International Association of Geosynthetic Installers

Certified Welding Technician (CWT) Program

Proctor Instruction Guide for Polyethylene

LLDPE Exam

and

HDPE Exam

Polyethylene

Program Revised: OCTOBER 2019

Introduction:

The International Association of Geosynthetic Installers' 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.

This Proctor Manual has instructions for both the LLDPE exam and the HDPE exam. As of September 1, 2019, the tests for each material are separate. A candidate can take the LLDPE Exam or the HDPE Exam or both.

IAGI is continually working to enhance this certification program. If you have suggestions for improving this process, please contact IAGI's Managing Director at +1 (720) 353-4977 or iagi@iagi.org.

Physical address:

IAGI
8601 W. Cross Drive, Suite F5, #220
Littleton, CO 80123
USA

Telephone: +1 (720) 353-4977
E-mail: iagi@iagi.org

www.iagi.org

Table of Contents

Getting started:

The basic steps for getting started with the program are outlined here. In all cases, the information written in the manual will supersede the general guidelines written below:

1. **Experience:** The first requirement is that test candidates meet the minimum experience level. They must have 90,000 square meters (1,000,000 square feet) of experience on more than five (5) different jobs.

   Alternatively, candidates who do small-project, welding-intensive work can still be certified. Some geomembrane installation industry applications require very small quantities of material compared to the landfills, mine sites and other large projects. These applications include above ground tanks, building foundation waterproofing, concrete protective lines (CPL's) for the wastewater industry, oil and gas drilling locations, etc. For technicians that work on these types of sites it is very difficult to gain the required square footage of experience required to take the CWT exam, even after many years working in the field. Therefore, an experience level requirement exception can be requested by technicians that fall into this category. The request needs to be submitted through the CWT Proctor to the IAGI board of directors for approval. This request will be in the form of a formal letter addressed to IAGI that details the technicians experience in terms of type of application where experience was gained, duties performed and number of years working in the geomembrane industry.

   All test candidates must provide a resume of the experience and a government-issued identification card.

2. Proctor: A proctor is needed to coordinate and oversee the exam process. Proctors are listed on the IAGI website.

   We recommend that you look to your suppliers for proctors. Make arrangements directly with the proctor. While IAGI strongly recommends that you use a proctor experienced in giving this exam, you can arrange to have someone local conduct this for you. All proctors are required to go through an IAGI training program to administer the exam. Contact IAGI for more information.

   One proctor may test a maximum of 12 people at a time. More than 12 candidates require a second proctor or two days of testing.

3. **Set Date:** Select a date to conduct the tests in conjunction with proctor.
4. **Assemble the materials:** The certification exam requires the use of a variety of material types in order to comply with the exam requirements. Be sure to follow the proctor booklet guidelines in assembling the right mix of products. Pre-cut all geomembranes in advance of the testing to make the process go smoothly.
5. **Set up the test area:** Set up a room with plenty of space between candidates to take the written exam. The hands-on portion can be conducted in your warehouse. Allow plenty of space for each candidate to conduct their welds.
6. **Test Preparation:** The test candidate is encouraged to review the study guide.
7. **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 + 1 (720)-353-4977 or e-mail iagi@iagi.org if you have any questions.

Receipt of Testing Materials

Please check that your order contains:

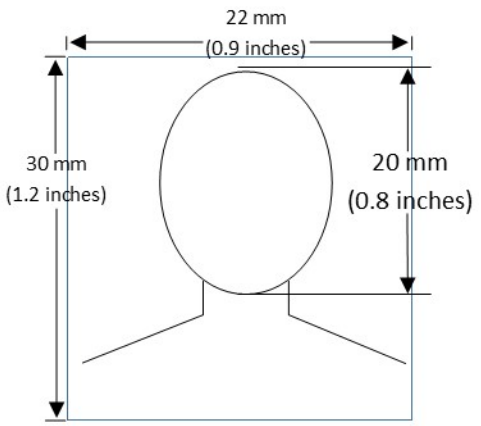
- Written Exam(s)
- Proctor Booklet
- GM-19 Seam Strength Tables (2 pages at the end of Proctor Booklet)

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 copy of the ID which will be returned with the completed test to IAGI. You can take a photo of the ID on your mobile phone and send the photo to iagi@iagi.org. Please label each photo file with the person's name.

