

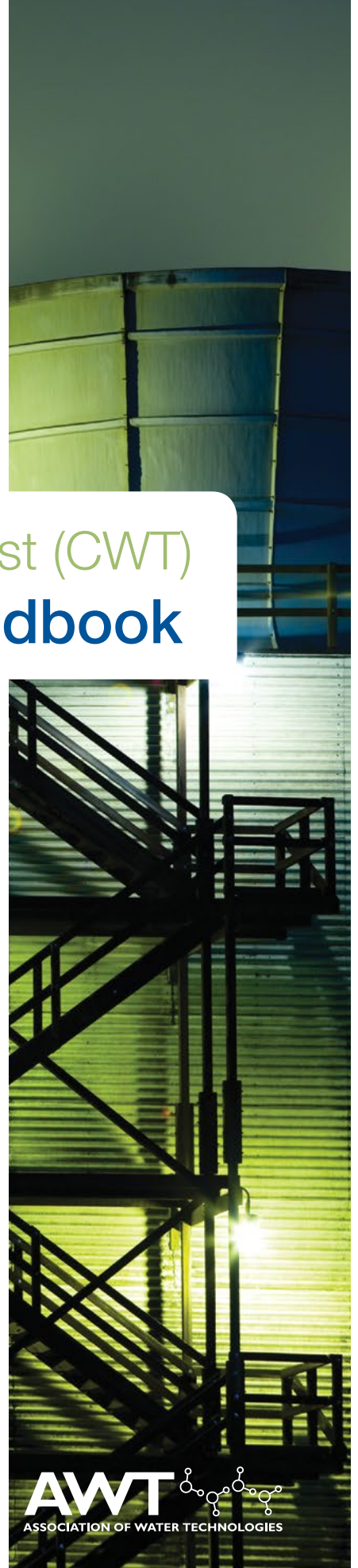


# Certified Water Technologist (CWT) Exam Candidate Handbook

# 1 PASS

3 Steps to Certification: **1.Pass** 2.Apply 3.Recertify

9707 Key West Avenue  
Suite 100  
Rockville, MD 20850  
P (301) 740-1421  
F (301) 990-9771  
<http://www.awt.org>





Information in this Handbook represents current policies and procedures for AWT's Certified Water Technologist (CWT) program. Information in this Handbook supersedes information contained in any previously published material.

All information and guidelines are subject to change.

Please read and understand the entire Handbook, including all policies, procedures and consequences.

## Check List

Have you:

- Read the Handbook cover to cover
- Filled out the exam registration form in its entirety
- Signed your registration form
- Paid the appropriate application fee
- Mailed or faxed your application to:

Association of Water Technologies  
Certification Program  
9707 Key West Avenue, Suite 100  
Rockville, MD 20850

Fax: (301) 990-9771



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## 1. Overview

### Why Certification Matters

Certified Water Technologist (CWT). Those three simple letters after your name add a particular cachet to your professionalism. The CWT designation assures potential and current clients that they have one of the industry's best working for them. Attaining the CWT provides professional recognition for individuals involved in water treatment science and technology to indicate to the general public, co-workers, employers and others that you have achieved a high level of experience, knowledge and education in the industry. The CWT designation assures that water professionals possess a core body of knowledge and have extensive professional experience in all aspects of water treatment. Those three simple letters let people know you possess:

- Expert, up-to-date knowledge
- Experience and reputation
- Ethics beyond question

Start on the path to becoming a CWT today by registering as a candidate for the CWT exam! Contact the Certification Program Manager at (240) 404-6477 with questions.

### A. Purposes

The Certified Water Technologist (CWT) program is sponsored by the Association of Water Technologies as a service to those companies that are committed to the professional development of the individuals who are the backbone of their companies and the industry. The purposes of the CWT program are:

- (a) To provide professional recognition for individuals involved in water treatment science and technology, to indicate to the general public, coworkers, employers, and others that an impartial organization has used a recognized method to assess the individual's experience, knowledge and education;
- (b) To build confidence in the professionalism of certified individuals working in the field of water treatment by securing a Declaration of Ethics stating their determination to give due consideration to the best interests of the public, to apply themselves diligently and responsibly to their work, to act ethically in all matters, and to profess competence and make recommendations only in areas in which they are qualified by knowledge and ability;
- (c) To encourage the growth and updating of knowledge and understanding of the complexities of water treatment mechanisms through continuing dissemination of topical information to all professionals working in the field;
- (d) To provide the individual with a sense of achievement through professional advancement in their chosen field of industrial water treatment.

