American Welding Society

Examination User Guide

Certified Robotic Arc Welding

(CRAW) Exam

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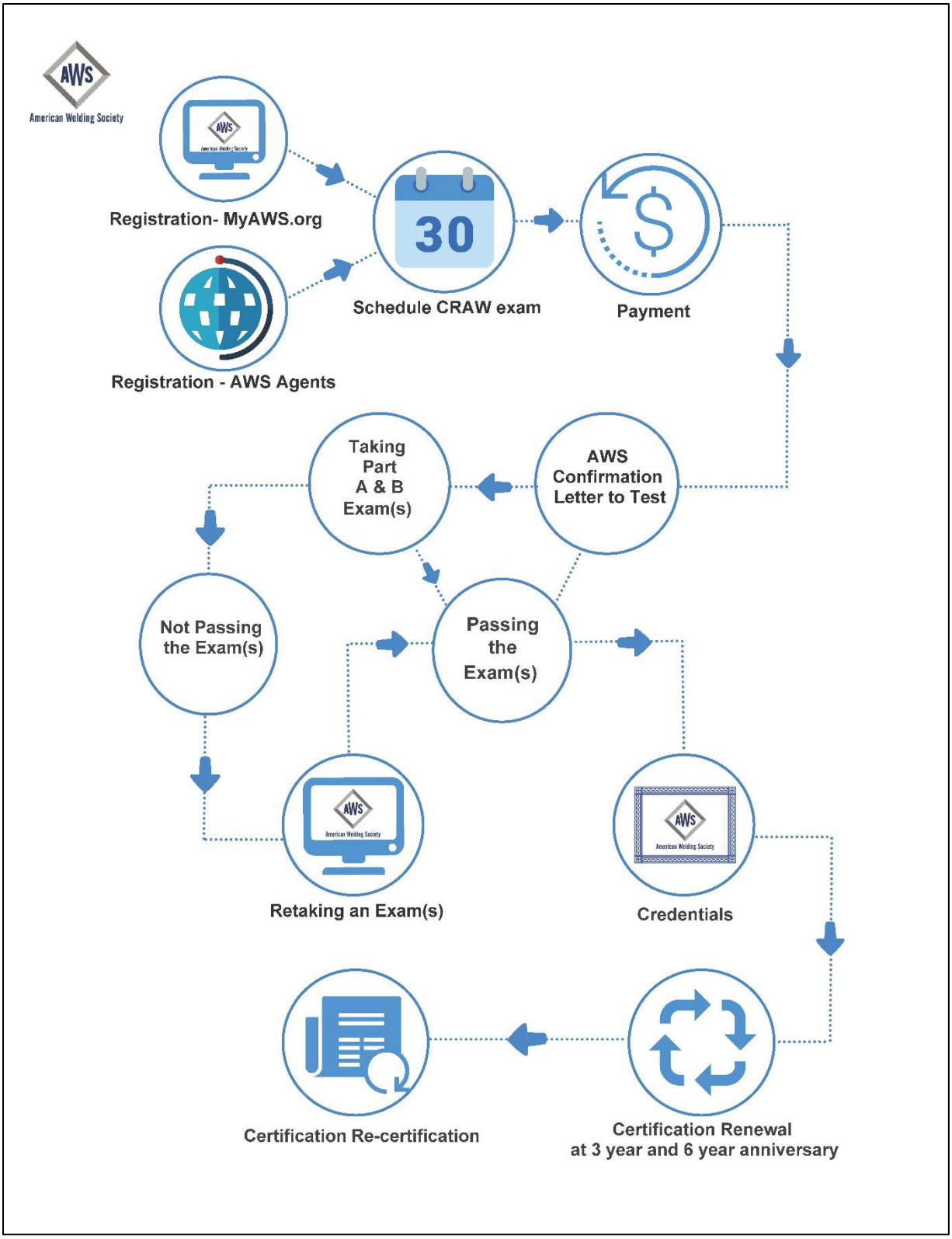
CRAW EXAM PROCESS



OVERVIEW

The Examination Guide for the Certified Robotic Arc Welding is the official guide to the rules, policies, procedures, and exam content for the CRAW exams which all candidates should familiarize themselves with.

Click here for the online information:
https://www.aws.org/certification/detail/certified-robotic-arc-welding

This Examination Guide contains important information on the rules, policies, procedures, and exam content for candidates seeking to take the CRAW exams. This Examination Guide is subject to change.

