



# **Certified Glass Installer Exam Handbook**

# **NGA**

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National Glass Association

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## Preface

A glass installer (glazier) installs and repairs safety glass and related materials (e.g., Lexan®) both in and on residential and commercial structures. This handbook explains the process necessary to becoming certified. It also provides the exam specifications and sample exam questions for the glass installer.

This handbook also provides glass installers, who are candidates for NGA's Certification program, with a unique reference to use in preparation for taking the certification examination. The information contained in this handbook is based on voluntary industry standards for acceptable practice as reflected in the job analysis and exam specifications.

This handbook is merely the starting point for preparing to take the certification exam. You should combine using this handbook with on-the-job training (OJT) and on-the-job experience *as well as the many study sources available industry-wide* such as NGA's *Glass Installer Reference Manual*. In a career that is as diverse as the glass field, it is a challenge for glass installers to remain current.

### **Disclaimer for Training and Educational Programs**

The National Glass Association (NGA) is a District of Columbia nonprofit corporation, which is tax exempt under Section 501(c)(6) of the Internal Revenue Code. NGA's training and educational programs have been developed in furtherance of its nonprofit tax exempt purposes primarily to benefit the architectural, automotive and specialty glass industries. These programs have been developed by NGA or its instructors to provide general education and training in connection with the above industries. These programs cannot however, anticipate all physical and factual situations, and cannot take the place of professional experience and judgment. NGA does not guarantee, warrant or endorse the methods, procedures and manner of work or services described or referred to in the educational and training materials, or any work or services performed by any individual person or any firm or shop; all warranties are expressly excluded. Neither NGA nor its officers, directors, members, employees, instructors or agents shall be liable for any loss, damage or claim with respect to any work or services performed, whether or not it is based on the training and education programs. All such liabilities, including special, indirect or consequential damages, are expressly disclaimed and excluded.

## Introduction

The beauty and appeal of glass have been evident throughout history. Glass has been a favorite medium of artists who use it to create intricate figurines and by architects to design massive buildings.

The purpose of this handbook is to provide information on NGA's Certified Glass Installer Program. There are eight objectives of the program:

- Provide a means for practicing glass installers to gain recognition and verification of their knowledge in their industry.
- Improve the credibility of practicing glass installers by measuring a specific body of knowledge.
- Recognize employee efforts to improve individual knowledge and proficiency.
- Promote universal industry safety training to safeguard worker health and welfare, emphasizing the glass industry's commitment to maintaining a safe workplace.
- Provide a forum in which the merits of new procedures and techniques can be analyzed and communicated to industry professionals.
- Ensure the future knowledge of the industry's pool of trained glass installers by providing for certification re-validation through continuing education.
- Encourage certification awareness by consumers and licensing/credential boards of government entities.
- Protect the public by ensuring that certified individuals have the knowledge necessary to practice competently as glass installers.



This handbook provides information on how to become certified for those glass installers who wish to sit for the NGA Certified Glass Installer exam.

September, 2002

RE: NGA Certified Glass Installer Program

Dear Certification Candidates,

I am writing as Chairman of the Glass Installer Training & Certification Committee, in order to explain our thinking in offering this new program to the industry.

In the spring/summer of 2000, we surveyed the industry to identify the tasks and knowledge that are important for competent performance by glass installers. The survey participants were asked to rate, on a scale of 1 to 5, the various tasks and knowledge statements in terms of their importance to competent performance as a glass/glazing professional.

Most of the tasks and knowledge statements were rated and validated as important for the work performed by glass installers.

These results indicated to us and to our professional testing service that we needed a *more comprehensive, more difficult exam*, and that the knowledge required for competent performance in all three levels of certification (Glass Installer, Senior, and Master) was really *the same for each level*. This would add more significance to the Certified Glass Installer level and streamline the testing of the current knowledge topics that the survey respondents felt were important.

Based upon these results, the Glass Installer Training & Certification Committee has:

- Developed a dramatically more comprehensive, more difficult exam for the Certified Glass Installer level; and
- Eliminated the Senior and Master levels since the survey results could not distinguish between a Certified Glass Installer and a Senior or Master Glass Installer (that is to say, the knowledge and tasks were identical in importance to the industry professionals).

In an effort to encourage industry professionals to sit for the new Glass Installer exam, we have adjusted the eligibility requirements for all candidates to *one year minimum employment* in the glass industry. *The certification renewal requirement remains at every three years*. Today's ever changing technology makes it impossible to increase the renewal requirement to six years as too many changes and improvements occur over a six-year period. As you know, it is extremely important for a glass installer to remain as current and knowledgeable as possible. Time in the

industry *does not necessarily* qualify one to be a Certified Glass Installer. Rather, an elevated awareness of industry knowledge is required. The revised exam is all encompassing, and much more in depth than the previous exam. Candidates could also be glass installers who are responsible for others, not just themselves.

