



International Association of
Geosynthetic Installers

RENEWAL

Certified Welding
Technician (CWT)
Program

*Third Party Instruction Guide for
Polyethylene*

LLDPE Exam

And

HDPE Exam



Polyethylene

Program Revised: July 2020



Introduction:

The International Association of Geosynthetic Installers' CWT Renewal Manual has been developed to ensure that the renewal process is 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 IAGI's Managing Director at +1 (720) 353-4977 or iagi@iagi.org.

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Rules for Third-party observer:

1. The third-party observer is neither employed by nor has a financial interest in the company where the welding technician is employed.
2. The third-party observer is responsible for checking that the individual taking the exam is also the individual listed on their government issued identification.
3. The third-party observer ensures that only the individual taking the exam makes the weld(s).
4. The third-party observer must provide complete contact information in the event IAGI needs to verify the authenticity of the submission.
5. The third-party is **NOT** responsible for certifying the quality of the weld(s), the proper material usage or equipment suitability. This is the sole responsibility of the technician.
6. Test candidates may test the strength of the weld(s) prior to submission using a field tensiometer. Candidates may weld a total of three samples and choose the one that they want to submit. No other party can influence the candidates decision about which seam should be submitted.

Steps for CWT Renewal:

The CWT renewal process has been updated as of 2019. Each CWT must submit one field-welded polyethylene sample for each seam type subject to renewal, made in the presence of a third-party observer, and sent to an approved independent laboratory for testing. IAGI suggests asking a third-party on a job site to oversee this process. The renewal process is as follows:

1. Submit CWT renewal order form and renewal fee. This price includes fees for the laboratory tests.
2. Fill out the renewal form.
3. Provide a resume showing 500,000 square feet (45,000 meters squared) welded within the past five years.
4. Submit one field-welded polyethylene sample for each seam type subject to renewal, (see page 8) made in the presence of a third-party observer, to one of the approved independent laboratories. (see page 7)
5. Have third-party observer sign off on renewal form.
6. The renewal will be processed and successful CWTs will have their certification renewed for another five (5) years.



Modified: 1 August 2020
Revision 7.0 / 1 September 2019



Send one copy of this page to IAGI; One copy of this page to the laboratory with seam sample

Third party Information:

Third party observer's name:			
Company Name:			
Address: (no PO Boxes)			
City:		Province/ State:	
Postal Code / Zip Code:		Country:	
Telephone:		Fax:	
e-mail:			
I attest that the welding technician listed on this application has shown me a government issued identification, has performed the weld(s) by himself/herself and has submitted the sample(s) directly to me.			
Signature:			

CWT Applicant Information:

Date of Weld(s):	Wedge Weld HDPE _____mil	Wedge Weld LLDPE _____mil	Extrusion Weld HDPE _____mil	Extrusion Weld LLDPE _____mil
CWT Renewal Applicant:				
Company Name:				
Address: (no PO Boxes)				
City:		Province / State:		
Postal Code / Zip Code:		Country:		
Telephone:		Fax:		
e-mail:				
Company Contact: (person IAGI can contact with questions.)				
Company contact e-mail:		Company Contact telephone:		
Notes:				
I attest that I made the weld(s). I further attest that I am responsible for the selection of material, selection of equipment, I have welded a minimum of 500,000 square feet of geomembrane in the field over the past 5 years, and I have completed this renewal in compliance with the rules of the CWT program.				
CWT Signature:	PO Number from IAGI:			

Checklist for renewal

The CWT Renewal Process for CWTs requires a renewal application, resume, field welded sample(s), and renewal fee. The following is a checklist of items needed for renewal:

