Module Overview

This module covers industrial coating safety for workers, for persons not directly involved in the coating operation, and for the environment. Information is also provided about the special precautions that must be taken when operations occur in dangerous areas, such as aboveground, near roadways, and in confined spaces.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify appropriate health and safety regulatory bodies pertaining to surface preparation and coating work.
2. Determine access requirements to structures needing coating work.
3. Identify site-specific lockout/tagout procedures and demonstrate verification of lockout.
4. Select the correct fall prevention system based on the job-site conditions.
5. Recognize intrinsically safe/explosion-proof equipment and devices.
6. Identify proper personal protective equipment (PPE) for surface preparation, coating mixing and thinning, and coating application operations.
7. Describe safety procedures associated with the following:
   • Pre-cleaning
   • Hand and power tool cleaning
   • Dry and wet abrasive blast cleaning
   • Ultra-high-pressure waterjetting
   • Chemical stripping
   • Disturbance of coatings containing toxic metals
   • Material handling, storage, disposal, and waste minimization
   • Mixing, thinning, and coating operations

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate lockout/tagout procedures.
2. Demonstrate proper donning of a personal fall-arrest system.
3. Identify intrinsically safe/explosion-proof equipment and devices.

Materials and Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard
Industrial Coating and Lining Application Specialist Level Two PowerPoint® Presentation Slides
(ISBN 978-0-13-605573-0)
Multimedia projector and screen
Computer
Appropriate personal protective equipment
Full-face and half-mask respirators
Lockout/tagout devices and tags
Supply of personal fall-arrest systems
Different types of gas-detection meters
Quantity of intrinsically safe/explosion-proof equipment, along with some equipment that is not
Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located at the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that all trainees are properly briefed on field safety, including electrical safety, lockout/tagout procedures, and fall arrest systems. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.


Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 30 hours are suggested to cover *Industrial Coating Safety*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of trainees may be noted during these exercises for Performance Testing purposes.

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<td>C. Lockout/Tagout Devices, Procedures, and Safeguards</td>
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<td>E. Laboratory</td>
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<tr>
<td>Have trainees demonstrate lockout/tagout procedures. This laboratory corresponds to Performance Task 1.</td>
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<td>F. Barricade and Barrier Safety</td>
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</table>
Sessions V–VII. Aboveground Work; Roadway Work

A. Aboveground Work
   1. Ladders
   2. Scaffolding
   3. Falls and Fall-Arrest Systems

B. Laboratory
   Have trainees demonstrate the proper donning of a personal fall-arrest system.
   This laboratory corresponds to Performance Task 2.

Sessions VIII and IX. Confined Spaces

A. Confined-Space Classification
   1. Non-Permit Required Confined Space
   2. Permit Required Confined Space

B. Entry Permits

C. Atmospheric Hazards

D. Laboratory
   Have trainees identify intrinsically safe/explosion-proof equipment and devices.
   This laboratory corresponds to Performance Task 3.

E. Additional Confined-Space Hazards

F. Worker and Supervisor Responsibilities and Duties

G. Confined-Space Safeguards

Sessions X and XI. Safety Guidelines

A. Fire Hazards

B. Hand and Power Tools

C. Pneumatic Tools

D. Abrasive Blasting

E. Waterjetting

F. Chemical Stripping

G. Coating Application

H. Debris Management

Session XII. Review and Testing

A. Module Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results
to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive
recognition from NCCER. If applicable, proficiency noted during laboratory
exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results
to the Training Program Sponsor.
Module Overview

This module explains how and why corrosion occurs and how it can be prevented through the use of coatings and other corrosion protection techniques.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Module 69201-10.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify the components of a corrosion cell.
2. Describe dissimilar metal corrosion.
3. Describe how concrete corrodes.
4. Describe how concrete rebar corrodes and the consequences of that corrosion.
5. List the types and classifications of corrosion.

Performance Tasks

This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard
Industrial Coating and Lining Application Specialist Level Two
Multimedia projector and screen
Computer
Appropriate personal protective equipment
Rust and corrosion kit
Samples of reinforcement corrosion in concrete
Quick Quiz*
Module Examinations**

* Located at the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that trainees are properly briefed on all appropriate field safety and site safety procedures prior to any site visits.


### Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.


### Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover Corrosion Protection. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

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<thead>
<tr>
<th>Topic</th>
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<td>A. Introduction</td>
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<td>B. Corrosion Cell</td>
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<td>1. Corrosion Protection Techniques</td>
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<td><strong>Session II. Concrete; Review and Testing</strong></td>
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<td>A. Concrete</td>
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<td>B. Module Review</td>
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<td>C. Module Examination</td>
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</tr>
<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</table>
Module Overview

This module covers the tasks and considerations involved in work planning and quality control for coatings projects. Calculations used in the planning process, and formulas used to determine the area of different surface shapes are described.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Modules 69201-10 and 69202-10.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Follow and execute a work plan, including documentation of all processes.
2. Use process control on coatings projects.
3. Calculate ratios and areas for simple structures.
4. Calculate adjusted volatile organic compounds (VOCs) based on thinner additions.
5. Describe how pressure, volume, and temperature affect surface preparation and coating application operations.
6. Prepare test sections, demonstrating processes.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Follow and execute a work plan, including documentation of all processes.

Materials and Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard
Industrial Coating and Lining Application Specialist Level Two
PowerPoint® Presentation Slides
(ISBN 978-0-13-605573-0)
Multimedia projector and screen

Computer
Appropriate personal protective equipment
An instructor-selected work plan reflecting the factors discussed in this module
Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located at the back of this module.
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that trainees are briefed on site safety policies prior to any site visits.
Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

SSPC-PA 1, Shop, Field, and Maintenance Painting of Steel. www.sspc.org.

Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 25 hours are suggested to cover Work Planning and Quality Control. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of trainees may be noted during these exercises for Performance Testing purposes.

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<td>4. Safety Planning</td>
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<td>B. Factors That May Affect Coating Quality</td>
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<td>A. Laboratory</td>
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<tr>
<td>Have trainees follow and execute a work plan, including the documentation of all processes. This laboratory corresponds to Performance Task 1.</td>
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<td>Session VII. Calculations for the Planning Process</td>
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<td>B. Proportions</td>
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<td>C. Expressing Rules as Formulas</td>
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<td>D. Powers</td>
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<td>E. Roots</td>
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<td>F. Evaluating Formulas</td>
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Sessions VIII and IX. Solving Area Problems

A. Finding the Area of a Rectangle
B. Finding the Area of a Triangle
C. Finding the Area of a Circle
D. Finding the Area of a Sphere
E. Finding the Area of a Cylinder

Session X. Review and Testing

A. Module Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module covers various aspects of the containment and ventilation systems used to manage the by-products of surface preparation and coating application.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Modules 69201-10 through 69203-10.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe which level of containment would be appropriate for a specific operation.
2. Describe the general requirements of industry standards for containment erection and dust collection.
3. List the different types of containment systems and their applications.
4. Construct a containment system for a specific application.
5. Demonstrate the installation of ventilation and humidification or dehumidification systems.
8. Demonstrate procedures for maintaining containment integrity.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Construct a containment system for a specific application.
2. Install ventilation and humidification or dehumidification systems.
3. Using SSPC Guide 6, test the effectiveness of a given containment structure.
4. Install containment around protrusions.
5. Perform a repair on a perforated area.

Materials and Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard
Industrial Coating and Lining Application Specialist Level Two PowerPoint® Presentation Slides
(ISBN 978-0-13-605573-0)
Multimedia projector and screen
Computer
Appropriate personal protective equipment
SSPC Guide 6
Typical MSDS for a coating
Manometers and magnehelic gauges
Handheld anemometers
Handheld personal lead monitoring unit
Smoke tubes
Temperature/humidity meter
Examples of the following instructor-selected materials:
Vacuum-shrouded tools
Type A2 containment materials
Type B containment materials
Type D joints
Pictures of Type E entryways
Pictures or examples of Type F air supply controls
Pictures of powered exhaust and filtration systems connected to containment systems

