



# CANDIDATE HANDBOOK

# CMRT





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# INTRODUCTION

Headquartered in Atlanta, Georgia, the Society for Maintenance & Reliability Professionals Certifying Organization (SMRPCO) is the certifying body of the Society for Maintenance & Reliability Professionals (SMRP) – a global professional society serving over 7,500 members.

## MISSION

To develop and promote excellence in maintenance, reliability and physical asset management.

## VALUES

SMRP values data-driven excellence, sharing/collaboration, membership focus, continuous improvement, accountability, trust and respect, integrity and social responsibility.

## MEMBERS

7,500+ members worldwide with a more than 80% increase in overall membership in the past five years and 145% increase in international membership in the past five years.

## About the SMRP Certifying Organization

SMRP was formed in 1992 by practitioners from 18 different companies who were passionate about actively promoting maintenance and reliability within their field and to the public. In 1997, SMRP formed SMRPCO to create a certification program to validate the skills and knowledge of maintenance, reliability and physical asset management practitioners. Three years later, the first Certified Maintenance & Reliability Professional exam (CMRP) was administered.

## Today, SMRPCO offers three exams:

- Certified Maintenance & Reliability Professional (CMRP)
- Certified Maintenance & Reliability Technician (CMRT)
- Certified Asset Management Assessor (CAMA)\*

\* The CAMA exam is managed by the World Partners in Asset Management. For information on the CAMA exam, visit [www.wpiam.com](http://www.wpiam.com).

## Purpose of SMRPCO

SMRPCO serves to foster high standards and ethical and professional practice in the delivery of services through a recognized, credible credentialing program that assures competency of practitioners in the maintenance, reliability and physical asset management profession. SMRPCO is committed to the underlying ethics upon which the certification process rests – absolute fairness and equity in the administration of examinations and recertification for all applicants without discrimination.

## Statement of Impartiality and Nondiscrimination

SMRPCO's leadership and management, including its Certification Commission, endorse the principles of impartiality and equal opportunity, and commit to act impartially and equitably in relation to its applicants, candidates, and certificants, including but not limited to: 1) applying its standards and requirements for examinations and certifications equally to all individuals regardless of age, race, religion, gender, sexual orientation, gender identity, national origin, veteran status or disability, 2) implementing its policies and procedures impartially and fairly, 3) not restricting certification based on undue financial or other limiting conditions, and 4) not allowing

commercial, financial, or other pressures to compromise impartiality in certification activities.

## Purpose of this Guide

This guide was developed to help candidates apply and take the CMRP or CMRT exam. It also provides in-depth information on the application process, exam administration, and the rules and procedures for maintaining a SMRPCO certification after an individual achieves it.

For additional information not covered in this guide, please contact SMRPCO staff at [certify@smrp.org](mailto:certify@smrp.org).

## Important Information

The most current version of this document is available at [www.smrp.org](http://www.smrp.org).

As a candidate or certificant, you are responsible for keeping SMRPCO informed of your current contact information. If your mailing or email address changes, be sure to update your SMRP profile on the website. Failure to update SMRPCO of your contact information may result in missing important notifications about your certification.





# CERTIFIED MAINTENANCE & RELIABILITY TECHNICIAN (CMRT) EXAM

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## About the CMRT Exam

The CMRT program is the leading credentialing program for the knowledge, skills and abilities of maintenance and reliability technicians. The certification assesses the proficiency of those responsible for preventative, predictive and corrective maintenance – multi-skilled individuals who play a critical role in the success of organizations worldwide. Earning the CMRT credential indicates that you have achieved a level of ability consistent with the requirements for competence on the job as a multi-skilled maintenance and reliability technician.

The CMRT exam tests competency and knowledge of specific tasks within four (4) domains:

- **Maintenance Practices**
- **Preventative and Predictive Maintenance**
- **Troubleshooting and Analysis**
- **Corrective Maintenance**

## Education/Experience Requirement

The CMRT is an experienced-based exam. A candidate is unlikely to pass the exam based on knowledge gained from a book, course or educational degree. Though SMRPCO does not endorse a specific study pathway to achieving a passing score on the CMRT, there are numerous study resources available at [www.smrp.org](http://www.smrp.org).