NEW REQUIREMENT—Photo of candidate: New wallet cards issued will contain a photo of the CWT candidate. The candidate can provide a photo via a JPEG or TIFF file format. You can take a head shot photo using your mobile phone, download them and send them electronically to iagi@iagi.org. The picture will be cropped to approximately 30 mm x 22 mm (1.2" x 0.9").



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(s). If the Proctor has someone else read the exam, they must monitor that the person reading the exam to prevent cheating. Anyone who reads the exam cannot later take the exam.

Testing Day Procedures

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 photographs for wallet card
- Candidate ID's (scanned copies preferred)
- Candidate Resumes
- Completed "Proctor Report"
- Test Registration Log
- Unused Test booklets

All written test materials must be shipped to IAGI and all hands-on exams must shipped to the third party laboratory on the second 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

Testing Day Procedures

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 date all test materials are sent to IAGI and the laboratory.

Proctor Guidelines for the Written Test

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.

If you, as the Proctor, suspect someone does not read well, you are strongly urged to read the exam out loud. Reading out loud is permitted and encouraged when there is any doubt. Some proctors have made it a practice to read the exam regardless. Some test candidates may be reluctant to admit (especially in the presence of their employer) that they do not read / comprehend the written word well. Err on the side of reading out loud if you have any doubt. This is not a test to determine reading comprehension but rather one to test the level of knowledge the candidate has about the work they do.

Writing Implements:

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

Proctor Guidelines for the Written Test

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.

Proctor Guidelines for the Written 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 50 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. Fill in the oval next to 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.
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 as you want it to appear on the certificate, date and company name on the front cover of the test.
7.	Begin the test	You may now begin the test.

High Density Polyethylene CWT Exam

The following are the options for certification. You can be certified in High Density Polyethylene (HDPE) in either wedge or extrusion or both. The same options exist for Linear Low Density Polyethylene (LLDPE). You can do one component or all four components.

HDPE Hands-on Testing Requirements (HDPE Wedge / Fusion Component) Upon passing, candidate will be certified in HDPE Wedge Welding			
Minimum Welding Experience: 90,000 square meters (1,000,000 square feet) on five (5) different jobs			
PE Written Exam			
WEDGE	*Thickness*	*Seam*	*Suggested Thickness*
HDPE Smooth	Different from textured HDPE	Wedge	40 mil
HDPE Textured	Different from smooth HDPE	Wedge	60 mil

HDPE Hands-on Testing Requirements (HDPE Extrusion Component) Upon passing, candidate will be certified in HDPE Extrusion Welding			
Minimum Welding Experience: 90,000 square meters (1,000,000 square feet) on five (5) different jobs			
PE Written Exam			
EXTRUSION	*Thickness*	*Seam*	*Suggested Thickness*
HDPE smooth	No requirement	Extrusion	40 mil
HDPE textured	No requirement	Extrusion	60 mil

Linear Low Density Polyethylene CWT Exam

LLDPE Hands-on Testing Requirements (LLDPE Wedge / Fusion Component) Upon passing, candidate will be certified in LLDPE Wedge Welding				
Minimum Welding Experience: 90,000 square meters (1,000,000 square feet) on five (5) different jobs				
PE Written Exam				
WEDGE	*Thickness*	*Seam*	*Suggested Thickness*	
LLDPE Smooth	Different from textured LLDPE	Wedge	60 mil	
LLDPE Textured	40 mil	Wedge	40 mil	

LLDPE Hands-on Testing Requirements (LLDPE Extrusion Component) Upon passing, candidate will be certified in LLDPE Extrusion Welding				
Minimum Welding Experience: 90,000 square meters (1,000,000 square feet) on five (5) different jobs				
PE Written Exam				
EXTRUSION	*Thickness*	*Seam*	*Suggested Thickness*	
LLDPE smooth	Different from textured LLDPE	Extrusion	60 mil	
LLDPE textured	40 mil	Extrusion	40 mil	

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 to success. 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.