(continued)
Duct fans and blowers, along with ductwork that can be connected to them
Sections of self-supporting scaffolding
Quantity of instructor-selected containment material for demonstrations and performance tasks, including the material manufacturer’s recommended sealing and repair materials

Refrigerant and desiccant dehumidifiers
Four-foot sections of 6-inch OD plastic pipe
Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located at the back of this module
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees will be required to construct, install, and test the effectiveness of containment structures and to hook up ventilation and humidification or dehumidification systems. Ensure that the trainees are properly briefed on field safety and are familiar with all appropriate safety precautions and procedures. Ensure that trainees are briefed on site safety policies prior to any site visits.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 60 hours are suggested to cover Containment. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

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<td>B. Worker Safety Standards</td>
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<td>D. Method D – EPA Ambient Air Monitoring for Toxic Metals</td>
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<td>E. Method E – Soil Analysis for Toxic Metals</td>
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<td>H. Containment Integrity and Protrusions</td>
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Session XVII. Environmental Humidity/Temperature Control

A. Dehumidifiers
B. Heating/Cooling Units

Sessions XVIII–XXIII. Laboratory and Performance Tasks

A. Laboratory (2 sessions)
   Have trainees construct a containment system for a specific application.
   This laboratory corresponds to Performance Task 1.
B. Laboratory (1 session)
   Have trainees install a ventilation and humidification or dehumidification system. This laboratory corresponds to Performance Task 2.
C. Laboratory (1 session)
   Using SSPC Guide 6, have trainees test the effectiveness of a given containment structure. This laboratory corresponds to Performance Task 3.
D. Laboratory (1 session)
   Have trainees install containment around protrusions. This laboratory corresponds to Performance Task 4.
E. Laboratory (1 session)
   Have trainees perform a repair on a perforated area. This laboratory corresponds to Performance Task 5.

Session XXIV. Review and Testing

A. Module Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module explains how to examine various surfaces and determine the methods to use to achieve the proper surface profile and cleanliness. It also covers how to maintain surface-preparation equipment.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Modules 69201-10 through 69204-10.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify and document surface conditions of steel substrates as depicted in the SSPC/NACE/ISO visual guides.
2. Examine and document preparation requirements for steel, nonferrous metals, nonmetallic surfaces, synthetic coatings, and existing coatings.
3. Demonstrate the use of a dull putty knife to confirm compliance with SSPC-SP 2, SSPC-SP 3, NACE No. 4/SSPC-SP 7, and NACE No. 8/SSPC-SP 14.
4. Demonstrate proper procedures for selecting, verifying the cleanliness of, and storing abrasives, including abrasive additives.
5. Explain how to maintain and troubleshoot abrasive blasting field equipment, and demonstrate field procedures for verifying cleanliness of abrasives and related documentation procedures.
6. Demonstrate procedures for measuring and documenting nozzle aperture, nozzle air pressure, and compressed air cleanliness.
7. Demonstrate the procedures for determining surface profile and surface cleanliness and associated documentation using a visual comparator, visual guide, dial surface profile gauge, replica tape, transparent tape test according to ISO 8502-3, ultraviolet light for detection of hydrocarbon contamination, and commercially available equipment to test for soluble salts.
8. Use the written standard and the accompanying visual guides (NACE VIS 9/SSPC-VIS 5 and NACE VIS 7/SSPC-VIS 4) to classify various examples of surface profiles.
9. Demonstrate the use and documentation of inspection procedures for concrete coating work using moisture meters, RH probes, anhydrous CaCl ASTM F1869, plastic sheet method ASTM D4263, ICRI surface roughness comparators, and concrete profiler putty.
10. Describe and demonstrate the proper use and documentation of environmental monitoring procedures using psychrometers, thermometers, and psychrometric tables.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify and document surface conditions of steel substrates as depicted in the SSPC/NACE/ISO visual guides.
2. Demonstrate the use of a dull putty knife to confirm compliance with SSPC-SP 2, SSPC-SP 3, NACE No. 4/SSPC-SP 7, and NACE No. 8/SSPC-SP 14.
3. Demonstrate field procedures for verifying cleanliness of abrasives (SSPC-AB2) and related documentation procedures.
4. Demonstrate the procedures for measuring and documenting:
   - Nozzle aperture
   - Nozzle air pressure
   - Compressed air cleanliness

continued
5. Demonstrate the procedures for determining anchor profile and associated documentation using:
   • Visual comparator
   • Dial surface profile gauge
   • Replica tape