THE CERTIFIED ROBOTIC ARC WELDING CERTIFICATION

The AWS Certification Program for Robotic Arc Welding - Operators and Technicians (CRAW) allows many welding personnel employed in various welding sectors to measure themselves against standards for their occupation. It also signifies that the CRAW Operator or Technician has demonstrated the capability of working with various codes, standards, and specifications. Since proof of active practice or re-examination is required every three years, certification also signifies that the CRAW Operator or Technician is current with the welding industry.

AWS recognizes two levels of AWS certifications for the Robotic Arc Welding Certification:

CRAW Operator (AWS D16.4 qualification levels 2 and 3) - effectively oversees the implementation of certification procedures, facilitating smooth workflow operations and promptly addressing any issues.

CRAW Technician (AWS D16.4 qualification level 4) - excels in managing and reviewing certification data, ensuring accuracy, and maintaining compliance with industry standards.

For more information, please review the following governing standards:

- AWS QC19, Specification for AWS Certification of Robotic Arc Welding Personnel
  QC19 Specification for AWS Certification of Robotic Arc Welding Personnel

- AWS D16.4, Specification for the Qualification of Robotic Arc Welding Personnel
  D16.4, Specification for the Qualification of Robotic Arc Welding Personnel

THE CERTIFIED ROBOTIC ARC WELDING EXAMS

According to QC19-2002, Clause 7, individuals aspiring to become a CRAW Operator or Technician must successfully complete one exam composed of two sections: one focusing on the written examination (Part A) and the other on the performance test (Part B). This exam aims to grant candidates their respective credential.

The exam is presented in two sections:

- Part A: Closed Book Examination
- Part B: Practical Examination

Part A - Closed Book Examination

A closed-book, general knowledge test consisting of multiple-choice questions on fundamental principles.

Test Specifications

Test Specifications provide a detailed breakdown of the content areas covered in the examination, including the relative weight of each content area in the overall exam.

As per QC19-2002, Clause 7.2.1, the CRAW Part A written exam is composed of the following domains and weights (percent of questions on the examination).

Content Domain	Minimum Percent of Questions on Exam
Weld Equipment Setup	8%
Welding Processes	15%
Weld Examination	8%
Definitions and Terminology	8%
Symbols - Welding & Robotics	4%
Safety	12%
Destructive Testing	8%
Conversion and Calculations	3%
Robot Programming and Logic	20%
Welding Procedures	8%
Kinematic Concepts	3%
Robot Arc Weld Cell Components-ID	3%
Total	100%

Examination References

The examination questions **may be** taken from the references found in Appendix D in this document.

General Exam Information

Exam Type: Closed book examination
Exam Delivery: Written examination, paper-based at AWS Test Sites
Complete Testing Time: 2 hours
Exam Question Type : Multiple-choice questions
Number of Exam Questions: 136

IMPORTANT!At this time, the CRAW examination is only offered in English.

The Passing Score

Successful candidates must correctly answer **a minimum of** 75% of the questions to pass the CRAW Part A examination.

Part B - Performance Examination

A performance test (Part B) on practical applications and knowledge is required. This test is to consist of a series of tasks, which will include a GMA welding test plate made according to a qualified Welding Procedure Specification (WPS). This performance test must be completed and passed three months prior to or after taking the written examination.

Test Specifications

As per QC19-2002, Clause 7.2.1, the CRAW Part B performance exam is composed of the following domains and weights (percent of questions on the examination).

Content Domain	Minimum Percent of Questions on Exam
Procedure & Welding Process Set-Up *Cannot lose more than 10 points in above sections*	10%
Robot Programming of Test Piece	20%
Welding of Test Piece	40%
Weld Quality Assessment	20%
Total	100%

Examination Delivery

The performance test must be administered by a CRAW Technician and is delivered as a paper-based exam at an AWS approved test center.

CRAW Approved Testing Centers

AWS CRAW Approved Testing Centers (ATCs) administer both the practical and written exams at their respective facilities.

For more information related to training/registration, visit:

https://www.aws.org/certification/page/craw-approved-testing-center

Examination References

The examination questions **may be** taken from the references found in Appendix D in this document.

