# ASME QRO Certification Program

## ASME QRO Certification For Operators of Resource Recovery Facilities

Applicant Information

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## Overview

The QRO Certification Program is based on the ASME QRO-1 Standard for the Qualification and Certification of Resource Recovery Facility Operators, first published in 1989. It was developed to establish standard qualifications for the two principal operators at resource recovery facilities: shift supervisors and chief facility operators. ASME QRO Operator Certification provides the means to comply with EPA requirements when there is no State certification program. (ref. 40CFR60.54b - Standards for municipal waste combustor operator training and certification). The regulations require that Shift supervisors and Chief facility operators first attain QRO Provisional and subsequently attain full Operator level QRO certification.

In 2005, the QRO-1 Standard was revised to include operators of facilities that combust municipal solid waste (MSW) with and without heat recovery. The following is a summary of the current types of certification offered by ASME:

## Types of Certification

| | Provisional Certification | Operator Certification | Combustion Certification |
|---|---|---|---|
| Applicable equipment | MSW combustion facility with heat recovery | | MSW combustion facility without heat recovery |
| Types of operators | Chief facility operators and shift supervisors | | Operators who control the MSW feed to the combustor and the combustion process |
| Applicable to specific facility? | No | Yes | No |
| Prerequisite Certification | None | Provisional Certification | None |
| Examination type | Written | Oral | Written |
| Term of certification | 5 years | 5 years | 5 years |
| Renewable? | Yes | Yes | Yes |

## The American Society of Mechanical Engineers Codes, Standards, Accreditation and Certification

ASME is a not-for-profit educational and technical organization with 120,000 members worldwide. ASME published its first national standard in 1884 and now has more than 600 codes and standards which are continually updated by committees comprised of over 3800 engineering professionals from academia, industry, and government.

In addition to the QRO certification program, ASME certifies operators of hazardous waste incinerators (QHO), and high capacity fossil fuel fired plants (QFO); and geometric dimensioning and tolerancing professionals (GDTP).

ASME has experience in administering conformity assessment programs for manufactures to certify that their equipment or services comply with an ASME code or standard. These programs include: boilers and pressure vessels; nuclear power plant components and materials; elevator inspector certifying organization; reinforces thermoset plastic corrosion resistant vessel fabricators; authorized inspection agencies; and pressure relief device laboratories.
ASME is also an accredited ISO 9000 quality systems registrar in the industries and sectors associated with the art, science, and practice of mechanical engineering.

# Operator Positions Covered by the QRO Certification Program

The QRO Certification Program is intended for the positions at solid waste combustion facilities which have the duties and responsibilities described below. These positions are meant to be descriptive only - the actual titles used by the solid waste combustion facility may differ.

## Shift Supervisor

The Shift Supervisor is in direct charge and control of the operation of a solid waste combustion facility during an assigned shift including, but not limited to the following:

(a) supervising, training, and monitoring performance of personnel during an assigned shift;

(b) maintaining records of operations, including operational changes and abnormalities, and reports submitted to the chief facility operator;

(c) authorizing issuance of work orders for equipment repair and maintenance;

(d) assuring that the facility is operated consistent with applicable federal, state, and local environmental requirements;

(e) monitoring operations in accordance with established policies and procedures;

(f) undertaking actions to correct upsets or emergencies;

(g) assuring a safe workplace;

(h) communicating operational status with the relieving shift at shift turnover.

## Chief Facility Operator

The Chief Facility Operator is in direct charge and control of the operation of a solid waste combustion facility and is responsible for overall on-site supervision, technical direction, management, and performance of the facility including, but not limited to the following:

(a) overall operation, maintenance, and performance;

(b) operation in accordance with established policies and procedures;

(c) assuring personnel are qualified and certified as required and trained whenever applicable federal, state, and local environmental regulations, or technology, policies, or procedures are changed;

(d) assuring operation is consistent with applicable federal, state, and local environmental requirements;

(e) communicating with regulatory agencies;

(f) assuring policies and procedures for proper and safe operations are formulated and updated periodically.