### B. Job Analysis

A job analysis study was conducted to ensure that the CWT program reflects current practices of the industry. Practitioners from across the U.S., Canada, and several other countries, were surveyed to help evaluate the level of knowledge, skills and ability expected within the industry. The CWT job analysis survey was used to identify and help define the different activities that are performed in commercial/industrial water treatment. This study was also used to evaluate the significance of the various activities water treatment professionals perform, with regard to public protection, and to establish the relative importance of the activities for those entering the profession.

### C. Process Summary

In order to become certified, the following requirements must be met:

1. You must have a minimum of five years acceptable work experience.
2. You must take and pass the CWT exam.
3. Upon passing the exam, you must complete the CWT application. ([Click here for PDF](#))
4. Upon Review and approval of the CWT accreditation, you must maintain your CWT designation by recertifying every five years. ([Click here for PDF](#))



## 2. Eligibility Requirements

### A. Exam

The CWT Certification process is twofold. Passing the exam does not make you a CWT. All individuals who pass the exam will be invited to apply for the CWT designation. Anyone in the water treatment field can take the exam, but you need five years acceptable work experience to become certified. There is a waiting period involved for candidates who did not pass a previous attempt at the CWT exam (see 7B).

#### I. Work Experience

Five (5) years of “Acceptable Work Experience” are requisite.

- a. “Acceptable work experience” is considered to be documented experience in a position related to industrial water treatment with general responsibility for (a) direct sales and/or service of water treatment applications, (b) technical support of sales and/or service personnel, or (c) technical consulting in the field of industrial water treatment. The term industrial water treatment is defined as treatment of boiler and cooling water systems associated with manufacturing facilities or HVAC operations.
- b. “Acceptable work experience” is considered to be documented work experience in the field of water treatment which includes (a) the investigation of water treatment problems, (b) the implementation of corrective control procedures, (c) the servicing of water treatment applications, or (d) teaching of water treatment technology, any of which should be at a level of responsibility requiring initiative, technical ability, and independent judgment. The applicant need not be in administrative or supervisory control of the work, however, it is necessary that the applicant be in technical control and have technical responsibility. The distinguishing characteristic should be considered to be the ability to deal creatively with a set of circumstances relating to water treatment problems and to deduce or synthesize a competent course of action.

#### II. Alternative to Work Experience

- a. A college degree in any discipline will be given 12 months credit toward fulfilling the work requirement.
- b. A technical degree (i.e. chemistry, physics, biology, engineering, etc.) will be given an additional 6 months of credit toward the work requirement.
- c. Credit will be given for work in a related field at the rate of 3 months for each year up to a maximum of 1 year. However, experience of this type will be evaluated on an individual case-by-case basis, and the burden will lie heavily on the applicant to demonstrate that the work performed meets the above criteria established under “Acceptable Work Experience.”

#### III. Passing the CWT Exam

The CWT exam is organized into five sections relating to industrial/commercial water treatment as follows:

1. General Water Treatment Knowledge;
2. External Treatment;
3. Boiler Water Treatment;
4. Cooling Water and Closed System Treatment; and
5. Health, Safety & Environmental Regulations.

A description of each content area is provided in the Content Outline (see 3A).

### B. Exemption

The Certified Water Technologist Program has been designed to have clear and reasonable requirements. No exceptions to the requirements are granted to any persons applying to participate in the program.



## 3. Examination Content Outline

The examination is made up of sections that cover separate areas of expertise. Each examination is considered a single unit. Applicants either pass or fail the examination as a whole. In case of failure, the complete examination must be retaken.

The exam is divided into 5 basic sections as described in the Content Outline. The exam has 200 multiple-choice questions. Four (4) answers are provided for each multiple-choice question. Only one answer of the four is correct. There are no “trick” questions, and there is no penalty for guessing. In other words, if you aren’t sure, make your best guess. You will have four (4) hours to complete the exam.