General Exam Information

Exam Type: Practical examination
Exam Delivery: AWS CRAW Approved Testing Center
Complete Test Time: 2 hours
Exam Question Type : True /False questions
Number of Exam Questions: 30

IMPORTANT!At this time, the CRAW examination is only offered in English.

The Passing Score

Successful candidates must correctly answer **a minimum of** 75% of the questions to pass the CRAW Part B examination.

Training

Training for the CRAW certification may be available at select AWS Approved Testing Centers (ATCs). Please contact your local ATC for details on available CRAW training opportunities.

ELIGIBILITY

To be eligible to take an AWS exam, you must first be qualified according to the requirements of the CRAW certification. The following are the qualification and certification standards for CRAW:

- AWS QC19, Specification for AWS Certification of Robotic Arc Welding Personnel
  QC19, Specification for AWS Certification of Robotic Arc Welding Personnel

- AWS D16.4, Specification for the Qualification of Robotic Arc Welding Personnel
  D16.4, Specification for the Qualification of Robotic Arc Welding Personnel

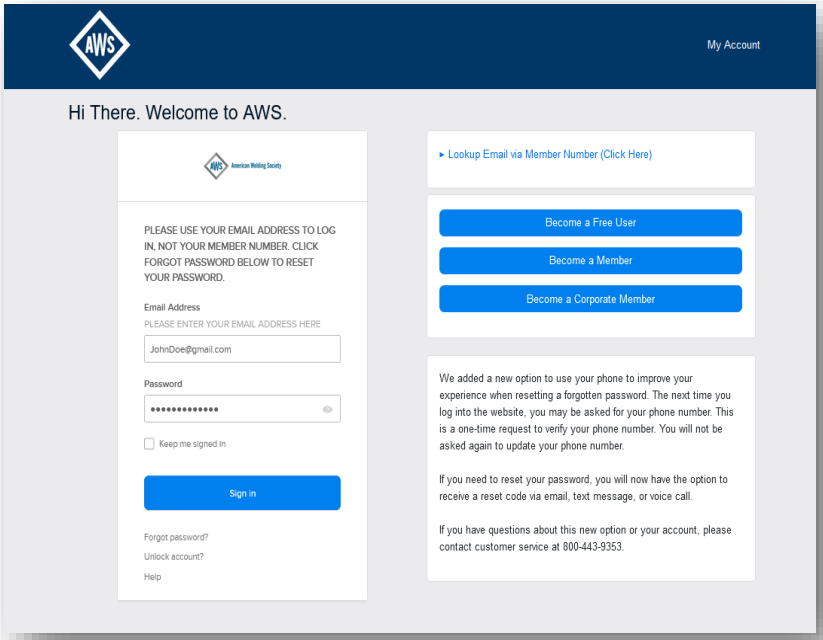
REGISTERING FOR THE EXAM

Domestic (US and Canada)

Application Instructions

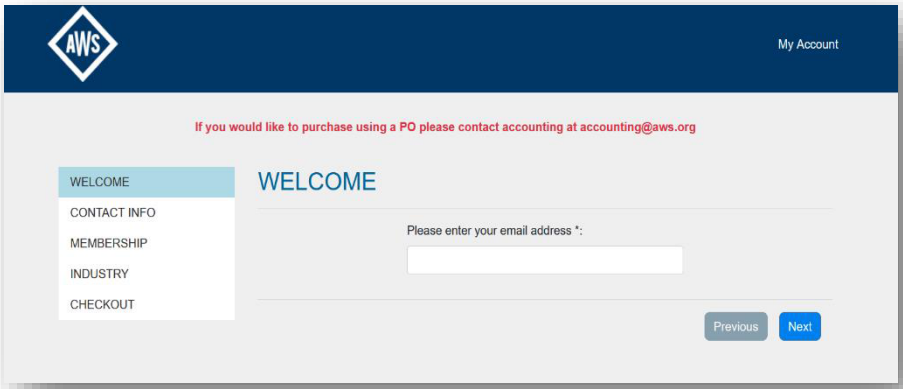
Applicants located in the United States or Canada apply directly via the Certification Application Portal.

- It is not necessary to complete the application in one sitting. You will be able to save your work by clicking on the "Save" button at the top or bottom of each screen. You can navigate among pages by using the "Save & Continue" and the "Save & Go Back" buttons. You can also logout at any time by clicking the "Save & Logout" button. The "Save" button simply allows you to save your work but continue working on the current page.