IAGI suggests that three sets of samples be available for each candidate. A minimum of one set of geomembrane materials per test candidate must be submitted for testing. Test candidates are allowed to weld and test three (3) seams of each material prior to submitting one.

Equipment Needed:

Wedge welder (if testing for wedge)
Extrusion welder (if testing for extrusion)
Extrusion rod (if testing for extrusion)
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)
Writing implement for marking geomembrane samples

The following are the options for certification. You can be certified in High Density Polyethylene (HDPE) in either wedge or extrusion or both. The same options exist for Linear Low Polyethylene (LLDPE).

Guidelines for the Wedge Welded Hands-on Test

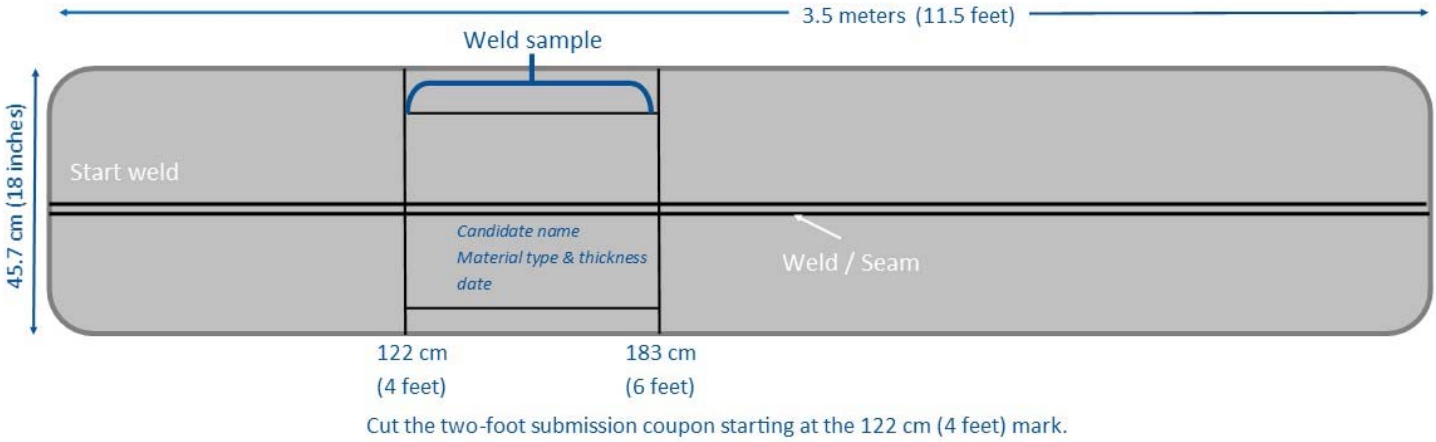
To make a wedge weld seam, use two strips of geomembrane, 30.5 cm x 3.5 meters (roll width) (1 foot x 11.5 feet). Wedge weld the panels together. The submission sample is the section of weld 122 cm (4 feet) from the start of the weld and is 61 centimeters (2 feet) in length. Mark the sample with the candidates name, material type and thickness and the date. You must submit the required samples for each component. (see diagram 1)

The candidate may conduct peel and shear testing on any area of the seam except the area of the submission sample.

If it is not customary for the welding technician to run the tensiometer, a lab technician may run the tests. The lab technician can only tell the test candidate the peel and shear numbers that the sample pulled. The lab technician cannot determine if the sample passes or fails. It is the responsibility of the test candidate to make that determination.

Diagram 1. HDPE and LLDPE Wedge welding sample.

This weld is made up of two strips that measure 30.5 centimeters x 3.5 meters (1 foot x 11.5 feet)



Cut the two-foot submission coupon starting at the 122 cm (4 feet) mark.