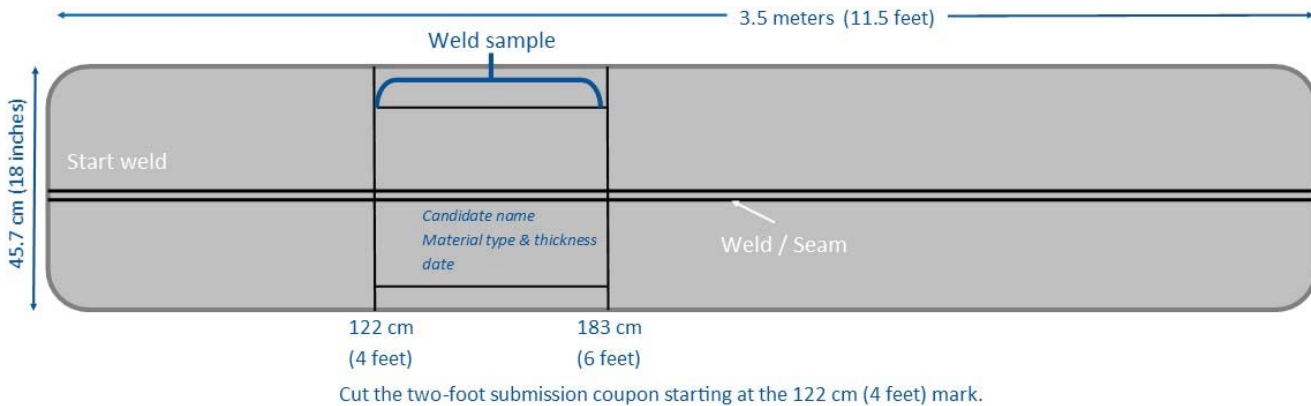
Checklist for renewal:			
✓	Requirements	Responsible party	Notes:
	Renewal fee paid	CWT candidate/ company	CWT Candidate/company to send directly to IAGI. IAGI will then provide a PO Number needed for the application. See page 9 the for fee schedule.
	Renewal Application completed	CWT candidate	
	Resume showing 500,000 square feet of seam welding	CWT candidate	Candidate to send directly to IAGI. (info@iagi.org)
	Field-welded sample(s) supervised by third-party witness	CWT candidate	One field welded extrusion weld sample and/or one field welded wedge weld sample to be sent to laboratory.
	Signed renewal application	Third-party observer & CWT candidate	One copy is sent to test lab with field welded sample(s) and one copy is sent to IAGI. <u>Be sure the Purchase Order Number received from IAGI is on this form.</u>
	Field-welded sample submitted	Third-party witness	Send directly to laboratory with a copy of the signed renewal application. Shipping is at the expense of the CWT candidate / company.

Guidelines for the Hands-on Test

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(s), have them cut a sample per diagram 2 (below). The submission weld sample(s) should be trimmed to approximately 8-12 inches wide by 24 inches long. The seam will run parallel with the 24-inch edge. Have the candidate label the submission weld sample (s) as described in diagram 2. Place the sample(s) in a 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 Renewal Testing.

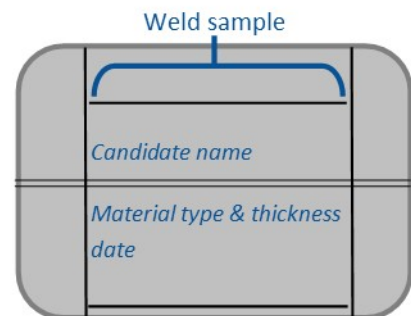
Diagram 1. HDPE and LLDPE Wedge welding sample.

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 submission weld sample starting at the four (4) foot mark. This allows for a temperature drop and recovery period on fusion welds.

Diagram 2. Labeling Welding sample.



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 third-party observer must monitor the QC person for compliance if this method is used. If the QC person states to the test candidate "pass or fail," then the weld cannot be submitted.

All welds will be graded in accordance with GM19 (see pages 9—10 for the tables)

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 following approved 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. Indicate that this shipment is for IAGI CWT Renewal exams for Polyethylene.