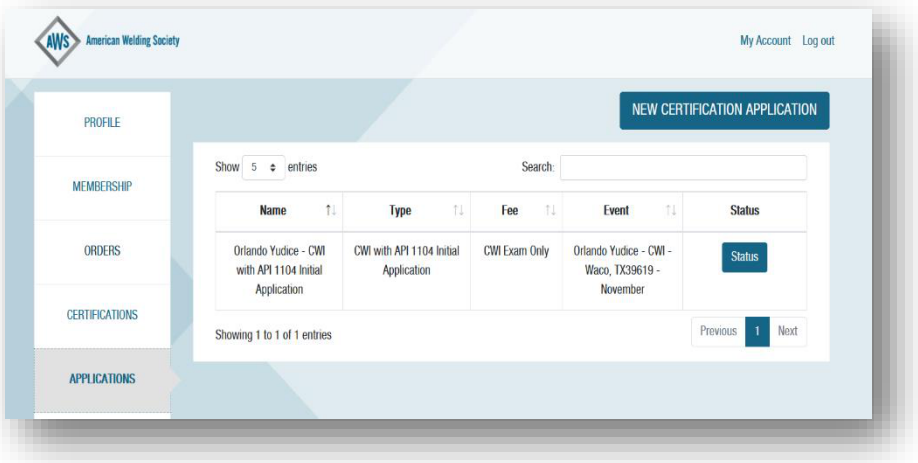


- For each individual file upload, the maximum file size is 5 MB.
- The first and last names on the application must match what is listed on the government-issued ID presented as proof of identity at all exam sites and test centers.
- New users will be asked to create a username and password to log into the AWS Certification Application Portal.

- The Certification Application Portal will guide applicants step-by-step to complete the exam application.



- Candidates can update and change their profile and contact information by accessing the Member profile via the Certification Application Portal.



- Candidates can view the online status of an application, order, or membership via
  - the Certification Application Portal .

- Approximately 4-6 weeks after the application submission, a Confirmation Letter will be emailed from the AWS. The Confirmation Letter contains examination details. (Appendix B shows a sample Confirmation Letter.)

AWS recommends that candidates **DO NOT** make travel arrangements until after a Confirmation Letter is received.

Exam Fees

Exam fees are due at time of registration and are paid directly to AWS. AWS accepts payments via MasterCard, VISA, and American Express. The CRAW exam price list is available online. Domestic applicants choosing to send their application to AWS headquarters via email (pdf) or mail carrier (paper) will incur an additional $125.00 processing fee.

American Disability Act (ADA) Accommodations

Candidates living within the US who have a documented disability under the ADA that prevents them from taking an exam under standard conditions may request special accommodations when they register through the Certification Application Portal. For the special accommodations AWS provides, please click HERE.

International (outside of the US and Canada)

Currently, international applicants must apply for the CRAW exams through an AWS Agent. For a list of available international Agents and test locations, please click HERE.

Application Instructions

- Applicants must review the international exam schedule on the AWS webpage to find a suitable date and location.
- Applicants download and print the CRAW Application Form; fill it out and submit to the Agent of your choice.
- Approximately 2-6 weeks after the application is submitted, a Confirmation Letter will be sent to an International Agent and candidate containing examination details. (See Appendix B for a sample confirmation letter.)

Exam Fees

Exam fees are due at time of registration and paid to the International Agent representing AWS. Agents can provide pricing information regarding international CRAW exams.

EXAM SCHEDULING

The CRAW two-part exam is scheduled through the Initial application process. The exam event's date and location are identified by a site code, which can be found on the AWS website. For instance, an example of an AWS site code is TX44321.

RESCHEDULING/ CANCELLATIONS/ REFUNDS

Circumstances may arise that will require candidates to reschedule or cancel the exam. Appointments must be rescheduled or canceled well before the exam date, or exam fees are forfeited. Details HERE.

- Domestic candidates may cancel or reschedule their CRAW exams by downloading and completing a Change of Site/Cancellation form and emailing it to Certification@aws.org or visiting the AWS Certification Application Portal.

International candidates may contact their selected Agent to cancel or reschedule their CRAW exams and to determine what that Agent's refund policy/procedures are.