	Proctor's Instructions	Read aloud to the Test Candidate
1.	Read the rules aloud to the candidates. Please be sure candidates allow enough time for the wedge to cool down before changing the machine setting.	You need to turn in two (2) samples for the hands-on portion of the wedge-weld test. Textured must be welded to textured geomembrane and smooth should be welded to smooth geomembrane. You are allowed to test the samples you produce using the field tensiometer.** You may re-weld up your seam to three times before submitting your final sample for grading. For each material type, grading will be done in accordance with GM-19.
2.	You may not set up one welder to handle each material sample and move candidates from welder to welder.	You must use the same welder for all samples. Please wait for the machine to cool down before adjusting the fusion welder for the next weld sample. Again, no helping other candidates with machine set-up adjustments. This is an individual test.
3.	Explain how to cut samples.	For Wedge welds, cut a 61 cm (24 inches) long by 30.5 cm (12 inches) wide sample starting 122 cm (four feet) from the beginning of the seam. You may take coupons for tensiometer testing from any section other than the one you submit.
4.	Ask candidates to mark samples.	Mark each sample with your name, date, material thickness and geomembrane type.
5.	Place all finished samples into a bundle / sandbag and label it.	Place the three welded samples into a bundle secured with stretch wrap or a sandbag. Label bundle or sandbag with your name.
6.	Gather the bundles / sandbags and pack them for shipping to the laboratory.	Hand the bundle / sandbag to the proctor when you are finished.

******NOTE**: in some companies the welding technicians do not run the field tensiometer. It is acceptable for the quality control person to run the tests. The QC person can only report the value (number) the specimen pulled on the tensiometer. The QC person cannot indicate "pass or fail" to the candidate. It is responsibility of the test candidate to determine if the strength of the weld and / or mode of failure is acceptable for submission. The Proctor must monitor the QC personnel for compliance if this method is used. If the QC personnel states to the test candidate "pass or fail," then the weld cannot be submitted.*

Guidelines for the Extrusion Welded Hands-on Test

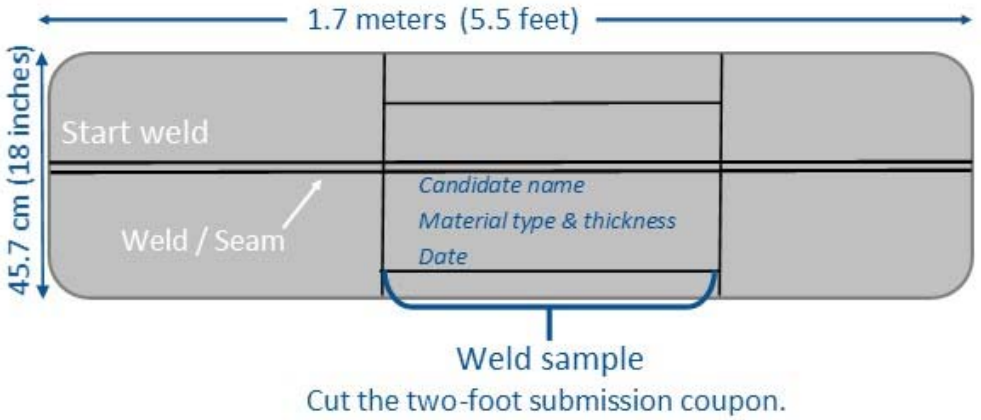
To make an extrusion weld seam, use two strips of geomembrane, 30.5 cm x 1.7 meters (roll width) (1 foot x 5.5 feet). Weld the panels together with the extrusion welder. The submission sample is 61 centimeters (2 feet) in length. Mark the sample with the candidates name, material type and thickness and the date. You must submit the required samples for each component. (see diagram 2)

The candidate may conduct peel and shear testing on any area of the seam except the area of the submission sample.