### A. Content Outline for the Certified Water Technologist Exam

The CWT exam covers a broad range of water treatment material related to the following general categories:

#### I. General Water Treatment Knowledge

- a. Basic Water Treatment Chemistry and Terminology
- b. Metallurgy
- c. Feed Control Equipment and Instrumentation
- d. Heat Transfer Principles
- e. Survey
- f. Boiler and Cooling Water System Monitoring
- g. Federal Environmental and Transportation Affairs

#### II. External Treatment

- a. Zeolite
- b. Boiler Feedwater Deaeration
- c. External Treatment Terminology
- d. Basic Water Chemistry

#### III. Boiler Water Treatment

- a. System Design
- b. System Inspection Procedures
- c. Sampling and Analytical Testing Procedures
- d. Corrosion and Deposit Problems and Treatments
- e. Water Treatment Program Limitations

#### IV. Cooling Water and Closed System Treatment

- a. System Knowledge
- b. System Sampling and Analytical Testing Procedures
- c. Cooling Water Corrosion
- d. Cooling Water Deposits and Scale
- e. Cooling Water Microbiological and Fouling
- f. Closed (Loop) Systems

#### V. Health, Safety, and Environment

- a. Maintaining Personnel and Physical Plant Safety
- b. Identification of Federal Regulations
- c. Proper Disposal of Treated Waters

## B. Sample Questions

**1. If a fresh water sample’s total alkalinity is higher than the total hardness, it indicates that:**

- (A) all hardness is in the bicarbonate form
- (B) no hardness is in the bicarbonate form
- (C) some hardness is in the bicarbonate form
- (D) all hardness is in the carbonate form ..... Answer: D

**2. To calculate boiler blowdown heat recovery savings, the water technologist must know:**

- (A) make-up water temperature
- (B) thermal losses due to deposits
- (C) BTU content of fuel
- (D) condensate temperature ..... Answer: C



**3. The normal bed depth in an ion exchange softener is:**

- (A) 24 inches
- (B) 36 inches
- (C) 42 inches
- (D) 48 inches ..... Answer: B

**4. Which coagulant operates best at pH 6.8?**

- (A) Aluminum sulfate
- (B) Ferric sulfate
- (C) Ferric chloride
- (D) Aluminum chloride..... Answer: A

**5. If a boiler cycles the feedwater eight times, what is the percent blowdown?**

- (A) 8%
- (B) 12.5%
- (C) 15%
- (D) 17.5% ..... Answer: B

**6. To prevent condensate from hanging up in a gravity feed condensate return system, the line must have adequate:**

- (A) separators
- (B) pitch
- (C) traps
- (D) treatment ..... Answer: B

**7. Which of the following materials would need the most frequent replacement as a sacrificial anode in a cooling water system?**

- (A) Aluminum
- (B) Magnesium
- (C) Cadmium
- (D) Zinc..... Answer: B

**8. A recommended copper corrosion inhibitor used in closed systems is:**

- (A) DEHA
- (B) sulfite
- (C) nitrite
- (D) tolyltriazole ..... Answer: D

**9. MSDS contains:**

- (A) all formulation information
- (B) a list of all ingredients, in order of concentration
- (C) safety, handling, spills, and fire information
- (D) information on how to use the product ..... Answer: C

**10. The MSDS at a customer plant must be:**

- (A) in a bound book
- (B) discarded after product is delivered
- (C) maintained by the purchasing agent
- (D) available to all plant personnel..... Answer: D

## C. Suggested Preparation Materials

- AWT *Technical Reference & Training Manual*
- AWT *Raw Materials Specifications Manual*
- Textbook: *Water Treatment: Industrial, Commercial and Municipal*
- AWT *Reference Guide for Water Treatment Companies*
- Textbook: *Cooling Water Treatment: Principles & Practice*

(Please note that all reference materials listed are available for purchase through AWT's Bookstore.)



## 4. Making Your Exam Reservation

### A. Scheduling the Exam at an AWT Event

The candidate should complete the CWT exam portion of the event registration brochure, or register online for the exam at that particular event.

