

The GSI Newsletter/Report



Geosynthetic Institute

Vol. 38, No. 1

March, 2024

This quarterly newsletter, now in its 36th year, presents the activities of GSI and its related institutes to all who are interested. It is available on the institute's home page at www.geosynthetic-institute.org. It also serves as a quarterly report to its member organizations. Details are available by contacting George R. Koerner or Jamie Koerner at phone (610) 522-8440; or e-mail at gsigeokoerner@gmail.com or Jamie@geosynthetic-institute.org

Activities of GSI's Officers and Board of Advisors (BOA)

2023-2025 Board of Advisors

The following are the names of the current BOA members and their contact information. We thank them for their time and advice on matters concerning the Geosynthetic Institute.

Term Ends 2024

- Burrill (Bo) McCoy - Waste Management Inc. (Owners and Operators)
e-mail: bmccoy2@wm.com
- Rene Laprade - Solmax Geosynthetics (Geotextiles and Geogrids)
e-mail: r.laprade@solmax.com
- Sam Allen – TRI Environmental Inc. (Test Laboratories)
e-mail: Sallen@tri-env.com

Term Ends 2025

- Henning Ehrenberg – NAUE GmbH & Co. KG (International-1)
email: hehrenberg@naue.com
- Miranda Rine – C.P. Chemical (Resin and Additives Group)
email: Miranda.rine@cpchem.com
- David Carson – U.S. EPA (Agencies)
email: carson.david@epa.gov

Term Ends 2026

- Henry Mock – WSP (Consultants)
email: henry.mock@wsp.com
- Anthony Johnson – Agru America Inc. (Barrier Group)
email: ajohnson2@AgruAmerica.com
- Jacek Kawalec – Tensar (International - 2)
e-mail: Jacek.Kawalec@vp.pl

GSI continues to have virtual quarterly meetings with the Board of Advisors via Zoom. The 1Q BOA meeting was held on March 28, 2024. In addition to information on the progress of the 5 institutes within GSI (Research, Accreditation, Information, Education and Certification), 2024 planned awards and donations from the institute was presented. The upcoming conferences, ICGEE Korea and Geo Americas Toronto, were also discussed.

IN THIS ISSUE

- Activities of GSI's Officers and BOA
- Overview of GRI (Research) Projects
- Progress within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- GSI's Member Organizations

Overview of GRI Projects (Research)

The following projects are all funded by GSI membership dues unless specifically noted. Most are long-term projects for which we are well positioned to accomplish. In an attempt not to repeat information in the quarterly newsletters, we will merely list the ongoing projects and new research details. Please contact George or Grace if you have advice or concerns.

George Koerner (gsigeokoerner@gmail.com)

Grace Hsuan (hsuanyg@drexel.edu)

1. Durability of Geosynthetics (15 materials)

Durability of Exposed Geosynthetics (GM, GT, GG, HPTRM, Turf, WD & GCCM) GSI is using two outdoor exposure racks and four UV fluorescent devices to estimate the projected exposed lifetime of a litany of different geosynthetics. We currently have 15 geosynthetic materials under investigation. The goal of the study is to quantitatively illustrate the durability of these materials and to correlate outdoor exposure to accelerated weathering.

2. GRI GS-27 “Determining the Rate of Capillary “Wicking” Within Geosynthetics”

This test method was developed by the Geosynthetic Research Institute (GRI), with the cooperation of the member organizations. The method is applicable to many geosynthetics and is used to determine the rate of capillary wicking. The method covers the measurement of liquid transport on a specimen of known cross section as it is exposed to Distilled Deionized Deaired (DDD) water at a known environmental conditions. It has a relevance to a broad range of geosynthetics and its applicability is seen mainly in the transportation arena. **The test method is now moving through ASTM as WK 90123.**

3. GeoMat Specification

GSI is undertaking a new effort in regards to a GeoMat Specification. This specification will cover open 3-D mats and composite structures. Such mats are constructed of continuous polymeric fibers that are fused where they intersect. They can be used in a multitude of applications from drainage to reinforcement. This specification is being developed by the Geosynthetic Research Institute (GRI), with the cooperation of the member organizations for general use by the public. The specification will sets forth a set of minimum, physical, mechanical, hydraulic, chemical and endurance properties that must be met. **If you are**

interested in the effort, please reach out to us. We are currently receiving materials at GSI for in-house testing to corroborate category thresholds.