If it is not customary for the welding technician to run the tensiometer, a lab technician may run the tests. The lab technician can only tell the test candidate the peel and shear numbers that the sample pulled. The lab technician cannot determine if the sample passes or fails. It is the responsibility of the test candidate to make that determination.

Diagram 2. HDPE and LLDPE Extrusion welding sample

This weld is made up of two strips that measure a minimum of 30.5 centimeters x 1.7 meters (1 foot x 5.5 feet)



	Proctor's Instructions	Read aloud to the Test Candidate
1.	Read the rules aloud to the candidates.	You need to turn in two (2) samples for the hands-on portion of the extrusion welding test. 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, grading will be done in accordance with GM-19.
2.	Weld the samples	No helping other candidates with machine set-up adjustments. This is an individual test.
3.	Explain how to cut samples	For Extrusion welds cut a 61 cm (24 inches) long by 30.5 cm (12 inches) wide. This sample can be taken from any section of the weld.
4.	Ask candidates to mark samples	Mark each sample with your name, date, material thickness and type.
5.	Place all finished samples into a bundle / sandbag and label it.	Place the two welded 12 x 24 inch (30.5 x 61 cm) samples into a bundle secured with stretch wrap or a sandbag. Label bundle or sandbag with your name.
6.	Gather the bundles / sandbags and pack them for shipping to the laboratory.	Hand the bundle / sandbag to the proctor when you are finished.

***__NOTE__: in some companies the welding technicians do not run the field tensiometer. It is acceptable for the quality control person to run the tests. The QC person can only report the value (number) the specimen pulled on the tensiometer. The QC person cannot indicate "pass or fail" to the candidate. It is responsibility of the test candidate to determine if the strength of the weld and / or mode of failure is acceptable for submission. The Proctor must monitor the QC personnel for compliance if this method is used. If the QC personnel states to the test candidate "pass or fail," then the weld cannot be submitted.*

Guidelines for the Hands-on Test

Lab selection:

The test candidate or candidate's company can choose the testing laboratory that will perform the destructive testing of submitted samples from the list. Send all labeled materials to one of the labs below and write the name of the sponsoring company on the box and internal packing labels. List that this shipment is for IAGI CWT exams for Polyethylene.

Geotechnics
Contact J.P. Kline, P.E.
544 Braddock Avenue
East Pittsburgh, PA 15112
USA
Phone: +1 (412) 823-7600
Email: jpkline@geotechnics.net

TRI Australia Pty Ltd
Contact: Warren Hornsey
Unit 12, 45 Township Drive
Burleigh Heads, QLD 4220
Australia
Phone: +61 (7) 5535 7227
Email: whornsey@tri-env.com

SAGEOS
Contact: Sylvie Dalpe
3000 Boullé Street
Saint-Hyacinthe, Québec J2S 1H9
Canada
Phone: +1 (450) 778-1870
Email: Sdalpe@gcttg.com

TRI Geosynthetic Testing and Services (Suzhou) Co. Ltd.
Contact: Cherry Lu
Room 113, A2, 218 Xinghu Road,
Biobay SIP
Suzhou, Jiangsu Prov.
China 215123
Phone: 86-181-5111-8987
Email: clu@tri-env.com

TRI/Environmental
Contact: Mansukh Patel
9063 Bee Caves Rd.
Austin, TX 78733
USA
Phone: +1 (512) 263-2101
Email: MPatel@tri-env.com

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:

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

Order Form

1. Enter the number of exams and the total amount due:

	WEDGE Component		EXTRUSION Component		MEMBER Test Fee (USD)	NON-MEMBER Test Fee (USD)		TOTAL Amount Due (USD)
Enter the number of candidates testing each component	**HDPE**	**LLDPE**	**HDPE**	**LLDPE**			X	
General Exam &1 seam (select 1 seam type)					$ 320	$ 440	X	
General Exam & 2 seams (select 2 seam types)					$ 410	$ 530	X	
General Exam & 3 seams (select 3 seam types)					$ 465	$ 585	X	
General Exam & 4 seams (select 4 seam types)					$ 520	$ 620	X	
							TOTAL DUE	

2. Select the language(s) needed for the written exams:

Language	Number of Exams needed
Chinese (Mandarin dialect)	
English	
French	
Indonesian	
Spanish	

3. The Proctor needs to ensure that each candidate have welding experience of at least 90,000 square meters (1,000,000 million square feet) of polyethylene geomembrane installation experience on more than five (5) different jobs. The Proctor will need to turn in the resumes, the wallet card photos and copies of photo identification with the exams. Failure to send in a resume and ID will delay the test results.