The *Glass Installer Reference Manual* is a comprehensive reference book designed to assist the Glass Installer. However, like other professional certification programs, *it has not been designed to ensure passing the exam by reading the book*. It is a reference book covering the subject matter to be tested, but the certification exam relies heavily on one's expertise and on-the-job experience.

We believe this new program is conducive to encouraging Glass Installer Certification. We are attempting to meet the needs of the industry and add value to the Certified Glass Installer Program. This is ***not*** an entry-level certification. This certification means that the glass installer has a complete understanding of all of the applicable knowledge areas as outlined in the exam specifications.

To be an NGA Certified Glass Installer means that the installer is a knowledgeable industry professional and should be acknowledged and respected for his or her accomplishments. We believe our new program does just that and we hope that you, too, will see the value of these changes to this important program.

Watch for notices and updates about the revised Certified Glass Installer Program in **Glass®** Magazine and on NGA's web site at [www.glass.org](http://www.glass.org). You can also call NGA's Professional Development Department at 703-442-4890 X134 or 151.

Thank you for your time and I encourage you to get involved with the various NGA Glass Committees.

Regards,



Ron Clawson  
Chairman, Glass Installer Training & Certification Committee

# How to Use This Handbook

## Overview

This *Certified Glass Installer Exam Handbook* is a study resource for experienced glass installers who wish to sit for the NGA Certified Glass Installer Exam. The topics included on the exams reflect the voluntary industry standards for acceptable practice and relate directly to the body of knowledge listed in the job analysis and exam specifications (pages 25-31).

The format of this handbook is arranged to show a list of topics necessary for a candidate to study prior to taking the exam. The certification exam items (questions) are written to test this body of knowledge. The knowledge areas and class codes (A1, B1, and so forth) are included as cross-references to the specific knowledge to be tested. This handbook explains the NGA certification process.

## Handbook Content

*This Certified Glass Installer Exam Handbook consists of these content areas:*

- NGA's Certified Glass Installer Program
- Certified Glass Installer Examination Specifications
- Certified Glass Installer Examination Study References

## Installer Preparation

Follow these hints for using this reference to help you prepare for your NGA certification exam:

- Reserve a study area and set it up for study in advance.
- Ensure that your study area is comfortable and conducive to learning, with such features as adequate lighting, heat or air conditioning, chair, table (writing surface), and a minimum of outside noise.
- Review the Certified Glass Installer Exam Specifications and sample exam items (questions) listed in this handbook.
- Read the reference material actively and carefully, taking notes or jotting down questions to enhance your understanding of the content.

## NGA's CERTIFIED GLASS INSTALLER PROGRAM

Providing technical information and education for the glass industry is a high priority for NGA. In fact, NGA's mission statement clearly supports this priority:

*To provide information and education, as well as promote quality workmanship, ethics, and safety in the architectural, automotive and window and door glass industries. NGA acts as a clearinghouse for industry information, a catalyst in education and training matters, and a powerful voice on behalf of our members.*

To meet this priority, NGA has developed the Certified Glass Installer Program in addition to other technical, safety and managerial programs. NGA is committed to providing the glass industry with educational materials and training programs at all levels, from entry level to senior management.



### NGA provides these essential certification services:

- Certification program management including registering, collecting and maintaining certification records; issuing certification credentials; enforcing certification policies; and resolving program discrepancies and challenges.
- Liaison between certification candidates and the certification committee.

Note: It should be clearly understood that the certification criteria required by this program have been developed to enhance professional standards within the industry and have no relationship, by design or inference, to local wage schedules, private compensation agreements, or reduction of any management prerogatives regarding promotion or pay.

### NGA's Glass Installer Training and Certification Committee

The NGA Glass Installer Training and Certification Committee is composed of a representative group of glass-industry content experts who assist the Association in assessing and developing certification program guidelines, examination specifications (under the guidance of NGA's professional exam development and delivery contractors), and job analyses. The

Committee also serves as the Appeals Board for the certification program, ruling on such issues as exceptions to established program procedures or challenges that have been unsatisfactorily resolved by the NGA staff. The committee meets as an Appeals Board, typically at GlassBuild America™.

## **Development of the Certified Glass Installer Examination**

NGA's certification examinations are developed with the guidance of professional exam developers and administrators. These professionals score the examinations as well. They specialize in developing computer-based examinations for both professional and academic settings.

All NGA certification examinations meet testing-industry standards for fairness, validity and reliability:

- An examination is fair when its contents neither favor nor discriminate against any individual or group due to ethnic background, geographic locale, practice setting or other demographic criteria.
- An examination is valid when it accurately reflects the knowledge required for competent practice.
- An examination is reliable when it yields consistent results over time.

The validity of NGA's Certified Glass Installer examination has been documented using two independent methods:

- First, the job analyses used to develop the examination were validated by a random sample of glass industry practitioners across the United States.
- Second, all examination items were validated by the NGA Glass Installer Training and Certification Committee using well-accepted psychometric rating scales.

## **Questions and Answers about NGA's Certified Glass Installer Program**

### ***What does it mean to be NGA certified?***

Passing an NGA certification examination means that you have met agreed-upon industry standards for knowledge in the field of glass replacement. You will receive a certificate, an identification card and six uniform patches that attest to your successful performance (passing score) on the examination.