TAKING THE CRAW EXAM

Test Sites and Check-In

AWS-approved test sites provide a standardized and secure testing environment for all examinees. Exam candidates are required to comply with all test supervisor instructions. This will ensure that the testing environment is fair and respectful for everyone. Because AWS exams start on time, candidates are encouraged to arrive at the test site 30-45 minutes before the scheduled exam start time. (The exam location, group number, date, and time can be found on the confirmation letter.)

Required Documentation at Check-In

All candidates must provide the following items at check-in before all exams:

- A Government-Issued Identification:
    - Examples: Driver License, Passport, or State ID.
    - ID must be current and include the candidate's full name, date of birth, a recognizable photo, signature, and expiration date. If this ID does not include a signature, then a secondary ID (e.g., credit card, student ID or military ID) with a signature is required in addition to the primary ID.
- Printed exam AWS confirmation letter.

Important!

Doors will close promptly at the end of the check-in period. Candidates arriving after their assigned check-in period WILL NOT be admitted and WILL NOT be permitted to take their exam during any other group session.

Candidates are invited to share feedback about their testing experience with AWS.

Items Allowed in the Test Room

- Government-Issued ID
- Number 2 Pencils
- Acceptable Calculator
  - Acceptable : Four-function, Construction, Non-Programmable Scientific
  - Unacceptable: Noisy, Programmable, Alphabetical, Memory
    Note: All Calculators will be inspected during Check-In per compliance.

Items NOT Allowed in the Test Room

- Scratch pads, notebooks, and post-it notes.
- Any devices that make noise
- Recording devices
- Cell phones
- Non-medical Wearable Electronics
- Large/bulky jackets or sweatshirts with hoods
- Hats or head coverings, and or sunglasses (unless they qualify as religious apparel)
- Food, beverages, gum

Note about backpacks, luggage, and other personal belongings: Tests takers are not permitted to bring personal items into the testing room. There are no exceptions. Test takers should arrange to store personal items safely in advance. AWS is not responsible for any loss or damage to personal items left outside the testing room.

CANDIDATE ATTESTATION AGREEMENT

Prior to beginning to work on the exam, candidates will be required to review and sign the Candidate Attestation Agreement. By signing this Agreement, candidates agree to maintain the confidentiality and integrity of the examination and the certification program. Candidates who do not accept the terms or sign the Agreement will forfeit both their opportunity to take the exam and all exam fees.

The Candidate Attestation Agreement can be found HERE or in Appendix A. Translations of the Candidate Attestation Agreement can be found here in 7 different languages:

Español | **Português** | **русский** | **中文** | **한국어** | **日文** | **Polskie**

AWS Policy on Unscheduled Breaks

After the two-hour exam begins, there will be no scheduled breaks. Should a bathroom break become necessary during the exam, only one person at a time will be permitted to leave the exam room. No testing materials, calculators, or writing implements may be removed from the room at this time. No extra time will be allotted to candidates taking an unscheduled break.

AFTER THE EXAM

Exam Result Reporting

The percentage for each CRAW exam part is calculated by dividing the total number of correct answers by the total number of questions. **The scores are reported to the nearest lower whole percent number.**

AWS Official Score Letter

Candidates will receive their AWS official score letter via email approximately two (2) to four (4) weeks after the final exam part has been completed. The AWS Official Score Letter contains scores for all CRAW exam parts. A sample version of the AWS Official Score Letter is provided in Appendix C of this Guide.

Receiving the CRAW Credential

Four to six weeks after CRAW Exam scores are confirmed, AWS shall issue all new Certified Robotic Arc Welding- Operator or Technician a serialized (unique) CRAW number, Official Certificate and Wallet Card.

Certifications can be viewed through the AWS Member Portal and the AWS QuickCheck webpage. To replace a Certificate and/or Wallet Card, complete and submit the order form located HERE.

OTHER POLICIES AND PROCEDURES

AWS Testing Experience Concerns

Candidates are encouraged to provide comments or concerns regarding their testing experience. Concerns about the CRAW testing experience must be submitted to AWS no later than 2 days after the test by clicking HERE.

Exam Content Feedback

AWS welcomes feedback regarding the content of exam questions. Content feedback received via the online Exam Feedback Form within 5 (five) days of the exam will be carefully reviewed by subject matter experts. All feedback helps improve the overall quality of AWS exams. In the event an error is found in the exam, the scoring is adjusted for all impacted candidates.