## Combustion System Operator (for facilities that combust MSW without heat recovery)

The Combustion System Operator of a solid waste combustion facility is the principal person responsible for:

(a) controlling the MSW feed to the combustor and;

(b) controlling the facility's combustion process in order to maintain operations in accordance with the design, operating and permit limitations applicable to the facility.

# Provisional Certification Requirements

In order to attain this level, the applicant must meet the eligibility requirements and pass a written multiple-choice examination (Provisional Examination). It applies equally to the positions of shift supervisor and chief facility operator. This is a prerequisite for Operator certification. Provisional certification is not facility specific.

## Eligibility Requirements

You must meet the following qualifications before taking the Provisional Examination:
-high school diploma or equivalent; and
- three years of experience in operation of a solid waste combustion facility, or
- five years of experience in occupations concerned with the design, start-up, operation, or maintenance of engines, boilers, turbines, air compressors, motors, generators, conveying equipment, or their related auxiliaries which supply power, heating, or cooling service to an industrial, maritime, or commercial process or facility;

Completion of a baccalaureate degree in physical science or engineering, or 60 credits of course work in the subjects listed below from an institute accredited to issue degrees, may be substituted for up to two of the five years of non solid-waste combustion facility experience described above: advanced mathematics; chemistry;
fluid dynamics; thermodynamics; materials science; combustion theory; environmental, mechanical, civil, chemical, or electrical engineering.

## Provisional Examination Structure and Content

The examination consists of between 100 and 150 questions and will be structured as shown on the following table.

| **Provisional Examination Subject Areas** | | |
|---|---|---|
| **Part 1**<br>**25% of Examination** | **Part 2**<br>**25% of Examination** | **Part 3**<br>**50% of Examination** |
| Solid waste collection, transfer, and management topics covering the following: | Theory, covering the following: | Operation of a solid waste combustion facility covering the following: |
| Municipal solid waste composition | General chemistry | Material handling equipment |
| Collection techniques | Thermodynamics | Boiler operations |
| Seasonal, industrial and legislative impact on the composition of refuse | Combustion | Generator and turbine operations |
| Impact on the composition of refuse due to composting, source reduction, and recycling | Mechanical and electrical operation and technology | Control room operations |
| Landfills | Air pollution control technology | General operations and maintenance procedures and techniques |
| Ash handling, treatment, testing, and disposal | Continuous emissions monitoring | Continuous emissions monitors and their calibration |
| Environmental regulation and requirements | | Ash handling, treatment, testing, and disposal operations |
| | | Worker safety |

## The Examination for Provisional Certification Will Cover the Following Topics

(a) characteristics that make certain types of waste unprocessible in the facility;
(b) waste conditions that have an impact on handling, processing, feeding, or combustion;
(c) solid waste and residue landfilling;
(d) laboratory procedures, such as testing water samples;
(e) principles of combustion;
(f) waste handling, processing, and feeding equipment design and operation;
(g) boiler designs;
(h) design and operation of facility waste water treatment equipment;
(i) interactions among the major facility systems;
(j) weigh scale equipment operation;
(k) operation of boilers and auxiliaries;
(l) operation of deaerator systems, cooling water chemistry, and feed water systems;
(m) the start-up, shutdown, and operating modes of a turbine generator and its auxiliaries, including condenser and cooling tower systems;
(n) the operation of steam, hot water, and/or chiller systems including load control, and communications with users;
(o) operation of ash handling equipment;
(p) the importance of planned and preventive maintenance programs required to maintain facility electrical, mechanical, and instrument equipment in optimum, reliable operating condition;
(q) implementation and maintenance of electrical, mechanical, and instrumentation maintenance logging;
(r) safe procedures and practices.

## Conduct of Examination

You will have three hours to complete the examination. It is a closed book examination. However, a non-programmable calculator is permitted.

