



International Association of Geosynthetic Installers

CERTIFICATION PROGRAM

Proctor Instruction Guide for Reinforced Geomembrane Materials



*** Updated: 7 October 2008 ***

Reinforced Materials

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Reinforced Certification Program

PROCTOR MANUAL

The IAGI Proctor's Manual has been developed to ensure that the certification tests are administered uniformly. Please follow all the guidelines as written in this manual.

IAGI is continually working to enhance this certification program. If you have suggestions for improving this process, please contact Laurie Honnigford, IAGI Managing Director. She can be reached by calling +651-554-1895 or e-mail iagi@iagi.org. Written suggestions can be sent to:

IAGI
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Reinforced Certification Program

Receipt of Testing Materials

Please check that your order contains:

- Guidelines for the Written Test (3 pages)
- Guidelines for the Hands-on Test (4 pages)
- Proctor Report (3 pages)
- GM-19 Seam Strength Tables (2 pages)
- Test Booklets



Reinforced Certification Program

Guidelines for the Written Test

Dear Proctor:

The following guidelines should provide every candidate an equal opportunity to complete the test successfully. It is the responsibility of the Proctor to protect the integrity of this certification process and to provide an environment conducive to testing. If you have any questions regarding these guidelines, contact IAGI.

Test Booklets:

- All test booklets should arrive individually packaged in clear plastic wrap.
- Do not open the clear plastic wrap on the test booklets. The test candidates will remove the clear plastic wrap once testing begins.
- Verify that you have received the correct number of tests in the correct language(s).
- **Record the number of test booklets received in the "Proctor Report" in the section titled, "Order Data".**
- Proctors are responsible for all testing materials in their possession. It is imperative that the Proctor safeguards the security of all test materials from the time the Proctor receives them until they are returned to IAGI. Test materials are strictly confidential and may not be reviewed before testing. Copying, transcribing, or removing the test materials is prohibited. Any breach in security should be reported to IAGI immediately. Keep the testing materials locked in a secure place until test time.

Writing Implements:

Bring an extra supply of writing implements in case the test candidates do not bring them. Pencils are recommended but not mandatory.

Room set up:

The room set-up is important to successful testing. Be sure an adequate amount of space is provided to prevent copying; IAGI requires a minimum of one seat between each candidate. The space and physical facilities must allow the Proctor(s) continuous surveillance of the room. It is also advised that candidates should have a wall clock in sight.

Quiet and comfortable test area:

A quiet and comfortable testing area enables candidates to do their best work without delays or distractions.

Time Allocation:

A maximum of **two hours** is allotted to complete the written exam.

No visitors:

No visitors are permitted in the testing room.

Testing Day Procedures

Proctor: It is important for you to proceed through the instructions at a pace that allows the slowest candidates to keep up. One of the main reasons why candidates have failed the test is because of their failure to follow the directions. Therefore, please ask the Test Candidates to listen carefully to the directions.

Photo ID required: Test candidates must present a government-issued photo ID prior to beginning the test. They must also supply the Proctor with a photocopy of the ID which will be returned with the completed test to IAGI.

Proof of minimum experience: Each test candidate must provide documented proof that he/she has at least 1,000,000 square feet (92,000 meters squared) of installation experience of reinforced geomembrane in any thickness. A list of projects (resume) is sufficient. The proctor is responsible for verification of experience before starting the test.