OR

### B. Local Computer Testing Provided by Pearson Vue Global Testing

Pearson VUE maintains the largest, most expansive network of test centers in the industry and is able to offer the optimum balance to uniquely meet each candidate's needs. Pearson VUE provides:

- Test Center Access and Consistency
- The world's largest test center network, over 5,000 locations in 165 countries.
- 138 Locations in Canada—Including three Pearson Professional Centers in Vancouver, Montreal and Toronto.
- Registration via Web or Call Center.
- Test centers typically open up to six days a week, including Saturdays.

Candidates should complete the **CWT Computer Based Exam Registration Form located at Page 11 of this handbook and mail, fax or email to AWT Headquarters. Non-members and International candidates will be charged the AWT Member fee when registering with Pearson Vue for the computer based exam. Additional fees apply, and will be charged separately by AWT.** Candidates will then be provided with an ID number which they will use to register with Pearson Vue, 24 hours after the number has been assigned, in accordance with the instructions given at <http://www.awt.org/Certification/remote.cfm>. **The candidate ID number will not be assigned until all fees are paid in full.**

### C. Canceling

What if you want to cancel your examination reservation? Immediately call AWT to cancel the appointment. If you do not, you will be considered absent and forfeit all application fees. If you want to reschedule, follow the guidelines 4D.

### D. Rescheduling

To reschedule an exam, you must notify AWT at least one week before your scheduled exam date. The full exam fee from your first reservation will be applied to your new exam date. You WILL NOT be able to change your reservation if it's less than one week before your scheduled exam. If you do not reschedule within these guidelines, you will be held responsible for the entire exam fee. You will be required to pay for the exam you missed before you will be eligible to make another reservation to take the exam.

### E. Failing to Appear for a Scheduled Exam

If on the day you are scheduled to take the exam you do not appear, and you have not rescheduled or cancelled, you will lose the full exam fee. To take the exam in the future, you will need to resubmit an application and full exam payment.

There are five acceptable reasons for failing to appear for a scheduled exam without prior cancellation or rescheduling. If your reason is accepted, you will be allowed to reschedule your exam—free of charge—one time. You will need to state your reason in writing within seven (7) days of the scheduled exam date to AWT Headquarters.

The only acceptable reasons for failing to appear are:

- Serious illness—either you or an immediate family\* member
- Death in the immediate family\*
- Disabling traffic accident
- Court appearance or jury duty
- Unexpected military duty call-up

**Note:** \*Immediate family is considered to be Spouse, parent, grandparent, child, grandchild and in-law (to include mother, father, brother, sister). Adopted and step members are also included in immediate family.

AWT reserves the right to request additional evidence to support your reason for failing to appear.

### F. Accommodations for Candidates with Disabilities

AWT pledges to comply with the provisions of the Americans with Disabilities Act (42 USC Section 12101, et. seq.), and with Title VII of the Civil Rights Act, as amended (42 U.S.C. 2000e, et. seq.). If you need us to make special arrangements because of a disabling condition, you may ask for special testing services. This request must be noted when making a reservation to take the exam. Upon such notification the candidate will receive a brief documentation form which must be completed to ensure that AWT can accommodate any special needs.





All test locations have access for candidates with disabilities. If a candidate needs special testing arrangements due to impaired sensory, manual or speaking skills, or other disabilities, the candidate must send a letter to AWT Headquarters from a licensed physician, optometrist, social worker, psychologist or other appropriate professional.

The letter must be written on the healthcare professional's letterhead and include the professional's title, address and telephone number. The letter must also include a diagnosis of the disabling condition, and explain why special testing arrangements are necessary. The letter must have an original signature from the professional. Faxes and photocopies will not be accepted.

Once approved, AWT will then decide on the time and place of the specially arranged exam. All special arrangements are subject to the policies of AWT. These arrangements will be provided at no additional charge.

## 5. Examination Day

### A. What to Bring

You must bring a form of signature identification. Your signature identification must have an imprint of your name in addition to bearing your signature (Driver's License, Passport) and must include a photo of you. It must bear the same name as the one you registered with for the exam. For the paper and pencil exam, you will be provided with supplemental materials including some formulas, a non-scientific calculator and two #2 pencils. Only candidates that preregistered for the exam will be allowed to take the exam. No on-site registration is available.