## Examination Results

In order to receive certification, you must achieve a 70% grade overall and no less than 50% in each of the three areas. You will be notified of the results of the examination within 30 days. In the event that you do not pass the examination, you may retake the test, however an individual may sit for the test no more than two times in a six-month period.

## Application Process (Provisional Certification)

Each applicant is required to fill out the application and submit it to ASME. After accepting the application, ASME will advise the applicant regarding how to schedule an examination. The ASME QRO Provisional Examination will be provided on computer at Prometric Test Centers. An applicant may select a convenient date and location for the test.

Application forms may be obtained from the ASME web pages or by contacting ASME. Refer to Page 12.

## Fees

Examination and certification fees are listed on the application. As a result of recent legislation, veterans may now use their G.I. Bill benefits to pay the cost of approved licensing and certification tests. The ASME QRO Certification Program is approved under this new benefit by the Division of Veteran's Affairs. Veterans will be reimbursed whether they pass or fail the test, and there is no limit on the number of times an examination by be taken. For further information, on the G.I. Bill Education Benefit Programs, visit www.gibill.va.gov (click on Education Benefit program and scroll to Licensing and Certification) or call 1-999-442-4551. **Note: fees are non-refundable.**

## Term

The expiration date of new certificates will be five years from the issue date.

## Renewal of Provisional Certification

Renewal requires demonstration of employment, as identified below, for at least 3 of the last 5 years:

-Employment in management, operation, maintenance or engineering of a municipal solid waste combustion facility, or

-Employment in occupations concerned with the design, start-up, operation, or maintenance of engines, boilers, turbines, air compressors, motors, generators, conveying equipment, or their related auxiliaries which supply power, heating, or cooling service to an industrial, maritime, or commercial process or facility.

Renewal notices are mailed six months prior to the certificate expiration date.

# Operator Certification Requirements

Operator certification is facility specific. In order to attain this level, the applicant must meet the eligibility requirements and pass an oral examination. It is intended for individuals performing the duties of Chief Facility Operator or Shift Supervisor.

## Eligibility Requirements

The applicant is required to be the holder of a valid Provisional Certificate, document six months of satisfactory employment performing the duties of Shift Supervisor or Chief Facility Operator at the specific facility, and pass an oral examination.

## Examination Content

The applicant will be tested for the listed knowledge areas. Within each knowledge area, the test will include at least two sub-areas per knowledge area.

## Knowledge Areas (and sub-areas)

### Refuse and Ash Handling
-Ash Handling Systems
-Waste Preparation/Refuse Cranes
-Refuse Handling and Fuel Preparation
-Waste Composition; Policy and Procedure
-Waste Composition

### Combustion Processing
-Auxiliary Fuel
-Combustion Temperature
-Combustion Fuel
-Combustion Air
-Theory

### Steam Cycle
-Boiler Water Treatment
-Boiler Cleaning Equipment
-Steam Distribution
-Turbine Operations
-Feedwater/Condensate

### Electrical
-Distribution
-Emergency Systems
-Generator

### Environmental Controls
-Particulate Removal
-Acid Gas Removal
-Air Pollution Permit Limits
-Continuous Emissions Monitoring System
-Environmental Public Relations
-Waste Water Controls
-NOx Controls
-Mercury Controls

### Safety
-Respirators (OSHA 1910.134)
-Emergency Response
-Noise Exposure (OSHA 1910.95)
-Fire Protection: Fire Brigades (OSHA 1910.156)
-Fire Protection: Fire Extinguishers (OSHA 1910.157)
-Fire Protection: Standpipe and Hose Systems (OSHA 1910.158)
-Fire Protection: Automatic sprinkler Systems (OSHA 1910,159)
-Fire Protection: Fixed Extinguishing Systems (OSHA 1910.160,161,162, and 163)
-Fire Protection: Employee Alarm Systems (OSHA 1910.165)
-Hazard Communication Program (OSHA 1910.1200)
-Overhead Cranes (OSHA 1910.179)
-Powered Industrial Trucks (OSHA 1910.178)
-Control of Hazardous Energy Sources (Lockout/Tagout) (OSHA 1910.147)
-Confined Space Entry (OSHA 1910.146, 1910.94(d), 252(f)
-Hot Work Procedures (OSHA 1910.252)
-Electrical (OSHA 1910.333)

### Administration; (chief facility operator only)
-Understanding of job duties and responsibilities of subordinates.
-Overall operation, maintenance, and performance of the facility.
-Formulation and updating of policies and procedures.