	Proctor's Instructions	Read aloud to the Test Candidates
1.	Verify that there is sufficient spacing between candidates. Have candidates change seating if necessary.	Seat yourselves so that there is a minimum of one seat between each person.
2.	Distribute the sealed test booklets	These books are to remain sealed until you are instructed to remove the plastic.
3.	Announce time allocation	You will be given two hours to take the written portion of the test. The time remaining to take the test will be announced occasionally. You may not leave the room during this time.
4.	Announce Test Directions [It is helpful to have the day's schedule available in advance. Specify what teams will be doing the hands-on test at what times. Allow 2 hours for each hands-on test.]	There are 71 questions and you must answer 65% of the questions correctly in order to pass. The test is a multiple-choice test. There is only one correct answer for each question. Circle the correct answer for each question. There is to be no talking during the test. If you have a question or problem, contact the Proctor. If you talk during the test, the test will be taken away and you will fail the test. Once you complete the test, be sure your name is on the cover and turn the test into the proctor. You may then leave the room. Return in time to begin the hands-on portion as announced by the proctor.
5.	Ask if there are any questions.	Are there any questions?
6.	Tell candidates to remove the plastic from the test booklet.	You may remove the plastic from the test booklet. Please print your name, date and company name on the front cover of the test.
7.	Begin the test	You may now begin the test. Good luck.

Testing Day Procedures - Continued

Verbal Exam: In the event that someone cannot read or cannot read well enough to take the written exam, it can be read aloud to them. Either the Proctor can read the exam, or monitor someone who reads it to the test candidate. If the Proctor has someone else read the exam, they must monitor that the person reading the exam to prevent cheating.

Replace defective test booklets:

If a candidate has a defective test booklet, replace it. Note the booklet number of both the defective booklet and the replacement booklet in the "Proctor Report".

Make sure there is no cheating:

The Proctor(s) should walk around the room frequently to guard against cheating, copying questions or answers, removing test booklet pages, or any other actions threatening test security or the testing environment. Note any discrepancies in the "Proctor Report" supplied by IAGI contained with each test package.

Collect all materials after the test:

Once the time allotted for the test has elapsed, collect all the test booklets. Be sure that candidates do not leave with any testing materials. Account for all test materials before candidates leave the room. Make sure there is one completed test for each test candidate. Record the number of completed tests in the "Proctor Report".

Count the used test booklets. Make sure the number agrees with the number of tested candidates. You must return both used and unused test booklets. Note the quantities in the "Proctor Report".

Send the following items in one envelope/box to IAGI (address on page 2):

- Completed Tests
- Candidate picture ID's (photo copies)
- Candidate Resumes
- Completed "Proctor Report"
- Test Registration Log
- Unused Test booklets

All written test materials must be shipped to IAGI on the first business day following the test. There are no exceptions to this rule. All test materials should be stored in a locked location until shipping.

To avoid lost or delayed return shipments, it is important to use a delivery service with a package tracking system.

Discrepancies:

If IAGI finds discrepancies in the test material or accounting, IAGI will notify the Proctor to resolve the discrepancy. IAGI will not process the test batch until any discrepancies are resolved. Unresolved discrepancies may result in the test being declared invalid.

Test acknowledgment:

Test candidates will receive notification regarding pass or failure from IAGI. Candidates who successfully meet testing requirements will receive a letter of congratulations, a certificate and a wallet card within six to eight weeks from the test date.



Reinforced Certification Program

Guidelines for the Hands-on Test

Number of candidates and room set-up:

For the hands-on portion of the certification, we recommend that a Proctor supervise no more than six (6) candidates taking the hands-on portion of the test at one time, however more technicians can test if the space and equipment allows; organization is the key. The room set-up must allow enough room between each candidate to conduct welding. No talking or questions between candidates is allowed and they are not allowed to assist each other in making welds.

Materials needed:

It is the responsibility of the company requesting certification and/or the testing candidates to provide the equipment and geomembrane materials used for the hands-on test.

The following is a list of specific reinforced material requirements for **each** test candidate. It is the responsibility of the proctor to ensure that **different geomembrane material types are submitted** for each weld that is made. Failure to submit different materials will result in the test candidate failing the exam.

Seaming Wedge welding/ Hot Air Welding Hands-on Test:

- 2 pieces of ___ mil thickness reinforced geomembrane, 12" wide x 13 feet long.
- 2 pieces of ___ mil thickness **DIFFERENT** from **ABOVE** reinforced geomembranes, 12" wide x 13 feet long.
- Company must submit manufacturer's specifications for IAGI Testing. **Please ensure the manufacturer specification lists the peel and shear values.**

Patching Material (Hot Air Welding) Hands-on Test:

- 1 piece of ___ mil thickness reinforced geomembrane 10" wide x four feet long—that will be used for patching.
- 1 piece of ___ mil thickness **DIFFERENT** from **ABOVE** reinforced geomembranes, 12" wide x 13 feet long.