6. Demonstrate the procedures for determining surface cleanliness and associated documentation using one or more of the following:
   • Transparent tape test according to ISO 8502-3
   • Ultraviolet light for detection of hydrocarbon contamination
   • Commercially available equipment to test for soluble salts

7. Use the written standard and the accompanying visual guides (NACE VIS 9/SSPC-VIS 5 and NACE VIS 7/SSPC-VIS 4) to classify various examples of surface profiles.

8. Demonstrate the use and documentation of inspection procedures for concrete coating work using one or more of the following moisture tests:
   • Moisture meters
   • RH probes
   • Anhydrous CaCl ASTM F1869
   • Plastic sheet method ASTM D4263

9. Demonstrate the use and documentation of inspection procedures for concrete coating work using one of the following surface profiles:
   • ICRI surface roughness comparators
   • Concrete profiler putty

10. Demonstrate the proper use and documentation of environmental monitoring procedures using:
    • Psychrometers
    • Thermometers
    • Psychrometric tables

Materials And Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard
Industrial Coating and Lining
   Application Specialist Level Two
   PowerPoint® Presentation Slides
   (ISBN 978-0-13-605573-0)
Multimedia projector and screen
Computer
Appropriate personal protective equipment
SSPC VIS 1 through SSPC VIS 3, NACE VIS 7, NACE VIS 9, and ISO 8501-1 through ISO 8501-4
Various steel surfaces representing surfaces depicted in the SSPC/NACE/ISO visual guides and described in the written standards
Steel surfaces prepared to SSPC-SP 2, SSPC-SP 3, NACE No. 4, and NACE No. 8
Surfaces contaminated with dust, hydrocarbons, and soluble salts
ISO 8502-3 transparent tape test kits
Replica tapes
Ultraviolet test lights for hydrocarbon contamination and for liquid penetrants
Commercial soluble salts test kits
Moisture meters and RH meters
Psychrometers
Thermometers
Anhydrous CaCl

Plastic wrap
Duct tape
ASTM D4263
ASTM F1869
ASTM D4417
NACE SP 0287
Liquid penetrant kits including developer
Nonporous surfaces with discontinuities
Visual comparators with lighted magnifier
Dial surface profile gauges
Digital surface profile gauge
Dull putty knives
ICRI comparators
Concrete profiler putty kits
Psychrometric tables
SSPC-AB2 tests for recycled abrasives
Small vials
Distilled water
Quantity of pH paper
Silver nitrate solution 5 percent
ASTM D4285 blotter test
Pressure blast analyzer (orifice) gauge
Needle pressure gauge
Small operating abrasive blast system
New and worn blast nozzles of the same size
Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located at the back of this module
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees will be required to demonstrate the use and documentation of various surface preparation procedures. Emphasize the hazards and safety precautions associated with surface preparation. Ensure that the trainees are briefed on the proper site or shop safety precautions and procedures.

Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

ISO 8501-1 through ISO 8501-4, Preparation of Steel Substrates Before Application of Paints and Related Products – Visual Assessment of Surface Cleanliness.
ISO 8502-3, Preparation of Steel Substrates Before Application of Paints and Related Products – Tests for the Assessment of Surface Cleanliness.
NACE VIS 9/SSPC-VIS 5, Guide and Reference Photographs for Steel Surfaces Prepared by Wet Abrasive Blast Cleaning.
SSPC-VIS 1, Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning.
SSPC-VIS 2, Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.

Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 80 hours are suggested to cover Surface Preparation Two. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Sessions I and II. Introduction</td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Laboratory (1 session)</td>
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<tr>
<td>Have trainees identify, classify, and document surface conditions of steel substrates as depicted in the SSPC/NACE/ISO visual guides and written standards. This laboratory corresponds to Performance Tasks 1 and 7.</td>
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</tbody>
</table>
Sessions III–XII. Surface Preparation One

A. Dull Putty Knife Test

B. Laboratory (2 sessions)
   Have trainees demonstrate the use of a dull putty knife to confirm compliance with SSPC-SP 2, SSPC-SP 3, NACE No. 4/SSPC-SP 7, and NACE No. 8/SSPC-SP 14. This laboratory corresponds to Performance Task 2.

C. Cleanliness

D. Soluble Salt Tests

E. Laboratory (3 sessions)
   Have trainees demonstrate the procedures for determining surface cleanliness and associated documentation using one or more of the following:
   - Transparent tape test according to ISO 8502-3
   - Ultraviolet light for detection of hydrocarbon contamination
   - Commercially available equipment to test for soluble salts
   This laboratory corresponds to Performance Task 6.

F. Moisture Tests and Controls

G. Laboratory (3 sessions)
   Have trainees demonstrate the use and documentation of inspection procedures for concrete coating work using one or more of the following moisture tests:
   - Moisture meters
   - RH probes
   - Anhydrous CaCl ASTM F1869
   - Plastic sheet method ASTM D4263
   This laboratory corresponds to Performance Task 8.

H. Nonporous Surface Discontinuity Tests

Sessions XIII–XXI. Surface Preparation Two

A. Surface Profile Tests

B. Laboratory (2 sessions)
   Have trainees demonstrate the procedures for determining anchor profile and associated documentation using:
   - Visual comparator
   - Dial surface profile gauge
   - Replica tape
   This laboratory corresponds to Performance Task 5.

C. Laboratory (2 sessions)
   Have trainees demonstrate the use and documentation of inspection procedures for concrete coating work using one of the following surface profiles:
   - ICRI surface roughness comparators
   - Concrete profiler putty
   This laboratory corresponds to Performance Task 9.

D. Environmental Conditions

E. Laboratory (2 sessions)
   Have trainees demonstrate the proper use and documentation of environmental monitoring procedures using:
   - Psychrometers
   - Thermometers
   - Psychrometric tables
   This laboratory corresponds to Performance Task 10.
Sessions XXI–XXII. Pre-Preparation Inspection and Work Plan

A. Steel
   1. Galvanized Steel
   2. Weathering Steel
   3. Stainless Steel
B. Copper and Aluminum
C. Masonry and Concrete
D. Synthetic Substrates
E. Existing Coatings

Sessions XXIII–XXIX. Dry Abrasive Cleaning

A. Dry Abrasive Media
B. Laboratory (2 sessions)
   Have trainees demonstrate field procedures for verifying cleanliness of abrasives (SSPC AB2) and related documentation procedures. This laboratory corresponds to Performance Task 3.
C. Maintaining Dry Abrasive Equipment
   1. Nozzle Orifice Check
   2. Nozzle Operating Pressure
D. Low-Volume Water Abrasive Blasting
E. Laboratory (2 sessions)
   Have trainees demonstrate the procedures for measuring and documenting:
   - Nozzle aperture
   - Nozzle air pressure
   - Compressed air cleanliness
   This laboratory corresponds to Performance Task 4.

Sessions XXX–XXXI. Waterjetting

A. Safety Guidelines
B. Environmental Issues
C. Waterjetting Equipment
D. Waterjetting Preparation
E. Dump Valve
F. Waterjetting Procedure
G. Shotgunning
H. Tanks
I. Cleanup
J. Other Waterjetting Equipment

Session XXXII. Review and Testing

A. Module Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview
This module provides detailed information about industrial protective coatings and linings. It also covers pipeline coatings, fire-resistant/fire-retardant coatings, and powder coatings.

Prerequisites
Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Modules 69201-10 through 69205-10.