If you do not have the required identification with you on your scheduled exam day, you will not be allowed to take the exam. You will be considered absent, and will lose the full exam fee. You will be required to reapply for the exam and pay all applicable fees.

Please note that visitors are not allowed in the exam room. Childcare is not provided.

### B. Report Time

Paper and pencil exams are typically scheduled to begin at 8:00am. Be sure to get to the testing location at least 30 minutes (and no later than 10 minutes) before the scheduled examination time. For exams administered at AWT sponsored events, you must be checked in with the exam administrator and in your assigned seat by 8:00am. No entry to the testing room will be admitted after 8:00am when the exam process has begun. You will be considered absent, and lose the full exam fee. You will be required to reapply for the exam and pay all applicable fees.

### C. Late Arrival

Candidates who arrive late for their exam will lose their reservation. They will be considered absent, and according to policy Item 4E, "Failure to Appear for a Scheduled Exam" will apply. There are no exceptions to this rule.

### D. Bad Weather

The exam will be delayed or canceled only in emergencies. If severe weather or a natural disaster makes the testing center inaccessible or unsafe, the exam will be canceled. Exams that are canceled due to bad weather will be rescheduled as soon as possible, without additional charge. Candidates should call AWT during business hours to find out when the exam has been rescheduled. For local computer testing, please contact your chosen Pearson Vue location directly.



## 6. Taking the Exam

### A. Strategies

The exam evaluates the skills and knowledge of water treatment professionals. It is not something for which you can study or “cram.” It is also not meant to judge your “academic excellence.” It is designed to measure your competence. The reference list in this handbook is provided as a guide for those areas in which you may need extra review. Please note, AWT does offer training courses and other educational materials. These programs are strictly for education and training purposes only. AWT neither endorses nor sponsors any review courses for the Certified Water Technologist Examination. Strict security measures are taken to prevent the removal and/or reproduction of examination questions. Use caution when purchasing study guides or paying for review courses that may claim to address actual examination items.

The following steps may be helpful as you prepare for the exam:

- The major subjects that will be included on the exam can be found in the Content Outline, in Section 3A of this Handbook.
- Sample exam questions are provided in this handbook at Section 3B to assist you in evaluating your level of understanding. This will also help you estimate the level of detail covered in the exam. The sample questions are arranged in content code order. On the exam, they may be scrambled.
- Answer all of the sample questions to see if there are any subjects you have difficulty answering. You should review those subjects.
- Study the format of the sample questions. The exam questions will follow the same format. All of the questions are multiple-choice. All will have only one correct answer, and all can be answered on their own.
- A list of some AWT Reference Materials is provided at Section 3C. AWT does not recommend you read all of these books, however, they can be especially helpful for certain subjects in which you might wish to have additional review.
- Know the best way to get to the test site before the exam day. Make sure you know the exact location of the center, where parking can be found, and the actual location of the testing room.
- Remember that you are not competing with anyone. There is no limit to the number of people who can pass the exam

### B. Tips

1. Relax. This will help you be more alert and reduce your physical stress.
2. Find the right work pace. Don't rush or go too slowly. Find a pace that is comfortable.
3. Follow the directions and work carefully.
4. Read all of the options for each question before you mark your answer.
5. Skip difficult questions. Or, mark them for later review, and come back to them.
6. If you are not sure of an answer, make an informed guess. There is no penalty for guessing. Questions that you don't answer and wrong answers are both counted as wrong responses. Whether you pass is based on your total number of correct responses.

## 7. Examination Scoring

Because this is a competency exam, and because it's not supposed to measure your “academic excellence,” the exam is scored as either a pass or a fail.

### A. Criteria for Passing the Exam

A cumulative score of 75% from all sections of the exam is needed to pass. Candidates will be advised if their score was a pass, however no further scoring information will be provided. Candidates who pass the exam will be notified via letter and invited to submit an application to become a CWT.

### B. Failing the Exam

Candidates will be advised via letter if they fail the exam. They will be notified if their score in any section was under 75%, however no further scoring information will be provided. All examinations may be retaken after the established waiting period has expired. The minimum waiting period is three (3) months. The Candidate must resubmit an application and pay the applicable examination fee. The examination fee is calculated to cover AWT's costs of handling the examination which are essentially the same for retakes as for initial attempts.



