PCS 1-Basic Principals Theory Exam

Exam Preparation Guide

December 2020

Table of Contents

Introduction 3
Target Audience 3
Requirements 4
Exam Blue Print 5
Types of Questions 9
Description of Questions 9
Sample Questions 10
Preparation 11
Required Training 11
Suggested Study Material 11
Reference Material Provided During Exam 11
What to Expect on Test Day 11
Remote Online Exam Proctoring 11
Examity Demonstration with Automated Proctor 11

Introduction

The PCS 1 Basic Principles exam is designed to assess whether a candidate has the requisite knowledge, skills and abilities (KSAs) that a minimally qualified person entering the field must possess to use coatings to control corrosion and understands the economic benefits of managing coatings. The 50 questions are based on the KSAs a of the Basic Principles in PCS 1 that are needed to be successful in the job. It is recommended that a candidate take the Math for the Coatings Professional eCourse but it is not required.

Exam Name	PCS 1 Exam
Time	2 Hours
Number of Questions	50
Format	Live Online Remote Proctoring (Examity*)
Passing Score	Pass or Fail

**Delivered through Examity NOT AT Pearson Testing Center*

Target Audience

PCS 1 benefits anyone who is new to the field or position responsible for industrial coatings and linings. The PCS 1 Exam and training was designed and targeted to the following people:

- Planning, engineering, and supervisory level personnel
- Specifiers, maintenance, and project engineers in all industries
- Marketing representatives of coatings materials or equipment
- Unit managers involved in corrosion

The person who may successfully complete the PCS 1 course and exam is able to define corrosion control and the purpose of coatings and linings, identify the types of coating systems and select the appropriate one based on factoring considerations, and recognize the purpose of surface preparation and identify errors/omissions as well as explain the methods of application and the standards associated with those methods. Additionally, they should be able to produce desired results by understanding the importance of coating specification and pre-job conference, conduct inspection and quality control and understand the instruments and tools required, utilize instruments and tests to conduct inspection and quality control, document and report data, recognize the importance of it and how it assists with maintenance planning.

Requirements

Requirements for PCS 1

Prerequisites
• None required -Recommended- • **Math for the Coatings Professional eCourse**
Core Course Requirements
Successfully complete the following course: • **+ Course - PCS 1**
Core Exam Requirements
• Exam - PCS 1 Exam
Application Requirements
• None required

Exam Blue Print

NOTE: At the end of the exam the candidate will receive a chart with strengths and weaknesses that correspond to the Domains listed below. You will have the option to email or print it.

Domain 1 – Introduction to PCS Basic Principles • Evolution of Coating Industry • Current Protective Coatings Use • Bridge and Highway • Petrochemical — Oil and Gas • Industrial Plants • Marine • Power Generation • Water and Waste-water Treatment	**8-12 %**
Domain 2 – Corrosion • Corrosion Control Principles • Electrolyte • Anode • Metallic Pathway • Cathode • Effects of Corrosion • Program Maintenance • Forms of Corrosion • Uniform Corrosion • Localized Corrosion • Metallurgically Influenced Corrosion • Mechanically Assisted Degradation • Environmentally Induced Cracking • Microbiologically Influenced Corrosion	**20-24 %**
Domain 3 – Coatings • Basic Mechanisms of Protection • Desirable Coating Properties • Chemical Resistance • Water Resistance • Resistance to Moisture Absorption • Resistance to Moisture Vapor Transmission • Ease of Application • Adhesion to Substrate • Cohesive Strength • Tensile Strength • Flexibility/Elongation • Impact Resistance	**28-32 %**

• Abrasion Resistance • Temperature Resistance • Resistance to Cold Flow • Dielectric Strength • Coating Classification • Organic (Carbon-containing) • Inorganic (Non-Carbon-containing) • Film Formation and Cure • Liquid/Liquefiable Coatings • Resin • Liquid Additives • Solvent • Manufacture of Liquid/Liquefiable Coatings	
Domain 4 – Coating System Selection • Single-Coat Systems • Multiple-coat Systems • Multiple-coat Systems with the Same Coating • Multiple-coat Systems with Different Coatings • Components of Multiple-coat Systems • Factors to Consider • Type of Exposure • Atmospheric Environments • Operating Conditions vs Upset Conditions • Substrate • Atmospheric Conditions During Application • Ambient Temperature • Relative Humidity • Dew Point • Surface Temperature • Environmental Regulations • Budget • Operation or Shutdown Conditions • Application: Labor • Time Constraints • New Construction/Maintenance • Shop/Field Application • Design/Fabrication Considerations • Fabrication Defects • Government and/or Industry Regulations	**6-10 %**
Domain 5 – Surface Preparation • Surface Preparation Errors and/or Omissions • Surface Preparation Standards • Solvent Cleaning • Hand Tool Cleaning	**6-10 %**