## CMRT Exam Questions

The CMRT exam contains 100 active questions and 10 pre-test questions. Examinees have two and one-half (2.5) hours to complete the closed-book exam. No reference materials will be allowed in the exam room during the exam. Online calculators are available to examinees to assist with calculations. External calculators are not allowed.





# CERTIFICATION SUMMARY

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## Select a Certification

SMRPCO offers certifications for different points in your career. Assess your education, work experience and knowledge to select the SMRPCO certification that is right for you.

## Determine Eligibility

The first step in the certification process is to review all of the eligibility requirements for your selected exam, and ensure you are qualified to sit for the exam before completing an application.

## Complete Your Application and Pay

After you determine that you are eligible to take your selected exam, complete the applicable exam application. Your application will not be accepted until payment is made. Upon completing your application and paying, you will have six months to sit for the exam.

## Schedule Your Exam

The CMRP and CMRT exams are delivered by Pearson VUE, the official computer-based testing provider for SMRPCO. Once SMRPCO processes your application and payment, you will receive an "Authorization to Test" email from Pearson VUE with instructions for how to create a profile with Pearson VUE and schedule your exam. More information about scheduling your exam can be found [here](#).

## Take Your Exam

Candidates have six months from the date of payment to take a SMRPCO exam. You must schedule and sit for your exam within those six months. Those who fail to take the exam within the six-month window must reapply and pay for the exam as new candidates.

Exams may be taken at a Pearson VUE computer-based testing facility. Pearson VUE has over 5,000 testing centers worldwide, including on U.S. military bases. Candidates can locate a testing center online [here](#). SMRPCO exams are delivered via computer at Pearson VUE facilities, and candidates are not required to bring their own.

## Get Your Results

Exam results are available immediately after submitting the exam. Candidates that do not pass the exam are eligible to retake the exam after six months. To retake the exam, a candidate must reapply and pay as a new candidate.

## Maintain Your Certification

After successfully passing a SMRPCO exam, candidates are responsible for maintaining their certification. Both the CMRP and CMRT exam are active for three years. At the end of the three-year cycle, certificants are required to submit a recertification application detailing their continuing education and to pay a recertification renewal fee to maintain a SMRPCO certification. More information on the recertification process is available [here](#).



# CERTIFICATION REQUIREMENTS

## EXAM ELIGIBILITY

There are no educational experiences or requirements to sit for the CMRP or CMRT exam. In order to take the CMRP or CMRT exam, a candidate must:

- 1. Complete the CMRP or CMRT application, which is available at [www.smrp.org](http://www.smrp.org)**
- 2. Pay all applicable fees**
- 3. Not have taken the applicable exam within six months**

Candidates who are unable to comply with the eligibility requirements will not be allowed to take a SMRPCO exam. Candidates are permitted to take all SMRPCO exams, so long as all eligibility requirements are met, for as many times as necessary to achieve a passing score.

## Application Process

Eligible individuals who wish to pursue the CMRP or CMRT credential must complete the online application and pay the applicable fees to take the exam.

SMRPCO applications are open, meaning there is no schedule or deadline to apply and pay for an exam.

## Obtaining an Application

The CMRP and CMRT applications are available on the SMRP website and must be completed and submitted online. Paper applications are not available.

### [CMRP Application](#)

### [CMRT Application](#)

## Exam Fees and Payment Methods

Candidates are required to pay the applicable exam fees to complete the exam application. Payment can be made online via major credit cards, by check and through wire transfer. SMRPCO also accepts group payments. For information on how to pay for a group, contact staff at [certify@smrp.org](mailto:certify@smrp.org).

SMRPCO reserves the right to adjust exam fees. When applicable, fees will be updated on the SMRP website and in the most current version of this guide.

