**Paint Mixing Course**

On-the-Job Training Facilitator Guide



# Change History

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| **Change/ Revision Number** | **Change/Revision Description** | **Changed/ Revised Pages** | **Changed/ Revised Date** | **Approved By** | **Approval Date** |
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# Facilitator Guide Instruction Key

Each page in the facilitator guide includes a combination of information:

1. Information that you explain to the learners
2. Information that is just for you

You may see the following icons throughout this guide. They provide visual indicators that you should emphasize key procedural or conceptual information, or to assist you with engagement and interaction opportunities for the learners:

|  |  |
| --- | --- |
| Icon | Definition |
| A picture containing text, kitchenware  Description automatically generated  Facilitator Note | Facilitator notes call out relevant details about the subject matter. This information assists you in presenting the material to the learners. |
| Icon  Description automatically generated  Important Note/ Warning or Caution | This symbol identifies an important note or calls your attention to hazards, warnings, and cautions.  It is important to point out hazards to the learners so they are aware of them when performing a task or step. |
| Icon  Description automatically generated  Group Discussion | Facilitating a group discussion serves two purposes:   1. It encourages learner interest and engagement in the training. 2. It helps you gauge whether learners are understanding the content. |
| Icon  Description automatically generated  Learning Activity | Adult learners learn by doing. These activities provide opportunities for learners to reflect, analyze, and evaluate what they are learning, all of which are important steps in the learning process. |

Graphical user interface, text, application

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# Course Preparation Instructions

## Training Room Setup

Ensure the training room is set up, including:

* Classroom with projector and computer for presentation.
* Computer terminals are available

During the Session

Follow these facilitation tips to make learning fun, meaningful, and relevant for the learners:

1. Ask questions throughout the presentation to draw learners into the discussion.
2. Link the information to a real-life situation by sharing your experiences and asking learners to consider possible scenarios and how to resolve them.
3. Monitor the learners’ participation in small- and large-group activities, providing on-the-spot corrections and critiques of the learners’ performance.

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| Icon  Description automatically generated | **Important Note:** Before presenting this training, facilitators must thoroughly prepare by studying this facilitator guide and reviewing all identified reference material. |

# Introduction to the Paint Mixing Course

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| Display the title screen as the learners enter the room.   * Welcome the learners as they enter the room. * Ask the learners, on a scale of 1 to 10, with 1 being not excited at all and 10 being very excited, how excited they are to take this course on paint mixing. * Introduce yourself after all the learners have gathered and are settled.  |  |  | | --- | --- | | A picture containing text, kitchenware  Description automatically generated | **Note:** The instructor-led training introduction allows the facilitator time to review the course introduction, welcome, and agenda with the learners.  The *Paint Mixing* course consists of 5 topics and 1 day of training. The training is a structured on-the-job training (OJT) event. | |  | | | |

Introduction

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| A picture containing text, kitchenware  Description automatically generated | **Note:** The instructor-led training introduction allows you time to welcome the employees and review the course introduction and agenda.  The *Paint Mixing* course consists of five topics and one day of training. The training is a structured OJT event. | | |
|  | | | |
| A picture containing text, kitchenware  Description automatically generated | Welcome the employees to the course. Briefly introduce yourself and talk about your background using the following information:   * Your name * Your background in the painting trade * What you want to teach in this class * Best advice for doing well in this course and overall in the painting trade | | |

Agenda

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| |  |  | | --- | --- | |  | | | A picture containing text, kitchenware  Description automatically generated | Share with learners the key topics that will be covered in this section, as well as the importance of the topic.  Animation: N/A | |   Introduce the course topics and agenda and OJT overview:   * The Tools Used in the Paint Mixing Task * Paint Mixing PPE * Paint Mixing Procedures * Final Paint Mixing Rules to Follow * Final Paint Mixing OJT | |

Facility Information

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| A picture containing text, kitchenware  Description automatically generated | **Note:** You may skip this page if the learners have been together in the same location for several days. | | |
| The emergency exits and where we assemble in case of a fire or tornado:   * Emergency exits, located at\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Emergency numbers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * In case of fire, the class will muster \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * In case of a tornado, the class will muster \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   The facilities that you may use, and their locations include:   * Restrooms located at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Breakroom located at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Smoking area located at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
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Class Rules

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| Icon  Description automatically generated | **Note:** You may skip this page if the learners have been together in the same location for several days. | |

Our class rules include:

* Place cell phones on silent.
* Be respectful of each other.
* Participate in class discussions and activities.
* Ask questions.
* Avoid sidebar conversations.