## C. Exam Security

Any candidate who gives help to, or receives help from, others during the exam will be asked to leave the exam site. Anyone involved in such behavior will be reported to the Association of Water Technologies and his/her exam will not be scored. Examination fees will not be refunded and the candidate may be prohibited from taking the Certified Water Technologist examination again. The performance of all candidates is monitored and may be analyzed to detect fraud. This data is given to the AWT Certification Committee. Candidates who violate security measures will not have their exam scored. All exam materials, including all questions and all forms of the exam, are copyrighted and the property of AWT. Any distribution of these materials through reproduction, or oral or written communication, is strictly prohibited and punishable by law.

## 8. Fees

The candidate fees for the CWT Exam are as follows:

### AWT Member

U.S..... \$385  
International..... \$485\*

### Non Member

U.S..... \$405\*  
International..... \$505\*

\*Non-Members and International candidates will be charged the AWT Member fee when registering through Pearson Vue for the computer based exam. Additional fees apply, and will be charged separately. The candidate ID number will not be assigned until all fees are paid in full.

## 9. Please Remember

There are **THREE** steps to becoming, and staying, certified:

### 1. Pass the exam.

- (a) **To take the paper and pencil CWT exam** at an AWT sponsored event, register as a candidate by completing the CWT Exam registration form contained in that event brochure.
- (b) **To take the CWT Computer based exam**, follow the remote exam instructions provided on the AWT website at: <http://awt.org/Certification/remote.cfm> For the computer based exam, complete the CWT Exam Registration form found at page 11 of this handbook. Mail, fax or email to AWT Headquarters.

### 2. Apply. Complete the CWT application form.

Complete the CWT application form found on the AWT website at <http://awt.org/Certification/index.cfm> and submit to AWT Headquarters with payment. Have FOUR references complete the Reference Form (contained therein) and submit on your behalf, directly to AWT Headquarters.

### 3. Recertify.

Recertify every five years, using the form found on the AWT website at <http://awt.org/Certification/recertification.cfm>.



## CWT Computer Based Exam Registration Form

One completed registration form required per person. You may mail or fax completed form(s) to:

AWT  
9707 Key West Avenue, Suite 100  
Rockville, MD 20850

**Fax** (301) 990-9771

### Candidate Information

\_\_\_\_\_  
Name

\_\_\_\_\_  
Company

\_\_\_\_\_  
Address

\_\_\_\_\_  
City

\_\_\_\_\_  
State

\_\_\_\_\_  
Zip

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Fax

\_\_\_\_\_  
Email address

### Please check one:

- AWT Member     \*AWT International Member
- \*Non-member     \*International Non-member

\*Additional fees apply. (See section 8). Please complete payment form at page 12.

The candidate ID number will not be assigned until all fees are paid in full.

### Pearson Vue Test Location

\_\_\_\_\_  
Address

\_\_\_\_\_  
City

\_\_\_\_\_  
State

\_\_\_\_\_  
Zip

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Fax



## Additional Fee Calculation Sheet and Payment for CWT Computer Based Exam

Candidate Name: \_\_\_\_\_

CWT Additional Exam Fees (Please check one):

- \*International AWT Member: \$100
- \*U.S. Non-member : \$20
- \*International Non-member: \$120

\*See Section 8. Non-members and International AWT member candidates will be charged the AWT Member fee by Pearson Vue when registering for the computer based exam. Additional fees apply, and will be charged separately by AWT Headquarters. The candidate ID number will not be assigned until all fees are paid in full.

### \*Payment

- Enclosed is a check payable in US Dollars to AWT
- Enclosed is a Money Order payable in US Dollars to AWT
- Please charge my:  Visa  MasterCard  Amex

Credit Card Number \_\_\_\_\_

Security Code \_\_\_\_\_

Name on Card \_\_\_\_\_

Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

### Please mail the completed form to:

AWT  
Certification Program  
9707 Key West Avenue, Suite 100  
Rockville, MD 20850

or Fax: (301) 990-9771