## Requests for Special Testing Accommodations

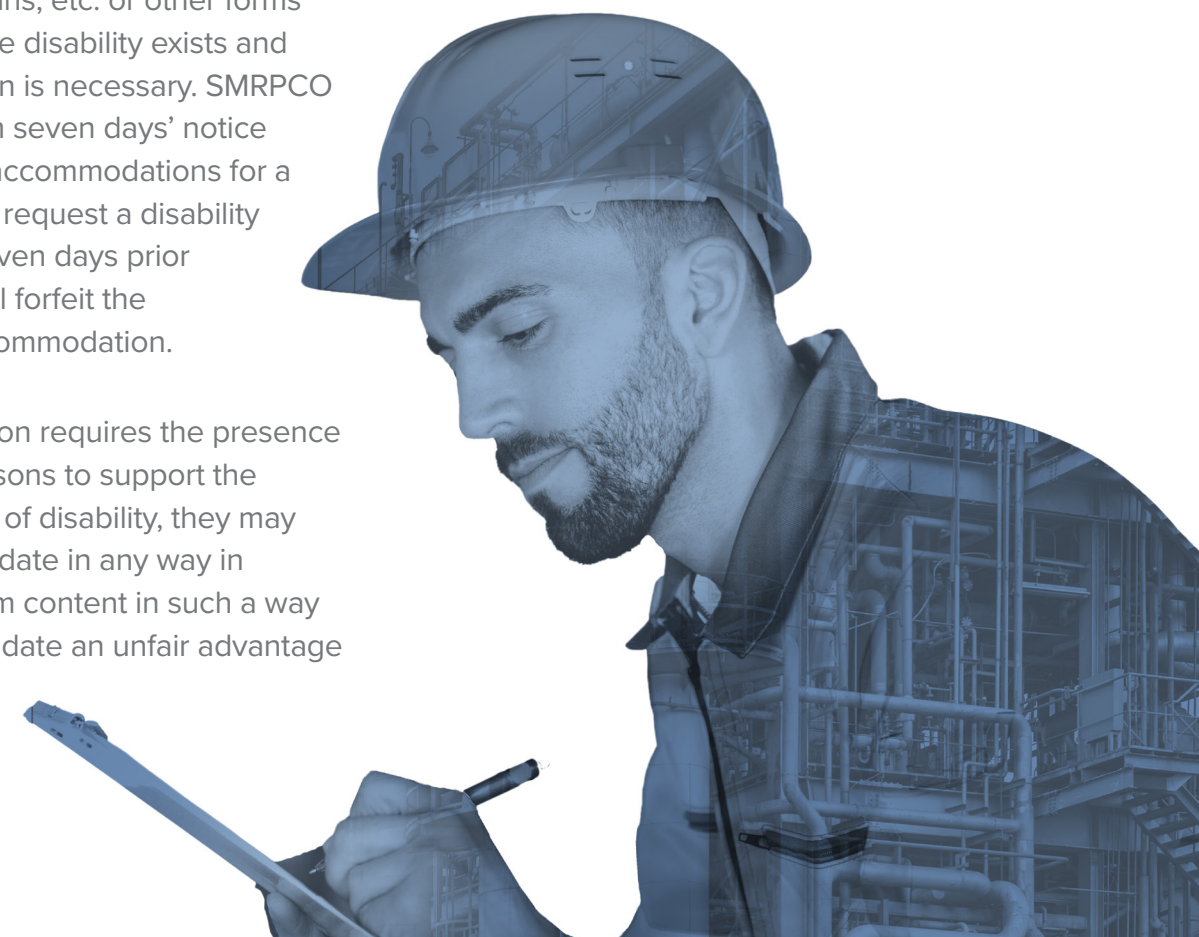
SMRPCO offers accommodations for candidates with disabilities and candidates for whom English is a second language.

If a candidate has a disability that requires accommodation to sit for the exam, the candidate must indicate they have a disability within the applicable certification application and submit a request for accommodation by emailing [certify@smrp.org](mailto:certify@smrp.org). Individuals requesting accommodation must provide proof (signed statements from supervisors, caregivers, physicians, etc. or other forms of evidence) that the disability exists and that accommodation is necessary. SMRPCO requires a minimum seven days' notice to request special accommodations for a disability. Failure to request a disability accommodation seven days prior to an exam date will forfeit the opportunity for accommodation.