Objectives
Upon completion of this module, the trainee will be able to do the following:
1. Describe physical coating properties.
2. Describe the characteristics of basic nonconvertible and convertible coatings.
3. Describe basic curing mechanisms and methods of film formation.
4. Describe basic pipeline coatings along with their advantages, disadvantages, and application methods.

Performance Tasks
This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

| Markers/chalk | Appropriate personal protective equipment |
| Pencils and scratch paper | Short sections of new and/or corroded coated pipelines |
| Whiteboard/chalkboard | Short section of ARO pipeline |
| Industrial Coating and Lining Application Specialist Level Two PowerPoint® Presentation Slides (ISBN 978-0-13-605573-0) | Samples of cold-applied pipeline tapes |
| Multimedia projector and screen | Examples of shrink-fit sleeves |
| Computer | Fire protection insulation materials |
| Quick Quiz* | Module Examinations** |

* Located at the back of this module
**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations
Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Ensure that the trainees are briefed on the proper site or shop safety precautions and procedures.
Additional Resources

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.


Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Industrial Coatings Two.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

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<td>B. Protection Mechanisms of Industrial Protective Coatings</td>
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<td>1. Barrier Coatings</td>
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<td>3. Sacrificial Coatings</td>
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<td><strong>Sessions II and III. Desirable Properties of Industrial Protective Coatings/Linings</strong></td>
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<td>A. Types of Coatings</td>
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<td>1. Pigment</td>
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<td>2. Solvents</td>
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<td>3. Additives</td>
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<td>4. Resins</td>
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<td>C. Coating Curing Mechanisms</td>
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<td>2. Hydration-Cure Coatings</td>
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<td>3. Nonconvertible Coatings</td>
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<td><strong>Session IV. Coating Methods for Some Non-Steel Substrates</strong></td>
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<td>2. Thin-Film Coatings</td>
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<td>3. Liquid Rigid-Barrier Thick-Film Coatings</td>
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<td>4. Elastomeric Membranes</td>
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<td>5. Protective Barrier Laminate and Bonded Thermoplastic Liners</td>
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<td>B. Aluminum Substrates</td>
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<td>1. Organic Coatings</td>
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<td>2. Anodic and Conversion Coatings</td>
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<td>3. Porcelain Enamels and Electroplating</td>
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<tr>
<td>C. Stainless Steel</td>
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</table>
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A. Fusion-Bonded Epoxy Pipeline Coatings
   1. FBE Coating Advantages and Disadvantages
   2. Plant-Applied FBE Coatings
   3. Field Joint FBE Coating Application
B. Coal-Tar Pipeline Coatings
   1. CTE Coating Advantages and Disadvantages
   2. Plant-Applied CTE Coatings
   3. Field Joint CTE Coating Application
C. Extruded Polyolefin Pipeline Coatings
   1. PO Coating Advantages and Disadvantages
   2. Plant-Applied Extruded PO Coatings
   3. Joint Coating and Field Repair of PO Coatings
D. Abrasion-Resistant Overlay (ARO) Pipeline Coatings
E. Cold-Applied Pipeline Tapes
   1. Advantages and Disadvantages of Cold Tape Coatings
   2. Petrolatum Cold Tape Application
   3. Polyethylene Cold Tape Application
F. Shrink-Fit Pipeline-Joint Sleeves
   1. Advantages and Disadvantages of Shrink-Fit Sleeves
   2. Shrink-Fit Sleeve Application
G. Pipeline Weight Coatings
H. Liquid Pipeline Coatings

Session VII. Fire-Resistant/Retardant Coatings; Powder Coatings; Pipeline and Specialty Coatings Standards
A. Fire-Resistant/Retardant Coatings
   1. Cementitious-Based Materials
   2. Non-Cementitious Materials
   3. Insulation-Based Materials
B. Powder Coatings
C. Pipeline and Specialty Coatings Standards