Appeals

If a candidate's exam results have been invalidated due to a violation of testing policy, the candidate may appeal in writing within 30 days from the date of the decision to the AWS Managing Director of Certification via email at certification@aws.org, fax to 305-443-7559 or mail to 8669 NW 36th Street #130, Miami, FL 33166.

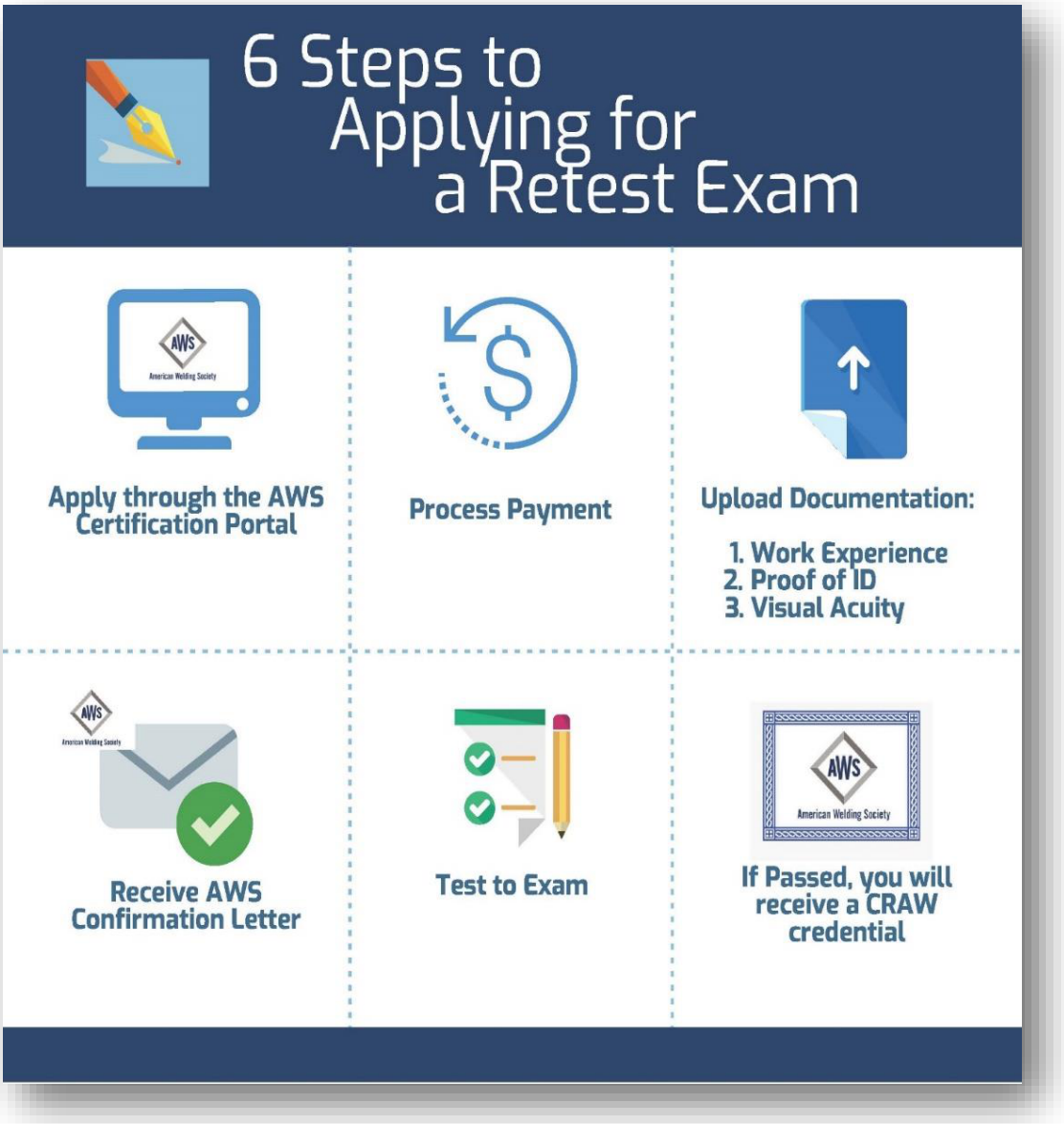
Rescore Request

Candidates who believe their CRAW exams have been scored inaccurately may request a manual rescore by downloading, completing, and emailing the form found on the AWS website, along with the applicable fee.

Retaking the Exam

Candidates who do not pass both parts of the CRAW exam on the first try will be permitted to retest to any part(s) they failed or received a low passing score that affected the overall average.