Order Form

4. Expected testing date / location:

If more than 12 candidates will be testing, there will have to be another proctor present or schedule two test dates			
Date of Exam:			
Company Name:			
Address: (no PO Boxes)			
City:		Province/ State:	
Postal Code / Zip Code:		Country:	
Telephone:		Fax:	
e-mail:			

5. Exam shipping information (all exams must be shipped to the Proctor)

Proctor Name:			
Company Name:			
Address: (no PO Boxes)			
City:		Province/ State:	
Postal Code / Zip Code:		Country:	
Telephone:		Fax:	
e-mail:			

6. Arrange for payment. The exams can be paid by Visa or MasterCard. You may request an invoice if it is needed. Contact IAGI for wire transfer information.

7. Return Test Order Form to IAGI via e-mail iagi@iagi.org.

Proctor Report

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

Proctor Identification	
Proctor's Name:	
Proctor's Company:	
Address:	
City:	Province / State:
Postal Code / Zip Code:	Country:
Telephone:	Email:
List all the Proctors who assisted in conducting the testing. All Proctors must complete CWT Training before Proctoring.	

Test Booklets	Quantity Received	Quantity Used	Total Un-used Tests Returned
Chinese (Mandarin dialect)			
English			
French			
Indonesian			
Portuguese			
Spanish			

Proctor Report

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

Test Date: _____

Item Number (if applicable)	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.

Company or Individual's Name and Physical Address where results are to be sent:

Name: _____

Company: _____

Address: _____

_____

City: _____ State/Province: _____

Zip/Postal Code: _____ Country: _____

Telephone: _____ E-mail: _____

IAGI Certification Program

Proctor Test Log for LLDPE Testing

Date: _____

Test Site: _____

Proctor(s): _____

Print each test candidate's name on this form as it appears on the written tests. The test candidates can take either the LLDPE exam or the HDPE exam or both. Write n/a in columns that don't apply to the candidate as some candidates will not take both the Wedge exam and the Extrusion exam.

After this log is completed, make two copies. Send the original form to IAGI with the Proctor Report. Send one copy to the selected testing lab with the welding samples and keep one for your records.

Name	Test Booklet Number	LLDPE Wedge Exam		LLDPE Extrusion Exam	
		Wedge Weld Textured 1.0 mm (40 mil) **LLDPE**	Wedge Weld Smooth thickness different from textured _____ **LLDPE**	Extrusion Weld Textured 1.0 mm (40 mil) **LLDPE**	Extrusion Weld Smooth thickness different from textured _____ **LLDPE**
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

IAGI Certification Program

Proctor Test Log for HDPE Testing

Date: _____

Test Site: _____

Proctor(s): _____

Print each test candidate's name on this form as it appears on the written tests. The test candidates can take either the LLDPE exam or the HDPE exam or both. Write n/a in columns that don't apply to the candidate as some candidates will not take both the Wedge exam and the Extrusion exam.

After this log is completed, make two copies. Send the original form to IAGI with the Proctor Report. Send one copy to the selected testing lab with the welding samples and keep one for your records.