Course Learning Objectives

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| |  |  | | --- | --- | | A picture containing text, kitchenware  Description automatically generated  Facilitator Note | Read the objectives or have the learners take turns reading the objectives to the class. Ask for volunteers. | | |

Upon completion of this course, you will be able to:

* Identify the tools used when mixing paint.
* Identify the PPE required when mixing paint.
* Describe paint-mixing procedures.
* Describe paint-mixing considerations and best practices.
* Perform full-cycle paint-mixing duties while OJT.

Occupational Safety and Health

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | Federal law entitles you to a safe workplace free of recognized health and safety hazards. You have the right to speak up about hazards without fear of retaliation.  You also have the right to:   * Receive workplace safety and health training in a language you understand * Work on machines that are safe * Receive the required safety tools, such as gloves or a harness to protect you from falls, for you to do your job * Be protected from toxic materials   Always ask questions if you do not understand work instructions. Speak up if you feel unsafe. | | | * Lead a group discussion about how to prevent workplace injuries. Share a personal story about how you keep the workplace safe for the employees. * The goal of this activity is to help the employees understand why workplace safety is our number one priority. * Emphasize that no employee should have to risk death or injury to earn a paycheck. | | Being aware of workplace safety hazards helps to keep us safe at work. We stay aware by:   * Identifying hazards * Recognizing how hazards can hurt us * Being aware of what contributes to hazards | | | | |

PPE, Safety, and Environmental Concerns

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| Icon  Description automatically generated | Electric Boat requires that personnel assigned to work with isocyanate-containing materials receive safety training and an initial medical screening to identify individuals for whom working with these materials presents a risk.  Only personnel with safety training and medical qualifications can work with isocyanate-containing materials. |
|  |  |
| Required PPE includes:   * Saranex coveralls * Nitrile rubber gloves * Booties * Eye protection * Full-face air-supplied respirator   Liquid isocyanate-containing materials can cause these effects in the short-term:   * Potential skin irritation * Sensitizers * Irritation of the eyes * Damage to the respiratory tract   **Important:** Isocyanates are a class of liquid chemicals that are the building-block of products called polyurethanes. They are dangerous.  Employees must pay attention to their surroundings and recognize the dangers of isocyanate-containing material and tools. | |
| Severe exposure can cause:   * Bronchitis * Fluid in the lungs * Redness * Swelling * Blistering     Review these safety precautions with the employees.  **High Temperatures**   * For Special Hull Treatment (SHT) tiles, the temperature of the plating, within 1 inch of the SHT, should not exceed 200°F. * Exposure should not exceed 3 hours.   **Safety Guards**   * To prevent serious injury, do not use the tools without safety guards installed on the moving parts. * Correctly reinstall the safety guards after any repair or maintenance of the tools is performed. * Major injuries include crushing or amputation.   **Environmental Considerations**   * See Material Safety Data Sheets (MSDSs). | |

Icebreaker

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| |  |  | | --- | --- | | A picture containing text, kitchenware  Description automatically generated  Facilitator Note | Conduct a quick icebreaker activity. Ask the employees to share a story about the biggest work project they achieved while on a painting task.  What did they learn?  What would they do differently?  **Note:** You may skip this page if the employees have been together for several days. | | |

# The Tools Used in the Paint Mixing Task

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| Paint-mixing tools include:   1. Ladles 2. Spatulas 3. 5-gallon buckets 4. 5-gallon bucket liners 5. 2-quart pails 6. 2-quart pail liners 7. Air-powered mixer 8. Wall-mounted cartridge dispenser 9. Paint shaker   Mandatory practices include the following:   * It is important that paints containing two components are mixed in the proper ratio. * Using an incorrect ratio could cure improperly, potentially leading to premature paint deterioration. * Paints that require an induction time of half an hour or more should not be issued until the paint has inducted for the proper length of time in the paint shop. * When using paint cartridges (300 or 750 ml), the wall-mounted dispenser or hand-held paint guns must be used. * Only qualified paint shop personnel may operate the wall-mounted dispenser.   Copies of this SDD will be posted in the following areas: Building 51, Building 212, Building 260 Paint Shop and Building 8S. | |

Activity: Scavenger Hunt

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Begin the course with a workstation OJT scavenger hunt of the “nine tools commonly used” while on the paint-mixing task.

Ask for the employees to collect the items in the center of the room for a group review and discussion. Have volunteers, one at a time, choose an item. Have them describe its purpose to the class as you make corrections.