4. GSI’s Bituminous Geomembrane Specification

The Bituminous Geomembrane specification GRI – GM38 Standard Specification for “Test Methods, Test Properties and Testing Frequency for Bituminous Geomembranes (BGM)” This specification covers bituminous geomembranes (BGM) which are factory produced materials in the form of rolls used to mitigate fluid loss. This specification sets forth a set of minima, physical, mechanical, chemical and endurance properties that must be met, or exceeded by the geomembrane being manufactured. Section 4.3 “leaching of constituents” has been removed.

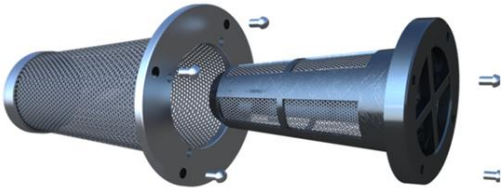
5. Chlorine Aging

Chlorine aging of geomembranes has been an endeavor that has taken much effort at GSI over the past six months. The relatively new EIA = PVC+KEE specification “GRI-GM34” covers physical, mechanical, chemical and endurance properties of EIA geomembranes. The majority of the required properties are evaluated by test methods established by the ASTM D35 Geosynthetics Committee. In cases where no ASTM standards are available, GRI test methods or practices are developed accordingly to fill the gaps. One such case is a practice for chlorinated water resistance. The purpose of this immersion challenge is to artificially *accelerate* the aging of EIA geomembrane. This important characteristic is covered under GRI GM-24 “Standard Practice for “Incubation and Subsequent Evaluation of Double 180° (Star) Folded Geomembranes” **This practice has now moved into ASTM as WK 89344.**

6. JET Filter Investigation

Earth retaining structures, such as seawalls, bulkheads, bridge abutments and retaining walls, require proper drainage. Inevitably, hydrostatic water pressure builds up behind such walls over time. Without proper drainage, the wall will subsequently become distressed and possibly experience failure. Maintainable weep hole filters will extend the life of any new or existing structure. JET Filters have proven to be a maintainable weep hole system for both new construction and retrofits of old infrastructure. They consist of a cage and a

removable geotextile cartridge for easy operations and maintenance. GSI has written a new test method to evaluate these products over time. The long-term flow test is a bit tricky because it deals with partially saturated flow rather than our conventional Darcian flow. As seen in the pictures below, the process is scalable to the lab and will be presented to ASTM for consideration in the ASTM D1987 test method task group.



7. Arrhenius Modeling

CARPI Inc. is sponsoring Arrhenius Modeling of four PVC geomembranes formulations at GSI. The Arrhenius method assumes that the mechanism of degradation at elevated temperature is similar to that of degradation under ambient conditions. This ten years plus effort is a huge undertaking for the institute. It keeps our endurance test lab solvent and operable and has provided justification for a large maintenance contract form Q-Panel for several years. We currently have three QUVA fluorescent devices running around the clock at 75, 65 and 55 degrees Celsius servicing this project. We are very grateful for CARPI Inc.'s continued support and interest in the long term durability of their products made at different manufacturing facilities around the world.

8. Controlling the smooth edge thickness of textured polyolefin geomembranes

Over the past several years, we have seen a reduction in thickness of the weld edge (smooth edge) of textured geomembranes. This is presenting a challenge for installers when trying to achieve passing trial seams in the field prior to production welding. Seam tests are passing,

but just barely (10% above GM19a or less). As a result, we have written GRI GM-37 "Determining the Weld Edge Thickness of Geomembrane" and slightly modified GM13 to give a means of evaluating the smooth edge thickness and to try and remedy the situation.