### ***Who is eligible for NGA's Certified Glass Installer examinations?***

Before you schedule your examination, be certain that you have been employed as a glass installer for one year. The minimum requirement for the Certified Glass Installer examination is a minimum of one year work experience in the glazing industry. This means that you are eligible to sit for the examination, but does not guarantee that you have sufficient knowledge to pass it. Success on this exam requires focused study.

### ***What is the certification fee?***

Call NGA at 703/442-4890 ext. 134 for the applicable fee.

### ***How do I register for an examination?***

Complete, sign, and mail or fax the registration form, examination checklist, *and* the examination fee (check or credit card) to: National Glass Association, Certified Glass Installer Program, 8200 Greensboro Drive, Suite 302, McLean, VA 22102-3881, or fax to 703/442-0630. You can also register online with a credit card at [www.glass.org](http://www.glass.org).

In all correspondence, be sure to give your name, address, telephone number and Personal Identification Number or Social Security Number.

*Note: If you do not wish to provide your Social Security number, NGA will assign a 5-digit Personal Identification Number.*

NGA will mail you a registration confirmation letter. This will arrive about two weeks after you send in your registration form and payment.

*Note: Your examination registration expires after one year. If your registration expires before you wish to take the examination, contact NGA for registration renewal.*

### ***How do I schedule an examination?***

Contact NGA's examination provider, LaserGrade Computer Testing using the toll-free exam hotline: **800/211-2754**. You must have ready **all** of the following information:

- Your personal information:
  - Last name, first name, and middle initial
  - 5 Digit Personal Identification Number
  - Home address
  - Home phone number
  
- Your employment information:
  - Company name
  - Company address
  - Company primary phone number
  - Company fax number

NGA's examination provider, LaserGrade, will not schedule an examination for anyone who has not been authorized by the NGA and who does not have an authorization record on file. To be authorized you must have submitted the registration form, checklist and fee to NGA. Once NGA receives these items, a confirmation will be mailed to you informing you that you are authorized to register for the exam. Do not contact the exam scheduling center until you receive this confirmation.

It is a good idea to schedule your examination as early as you can after registering to ensure that the testing center has an appointment available for the date and time you prefer. Once you have scheduled your examination, your examination fee is not refundable.

If for some reason, you cannot keep a scheduled examination appointment; you may reschedule the appointment without penalty, if you notify the testing center 48 hours in advance. If you fail to notify LaserGrade at least 48 hours before the scheduled exam time, the exam fee will **not be refunded**. You will be required to re-register and pay the exam fee again to take the certification exam.

### ***Where do I take the examination?***

Examinations are administered at testing centers nationwide operated by NGA's examination provider. You can learn the location of the center nearest you by using the toll-free exam hotline: **800/211-2754** or by visiting the test center web site at **www.lasergrade.com**. On this site follow these steps:

- Select "Find a Test Center."
- Enter your zip code.
- Select "National Glass Association" for Sponsor and click "Find a Testing Center."

- The four closest testing locations will be listed along with directions to the testing center. You may change the search for test locations to show more than four locations.

You will take your NGA examination at the testing center by entering answers to multiple choice items on a computer.

### ***Are special accommodations available?***

Special testing arrangements are available for candidates with disabilities. To request a special accommodation, send a registration form and a completed accommodation request form to NGA. An accommodation request form is available from NGA.

*Note: All registrations requiring special accommodations must receive specific approval from NGA prior to scheduling the examination.*

Once NGA has notified you of the approval of your special accommodations request you may call LaserGrade to schedule your exam. Call 800/211-2754 and ask to speak with the **ADA Coordinator**. You must schedule/reschedule your appointments with the ADA Coordinator.

### ***Are foreign language interpreters available?***

The use of a language interpreter is prohibited. Because NGA cannot guarantee consistent translation of examinations, this practice is not available.

### ***Are study materials available?***

You may purchase the optional study materials from NGA by calling toll-free 866/DIAL NGA (342-5642), extension 134, or by visiting our website at [www.glass.org](http://www.glass.org). For a list of additional reference materials please visit our website at [www.glass.org](http://www.glass.org).

### ***What should I expect at the examination?***

Each computer-administered examination covers a range of topics which glass industry experts have judged appropriate. Exam items (questions) are based on the industry-approved exam specifications, which provide an outline of the areas of knowledge required for a Certified Glass Installer.

***Are sample examination items available?***

The following are sample examination items (questions) for the Glass Installer examination:

1. Suspension scaffolding must be inspected after each change in rigging procedure, and thereafter at what intervals?
  - a. No inspection needed
  - b. Weekly
  - c. Bi-weekly
  - d. Monthly
  
2. Aluminum and glass expand and shrink at different rates. Under the same conditions, how much faster is aluminum's expansion rate?
  - a. One and one-half times
  - b. Two and one-half times
  - c. Five times
  - d. Ten times
  
3. Any repair or alteration involving glazing materials must be governed by the:
  - a. Owner's preference of glazing product
  - b. Availability of preferred glazing products
  - c. Nature of the building's location
  - d. Requirements of the local building codes.
  