If the accommodation requires the presence of one or more persons to support the candidate because of disability, they may not assist the candidate in any way in understanding exam content in such a way as to give the candidate an unfair advantage

over candidates without disabilities. Supporting personnel must agree to SMRPCO's Nondisclosure Agreement and agree to not sit for the exam for five years after the date they assist a candidate.

Candidates, whose primary language is not English, may use a strict translation dictionary developed for common use during a certification exam. Candidates must bring their own dictionary to the testing center or exam venue. Any dictionary that has definitions, any written notes, or additional text will not be allowed. Dictionaries will be inspected by the exam proctor, and those who violate this policy will have the dictionary seized. Candidates who refuse to allow the proctor to inspect the dictionary or bring a dictionary that does not meet SMRPCO guidelines will not be allowed to test with the dictionary.





# CMRT EXAM OUTLINE

## Subject Areas Addressed by the Certification Exam

Four major performance domains account for the examination's content. These four domains, as well as the task statements for each domain, are listed below:

### Domain I: Maintenance Practices

Task 1: Adhere to safety, health, and environmental standards and policies by taking personal responsibility to prevent injury or illness from exposure to hazards. The candidate must demonstrate knowledge in the following:

1. Bloodborne pathogens
2. Confined space entry
3. Electrical safety
4. Emergency response (ER) and evacuation
5. Environmental compliance
6. Ergonomics
7. Eye protection
8. Fall protection
9. Fire safety
10. HAZCOM/MSDS
11. Hearing conservation
12. Ladder safety
13. Lockout/tagout procedures
14. Personal protective equipment (PPE)
15. Process safety management (PSM)
16. Respiratory protection

17. Rigging
18. Safety system and devices
19. Scaffolding

Task 2: Inform production control personnel about the maintenance activity required per company protocol to adjust the operations schedules. The candidate must demonstrate knowledge in the following:

1. Lockout/tagout procedures
2. Process overview
3. Work permits

Task 3: Perform the proper lockout/tagout procedures on equipment per applicable standards to ensure zero energy state prior to commencing maintenance work and minimize health, safety, and environmental hazards to employees and the community. The candidate must demonstrate knowledge in the following:

1. Lockout/tagout procedures
2. Multiple energy sources
3. Zero energy states

Task 4: Perform a pre-use inspection on maintenance tools and equipment using established standards and guidelines to ensure safe operation and to extend the life of the tools and equipment. The candidate must demonstrate knowledge in the following:

1. Cranes and hoists
2. Field machinery and tools
3. Ladder safety

4. Rolling stock/mobile equipment (e.g., mobile cranes, man-lift/scissor lift, forklift)
5. Shop machinery and tools
6. Rigging equipment (e.g., slings, shackles, eyebolts, chains, hooks)

Task 5: Use maintenance tools and equipment per manufacturers' specifications and established safety policies to ensure safety and efficiency. The candidate must demonstrate knowledge in the following:

7. Equipment and tool specifications
8. Established equipment and tool-safety policies and procedures

Task 6: Use measuring tools and equipment in a manner that will ensure accurate measurements to perform maintenance tasks properly. The candidate must demonstrate knowledge in the following:

1. Application of specific tools
2. Basic math (e.g., fractions, addition, subtraction, multiplication, division)
3. Calibration requirements for measurement tools (e.g., torque wrench, calipers, alignment tools)
4. Conversion of appropriate measurement and engineering units
5. Measurement principles (e.g., mass, force, motion, distance, acceleration, power, fluid, bulk)
6. Measurement tools (e.g., rulers, gauges, tapes, micrometer, calipers, lasers)

Task 7: Handle all maintenance materials and parts per established standards and procedures to prevent damage to the parts and equipment. The candidate must demonstrate knowledge in the following:

1. Company safety policies

2. Material handling techniques and procedures
3. Material storage procedures
4. Original equipment manufacturers' (OEM) instructions

Task 8: Maintain housekeeping by adhering to established site standards and by removing all maintenance-related parts and waste to ensure a safe and orderly job site. The candidate must demonstrate knowledge in the following:

1. Facility and regulatory policies on housekeeping
2. Hazards of improper housekeeping
3. Proper organization and cleaning of job site