Session VIII. Review and Testing
A. Module Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module covers coating application products, equipment, and procedures, as well as coating safety and how to calculate coating coverage.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Industrial Coating and Lining Application Specialist Level One and Industrial Coating and Lining Application Specialist Level Two, Modules 69201-10 through 69206-10.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Demonstrate the use of a PDS to extract the following information:
   - Storage requirements
   - Mixing and thinning procedures
   - Induction time requirements
   - Pot life
   - Viscosity control requirements
   - Application equipment requirements
   - Recoat/curing times
   - WFT
   - DFT
   - Ambient condition requirements
   - VOC data
   - Repair procedures
   - Cleanup procedures
2. Employ procedures for visual verification of striping processes.
3. Select, demonstrate, and document setup, operation, adjustment, troubleshooting, maintenance, and cleanup of basic spray equipment on simple and complex structures, including:
   - Conventional air-spray
   - Airless spray
   - Air-assisted airless spray
   - HVLP
4. Analyze the need for auxiliary heating, humidification/dehumidification and/or ventilation to aid coating drying/curing.
5. Select appropriate repair procedures for application defects.
6. Measure and document, prior to coating application, appropriate inspection procedures utilizing the following:
   - Psychrometer
   - Thermometers (air and coating temperatures)
   - Anemometer
7. Document batch/lot numbers and identify defective material.
8. Measure and document coating film quality, during and/or after coating application, using the following:
   - WFT gauge
   - DFT gauge
   - Low-voltage and high-voltage holiday detectors
   - Hardness test instrument
   - Solvent sensitivity test
9. Demonstrate the appropriate procedures for overcoating existing coating systems.
10. Identify common field and laboratory methods used for evaluating coatings and conducting coating failure investigations.
11. Demonstrate proper mixing and thinning methods.
12. Demonstrate coating coverage calculations using a calculator.
Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the use of a PDS (provided by instructor) to extract the following information:
   - Storage requirements
   - Mixing and thinning procedures
   - Induction time requirements
   - Pot life
   - Viscosity control requirements
   - Application equipment requirements
   - Recoat/curing times
   - WFT
   - DFT
   - Ambient condition requirements
   - VOC data
   - Repair procedures
   - Cleanup procedures

2. Measure and document, prior to coating application, appropriate inspection procedures utilizing the following:
   - Psychrometer
   - Thermometers (air and coating temperatures)
   - Anemometer

3. Document batch/lot numbers and identify defective material.
4. Demonstrate proper mixing and thinning procedures.
5. Demonstrate the proper technique for brush application of stripe coat.
6. Demonstrate the setup, operation, cleaning, and disassembly of conventional and airless spray equipment.
7. Measure and document coating film quality, during and/or after coating application, using WFT and DFT gauges.
8. Demonstrate the appropriate procedures for overcoating existing coating systems.
9. Demonstrate coating coverage calculations using a calculator.

Materials and Equipment

Markers/chalk
Pencils and scratch paper
Whiteboard/chalkboard

* Located at the back of this module
** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees will be required to mix and thin coatings and to set up, operate, and troubleshoot coating application equipment. Emphasize the special safety precautions associated with coating application. Ensure that the trainees are briefed on the proper site or shop safety precautions and procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


NACE International, for corrosion control resources and information. www.nace.org:


Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 100 hours are suggested to cover Coating Applications Two. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Coating Safety; Mixing and Thinning</strong></td>
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<tr>
<td>A. <strong>Introduction</strong></td>
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<tr>
<td>B. <strong>Coating Safety</strong></td>
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<tr>
<td>C. <strong>Mixing and Thinning</strong></td>
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<tr>
<td>1. <strong>Mixing Equipment</strong></td>
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<td>2. <strong>Mixing Guidelines</strong></td>
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<td>3. <strong>Thinning Coatings</strong></td>
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<tr>
<td><strong>Sessions II–IV. Calculating Coating Coverage</strong></td>
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</tr>
<tr>
<td>A. <strong>How to Calculate Coating Coverage</strong></td>
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<tr>
<td>B. <strong>Laboratory (2 sessions)</strong></td>
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<tr>
<td>Have trainees demonstrate coating coverage calculations using a calculator.</td>
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<tr>
<td>This laboratory corresponds to Performance Task 9.</td>
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</tbody>
</table>
Sessions V–VIII. Selection of Application Equipment

A. Product Data Sheets

B. Laboratory (1 session)

Have trainees demonstrate the use of a PDS (provided by instructor) to extract the following information:

- Storage requirements
- Mixing and thinning procedures
- Induction time requirements
- Pot life
- Viscosity control requirements
- Application equipment requirements
- Recoat/curing times
- WFT
- DFT
- Ambient condition requirements
- VOC data
- Repair procedures
- Cleanup procedures

This laboratory corresponds to Performance Task 1.