4. The ability of a sealant to stick to a surface is the definition of:
  - a. Adhesion
  - b. Shear Strength
  - c. Elasticity
  - d. Cohesion

5. 1 foot and 3-3/4 inches is equivalent to:
- a. 5050 millimeters
  - b. 4.60 decimeters
  - c. 3.90 centimeters
  - d. 0.40005 meters
6. A Johnson bar is a:
- a. Mule pry dolly
  - b. Split case dolly
  - c. Madison dolly
  - d. Low floor dolly
7. Which of the following is not a type of vise used with a milling machine?
- a. Universal vise
  - b. Fence vise
  - c. Swivel base vise
  - d. Plan vise

*Answers: 1. b; 2. b; 3. d; 4. a; 5. d; 6. a; 7. b;*

## What should I expect on the day of the examination?

Be sure to arrive at the testing center at least 15 minutes early. Before being admitted, you will be required to show two forms of identification -- **Primary form of identification** must be a federal or state government issued photo ID. (State-issued driver's license or identification card, passport, active military identification) **Secondary form of identification** must be a valid credit card or a Social Security Card. (In keeping with FTC guidelines to prevent identity theft, it is not recommended carrying your Social Security card. If it is the only secondary form of identification you have, it will be accepted by LaserGrade.)

*Note: If for any reason, you cannot take the exam on the scheduled date and time, call 800/211-2754 and reschedule the exam, at least 48 hours in advance to avoid forfeiting your exam fee. If you fail to notify LaserGrade at least 48 hours before the scheduled time, the exam fee will **not** be refunded. You will be required to re-register and pay the exam fee again to take the certification exam.*

You will be shown to a computer and given operating instructions. A practice program, to familiarize you with taking an examination on the computer, will be run. No prior knowledge of computers or typing is needed to take the examination. Once the examination begins, you will have 90 minutes to complete it.

The computerized examination allows you to skip items temporarily, then return to them after you have seen all of the items. Before allowing you to exit the examination, the computer will notify you about the items that you have marked for review or those that remain unanswered. Upon your completion of the examination, you will receive your examination results. You will learn immediately whether you passed the examination.

## What are the testing center regulations?

The testing center regulations are:

- Candidates who arrive after their scheduled time will be required to reschedule the examination. Arrive at least 15 minutes before your scheduled time.
- Candidates must present **two forms of identification:**  
**Primary** form of identification must be a federal or state government issued photo ID. (State-issued driver's license or identification card, passport, active military identification)

**Secondary** form of identification must be a valid credit card or a Social Security Card. *(In keeping with FTC guidelines to prevent identity theft, it is not recommended carrying your Social Security card. If it is the only secondary form of identification you have, it will be accepted by LaserGrade.)*

- No electronic devices (pagers, palm pilots or cell phones) are allowed in the examination room. Only non-programmable, silent calculators that do not require electrical outlets may be taken into room. No reference materials or notes of any kind will be permitted.
- No exam materials, documents, or memoranda of any sort may be taken from the examination.
- Visitors will not be permitted in the examination room.
- Testing center personnel will be instructed to answer questions about examination procedures only. They cannot respond to inquiries regarding examination content.
- Any candidate giving or receiving assistance of any kind, or found making a disturbance, will be required to turn in examination materials and leave the testing center. Examinations from candidates who violate these security guidelines, or from those who attempt to impersonate another candidate, will not be scored. The candidate's examination fee will not be refunded.
- Once a date and time has been scheduled to take the exam, LaserGrade requires 48 hours notification to reschedule. If the candidate fails to notify the LaserGrade at least 48 hours before the scheduled time, the exam fee will **not** be refunded. The candidate will be required to re-register and pay the exam fee again to take the certification exam.

### ***When will I receive a score report?***

You will receive immediate pass/fail results when you complete your certification examination. Permanent certification records maintained by NGA contain only a pass/fail indication, not a numeric or scaled score.

### ***When may I retake the examination if I fail it?***

If you fail the examination, you must wait 30 days before taking it again. ***The cost of re-testing is the same as the cost of the original examination.*** If you fail a second time, you must wait an additional 30 days before taking the next examination. If you fail a third time, you must wait 6 months before taking another exam. After waiting 6 months, the examination retest schedule begins all over again (waiting 30 days, 30 days and 6 months).

### ***How is the examination scored?***

The score you receive on the exam is a “scaled score.” Since there is more than one form for the glass installer exam, NGA’s exam development company has ensured that the exam forms are equal in difficulty. There is a mathematical adjustment across all forms of the exam to ensure that one form is not easier or more difficult than the other forms.

The passing scaled score for the exam is 75. If your reported scaled score is equal to or greater than 75, then “PASS” appears on your score report. If your scaled score is less than 75, “FAIL” appears on your score report. If a failed score appears, your score and the exam topics will be listed with an indication of the acceptable performance or recommended additional study items.