There is no limit on the number of retests that a candidate may take to achieve all the examination criteria.



RENEWALSAND RECERTIFICATIONS

Renewing the CRAW Credential

A CRAW technician or operator shall renew the CRAW certification to maintain the CRAW credential.

CRAW Certification is valid for three years from date of issue. A CRAW can renew their credential twice: once a year three (3) and once at year six (6).

A CRAW can renew through any of the following non-exam and exam options.

- The CRAW Technician or Operator must demonstrate two years of relevant welding activity within your three-year certification period.
- Retake the CRAW exam.
    - This requirement can be met through documented completion or instruction of a minimum of 40 contact hours in training courses related to welding skills, applications, control, materials, and processes, as outlined in QC19, Specification for AWS Certification of Robotic Arc Welding Personnel. One of the two years can be fulfilled through this educational option.

Renewal applications can be accessed through the Certification Application Portal, and the status of credentials, applications, or exam registrations can be checked via the MyAWS Portal.

Nine-Year Recertification

CRAW Technicians or Operators who wish to recertify may submit a 9-year recertification application via the Certification Application Portal.

A CRAW Technicians or Operators can recertify through any of the following non-exam and exam options:

Retake the current CRAW Operator or Technician performance exam, which is based on the test version in use when you apply for recertification.

Prove that you have been active in related fields like inspection, welding, design, production, construction, or repair for at least two years within your last three certified years. Plus, show evidence of participation in activities listed in QC19 for at least 80 contact hours. These hours can be documented as 8 Continuing Education Units (CEUs) or 80 Professional Development Hours (PDHs).

APPENDIXA CANDIDATE ATTESTATION AGREEMENT

You must review and agree to the terms of the Candidate Attestation Agreement before starting your test.

1. I attest that I am the person whose name appears in the form of identification I presented prior to admission to the testing room.
2. I understand and agree that all AWS certification exams are confidential and secure tests, protected by U.S. and international copyright laws.
3. I understand and agree that all test materials, including my answers, are the property of AWS, and I will not be provided access in any form except on the test itself.
4. I understand and agree that disclosing any exam question or answer to any person, in whole or in part, by any means whatsoever is unlawful and even potentially a criminal act, and I may be financially liable and/or charged with theft for doing so. I also understand and agree that if I disclose information about exam questions or answers, I may suffer adverse consequences, including but not limited to any or all of the following:
   – civil or criminal liability for copyright infringement or related conduct; and
   – disciplinary action by AWS, including prohibiting me from seeking certification in the future.
5. I understand and agree that AWS is the final authority that determines if I can take an exam.
6. I understand and agree that AWS has the right to cancel my scores if it finds any evidence of any irregularities whatsoever.
7. I understand and agree that furnishing inaccurate details about myself, breaching exam regulations, or acting contrary to the instructions outlined on the AWS/Prometric website, confirmation letter, and the AWS Certification and Qualification Standards may result in disciplinary action, including but not limited to removal from the test session under the supervision of the Test Supervisor or Test Center Administrator; score annulment; disqualification from taking the exam in the future; and potential legal liability.
8. I agree that upon obtaining my certification, I give permission to AWS to publish my certification status as it relates to its validity and duration.

I understand and accept the terms of this agreement.

Print Full Name: _____

Signature: _____ Date: _____

APPENDIX B SAMPLE AWS CONFIRMATION LETTER

American Welding Society

AWS Registration Confirmation Letter

I. VERIFICATION OF CANDIDATE CONTACT INFORMATION:

Please verify your contact information and contact AWS immediately should any corrections be necessary.

AWS Member No.:	123456789
Full Name:	John Doe
Address:	8669 NW 36 St. Miami, FL 33166
Email:	Jdoe@yahoo.com

II. VERIFICATION OF EXAM INFORMATION:

Please verify your exam information and contact AWS immediately should any corrections be necessary. Please note that changes cannot be made at the testing facility and rescheduling an exam may result in forfeiture of seat fee.