Share with the group the mandatory safety practices for PPE. Provide knowledge checks before moving on to the next topic.

# Paint Mixing PPE

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The following are some safety considerations to be aware of before beginning the task:

Ensure that the area where spray painting with flammable paints is being performed is roped off.

Ensure the area has a posted sign that reads, “Danger – No Hot Work, Open Flame, Arcs, or Spark-Producing Tools Allowed in the Area.”

There are four main areas that require PPE:

* Area 1: Tanks/Confined Space Grit Clean-up
* Area 2: Tanks/Confined Space 2nd Blowdown
* Area 3: Tanks/Confined Space 1st Blowdown
* Area 4: Tanks/Confined Space Blasting

Safety Shoes are required for all painters and blasters in all four areas.

Goggles arenot required for painters and blasters in any of the four areas

* Face Shield/Spray Shield: Mandatory when using an air mixer or wall-mounted distributor
* Not required for painters and blasters in any of the four areas

With the Respirator, theAbrasi-Blast with P100 cartridge is required in areas 1 – 3

* Tanks/Confined Space Grit Clean-up
* Tanks/Confined Space 2nd Blowdown/Turn Planks
* Tanks/Confined Space 1st Blowdown

Not required in:

* Tanks/Confined Space Grit Clean-Up

Hearing Protection

* Required for all painters and blasters in all four areas

Coveralls

* Grey ones required in areas 1 – 3
  + Tanks/Confined Space Grit Clean-up
  + Tanks/Confined Space 2nd Blowdown/Turn Planks
  + Tanks/Confined Space 1st Blowdown

Except Gray or Tyvek ones required in:

* Tanks/Confined Space Grit Clean-up

Nitrate Gloves

* Tanks/Confined Space Grit Clean-up
  + Dexterity gloves required
* Tanks/Confined Space 2nd Blowdown/Turn Planks
  + Dexterity gloves required
* Tanks/Confined Space 1st Blowdown
  + Dexterity gloves required
* Tanks/Confided Space Blasting
  + Leather gloves required (4-inch cuff, lined, unlined, anti-vibration)

Hard Hats areonly required for painters or blasters in Tanks/Confined Space Grit Clean-up.

Abrasive blasting includes the use of all blasting media used at Electric Boat, including Sponge Jet. The following are general safety considerations for abrasive blasting:

* Painters will clean the staging and work areas of all material they use.
  + No material except blasting grit will be swept or thrown from staging to the ground.
* Flammable solvents used onboard the ship must be contained in approved safety cans with HazCom Labels. The contents must be clearly marked.
* Solvent containers will be removed from the ship:
  + At the end of each work shift (G), or
  + When left unattended (Q)
  + And returned to the paint shop from where they were issued.
* Flammable or combustible materials, such as rags and trash, must be in covered containers.
* Painters must change their clothing, as required, to prevent a buildup of paint and solvents on the clothing.

Safety harnesses must be worn and properly secured at all times when working from:

* A vehicle-mounted elevating and rotating work platform
* A JLG lift
* A crane-suspended work platform

Ensure that painted or coated surfaces have been adequately characterized for potential health hazards prior to performing hot work blasting on:

* In-service vessels
* Facilities assets

Other notes include the following:

* Orange coveralls for Black Beauty are required in all areas.
* A head lamp or a secondary light source is required for confined spaces.

In completion of this task:

* Ensure that all materials are removed to the paint shop or properly disposed of before hot work (e.g., welding, burning) begins. This includes paint cans, rags, spray equipment, and solvent containers.
* Do not remove warning signs and barriers until the Marine Chemist or a Competent Person has certified safe the paint spray area.
* Ensure that ventilation, if required, is installed and maintained.

Activity: PPE Safety Awareness

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Over the next 2 hours, you will provide an overview of all the safety concerns and completion procedures required while using paint-mixing tools. This includes a discussion on wearing the right PPE.

Show the various paint-mixing tools and PPE items live in class. This will engage the employees on all the safety precautions they must be aware of regarding paint-mixing safety. The four main areas of the ship that are commonly painted are:

1. Tanks/Confined Space Grit Clean-up
2. Tanks/Confined Space 2nd Blowdown/Turn Planks
3. Tanks/Confined Space 1st Blowdown
4. Tanks/Confided Space Blasting

Provide an overview of each safety area as the employees observe.

Direct the employees towards the Safety or Danger signage that protects workers. Quiz them for memory recall and comprehension.