Name	Test Booklet Number	HDPE Wedge Exam		HDPE Extrusion Exam	
		Wedge Weld Textured 1.0 mm (40 mil) **HDPE**	Wedge Weld Smooth thickness different from textured _____ **HDPE**	Extrusion Weld Textured 1.0 mm (40 mil) **HDPE**	Extrusion Weld Smooth thickness different from textured _____ **HDPE**
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

Table 1(a) – Seam Strength and related Properties of Thermally Bonded Smooth and Textured **Linear Low Density Polyethylene (LLDPE)** Geomembrane
(English Units)

Geomembrane Nominal Thickness	20 mils	30 mils	40 mils	50 mils	60 mils	80 mils	100 mils	120 mils
Hot Wedge Seams [1]								
shear strength[2], lb/in.	**30**	**45**	**60**	**75**	**90**	**120**	**150**	**180**
shear elongation at break[3] , %	50	50	50	50	50	50	50	50
peel strength [2], lb/in.	**25**	**38**	**50**	**63**	**75**	**100**	**125**	**150**
peel separation, %	25	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]								
shear strength[2], lb/in.	**30**	**45**	**60**	**75**	**90**	**120**	**150**	**180**
shear elongation at break[3] , %	50	50	50	50	50	50	50	50
peel strength [2], lb/in.	**25**	**34**	**44**	**57**	**66**	**88**	**114**	**136**
peel separation, %	25	25	25	25	25	25	25	25

Table 1(b) – Seam Strength and related Properties of Thermally Bonded Smooth and Textured **Linear Low Density Polyethylene (LLDPE)** Geomembrane
(S.I. Units)

Geomembrane Nominal Thickness	0.50 mm	0.75 mm	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm
Hot Wedge Seams [1]								
shear strength[2], N/25mm	**131**	**197**	**263**	**328**	**394**	**525**	**657**	**788**
shear elongation at break[3] , %	50	50	50	50	50	50	50	50
peel strength [2], N/25mm	**109**	**166**	**219**	**276**	**328**	**438**	**547**	**657**
peel separation, %	25	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]								
shear strength[2], N/25mm	**131**	**197**	**263**	**328**	**394**	**525**	**657**	**788**
shear elongation at break[3] , %	50	50	50	50	50	50	50	50
peel strength [2], N/25mm	**95**	**150**	**190**	**250**	**290**	**385**	**500**	**595**
peel separation, %	25	25	25	25	25	25	25	25

Notes for Tables 1(a) and 1(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 low as 80% of the listed values
3. Elongation measurements should be omitted for field testing

Table 2(a) – Seam Strength and related Properties of Thermally Bonded Smooth and Textured **High Density Polyethylene (HDPE)** Geomembrane
(English Units)

Geomembrane Nominal Thickness	**30 mils**	**40 mils**	**50 mils**	**60 mils**	**80 mils**	**100 mils**	**120 mils**
Hot Wedge Seams [1]							
shear strength[2], lb/in.	**57**	**80**	**100**	**120**	**160**	**200**	**240**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**45**	**60**	**76**	**91**	**121**	**151**	**181**
peel separation, %	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]							
shear strength[2], lb/in.	**57**	**80**	**100**	**120**	**160**	**200**	**240**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**39**	**52**	**65**	**78**	**104**	**130**	**156**
peel separation, %	25	25	25	25	25	25	25

Table 2(b) – Seam Strength and related Properties of Thermally Bonded Smooth and Textured **High Density Polyethylene (HDPE)** Geomembrane
(S.I. Units)

Geomembrane Nominal Thickness	**0.75 mm**	**1.0 mm**	**1.25 mm**	**1.5 mm**	**2.0 mm**	**2.5 mm**	**3.0 mm**
Hot Wedge Seams [1]							
shear strength[2], N/25mm	**250**	**350**	**438**	**525**	**701**	**876**	**1050**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], N/25mm	**197**	**263**	**333**	**398**	**530**	**661**	**793**
peel separation, %	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]							
shear strength[2], N/25mm	**250**	**350**	**438**	**525**	**701**	**876**	**1050**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], N/25mm	**170**	**225**	**285**	**340**	**455**	**570**	**680**
peel separation, %	25	25	25	25	25	25	25

Notes for Tables 1(a) and 1(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 low as 80% of the listed values
3. Elongation measurements should be omitted for field testing