It is important to remember that a 74 on the exam does NOT mean you have missed passing by only one item, because, a scaled score is NOT a percentage score. It is very possible that you have missed passing by more than one item.

A scaled score is a standard method of scoring. It is extremely reliable in ensuring exam fairness.

### ***How do I submit comments about the testing?***

Mail your comments to Certified Glass Installer Program, National Glass Association, 8200 Greensboro Drive, Suite 302, McLean, VA 22102-3881. You may also fax your comments to 703/442-0630. Please include:

- Your name, address, 5-Digit Personal Identification Number and phone number.
- Your test date.
- Exam name.
- Your testing center location (found on the results form).

Direct all inquiries and comments about eligibility and procedures for registration to NGA as above, or e-mail [certification@glass.org](mailto:certification@glass.org)

### ***When will my certification be issued?***

When you have met all the certification eligibility criteria, your certification will be issued approximately 8 weeks after NGA receives your official passing notice.

At that time, NGA will mail you the following materials:

- Certification certificate.
- Wallet identification card. (Call NGA for details about replacement of a lost or damaged card.)
- 6 complimentary uniform patches.

*Note: Replacement or additional patches can only be obtained by contacting NGA toll-free at 866/DIAL NGA (342-5642) extension 134.*

- A card for a complimentary one-year subscription to **Glass Magazine®**. (You must fill out the form, sign it, and mail it in order to get your subscription.)

### ***What are the privileges of NGA certification?***

- The right to use (in accordance with specific licensing regulations) the credentials for the certification you have achieved.
- The right to display the appropriate uniform patch.
- The right to purchase optional certification products according to your certification type.

### ***Are examination results ever released?***

To maintain confidentiality, NGA does not share, sell, or circulate certification records.

### ***How can others verify my participation?***

To provide information without compromising participant privacy, each participant is identified by the participant's 5-digit Personal Identification Number which can be found on the participant's confirmation letter or by the last four digits of the participant's Social Security number.

*Note: The release of information is restricted to certification program and company participants. Encrypted code is based upon information provided to NGA on the candidate's registration form.*

### ***Can my employer verify my certification?***

Employers and consumers may contact NGA for a glass installer's certification status. NGA will release only the following information:

- Certification type
- Status (active or expired)
- Effective date
- Expiration date

*Note: Please notify NGA when you change employers.*

### ***How will I know when to renew my certification?***

Certification renewal is required every three years. NGA will notify you in writing, approximately 60-90 days before the expiration of your certification, so that you may renew your certification.

### ***What are the requirements/options for certification renewal?***

The requirements for certification renewal, is to sit for and pass the certification examination or you can earn credits through NGA Continuing Education. Our program is a great way to recertify and keep your knowledge up to date. Plus, it reinforces your reputation as a glass expert. For more information about the Continuing Education program please read the section "Continuing Education for Certification Renewal" on page 34.

### ***Why do I need to renew my NGA certification every three years?***

Glass installers are on the front lines of keeping people safe in their workplaces and residences. They need to show that they are knowledgeable about the latest techniques and information. Many professional fields require certification renewal.

### ***Can NGA certification be revoked?***

The Certified Glass Installer Program is important to the industry and provides certain entitlements to successful candidates; therefore, it is essential to maintain the integrity and prestige of the program. All certified glass installers are expected to exemplify the highest legal and ethical

principles, to abide by the rules promulgated by the NGA Glass Installer Training and Certification Committee, and to comply with applicable laws. Any transgression or violation of these principles, rules or laws may constitute grounds for appropriate disciplinary action, including censure, suspension or revocation of certification. Any violation of this nature affecting the Certified Glass Installer Program should be brought to the attention of the NGA Glass Installer Training and Certification Committee, which may take appropriate disciplinary measures after providing notice of the intended action and an opportunity for the individual in question to be heard. The decision of the NGA Glass Installer Training and Certification Committee shall be final and cannot be appealed.

## **Summary**

Providing technical information and education for the glass industry is a high priority for NGA. To meet this priority, NGA has developed the Certified Glass Installer Program in addition to other technical, safety and managerial programs. NGA's Certification Department is committed to providing the glass industry with educational materials and training programs at all levels, from entry level to senior management.

## Certification Checklist

Registration form, exam checklist and examination fee

- Completed?
- Signed?
- Mailed or faxed to NGA or registered on NGA's web site?

Registration confirmation

- Confirmation letter received?
- Have you called 800/211-2754 to schedule your exam?