Equipment Needed:

- Wedge welder (if applicable)
- Any tools needed for adjusting and/or fixing the welders in the event of machine failure
- Hook blade or similar for cutting geomembrane liners
- Field Tensiometer (one unit for every 4 test candidates is recommended)
- Test coupon cutter (Bone-Cutter)

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- Writing implement for marking geomembrane samples

Each candidate should be given 1 piece (strip) of material, of various thicknesses, from the geomembrane pieces provided and instructed to cut approximately 13 feet long.

If the material is pre-cut the testing will go faster. A few extra pieces are recommended.

The Candidate sets up the machine and makes a weld in the liner.

The candidate will take a final weld coupon from his/her weld per the diagram below.

The candidate may cut coupons ("bones") and conduct as many peel and shear tests on the field Tensiometer as they desire to determine if they have a good seam. The candidate may not cut bones out of the coupon area to be submitted (the section of seam between 4 and 7 feet from the beginning of the weld).

Each candidate can re-weld up to 3 (three) times.

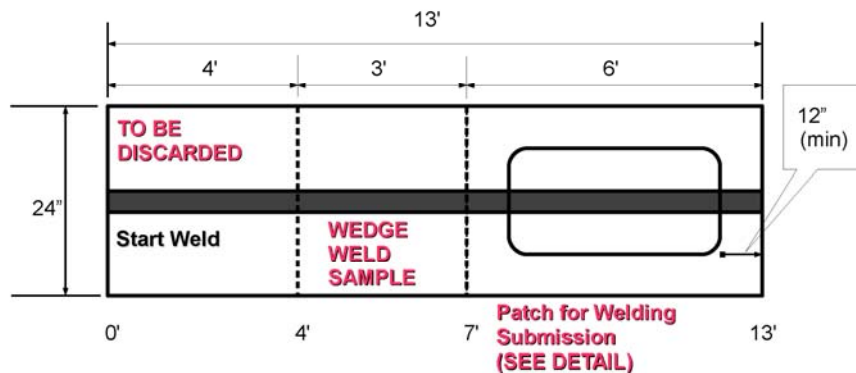
The candidate may seam up to three welds and then choose the best sample to submit. Once the candidate is ready to submit his/her sample, have them cut a sample per the diagram below (diagram 1). The submission coupon should be trimmed to approximately 12 inches wide by 36 inches long.

Cut the patch area 10 inches wide by 48 inches long. Label as shown in diagram 2.

Have the candidates label the submission coupon as described below (diagram 2). Place the sample in an envelope / sandbag and send to the laboratory for testing. Also label the envelope / sandbag with the test candidate's full name and note it is IAGI Certification Testing.

Diagram of weld coupon:

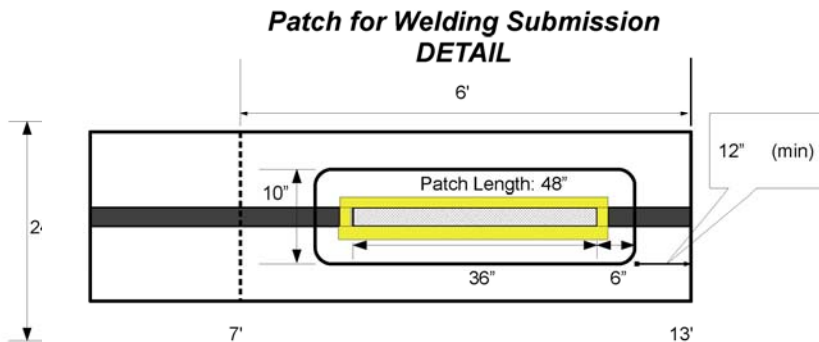
DIAGRAM 1



NOTES:

Do not cut the 4' – 13' welded sample. For submission, roll up the sample and place the information as stated in Diagram #2

Cut the submission coupon starting at the 4' mark. This allows for temperature drop and recovery period on fusion welds.