Geotechnics

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

SAGEOS

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

TRI/Environmental

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

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

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

Transition from 2012 to 2020 CWT Test Matrix

Those who were certified under the 2012 CWT test matrix must transition to the CWT test matrix adopted in 2020 when they renew their certification. Test candidates may choose between testing on HDPE or LLDPE geomembranes or both LLDPE and HDPE geomembranes. You must have passed the welding type to take a renewal. If the test candidates want to test for an element they are not certified, they must go through the formal testing process with a Proctor overseeing the exam.

	Hands-On Component (s) that the Candidate is Eligible to Take (The test candidate may take one or all of the components they are eligible to take for renewal)			
	Renew HDPE Wedge	Renew HDPE Extrusion	Renew LLDPE Wedge	Renew LLDPE Extrusion
Certified in wedge and extrusion welding	One (1) HDPE seam	One (1) HDPE seam	One (1) LLDPE Seam	One (1) LLDPE Seam
Certified in wedge welding	One (1) HDPE seam		One (1) LLDPE Seam	
Certified in extrusion welding		One (1) HDPE seam		One (1) LLDPE Seam

Prices for Renewal

Components			# of seams	Fees	
	Extrusion	Wedge		IAGI Member (USD)	Non-member (USD)
HDPE & LLDPE Wedge & Extrusion	One (1) seam HDPE & One (1) Seam LLDPE	One (1) seam HDPE & One (1) Seam LLDPE	4	\$ 210	\$ 420
HDPE & LLDPE Wedge		One (1) seam HDPE & One (1) Seam LLDPE	2	\$ 160	\$ 320
HDPE & LLDPE Extrusion	One (1) seam HDPE & One (1) Seam LLDPE		2	\$ 160	\$ 320
HDPE Wedge & Extrusion	One (1) seam HDPE	One (1) seam HDPE	2	\$ 160	\$ 320
HDPE Wedge		One (1) seam HDPE	1	\$ 135	\$ 270
HDPE Extrusion	One (1) seam HDPE		1	\$ 135	\$ 270
LLDPE Wedge & Extrusion	One (1) seam LLDPE	One (1) seam LLDPE	2	\$ 160	\$ 320
LLDPE Wedge		One (1) seam LLDPE	1	\$ 135	\$ 270
LLDPE Extrusion	One (1) seam LLDPE		1	\$ 135	\$ 270

Table 2(a) – Seam Strength and related Properties of Thermally Bonded Smooth and Textured Linear 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. shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , lb/in. peel separation, %	57	80	100	120	160	200	240
	50	50	50	50	50	50	50
	45	60	76	91	121	151	181
	25	25	25	25	25	25	25
Extrusion Fillet Seams ⁽¹⁾ shear strength ⁽²⁾ , lb/in. shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , lb/in. peel separation, %	57	80	100	120	160	200	240
	50	50	50	50	50	50	50
	39	52	65	78	104	130	156
	25	25	25	25	25	25	25

Notes for Tables 2(a) and 2(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(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 shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , N/25mm peel separation, %	250	350	438	525	701	876	1050
	50	50	50	50	50	50	50
	197	263	333	398	530	661	793
	25	25	25	25	25	25	25
Extrusion Fillet Seams ⁽¹⁾ shear strength ⁽²⁾ , N/25mm shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , N/25mm peel separation, %	250	350	438	525	701	876	1050
	50	50	50	50	50	50	50
	170	225	285	340	455	570	680
	25	25	25	25	25	25	25

Table 3(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. shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , lb/in. peel separation, %	30 50 25 25	45 50 38 25	60 50 50 25	75 50 63 25	90 50 75 25	120 50 100 25	150 50 125 25	180 50 150 25

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 low as 80% of the listed values
3. Elongation measurements should be omitted for field testing

Table 3(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 shear elongation at break ⁽³⁾ , % peel strength ⁽²⁾ , N/25mm peel separation, %	131 50 109 25	197 50 166 25	263 50 219 25	328 50 276 25	394 50 328 25	525 50 438 25	657 50 547 25	788 50 657 25