Task 9: Document maintenance activities using the facility's maintenance management system to record history, assist with planning and scheduling, and support root-cause failure analysis. The candidate must demonstrate knowledge in the following:

1. Documentation systems (e.g., paper filing systems, computer filing systems, email)
2. Maintenance planning and scheduling

## Domain II: Preventive and Predictive Maintenance

Task 1: Perform preventive and/or predictive maintenance according to the work plan to maximize mean time between failures. The candidate must demonstrate knowledge in the following:

1. **Company safety, health, and environmental policies**
2. **Equipment function and use**
3. **Predictive maintenance procedures**
4. **Preventive maintenance procedures**
5. **Work plan requirements**

Task 2: Apply predictive maintenance techniques by observing equipment performance and collecting ongoing performance data to maximize mean time between failures. The candidate must demonstrate knowledge in the following:

1. **Company safety, health, and environmental policies**
2. **Function of equipment**
3. **Operation parameters for equipment, including baseline conditions**
4. **Predictive maintenance techniques and technologies (e.g., oil samples, vibration readings, thermographic equipment, ultrasonic testing)**

Task 3: Lubricate equipment per the lubrication schedule and equipment specifications to ensure reliable performance and prevent damage. The candidate must demonstrate knowledge in the following:

1. **Company safety, health, and environmental policies**
2. **Equipment specifications**
3. **Filtering systems**

4. **Lubricant specifications**
5. **Lubricating systems**
6. **Lubrication principles**
7. **Lubrication route**

Task 4: Perform alignment checks on rotating equipment (e.g., pumps, fans, blowers, turbines, gearboxes, compressors) per equipment specifications to ensure reliable performance and prevent damage. The candidate must demonstrate knowledge in the following:

1. **Company safety, health, and environmental policies**
2. **Equipment alignment techniques (e.g., laser, reverse, straight edge, rim and face)**
3. **Equipment functions**
4. **Thermal growth**
5. **Operation principles for rotating equipment**

Task 5: Perform checks on safety systems and devices per equipment design specifications to ensure reliable operation and protect employees. The candidate must demonstrate knowledge in the following:

1. **Company safety, health, and environmental policies**
2. **Consequences of bypassing safety systems**
3. **Equipment design specifications**
4. **Equipment functions (e.g., limit switches, photoelectric eyes)**
5. **Operation of safety systems**

## Domain III: Troubleshooting and Analysis

Task 1: Gather information relating to a

maintenance request by reviewing the work order and/or interviewing operations personnel to determine the general nature of the problem. The candidate must demonstrate knowledge in the following:

1. **Effective interpersonal relations**
2. **Equipment and/or processes**
3. **Maintenance work order systems**

Task 2: Verify that the problem is valid by systematically testing and/or observing the equipment's performance, as conditions permit, to determine if a problem exists. The candidate must demonstrate knowledge in the following:

1. **Function and use of the equipment**
2. **Process indicators (e.g., gauges, annunciators, Human Machine Interface [HMI] displays)**

Task 3: Obtain appropriate technical documentation using facility resources to gain a full understanding of designed operating parameters and/or sequences. The candidate must demonstrate knowledge in the following:

3. **Facility resources (e.g., CMMS, technical library, engineering files)**
4. **Operating parameters and sequences**
5. **Technical documentation (e.g., schematics, P&ID, blueprints, O&M manuals, SOP, MSDS)**

Task 4: Investigate previous maintenance activities, as conditions require, by reviewing equipment history in order to identify information that will facilitate troubleshooting. The candidate must demonstrate knowledge in the following:

1. **Facility maintenance record systems**

2. **Facility preventative maintenance scheduling programs or systems**
3. **Preventative maintenance techniques and theories (e.g., lubrication, seals and bearings, alignments)**

Task 5: Identify the cause of the problem using a systematic process of elimination in order to determine what is causing the malfunction. The candidate must demonstrate knowledge in the following:

1. **Equipment and/or process design parameters**
2. **Hazards involved with operating and/or maintaining specific process equipment**
3. **Systematic troubleshooting and analysis**