## Conduct of Examination

The examination will be conducted by a board of examiners consisting of three members, one each from ASME, the solid waste industry, and a regulatory agency.

The facility will be required to make technical and/or operations manuals available to the board of examiners. These will include the facility operations manual as specified by 40CFR60 section 60.54b, the health and safety policies and procedures, appropriate technical manuals, and all operating permits. If more than one person from the facility is applying for certification at the same time, only one set of manuals needs to be available.

The applicant must advise ASME whether the examination can be conducted at a facility or specify an alternative location. A designated room must be available starting one day prior to the examination for the board to convene and prepare for the examination. The technical and operation manuals and operating permits must be made available in the designated room. Applicants will not have free access to the manuals during the examination.

The examination will be conducted in a quiet room with a flip chart and/or a writing board available. A tour of the unrestricted areas of the plan must be provided if requested by the examiners. The actual examination will be conducted within approximately two hours. No more than three tests may be conducted in one day.

## Examination Results

Unanimous approval from the members of the board of examiners is required to pass the site-specific examination. You will be notified of the results in writing within ten days of the examination.

## Application Process

Each applicant is required to complete an application and return it to ASME together with the deposit. Both the applicant and the applicant's employer must sign the application. If more than one person from the facility is applying at the same time, the facility information form only needs to be filled out once, however a copy must accompany each application. Application forms may be obtained from the ASME web pages or by contacting ASME. Refer to Page 12.

The applicant must also advise ASME of the regulatory agency responsible for issuing the facility's construction or operating permit so that their representative will have the opportunity to participate on the board of examiners.

It is recommended that applications be submitted at least three months in advance of the anticipated examination date. After accepting the application ASME will coordinate the scheduling of the examination with the applicant and the facility.

Two face-view photographs (2 inches by 1 inch or passport size) taken within the last six months must accompany the application.

## Term

The expiration date of new certificates will be five years from the issue date. Upon obtaining or renewing an Operator Certificate, provisional certification shall be automatically renewed and the expiration date of the Provisional Certificate adjusted to coincide with the expiration date of the Operator Certificate.

## Renewal of Operator Certification

Renewal notices are mailed six months prior to the certificate expiration date. Renewal requires that the applicant demonstrate employment for least 3 of the last 5 years at the specific municipal solid waste combustion facility in the applicable level of Chief Facility Operator or Shift Supervisor.

For renewal to a new technology, the applicant must provide a description of the new technology and document associated training.

## Transfer of Operator Certification

Operator certification may be transferred to another facility of similar technology. The applicant must demonstrate that employment at the original facility was satisfactory and was not interrupted for more than 6 months (cumulative) during the period for which your Certification is valid. The application for such transfer must be received by ASME within 60 days of employment at the new facility. In order to transfer certification to a facility of dissimilar technology, the applicant must document 6 months of satisfactory employment in the position of chief facility operator or shift supervisor at the new facility, and pass another site-specific examination. Applications for transfer of certification may be obtained from ASME.

# Combustion System Operator Certification Requirements

In order to attain Combustion System Operator Certification, the applicant must meet the eligibility requirements and pass a written multiple choice examination (Combustion Examination).

Note: The Combustion System Operator Certification is intended for facilities that combust municipal solid waste without heat recovery. The Combustion System Operator Certificate is not a prerequisite, nor may it substitute for any other QRO certification.