9. Exhuming GS's from Ultra-Lightweight Foam Glass Aggregate MSE Wall

Lightweight fill, including geofoam and expanded shale, are becoming increasingly popular in the United States in terms of construction. Ultra-Lightweight Foam Glass Aggregate (UL-FGA) is a relatively new member of this group in the USA. With its rise starting in Europe in the late 20th century, UL-FGA quickly became a sustainable alternative to traditional lightweight aggregate fills; not only is it made from 100% post-consumer recycled glass, but it also increases the lifetime of other materials within the construction project. We presented a paper at the 12th ICG entitled "Geosynthetic damage due to installation stresses in ultra-light weight foamed glass aggregate versus conventional aggregate" with Loux, Filshill and Schuller.

We are currently extending this work with the exhumation of geosynthetic from the MSE Wall or I-95. This is an amazing site of opportunity. After the tragic bridge collapse and complete closure of I-95 just north of Philadelphia, PA on June 11, 2023, Penn DOT organized an emergency repair to reopen six lanes through this essential transportation corridor. The solution was to build a temporary MSE wall of UL-FGA reinforced with geosynthetics. The structure functioned spectacularly and was constructed in only eleven days. At the end of the year, Buckley Construction Company dismantled the MSE wall and we had the privilege to exhume the geosynthetic contained within. We are currently testing the exhumed materials at GSI and will generate survivability partial factors of safety for each. **Strain Hardening and Stress Cracking**

The Institute has had a major effort of relating the stress cracking performance of HDPE geomembranes to strain hardening modulus (SHM). The SHM is based on ASTM D6693 testing. This test method is used to develop a test method from which the susceptibility of unaged HDPE geomembrane sheet material to stress cracking under a constant tensile load condition and an accelerated environmental condition can be predicted using strain hardening modulus value. This comparison of

characteristics of similar materials by standardizing the method for deriving the onset, modulus, and break point on the stress-strain curve from an HDPE Tensile Test. Strain hardening data can be appropriate for assessing the stress crack susceptibility of HDPE geomembranes. However, it should be very clearly stated that this method shows a good correlation between strain hardening modulus and stress crack performance within a specific formulation (resin type plus master batch). In addition, this method shows very poor correlation between strain hardening modulus and stress crack performance across different formulations. As such, this method is a useful manufacturing quality control (MQC) tool but is not appropriate for setting specification criteria by engineers to compare different geomembranes. To this end, if formulations are compared, they should be of the same supplier, grade, and density. We are looking forward to collaborating with ASTM, Jan Retzlaff (GeoScope) and the ISO crew on this subject.

As many of you know, the Geosynthetic Institute is in search of an alternative surfactant for stress cracking tests for HDPE geomembranes. It has been brought to the attention of the ASTM D5397 task group that the surfactant used in this experiment (Igepal CO-630) is a regulated substance in some countries (i.e., EU REACH directive). For this reason, many labs throughout the world are requesting a substitute-alternative surfactant for determining the stress crack resistance of HDPE via this method.

GSI is working with the ISO task group on this subject. The German committee of NAUE, SKZ, SOLMAX and HKA are currently in round robin testing with three different GRI geomembranes using BASF's Dehyton PL. These three geomembranes are the same materials that GSI used for the ASTM round robins. Hopefully they will find a REACH (EU) compliant surfactant that has the similar SP-NCTL signature as Igepal CO-630 across HDPE geomembrane formulations commonly used in our industry. We will keep you posted.