## Domain IV: Corrective Maintenance

Task 1: Verify troubleshooting analysis by disassembling and inspecting components using established procedures per applicable standards and guidelines in order to confirm that the identified corrective action is appropriate. The candidate must demonstrate knowledge in the following:

1. **Common mechanical systems (e.g., lubrication, seals and bearings, alignment, power transmission, cams, cranks, pneumatics, hydraulics, thermodynamics, heat transfer, piping systems, steam systems)**
2. **Correct use of tools and equipment, including measuring devices**
3. **Equipment specifications**
4. **Equipment and component functions**
5. **Operation of equipment and components**
6. **Results of troubleshooting analysis**
7. **Specific equipment repair procedures, applicable standards, and guidelines**



Task 2: Repair the malfunction by performing required corrective maintenance tasks per best maintenance practices to return the equipment to the desired operating condition. The candidate must demonstrate knowledge in the following:

1. Common mechanical systems (e.g., lubrication, seals and bearings, alignment, power transmission, cams, cranks, pneumatics, hydraulics, thermodynamics, heat transfer, piping systems, fabrication, steam systems)
2. Correct use of tools and equipment, including measuring devices
3. Equipment specifications
4. Equipment and component functions (e.g., pumps, fans, blowers, turbines, gearboxes, compressors, fasteners, motors, piping systems, gaskets/packing, drive systems, conveying systems)
5. Equipment and component operation
6. Specific equipment repair procedures, applicable standards, and guidelines

Task 3: Monitor the equipment after it has been repaired while operating it under normal conditions in order to determine whether or not the repair was successful. The candidate must demonstrate knowledge in the following:

1. Equipment and component functions (e.g., pumps, fans, blowers, turbines, gearboxes, compressors, fasteners, motors, piping systems, gaskets/packing, drive systems, conveying systems)
2. Equipment and component operation

Task 4: Release repaired equipment for return to service using standard operating procedures in order to resume normal operations. The candidate must demonstrate knowledge in the following:

1. Procedures for releasing equipment for return to service



# CMRT PRACTICE QUESTIONS

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**1. The best way to assure that a full-face respirator has a positive seal is to place the palms of your hands:**

- a. Over the discharge and inhale
- b. Over the inlet and inhale
- c. On the front and press toward your face
- d. On the bottom and push up

**2. According to industry standards, at which minimum working height would an individual be required to wear a safety harness?**

- a. 3 feet
- b. 4 feet
- c. 5 feet
- d. 6 feet

**3. In OSHA regulations, the term point-of-operation protection device refers to what feature in maintenance?**

- a. Lockout-tagout
- b. Machine guarding
- c. Personal protective equipment
- d. Pre-operational inspection

**4. Which of the following is an example of a predictive maintenance task?**

- a. Changing oil on an hour meter set point
- b. Changing V belts once a year on a fan drive
- c. Lubricating equipment on a set schedule
- d. Monitoring with a vibration equipment

**5. The opening of a relief valve is caused due to an increase in:**

- a. Pressure
- b. Temperature
- c. Valve
- d. Flow

**6. There are often multiple reasons when equipment fails. What is the appropriate tool to use to determine the reason?**

- a. Cause and effect analysis
- b. Equipment failure analysis
- c. Process failure analysis
- d. Root cause analysis

**7. What instrument is used to check the quality of an electric motor's insulation resistance?**

- a. A megohmmeter
- b. A multimeter
- c. A volt-ohmmeter
- d. A light meter

**8. What is the main advantage of a flexible coupling over a rigid one?**

- a. They are able to accept shock loads
- b. They are easier to install
- c. They are less expensive
- d. They compensate for some misalignment

**9. What type of mechanical damage to a centrifugal pump can be caused by cavitation?**

- a. Pitting and erosion
- b. Motor current under load
- c. Premature gasket failure
- d. Scaling and clogging

**10. When performing an alignment on a new idler pulley on a belt conveyor, you must start with the belt in what load condition?**

- a. 1/2 full
- b. 3/4 full
- c. Empty
- d. Under-full

Answer Key:

1:B; 2: B; 3: B; 4: D; 5: A; 6: D; 7: A; 8: D; 9: A; 10: C





# **SMRPCO**

Certifying Organization

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