NOTES



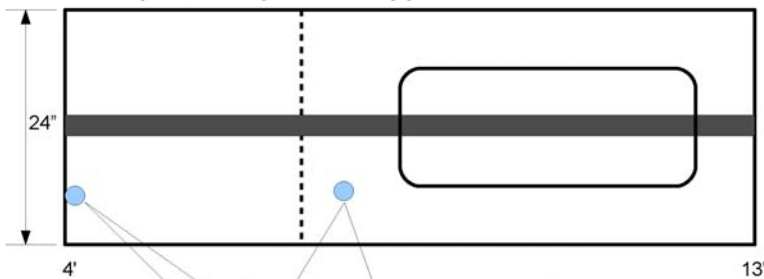
Proctor to cut out 36" of seam for patch prior to patching



Proctor to apply 1" to 1 1/2" masking tape around the cut out seam prior to patching by the CWT technician

DIAGRAM 2

Cut the submission coupon starting at the four (4') mark. This allows for temperature drop and recovery period on fusion weld.



Last Name of Candidate
 Material Type & Mil Thickness
 DATE
 Wedge Weld Material # _____

Wedge Weld Test Instructions

	Proctor's Instructions	Read aloud to the Test Candidates
1.	Read the rules aloud to the candidates.	<p>You need to turn in three samples for the hands-on portion of the wedge-weld test.</p> <ul style="list-style-type: none"> • One sample must be ___mil Reinforced Material (1) • One sample must be ___mil Reinforced Material (2) • One sample of a patch on Reinforced Geomembrane 1 (You must weld two different geomembrane thicknesses for reinforced materials) • One sample of a patch on Reinforced Geomembrane 2 (You must weld two different geomembrane thicknesses for reinforced materials) <p>You are allowed to test the samples you produce using the field Tensiometer*. You may re-weld up to three times before submitting your final sample for grading. For each material type, you must pass in accordance with GM-19 for Polypropylene and ASTM D-751 for coated fabrics (i.e., XR-5)</p>
2.	Please be sure candidates allow enough time for the wedge to cool down before changing the machine setting. You may not set up one welder to handle each material sample and move candidates from welder to welder	<p>You must use the same welder for all three samples. Please wait for the machine to cool down before adjusting fusion welder for next weld sample.</p> <p>Again, no helping other candidates with machine set-up adjustments. This is an individual test!</p>
3.	Explain how to cut samples	Cut a 36 inch long by 12 inch wide sample starting four feet from the beginning of the seam. You may take coupons from any section other than the one you submit.
4.	Ask candidates to mark samples	Mark each two sample with your name, date, material thickness and type.
5.	Place all finished samples into an envelope / sandbag and label it "IAGI certification testing"	Place the two welded 12 X 36 inch samples into the envelope / sandbag. Label the envelope with your full name. Roll up patch sample and submit to proctor.
6.	Gather the envelopes / sandbags and pack them for shipping to the laboratory	Hand the sealed envelope / sandbag to the proctor when you are finished.

Lab selection:

The test candidate or candidate's company can choose the testing laboratory that will perform the destructive testing of submitted samples. The proctor can recommend a lab that is familiar with the IAGI testing protocol.

Test site inspection:

Test sites are subject to unannounced inspections by IAGI representatives. Any inspections should be noted in the Proctor Report.

Compliance with regulations:

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Failure to comply with the regulations listed in this manual and the Registered Proctor's agreement will result in the termination of Proctor privileges.

Compensation for Proctors:

Proctors may charge a fee for administering this test. The fee is determined between the company/individual requesting this service and the Proctor. IAGI has no part in determining the fees charged. The Proctor is responsible for collecting the testing fees and submitting payment to IAGI with the order. Contact IAGI at 651-554-1895 or e-mail iagi@iagi.org if you have any questions.