• Power Tool Cleaning • Waterjetting • High-Pressure Water Blast Cleaning with Abrasive Injection • Abrasive Blast Cleaning • NACE Standards • ISO Surface Cleaning Standards • Types of Abrasives • Hard Non-Metallic Abrasives (Oxides, natural, or synthetic) • Abrasive Selection • Dry Abrasive Blast Cleaning • Wet Abrasive Blast Cleaning • Centrifugal Blast Cleaning • Vacuum Blasting • Surface Preparation of Concrete • Effects of Environment on Abrasive Blasting • Surface Preparation Quality Control Tests • Abrasive Tests • Surface Cleanliness Tests • Surface Profile (Anchor Pattern) • Profilometer/Digital Dial Depth Gauge Micrometer • Comparators and Coupons • Replica Tape (Testex® Tape) • Magnification • Tests for Soluble Salts • Testing for Moisture	
Domain 6 – Application • Brush/Roller/Mitt Application • Conventional Air-Spray • Airless Spray • Plural-component Spray Equipment • Electrostatic Spray Equipment • Centrifugal Spray • Considerations • Powder Coating • Spray Metallizing • High-Volume/Low-Pressure (HVLP) Equipment • Hot Spray Systems • Hot-Dip Galvanizing • Zinc Coatings • Thick-barrier Lining Operations	**1-3 %**
Domain 7 – Safety • Regulatory Agencies • Safety Checklists	**1-3 %**

• General Work Site Safety • Ladder Safety • Scaffold Safety • Abrasive Blast Safety • Spray Application Safety • Personal Protection Safety • Hose and Gun Safety • Solvent and Coating Material Safety • Test Equipment Safety • Material Safety Data Sheets • Personal Protective Equipment • Breathing Apparatus • Hood Respirators • Mouth and Nose Air-Supplied Respirators • Organic-Vapor Respirators • Dust and Particulate Respirators • Protective Clothing	
Domain 8 – Specification and Pre-Job Conference • Coating Specifications & Sections • Terms and Definitions • Reference Standards and Codes • Environmental Regulations • Scope • Safety • Pre-Job Conference • Surface Preparation • Coating Materials • Sampling Coatings • Coating Schedule • Workmanship • Application • Work Schedule • Repair and Remedial Work • Inspection • Documentation/Submittals • Pre-Job Conference	**8-12 %**
Domain 9 – Inspection and Quality Control • Inspection and Quality Control • Inspection Instruments and Tests • Wet-film Thickness Gauges • Dry-Film Thickness Magnetic Gauges • Eddy Current Instruments • Ultrasonic Thickness Gauges • Holiday Detectors	**8-12 %**

• Tooke Gauges (paint inspection gauge) • Knife Adhesion Test • Tape Adhesion Test • Pull-off Adhesion Testers • Pencil Hardness Test • Hardness Testers	

Types of Questions

Description of Questions

The exam consists of multiple-choice questions where some questions may have more than one answer. Items with more than one correct answer may contain the phrase **"*SELECT ALL THAT APPLY*"** and you will need to select more than one answer choice. The questions are based on the knowledge and skills required in the Protective Coatings industry.

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 exam.

1. What are some reasons that high performance coatings may be used?
   SELECT ALL THAT APPLY
   A. Aesthetics
   B. Chemical Resistance
   C. Corrosion Control
   D. Fire Protections

2. Pitting corrosion and Crevice corrosion occur at discrete locations on a material and fall under what category?
   A. Uniform Corrosion
   B. Localized Corrosion
   C. Filiform Corrosion
   D. Stress Corrosion Cracking

3. The ability of a coating to resist breaking and cracking under linear stress is the coating's:
   A. cohesive strength.
   B. flexibility.
   C. impact resistance.
   D. tensile strength.

4. The main advantage of what type of spray equipment is that the coating materials are not mixed until immediately before application and a coating with a pot life of 5 minutes can be applied?
   A. Conventional
   B. Electrostatic
   C. Plural-Component
   D. Spray metalizing

Answer Key:

1. **A, B, C, D**
   Reference: PCS 1 Manual Chapter 1

2. **B**
   Reference: PCS 1 Manual Chapter 2

3. **D**
   Reference: PCS 1 Manual Chapter 3

4. **C**
   Reference: PCS 1 Manual Chapter 6

Preparation

Required Training

NACE PCS 1

Suggested Study Material

NACE PCS 1 Manual

Math for the Coatings Professional eCourse Materials

Reference Material Provided During Exam

The PCS 1 Course manual is provided in electronic form during the exam.

What to Expect on Test Day

Remote Online Exam Proctoring

** Remote online proctored exams are offered for select exams.*

The NACE Institute has partnered with Examity to offer remote online proctoring for the PCS 1 Exam. With the new Examity platform, you can take the exam from home without the need to arrange for a proctor or take the exam at a testing site. Please visit this link for information you should know.
https://naceinstitute.org/certification-resources/online-exam-proctoring

Examity Demonstration with Automated Proctor

Please visit this link for a demonstration of the computer-based exam. You will have the opportunity to get familiar with how it all works.
https://vimeo.com/399635210/2eb75207b8