Environmental testing – practice lab

## Domain 5- Surface Preparation and Inspection - 20%

- Explanation of design and fabrication defects and their role in corrosion and coating defects, Demonstration and use of the weld replica associated with NACE SP 0178
- Explanation of solvent/hand/power tool cleaning
- abrasive blasting of steel surfaces
- Explanation of the types of abrasives and test methods for measuring size (ASTM C136).
- Explanation of visual contaminants, removal and test methods

- Explanation of residual soluble salts, removal and test methods
- Explanation of all relevant NACE, SSPC, ASTM and ISO standards relating to solvent/hand/power tool cleaning, abrasive blasting and of steel and tests for residual soluble salts
- Explanation, demonstration and use of dust and debris test, and replica Tape, Digital Surface Profile Gauge, ISO Comparators (ASTM D4417).

### **Domain 6- Coatings and Inspection - 20%**

- Explanation of Coating Fundamentals including basic constituents and modes of protection.
- Explanation of broad classifications i.e. Organic vs. Inorganic, Thermoset vs. Thermoplastic, Convertible vs. Non-Convertible
- Explanation of polymerization and curing mechanisms, and generic coating types
- Explanation of the use of a wet film thickness gauge and how to calculate the resulting dry film thickness.
- Explanation and demonstration of Coating Specifications
- Explanation, demonstration and use of magnetic DFT gauges, i.e. pull off and constant pressure probe gauges
- Explanation and use of SSPC PA-2
- Explanation and use of holiday detection test instruments
- Explanation of the different types of coating defects.

### **Domain 7- Coating Application - 7.5%**

- Explanation of brush, mitt, roller, conventional air spray, airless and air assisted airless application methods
- Demonstration and use of brush, conventional and airless spray including basic troubleshooting
- Explanation of the need and the use of stripe coats
- Explanation of the importance of surface pre-cleaning, surface preparation and environmental conditions on the quality of coating application
- Explanation of the importance of mixing, induction time, pot life and overcoat window.

### **Domain 8 - Documentation - 10%**

- Explanation of importance of reporting and documentation to the inspection process
- Explanation, demonstration and use of a log book, daily inspection reports
- Explanation, demonstration and use of a coating specification
- Explanation of material inventory, weekly and non-conformance reports
- Explanation, demonstration and use of product and material safety data sheets.

### **Domain 9 - Standards - 10%**

- Review, interpretation and use of all relevant standards referenced in Level 1

### **Domain 10 - Team Work - 2.5%**

- Basic understanding of team work (desert survival)

### **Domain 11- Ethics - 2.5%**

- Basic understanding of ethics required of a NACE Certified Inspector (as per attestation)

# Types of Questions

## Description of Questions

The questions on this exam are multiple-choice where there *may be more than* one correct answer. The questions are based on the knowledge and skills required in the coating inspector industry. While the NACE training course is an excellent method of preparation it is not the only reference used in the development of the questions.

## Sample Questions

The sample questions are included to illustrate the formats and types of questions that will be on the exam. Your performance on the sample questions should not be viewed as a predictor of your performance on the actual test.

1. The temperature at which moisture begins to form on a steel surface is called
  - A. relative humidity.
  - B. dew point.
  - C. maximum surface temperature.
  - D. minimum surface temperature.
  
2. The contractor should not use air to blow off the surface of a coating if
  - A. iron is present in the coating waste or blast debris
  - B. lead is present in the coating waste or blast debris
  - C. biological residue is present in the coating waste
  - D. soluble salts are present in the coating waste
  
3. SSPC-SP 3 is a standard for
  - A. white metal blast cleaning.
  - B. pickling.
  - C. power tool cleaning.
  - D. hand tool cleaning.
  
4. When inspecting a silicone coating it is very important to
  - A. observe application and ensure the film is applied at the correct DFT.
  - B. pay close attention to the mix ratio and heating of the material.
  - C. ensure that the necessary time frames for overcoating or in-service exposure are adhered to.
  - D. ensure the proper materials

## Answer Key

1. **b**

*Reference: NACE Coating Inspection Program Level 1 course materials.*

2. **b**

*Reference: NACE Coating Inspection Program Level 1 course materials.*

3. **c**

*Reference: NACE Coating Inspection Program Level 1 course materials. 13*

4. **a**

*Reference: NACE Coating Inspection Program Level 1 course materials.*

## Preparation

### Training

#### ***NACE CIP Exam Course 1***

### Reference Material

- NACE Coating Inspection Program Level 1 course materials

### Books

- Corrosion prevention by protective coatings by Charles Munger and revised by Lou Vincent et. al.
- Practical Math for the Protective Coatings Industry by Raymond Weaver
- Users Guide to Hot Dip Galvanizing by American Galvanizers Association
- SSPC Painting Manual Volume 1- Good Painting Practices
- SSPC Painting Manual Volume 2- Systems and Specifications

### Standards

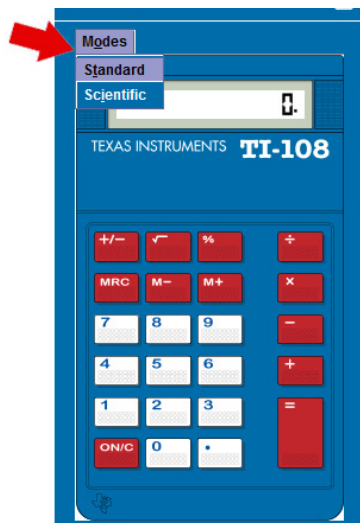
- ASTM Volume 06.01 Paint- Tests for Chemical, Physical, and Optical Properties; Appearance
- ASTM Volume 06.02 Paint- Products and Applications; Protective Coatings; Pipeline Coatings



## Calculators

Students will have access to either a TI Standard or TI Scientific calculator for use during the CBT Exam.