Focus on safety harness use. It is mandatory if a worker performs the paint-mixing task from a vehicle-mounted elevating and rotating work platform, a JLG lift, or a crane-suspended work platform.

Throw away discarded flammable or combustible material, such as rags and trash, in covered containers only. This is in compliance with safety regulations.

Separate the employees into small groups. Ask them to recall three key takeaways from the safety areas, parts, or processes. Make corrections to ensure they have captured this learning to a high level of proficiency.

# Paint Mixing Procedures

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Tips for processes include the following:

1. Different types of paint have different mix ratios. Employees must follow manufacturer instructions when mixing their respective paints.
2. It is important that paints containing two components are mixed in the proper ratio:
   * Two-component paints that are mixed using an incorrect ratio could cure improperly. This can potentially lead to premature paint deterioration.

Mixing Time Instructions:

* When mixing single-paint components, ensure to allot proper time for proper agitation and mixing.
* Paints that require an induction time of half an hour or more should not be issued until the paint has inducted for the proper length of time in the paint shop.
* When using paint cartridges (300 or 750 ml), the wall-mounted dispenser or hand-held paint guns must be used.
  + Only qualified paint shop personnel may operate the wall-mounted dispenser.
* When mixing less-than-full containers of paint, ensure to maintain the proper ratio.
* When mixing paint in 5-gallon buckets and a bucket liner is present, always remove the liner. This is to confirm there are no solvents underneath before adding the paint.
* If the mixer pierces the liner, unwanted solvents will be introduced to the coating. This affects the ratio and results in defects after application.
* Mix each component separately for approximately 5 minutes to ensure a homogeneous mixture using:
  + Paint shakers
  + Ladles and measuring pitcher
  + Air-powered mixers

Here is the Paint-Mixing Procedure to Follow:

1. Slowly mix the two components together in a 5-gallon bucket or 2-quart pail. Continue mixing for 5 minutes.
2. Using a 3 green, fluorescent label, record the date that you mixed the paint.
   * Only paint that has an induction of half an hour or more requires this action.
3. Discard any paint that has exceeded its pot life in the applicable waste drum.

Typical EB Paint Ratios:

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Activity: Paint Mixing Demos

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Discuss the various paint ratios, pail sizes, and tools with the employees. This includes paint shakers, ladles and measuring pitchers, and air-powered mixers. Lead the employees through a group knowledge check before they perform OJT work in the workstation and on the ship.

Give the above chart to the employees. It has specific and highly detailed ratios for paint mixing. The paint ratios must be fully complied with.

During a paired activity, observe the employees as they practice pairing small amounts of paint. Using small amounts reduces waste. There will be six rounds of paint-mixing practices. You will observe and review the work “as of quality and approaching mastery with your proficiency card.”

1. Demonstrate the use of both types of paint cartridges: 300 and 750 ml.
2. Also demonstrate the two tools used to utilize them: the wall-mounted dispenser and the hand-held paint guns.
3. Instruct the best team from the six rounds of the paint-mixing practice to use two tools and paint cartridges and demonstrate them in front of the class.

After some opportunity to observe, lead the best two teams of paired employees through the process of paint mixing. Use the wall-mounted paint gun and the hand-held gun. The rest of the class takes notes and observes.

Break up the class into groups of three or four. Have them mix the paints or utilize the single-paint process until you have reviewed them all for skill progression.

# Final Paint Mixing Rules to Follow

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**Cleaning:**

* Ensure to use the appropriate gloves when handling material, scrap, and debris.
* Wear nitrile gloves or neoprene gloves when handling and removing oil, bilge water, or other liquids that may be harmful to the skin.
* Ensure static mixers are thoroughly cleaned to prevent cross-contamination between paints.
* Usual application of MEK, 50/50 and Mineral spirits (depending on the type of paint).
* It is important to clean up the tools and maintain cleanliness at the worksite.

**Wall-Mounted Distributor Plungers:**

* Pay attention to the correct plunger to use for either 700 mL or 350 mL tubes.
  + This includes the use of static mixers for either tube.
* To avoid static charge while mixing paint on site:
  + Ensure all paint mixed at the job site is in metal buckets and grounded.

**Complete Mixing:**

* Use spatulas to scrap paint cans prior to mixing two-component paint.
  + This ensures all paint is used and reduces waste.

**Paint Disposal:**

* Contaminated material are flammable and combustible.
* Painters must discard flammable or combustible material, such as rags and trash.