Exam Date \_\_\_\_\_

Time \_\_\_\_\_

Location \_\_\_\_\_

Take to the Exam

- Primary form of identification? (state-issued driver's license or identification card, passport, active military identification)
- Secondary form of identification? (valid credit card or Social Security Card)

**Note: DO NOT bring electronic devices such as cell phones, palm pilots, programmable calculators, or pagers. ONLY non-programmable calculators are allowed.**



## EXAMINATION SPECIFICATIONS

### How to use these Tables

The tables below summarize the glass knowledge categories from the job survey conducted industry wide. This information has been divided into knowledge areas and classes. These classes together add up to 100% of what candidates need to know to become a certified glass installer. For example, the table, Knowledge Area 2: “Safety Procedures, Laws, Standards, and Codes” is 20% of the exam. Under this major topic or “Class” are 7 specific sub-topics that make up the items or Class. Also listed is the approximate number of items (questions) on the exam from each knowledge area.

Make sure to review each knowledge area to determine the specific topics of study. Make sure to review and understand each knowledge area.

### CERTIFIED GLASS INSTALLER EXAM SPECIFICATIONS

<b>Class Code</b>	<b>Knowledge</b>
<b>A</b>	<b>Area 1: Glass Installation (80% of Exam - 64 Items)</b>
	<i>Knowledge of:</i>
<b>A1</b>	Types of glass
<b>A2</b>	Types of heavy glass
<b>A3</b>	Types of plastics
<b>A4</b>	Handling techniques for glass, plastic, metal, and panels
<b>A5</b>	Cutting techniques for glass
<b>A6</b>	Cutting techniques for heavy glass
<b>A7</b>	Cutting techniques for plastic

<b>A8</b>	Cutting techniques for metal
<b>A9</b>	Cutting techniques for panels
<b>A10</b>	Field glass cutting techniques
<b>A11</b>	Types of cutters for glass, heavy glass, and plastic
<b>A12</b>	Types of edgework
<b>A13</b>	Basic glass edge profiling
<b>A14</b>	Edge sealants (e.g., for mirrors)
<b>A15</b>	Types of sealants, including joint sealants
<b>A16</b>	Sealant application techniques
<b>A17</b>	Techniques used for hand-washing glass and glazing materials
<b>A18</b>	Types of cleaning products and techniques
<b>A19</b>	Types of abrasive products (e.g., belts, discs, drums)
<b>A20</b>	Glazing compounds (e.g., putty, caulking)
<b>A21</b>	Solvent application techniques for plastic fabrication
<b>A22</b>	Plastic bending techniques and tools (e.g., strip heater, torch)
<b>A23</b>	Types of metal finishes (e.g., anodized, painted, powder-coated)
<b>A24</b>	Machinery operation (e.g., metal fabrication)
<b>A25</b>	Metal joinery techniques (e.g., storm windows, shower doors, storefront, curtainwall)
<b>A26</b>	Metal shearing and forming techniques
<b>A27</b>	Assembly preparation procedures in metal fabrication (e.g., end dam, weep hole, setting blocks, pull-in vinyl, putty)
<b>A28</b>	Door hardware preparation

	procedures/applications (e.g., hinges, locks, pivots, holders)
<b>A29</b>	Types of applications (e.g., covered or uncovered edges, speak holes, screw spline, shear block)
<b>A30</b>	Preparation of substrate and application of adhesives
<b>A31</b>	Mirror fastening techniques
<b>A32</b>	Types of fasteners and anchors
<b>A33</b>	Types of glass machinery
<b>A34</b>	Types of drills (e.g., tube drill, bits, twist drills, countersinks)
<b>A35</b>	Hand tools (e.g., portable belt sanders, disc sanders, drill motor, screw gun, diamond saws)
<b>A36</b>	Preventive maintenance procedures
<b>A37</b>	Types of measurement devices (e.g., transit, laser level, spirit level)
<b>A38</b>	Measurement units (e.g., reading a standard tape measure, the metric system)
<b>A39</b>	Trade mathematics (e.g., algebra, geometry, trigonometry)
<b>A40</b>	Manufacturer's installation instructions
<b>A41</b>	Types and components of scaffolding, rigging, and ladders
<b>A42</b>	Types of glazing systems (e.g., aluminum, wood, vinyl)
<b>A43</b>	Types of doors (e.g., hinge, slide, revolve, swing)
<b>A44</b>	Types of door operators (e.g., swing, slide, revolving, balanced)
<b>A45</b>	Types of door hardware (e.g., locks, hinges, closers, pulls)
<b>A46</b>	Types of windows and window hardware

<b>B</b>	<b>Area 2: Safety Procedures, Laws, Standards, and Codes (e.g., OSHA, EPA, ADA, UBC, Building and Fire Codes, Security Codes, etc.) (20% of Exam- 16 Items)</b>
	<i>Knowledge of:</i>
<b>B1</b>	Personal safety protective equipment (e.g., respirators, goggles, gloves, hard hats, shoes, harnesses, belts)
<b>B2</b>	First aid procedures (e.g., cuts)
<b>B3</b>	Applicable accident and safety reports
<b>B4</b>	Safety glazing code
<b>B5</b>	OSHA regulations (including HAZCOM)

<b>B6</b>	ADA (Americans with Disabilities Act)
<b>B7</b>	NFPA Fire Code (National Fire Prevention Association)

## **CERTIFIED GLASS INSTALLER EXAMINATION STUDY REFERENCES**

The following lists of reference are suggested sources for information. These organizations and the material they provide, are **NOT** required by the NGA for source information covering the Examinations Specifications (see Pages 25-28). However, NGA *recommends* that these or similar sources be used in preparation for the Certified Glass Installer Examination.