Practical:

Exam Type:	CRAW - Part B
Language:	English
Exam Date:	9/14/2024
Exam Group:	Fort Collins, CO - September 14, 2024 - CRAW - Group 1
Check-in Time:	7:00 - 7:25 AM
Exam Start Time:	7:30 AM
Location:	Lincoln Electric Automation- Fort Collins 4600 Innovation Drive Fort Collins Colorado 80525
Site Code:	**CO37923**

Package Type:
Exam Only
Package Details:
CRAW Exam

Prometric Exam(s):

Language: English

APPENDIX BSAMPLE AWS CONFIRMATION LETTER Pg. 2

Exam Type	Eligibility ID	Eligibility Start Date	Eligibility End Date
CRAW - Part A	AWSAPP310912	9/14/2023	1/12/2024

III. SCHEDULING AND PREPARATION:

If you are taking a Prometric exam, you must schedule your exam(s) at a convenient test center of your choosing through our partners at Prometric. Please follow the steps to schedule your appointment:

1. Go to www.prometric.com/aws or call 1-800-864-5257
2. Click on Schedule My Test
3. Select your Country and State
4. Enter Eligibility ID and First 4 Characters of Last Name
5. Select location
6. Select available date and time
7. Receive confirmation letter from Prometric

The following content must be reviewed by the candidate prior to taking his/her exam(s) in order to be fully prepared for testing. Failure to do so may result in forfeiture of exam fees, or disqualification from taking the exam.

- Exam References and Editions for Open Book and AWS Sites — https://aws-p-001-delivery.sitecorecontenthub.cloud/api/public/content/Open-book-Exam-Reference-Guide?v=077ab1ca

For more information regarding your application status, certification, order history, and/or membership, please log in to your AWS account at: **https://my.aws.org/SignIn**

Should you have any questions regarding your exam, please feel free to contact the Certification Department at 800-443-9353, option 3.

APPENDIXC SAMPLE AWS OFFICIAL SCORE REPORT

American Welding Society®

Certified Robotic Arc Welder - Operator (CRAW-O)

Score Report

1231456789
John Doe
8669 NW 36 St.
Miami, FL 33166
US

Exam Status: Pass
Certified Robotic Arc Welder - Operator
Exam Part Passing Score: 75
Your Composite Average Score: 93

Congratulations! You have passed all the examinations of the AWS Certified Robotic Arc Welder Program.

Exam Type	Score
CRAW - Part A	87%
CRAW - Part B	100%
Composite Average Score:	**93%**

Your performance of each examination part by content category can be found in the next section.

Your certificate and wallet card will be mailed to you within 4-6 weeks from the receipt of this letter. AWS QuikCheck is updated to reflect this new certification.

NOTE: It is your responsibility to contact AWS if you have not received your Credentials within 120 days of receiving this letter. After these 120 days, you may incur additional charges to order a duplicate.

APPENDIX DEXAMINATION REFERENCES

1.	AWS A3.0, *Standard Welding Terms and Definitions*
2.	AWS B1.10, *Guide for Nondestructive Inspection of Welds*
3.	AWS B1.11, *Guide for Visual Welding Inspection*
4.	AWS B5.1, Qualification Standard for AWS Welding Inspectors
5.	AWS QC1, Qualification Standard for AWS Welding Inspectors
6.	AWS WI, *Welding Inspection*
7.	AWS CM-00, *Certification Manual for Welding Inspectors*
8.	AWS B2.1, *Specification for Welding Procedure and Performance Qualification*
9.	AWS D8.8, *Specification for Automotive and Light Truck Weld Quality: Arc Welding*
10.	AWS D16.2, *Guide for Components of Robotic and Automatic Arc Welding Installations*
11.	AWS D16.3, *Risk Assessment Guide for Robotic Arc Welding*
12.	AWS D16.4, Specification for the Qualification of Robotic Arc Welding Personnel
13.	ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes* (published by the American Welding Society)
14.	NEMA EW-1, *Electric Arc Welding Power Sources* AWS Arc Welding with Robots, Do's and Don'ts
15.	Automating the Welding Process, Jim Berge, Industrial Press
16.	AWS Welding Handbook, Volume 1, 10th Edition
17.	AWS Welding Handbook Volume 2, 9th Edition, Welding Processes (published by robot manufacturer)
18.	AWS 058, *Arc Welding Automation, Howard Car*
19.	AWS A2.4, *Standard Symbols for Welding Brazing, and Nondestructive Examination*
20.	*Jefferson's Welding Encyclopedia 8th Edition (published by the American Welding Society)*
21.	RIA 15.06, *American National Standard of Industrial Robots and Robot Systems – Safety Systems*