**Material Temperature:**

* Type IV Mare Island Paint must be greater than 60°F for any ambient temperature range.
* Application temperature is the temperature of the applied film at which the coating is actually curing.

**Ambient Temperature**

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| **35° – 50°F** | None |
| **35° – 60°F** | 2 hrs. @ 70°F min |
| **61 – 70°F** | 1 – 1½ hrs. @ 61 – 70°F |
| **71 – 90°F** | ½ to 1 hr. @71 – 90°F |
| **51 – 100°F** | None |
| **91 – 100°F** | None |

Paint Pot Life Details:

1. Can refer to any mixture that increases in viscosity as time passes.
2. The “pot life” of paint in this task is the length of time in which multiple paint coatings or paints can be applied to a surface.
3. Paint pot life begins when the mixing is complete at room temperature (23°F).
4. It ends when the mix is unsuitable for application or has set.

Activity: Ambient Temperatures

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To review the employee’s skills so far, review the completion tasks that are required to work on the paint-mixing task. Also review ambient temperatures.

Quiz the employees via knowledge checks on pot ratios to ensure they understand the lesson.

# Activity: Final Paint Mixing OJT

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Ask volunteers to share a fun fact about PPE, safety, or signage until the whole course list is cleared.

Provide one large-group demo practice of the paint-mixing process. Help the employees point out paint ratios and the names of tools. Also ensure they know the differences between the wall-mounted spray gun and the handheld spray gun.

After each group completes a peer-reviewed OJT, separate the members into small groups. Have them share one key takeaway or demonstrate one process or lesson they learned from this course. This will validate their paint-mixing skill development.

Ask the employees to mentor their peers. Have them provide accurate instructions, tips, and safety factors as you correct, lead, and mentor.

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| A picture containing text, kitchenware  Description automatically generated | The whole process from PPE safety to completion is demonstrated, assessed, practiced, and perfected in this topic.  This includes the course objective of the employees performing full-cycle paint-mixing duties while OJT. |

# Resources

Material in this course was adapted, modified, and reproduced with permission as appropriate from the following resources:

* Reference 1
* Ref 1, Page 3
* Reference 3

On-the-Job Training Guide

# Training Plan Information and Instructions

Training plans outline the specific skill requirements for on-the-job training (OJT).

They document which skills the employee lacks at the start of the training and measure the skills the employee acquires during the training.

# Job Description

This course is for current painters at Electric Boat who need to master the core skills of Paint Mixing during MIP pours.

This training evaluates the learner through knowledge checks and OJT, highlighting examples of quality assurance to help the learner master the required skill.

# Skill Requirements

The painters must demonstrate proficiency in the operation of the paint mixing task, including the use of safety devices and emergency procedures, to the satisfaction of the supervisor or facilitator.

# How You Are Evaluated

## Proficiency Assessment

Observe the employee’s ability to apply knowledge and to perform each skill in a satisfactory manner.

## Performance Checklist

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|  | Performance Checklist  **Note:** Access the Proficiency Card and select the appropriate course.  Explain to the employees that the Proficiency Card contains a performance checklist that identifies critical tasks and performance criteria. Employees must complete the competency-based instruction and independent practice before attempting the assessment.  When employees are ready to be evaluated, they perform the tasks that appear in the performance checklist. After the employee’s successful completion of the task, both you and the employee add your digital signatures to the Proficiency Card. The signatures confirm the employee is proficient and can work independently. |

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|  | Check for understanding by asking a few follow-up questions to ensure employees understand how they will be evaluated.  For your convenience, a copy of the performance criteria for this course appears at the end of this OJT guide. |

# Agenda

| Topic | Overview |
| --- | --- |
| Intro to the Paint Mixing Course | This topic is an introduction to the pain mixing task. |
| The Tools Used in the Paint Mixing Task | This topic describes the tools used in the painting task. |
| Paint Mixing PPE | This topic reviews the safety rules and PPE for the course. |
| Paint Mixing Procedures | This topic provides details about paint mixing procedures. |
| Final Paint Mixing Rules to Follow | This topic summarizes the final rules for the paint mixing task. |

# Performance Checklist

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|  | The Proficiency Card’s critical tasks and performance criteria appear here for your reference. Use the Proficiency Card to document your evaluation of the employee’s performance against the performance criteria. |

| Critical Task/Performance Criteria |
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| 1. Perform paint-mixing procedures. |
| 1. Describe paint-mixing considerations and best practices. |
| 1. Perform full-cycle paint-mixing duties while OJT. |

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