C. Environmental/Facility Restraints and Monitoring

D. Laboratory (2 sessions)

Have trainees measure and document, prior to coating application, appropriate inspection procedures utilizing the following:

- Psychrometer
- Thermometers (air and coating temperatures)
- Anemometer

This laboratory corresponds to Performance Task 2.

E. Size and Configuration of Surfaces

F. Production Considerations

Sessions IX–XII. Pre-Application Preparations

A. Surface Preparation

1. Masonry and Concrete Surfaces (SSPC-SP13/NACE 6)
2. Steel Surfaces
3. Existing Coatings

B. Coating Materials Preparation

1. Coating Mixtures
2. Coating Viscosity

C. Laboratory (2 sessions)

Have trainees demonstrate proper mixing and thinning procedures. This laboratory corresponds to Performance Task 4.

D. Preparation of Application Equipment

1. Brushes and Rollers
2. Spray Equipment (Conventional and Airless)

E. Documentation Requirements

F. Laboratory (1 session)

Have trainees document batch/lot numbers and identify defective material. This laboratory corresponds to Performance Task 3.
Sessions XIII–XIX. Application Procedures

A. Spray Gun Application Techniques
   Have trainees demonstrate the proper technique for brush application of a stripe coat. This laboratory corresponds to Performance Task 5.

B. Laboratory (1 session)
   C. General Equipment Setup and Operation
   D. Conventional Spray System Setup, Operation, and Shutdown
   E. Airless Spray System Setup, Operation, and Shutdown
   F. Air-Assisted Airless Spray System Setup, Operation, and Shutdown
   G. HVLP Spray System Setup, Operation, and Shutdown

H. Troubleshooting
   1. Conventional and HVLP Spray Systems
   2. Airless and Air-Assisted Airless Guns

Session XX. Specialty Coatings

A. Electrostatic Spray and Powder Coatings
   1. Electrostatic Spray Gun Coating
   2. Fluidized Bed Coating

B. Plural-Component Spray Systems

C. Thermal Spray

Session XXI. Auxiliary Equipment

A. Humidity and Ferrous Surfaces/Substrates
   1. Humidity Control for Ferrous Surfaces/Substrates
   2. Selection of Dehumidification Equipment

B. Environmental Dehumidification and Conditioning Equipment
   1. Desiccant and Refrigerant Dehumidifiers
   2. Chillers and Cooling Coils
   3. Direct-Fired, Indirect-Fired, and Steam/Hot Water Heaters
   4. Electric and Infrared Heaters

Sessions XXII–XXIII. Quality Control and Evaluation; Waste Management

A. Inspection Gauges, Instruments, and Tests
   1. Wet Film Thickness (WFT) Gauge
   2. Dry Film Thickness (DFT) Gauge
   3. Low- and High-Voltage Holiday/Pinhole Detectors
   4. Hardness Testers
   5. Solvent Resistance Test

B. Overcoating and Coating Repair

C. Coating Application Failures and Remedies

D. Non-Hazardous and Hazardous Waste Disposal

Sessions XXIV–XXXIX. Laboratory and Performance Testing

A Laboratory (14 sessions)
   Have trainees demonstrate the setup, operation, cleaning, and disassembly of conventional and airless spray equipment. Also have trainees measure and document coating film quality, during and/or after coating application, using WFT and DFT gauges. This laboratory corresponds to Performance Tasks 6 and 7.
B. Laboratory (2 sessions)
   Have trainees demonstrate the appropriate procedures for overcoating existing coating systems. This laboratory corresponds to Performance Task 8.

Session XXXX. Review and Testing

A. Module Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.