### Standard Calculator



### Standard Mode Functions

Add	$+$	
Subtract	$-$	
Multiply	$\times$	
Divide	$\div$	
Negative	$(-)$	
Percentage	$\%$	
Square Root	$\sqrt{\quad}$	Example: $4\sqrt{\quad}$
Reciprocal (Inverse)	$x^{-1}$	Example: $1\div 2 =$
Store value to variable	$M+$	Example: $3\times 5 = M+$
Access variable	$MRC$	Example: $7 + MRC =$
Clear variable	$M- MRC$	

### Scientific Calculator



### Scientific Mode Functions

Add	$+$	
Subtract	$-$	
Multiply	$\times$	
Divide	$\div$	
Negative	$(-)$	
Percentage	$2^{nd} [\%]$	
Square Root	$\sqrt{\quad}$	Example: $2^{nd} \sqrt{\quad} 4 \text{ enter}$
Reciprocal (Inverse)	$X^{-1}$	Example: $2 X^{-1} \text{ enter}$
Store value to variable	$\text{sto} \blacktriangleright [X^{YZ}]$	Example: $3 \times 5 \text{ enter } \text{sto} \blacktriangleright X^{YZ} \text{ enter}$
Access variable	$[X^{YZ}]$ or $2^{nd} [\text{recall}]$	Example: $7 + 2^{nd} [\text{recall}] \text{ enter } \text{enter}$

## Numeric Notation

### Standard (Floating Decimal)

Notation (digits to the left and right of decimal)

mode menu options

**NORM** SCI ENG

e.g. 123456.78

FLOAT 0 1 2 3 **4** 5 ...

e.g. 123456.7800

### Scientific Notation

(1 digit to the left of decimal and appropriate power of 10)

mode menu options

NORM **SCI** ENG

e.g. 1.2345678\*10<sup>5</sup>

### Engineering Notation

(numer from 1 to 999 times 10 to an integer power that is a multiple of 3)

mode menu options

NORM **SCI** ENG

e.g. 123.45678\*10<sup>3</sup>

## Fractions

Simple fractions	$\boxed{n/d}$
Mixed numbers	$\boxed{2nd} [Un/d]$
Conversion b/w simple fraction and mixed number	$\boxed{2nd} [n/d \blacktriangleleft \blacktriangleright Un/d]$
Conversion b/w fraction and decimal	$\boxed{2nd} [f \blacktriangleleft \blacktriangleright d]$

## Powers, roots, and inverses

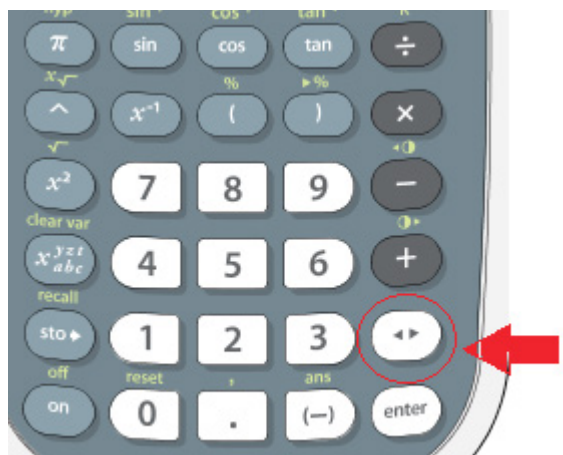
Square a value	$\boxed{x^2}$	
Cube a value	$\boxed{\wedge}$	
Raise value to specified power	$\boxed{\wedge}$	Example ( $2^4$ ) $2 \boxed{\wedge} 4$
Square root	$\boxed{2nd} [\sqrt{\quad}]$	Example ( $\sqrt{16}$ ): $\boxed{2nd} [\sqrt{\quad}] 16$
Reciprocal	$\boxed{x^{-1}}$	Example ( $n^{\text{th}}$ root): 5 <sup>th</sup> root of 8: 5 $\boxed{2nd} [x^{\sqrt{\quad}}] 8$

## Pi

PI ( $\pi$ )	$\boxed{\pi}$
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## Toggle

The scientific calculator might show the results of certain calculations as a fraction - possibly involving pi or a square root. To convert this kind of result to a single number with a decimal point, you will need to use the "toggle answer" button circled in the picture below. Pressing this button will change the display from a fractional to a decimal format.




### Answer Toggle



Press the  key to toggle the display result between fraction and decimal answers, exact square root and decimal, and exact pi and decimal.

#### Example

Answer toggle	$\boxed{2nd} [\sqrt{\quad}] 8 \text{ enter}$	$\sqrt{8}$ $2\sqrt{2}$
		$\sqrt{8}$ $2\sqrt{2}$ 2.828427125

If you find this onscreen calculator difficult to use, raise your hand and ask the TA to provide you with a hand-held scientific calculator. **If available, you will be provided with a scientific or non-scientific calculator. Candidates are not permitted to bring their own calculator into the testing room.**