If you plan to mail your samples to **TRI**, the mailing address is:

TRI/Environmental
Attn: Sam Allen
9063 Bee Caves Road
Austin, TX 78733



Reinforced Certification Program

Proctor Report

Please fill out this report and return it to IAGI with the written tests after the testing is completed.

Proctor Identification:

Proctor's Name: _____
Company: _____
Address: _____
City: _____ State: _____ Zip: _____
Country: _____
Phone: _____
Email: _____

Order Data:

Test Booklets	Quantity Received	Quantity Used	Total Returned
English			

Proctor Registration:

List all other Proctors who assisted in conducting the test session. All Proctors must have IAGI approval before assisting with the test session.

Name/Address/Phone

Name/Address/Phone

Name/Address/Phone

Discrepancy Statement:

Note all discrepancies that occurred before, during, or after the test session. Also, note any discrepancies that may have occurred with this test order. List any activity or circumstance that was not part of the normal course of the entire test session, or violated the testing procedures as described in the Proctor Manual.

<u>Item Number</u>	<u>Description of Discrepancy and/or Action taken</u>

Test Site (City / State): _____ Test Date: _____

Company or Individual's Name and Address (where certificates are to be sent):

Test Registration Log IAGI Certification Program

Test Site: _____

Proctor: _____ Test Date: _____

On the day of the test, print each test candidates name on this form as it appears on the written tests.

As each hands-on test sample is submitted, write in the mil thickness being submitted in the appropriate column across from the name of that test candidate. **Be sure that DIFFERENT GEOMEMBRANE MATERIAL TYPES and DIFFERENT MIL THICKNESS are submitted!**

Make two copies of this log when complete. Send original to IAGI with Proctor Report. Send one copy to the selected testing lab with weld samples and keep a copy for your records.

	Candidate's Name	Booklet Number	Wedge Weld Reinforced Material #1	Patch Weld Reinforced Material #1	Wedge Weld Reinforced Material #2	Patch Weld Reinforced Material #2
	Manufacturer (Attach Manufacturer Product Description Sheet)		Product Name	Product Name	Product Name	Product Name
1.						
2.						
3.						
4.						
5.						
6.						

7.						
8.						
9.						
10.						
11.						
12.						

GM-19 Values for Polypropylene.

All other material should be based on the manufacturer’s product specification sheet

Table 3(a) – Seam Strength and related Properties of Thermally Bonded Nonreinforced and Reinforced Flexible Polypropylene (fPP) Geomembrane **(English Units)**

Geomembrane Nominal Thickness	30 mil	40 mil	36 mil-R⁴	45mil- R⁴
Hot Wedge Seams ⁽¹⁾				
shear strength ⁽²⁾ , lb/in. (R-lb.)	25	30	200	200
shear elongation at break ⁽³⁾ , %	50	50	n/a	n/a
peel strength ⁽²⁾ , lb/in. (R-lb.)	20	25	50	20
peel separation, %	25	25	n/a	n/a

Notes for Tables 3(a) and 3(b):

1. Also for hot air and ultrasonic seaming methods
2. Value listed for shear and peel strength are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values
3. Elongation measurements should be omitted for field testing
4. Values are based on grab tensile strength and elongation per D751 for laboratory specimens

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Table 3(b) – Seam Strength and related Properties of Thermally Bonded Nonreinforced and Reinforced Flexible Polypropylene (fPP) Geomembrane **(S.I.Units)**

Geomembrane Nominal Thickness	0.75 mm	1.0 mm	0.91 mm- R⁴	1.14 mm- R⁴
Hot Wedge Seams ⁽¹⁾				
shear strength ⁽²⁾ , N/25mm (NR); N (R)	110 50	130 50	890 n/a	890 n/a
shear elongation at break ⁽³⁾ , %	85	110	90	90
peel strength ⁽²⁾ , N/25mm N (R)	25	25	n/a	n/a
peel separation, %				

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