## Eligibility Requirements

-high school diploma or equivalent
-two years of experience in industrial processes or operations of machinery

## Combustion System Examination Structure and Content

The examination consists of between 75 and 130 questions and will be structured as shown on the in the following table.

| **Combustion Systems Operator Examination Subject Areas** | | |
|---|---|---|
| **Part 1<br>30% of Examination** | **Part 2<br>30% of Examination** | **Part 3<br>40% of Examination** |
| Solid waste collection, transfer, and management topics covering the following: | Theory, covering the following: | Operation of a solid waste combustion facility covering the following: |
| Municipal solid waste composition | General chemistry | Material handling equipment |
| Collection techniques | Thermodynamics | Furnace and combustion chamber operations |
| Seasonal, industrial and legislative impact on the composition of refuse | Combustion | Control room operations |
| Impact on the composition of refuse due to composting, source reduction, and recycling | Mechanical and electrical operation and technology | General operations and maintenance procedures and techniques |
| Landfills | Air pollution control technology | Continuous emissions monitors and their calibration |
| Ash handling, treatment, testing, and disposal | Continuous emissions monitoring | Ash handling, treatment, testing, and disposal operations |
| Environmental regulation and requirements | | Worker safety |

## The Examination Will Test for an Understanding of the Following Topics

(a) characteristics that make certain types of waste unprocessible in the facility;
(b) waste conditions that have an impact on handling, processing, feeding, or combustion;
(c) solid waste and residue landfilling;
(d) laboratory procedures, such as testing water samples;
(e) principles of combustion;
(f) waste handling, processing, and feeding equipment design and operation;
(g) design and operation of facility waste water treatment equipment;
(h) interactions among the major facility systems;
(i) weigh scale equipment operation;
(j) operation of combustion chamber;
(k) operation of ash handling equipment;
(l) the importance of planned and preventive maintenance programs required to maintain facility electrical, mechanical, and instrument equipment in optimum, reliable operating condition;
(m) implementation and maintenance of electrical, mechanical, and instrumentation maintenance logging;
(n) safe procedures and practices.

## Conduct of Examination

You will have three hours to complete the examination. It is a closed book examination. However, a non-programmable calculator is permitted.

## Examination Results

In order to receive certification, you must achieve a 70% grade overall and no less than 50% in each of the three areas. You will be notified of the results of the examination within 30 days. In the event that you do not pass the examination, you may retake the test, however an individual may sit for the test no more than two times in a six-month period.

## Application Process (Combustion System Operator Certification)

Each applicant is required to fill out the application and submit it to ASME. After accepting the application, ASME will advise the applicant regarding how to schedule an examination. The ASME QRO Provisional Examination will be provided on computer at Prometric Test Centers. An applicant may select a convenient date and location for the test. Prometric has a network of approximately 250 test centers in the United States and 15 in Canada. Application forms may be obtained from the ASME web pages or by contacting ASME. Refer to Page 12.

## Fees

Examination and certification fees are listed on the application. As a result of recent legislation, veterans may now use their G.I. Bill benefits to pay the cost of approved licensing and certification tests. The ASME QRO Certification Program is approved under this new benefit by the Division of Veteran's Affairs. Veterans will be reimbursed whether they pass or fail the test, and ther is no limit on the number of times an examination by be taken. For further information, on the G.I. Bill Education Benefit Programs, visit www.gibill.va.gov (click on Education Benefit program and scroll to Licensing and Certification) or call 1-999-442-4551. **Note: fee are non-refundable.**

## Term

The expiration date of new certificates will be five years from the issue date.

## Renewal of Combustion System Operator Certification

A Combustion System Operator Certificate can be renewed subject to demonstration of employment for three of the five years preceding the expiration date with the duties and qualifications listed below:

(a) controlling the MSW feed to the combustor and;
(b) controlling the facility's combustion process in order to maintain operations in accordance with the design, operating and permit limitations applicable to the facility and:
(c) experience in industrial processes or operations of machinery

Renewal notices are mailed six months prior to the certificate expiration date.