### **References**

#### **American Architectural Manufacturers Association (AAMA)**

[www.aamanet.org](http://www.aamanet.org)

AAMA Technical Reference Center

- Volume 1: “Windows and Sliding Glass Doors”
- Volume 2: “Metal Curtain Walls”
- Volume 3: “Aluminum Storefront & Entrance Manual”
- Volume 4: “Skylights and Space Enclosures”

#### **American Society for Testing and Materials**

[www.astm.org](http://www.astm.org)

#### **Builders Hardware Manufacturers Association (BHMA)**

[www.buildershardware.com](http://www.buildershardware.com)

- “Directory of Certified Door Closers”
- “Directory of Certified Exit Devices”
- “Directory of Certified Locks & Latches”
- “ANSI/BHMA Standards A156 Series”
- “Guide to Builders Hardware Terminology”

#### **Building Officials and Code Administrators International (BOCA)**

[www.bocai.org](http://www.bocai.org)

#### **California Glass Association**

[www.glassassociation.com](http://www.glassassociation.com)

#### **Glass Association of North America (GANA)**

[www.glasswebsite.com](http://www.glasswebsite.com)

**Insulating Glass Manufacturers Alliance (IGMA)**

[www.igmaonline.org](http://www.igmaonline.org)

**International Code Council (ICC)**

[www.intlcode.org](http://www.intlcode.org)

**International Conference of Building Officials (ICBO)**

[www.icbo.org](http://www.icbo.org)

- Uniform Building Code (UBC)
- Council of American Building Official Codes (CABO) Handbook and video format of interpretations, indexes, analyses, references, and guidelines to the codes.

**National Glass Association (NGA)**

[www.glass.org](http://www.glass.org)

- **Glass® Magazine**
- “Employee Safety Guide”
- “Workplace Safety Guide” (CD ROM)
- “Guide to the Glass and Glazing Requirements of the Model Building Codes”
- “Glass Installer Reference Manual”
- **Window and Door® Magazine**
- “Glass Sense for Doors”
- “Glass Sense for Bath Enclosures”
- “Custom Mirrors; Fabrication and Installation”

**National Wood Window and Door Association (NWWDA)**

[www.nwwda.org](http://www.nwwda.org)

- NWWDA/ANSI Standards

**Occupational Safety and Health Administration (OSHA)**

[www.osha.gov](http://www.osha.gov)

**Power Tool Institute Inc.**

[www.powertoolinstitute.com](http://www.powertoolinstitute.com)

- “On the Job Power Tool Safety Maintenance Check List”
- “Power Tool Safety”
- “A Teacher’s Reference Guide To Power Tool Safety”
- “Safety Is Specific”
- “Power Tool Accidents-They Can Be Prevented”
- “Safety Poster- Mr. Power Tool SAFETY”
- “Circular Saw Safety Video”
- Tape “Power Tool Accidents - They Can Be Prevented”
- Tape “Circular Saw Safety”

**Screen Manufacturers Association (SMA)**

[www.smacentral.org](http://www.smacentral.org)

**Southern Building code Congress International (SBCCI)**

[www.sbcci.org](http://www.sbcci.org)

**Steel Door Institute (SDI)**

[www.steeldoors.org](http://www.steeldoors.org)

- Steel Door Institute Standards, Industry Alerts

**Underwriters Laboratories**

[www.ul.com](http://www.ul.com)

- UL Standards

**United States Consumer Product Safety Commission (CPSC)**

[www.cpsc.gov](http://www.cpsc.gov)

## CONTINUING EDUCATION FOR CERTIFICATION RENEWAL

### Overview

The purpose of the continuing education program is to provide NGA Certified Auto Glass and Glazer Technicians with the opportunity and option to earn 30 Certification Credits (CCs) for certification renewal instead of sitting for the certification exam again. Taking the exam again for certification renewal, however, is always an acceptable option. Therefore, a candidate for certification renewal will either take the exam again or earn the required 30 CCs during the 3 years that his/her certification is valid.

*Note: Remember that passing the certification exam is required for initial certification.*

The time frame for earning the 30 CC's is 3 years. Once a candidate passes either the Certified Auto Glass Technician exam, Certified Master Auto Glass Technician exam or Glass Installer (Glazer) exam, the candidate must earn 30 CC's within the 3-year time frame that his/her certification is valid. Otherwise, the candidate will need to take and pass the exam again in order to renew his/her certification. If the candidate earns the 30 CC's through NGA-approved continuing education providers, the certification will be renewed for another 3 years.

Although it is the Continuing Education Provider's responsibility to inform NGA of a candidate's attendance at an approved program, candidates are required to keep their certificates of completion from the providers in their own files and submit them as requested by NGA. In the unlikely event of disagreement, candidates may need to produce their certificates of completion as proof of attendance. In addition, NGA may request to review a candidate's files in the context of routine program auditing.

Certification Credits are awarded by Providers in the following format:

50-60 minutes	=	1 contact hour
30-49 minutes	=	.5 contact hour
Less than 30 minutes	=	not counted

*Note: Credit is awarded for educational time only. Credit is not awarded for program registration, class breaks, meals, travel, receptions, and so forth. Where a presentation occurs at a meal, credit is not awarded for the time spent eating.*

### **Continuing Education Renewal Fees**

Member: \$99.95

Non-member: \$199.90

### **Candidate Requirements for Continuing Education**

The certification levels that are eligible to be renewed by earning CCs are: Auto Glass Technician, Auto Glass Master and the Glass Installer certification. The overall number of required Certification Credits to be earned is 30. Please review the following certification listing to determine what CCs must be earned in order to renew your certification:

# Appendix E

## Glass Installer Topics and Certification Credits

### Certified Glass Installer

The required number of CCs to be earned is 30. The breakdown by topic is:

Workplace /Consumer Safety, Codes/Standards	12
Adhesives/Sealants, Tools	12
Glass Fabrication and Installation	6
Total	30

### Safety and Codes and Standards Topics (12 CCs)

- Personal safety protective equipment (e.g., respirators, goggles, gloves, hard hats, shoes, harnesses, belts)
- Glass handling
- Manual and power tool usage
- First aid procedures (e.g., cuts)
- Applicable accident and safety reports
- Safety glazing code
- OSHA regulations (including HAZCOM)
- National and local building codes

### Adhesives, Sealants, and Tools Topics (12 CCs)

- Edge sealants (e.g., for mirrors)
- Types of sealants, including joint sealants
- Preparation of substrate and application of adhesives
- Sealant application techniques
- Types of abrasive products (e.g., belts, discs, drums)
- Glazing compounds (e.g., putty, caulking)
- Solvent application techniques for plastic fabrication
- Plastic bending techniques and tools (e.g., strip heater, torch)
- Types of metal finishes (e.g., anodized, painted, powder-coated)
- Types of glass machinery Machinery operation (e.g., metal fabrication)
- Types of drills (e.g., tube drill, bits, twist drills, countersinks)
- Hand tools (e.g., portable belt sanders, disc sanders, drill motor, screw gun, diamond saws)
- Preventive maintenance procedures
- Types and components of scaffolding, rigging, and ladders
- Types of measurement devices (e.g., transit, laser level, spirit level)
- Types of cutters for glass, heavy glass, and plastic

## **Glass Fabrication and Installation Topics (6 CCs)**

- Types of glass
- Types of heavy glass
- Types of plastics
- Handling techniques for glass, plastic, metal, and panels
- Cutting techniques for glass
- Cutting techniques for heavy glass
- Cutting techniques for plastic
- Cutting techniques for metal
- Cutting techniques for panels
- Field glass cutting techniques
- Types of edgework
- Basic glass edge profiling
- Techniques used for hand-washing glass and glazing materials
- Types of cleaning products and techniques
- Metal joinery techniques (e.g., storm windows, shower doors, storefront, curtainwall)
- Metal shearing and forming techniques
- Assembly preparation procedures in metal fabrication (e.g., end dam, weep hole, setting blocks, pull-in vinyl, putty)
- Door hardware preparation procedures/applications (e.g., hinges, locks, pivots, holders)
- Types of applications (e.g., covered or uncovered edges, speak holes, screw spline, shear block)
- Mirror fastening techniques
- Types of fasteners and anchors
- Measurement units (e.g., reading a standard tape measure, the metric system)
- Trade mathematics (e.g., algebra, geometry, trigonometry)
- Manufacturer's installation instructions
- Types of glazing systems (e.g., aluminum, wood, vinyl)
- Types of doors (e.g., hinge, slide, revolve, swing)
- Types of door operators (e.g., swing, slide, revolving, balanced)
- Types of door hardware (e.g., locks, hinges, closers, pulls)
- Types of windows and window hardware

### **Continuing Education Providers**

NGA reviews and approves/accepts all Provider program outlines before approval is given. Providers must submit their program outlines to NGA yearly for review and approval/acceptance. Providers agree to include learning outcomes and an evaluation method in their programs (quiz, question/answer session, and so forth.) It is the Provider's responsibility to provide each attendee with a certificate of completion as well as to forward a Program Attendance Form to NGA within 10 working days of a program's completion to document a candidate's attendance.

*Note: Candidates are also required to keep their certificates of completion from the Providers in their own files if they are requested by NGA to validate attendance and amount of earned credits.*

Some Providers may charge attendance fees for their programs. NGA does not require, dictate, or profit from Providers' fees. NGA is not responsible for refunding a student any fees related to attending an approved course. It is highly recommended that attendees/students become fully aware of refund policies before signing up for educational programs.

To find a Providers' programs, look for the NGA Continuing Education logo on Providers' promotional materials.