10. Beyond GM-13 and GM-17 Specifications

GM-13 and GM-17 have achieved acceptance and adaption in many markets and countries throughout the world. The documents have been modified over time with 16 and 14 modifications/revisions, respectively. However, the barrier market has significantly expanded in scope, range and expected performance over the past decade. A "one size fits all" approach, while appropriate in the past, is no longer

adequate to address the industry's needs. For this reason, GSI has contracted a group of talented engineers and scientists with a wealth of knowledge on formulating and manufacturing PE geomembranes to prepare new specifications for geomembrane barriers based on application requirements including, but not limited to durability, lifespan, barrier properties and other factors. This process included investigation of existing databases from multiple sources with review and discussion of the proposed levels and values. This effort accomplished the following objectives:

- a. Proposed new DRAFT standards that respond to the current Wide variety of HDPE geomembrane applications.
- b. Tools for accelerating the measurement of stress crack resistance, resistance to oxidation and resistance to UV exposure, PROVIDED CORRELATION is performed.
- c. A Protocol for the "fingerprinting" of a geomembrane formulation in order to track consistency and relationship to observed durability performance.
- d. DRAFT Tech Notes that address ongoing issues (surface defects, engineered layers, recycled content and formulation definition).

11. GM Seam Specifications

GSI currently has twelve (12) barrier specifications. It has been requested that each have an accompanying seam specification. It is envisioned that the series of seam specification will be expanded to include the following:

19a, GM-13 HDPE, GM-17 LLDPE, GM-18 fPP

19b, GM-22 PE-R, GM-25 LLDPE-R, GM-28 CSPE-R, GM-34 EIA-R

19c, GM-21 EPDM

19d, GM-30 RCPE

19e, GM-38 BGM

GRI GM-22 PE-R B, GCL-3 and GS-33 VB film will not be covered by a seam specification and GSI will stay away from a PVC specification as a result of duplication of effort with ASTM.

Progress within GII (Information)

The bylaws are available to anyone upon request.

As you can see by the listing below, we are still disseminating a lot of new information at the institute.

- GRI Methods, Specifications, Guides & Practices
- Quarterly Newsletters

- White papers
- GSI Website
- Bimonthly GMA Techline
- Bimonthly GSI News Column in Geosynthetics Magazine
- Conference Papers
- GRI Reports

IGS Geosynthetic Handbook

George R. Koerner, editor of the IGS handbook, has submitted the first draft of the handbook. It is now being reviewed by the IGS handbook committee. This handbook will be a dynamic document that will continue to evolve over time, updating as new information and technologies develop. This practical text is intended to serve as a general reference document in the field of geosynthetics. Polymeric construction materials used in civil applications are now commonly accepted as solutions to geotechnical and environmental engineering challenges. This handbook offers a comprehensive overview of geosynthetics and their various applications. The chapter breakdown and authors of the handbook are as follows:

- I **Introduction to Geosynthetics**
(George Koerner)
- II **Geosynthetics in Roads and Pavements**
(Eli Cuelho)
- III **Geosynthetics in Subsurface Drainage/Water Storage** (Barry Christopher)
- IV **Geosynthetics in Erosion and Sediment Control**
(Joel and Jay Sprague)
- V **Geosynthetics in Reinforced Soil Systems**
(Chris Lawson)
- VI **Geosynthetics in Seepage Control Systems**
(Kent von Maubeuge)
- VII **Geosynthetics in Environmental Protection**
(Kerry Rowe)
- VIII **Geosynthetics Support Systems**
(George Koerner)
- IX References / Links

We will keep you updated on the progress of the handbook, which is targeted for release by the end of 2024.

Geosynthetic Institute's upcoming Activities:

- 2024 April 19-26th ICGEE Busan, South Korea
- 2024 April 28- May 1 GeoAmericas Toronto Canada
- GSI Annual Meeting – Monday April 29 at GeoAmericas conference, 6:00 – 7:00pm
- 2024 June 12-14 ASTM D35

Members Only Section on Website

Accessible with a members-only password. Your contact person/persons (names listed beneath member company) must obtain a password from Jamie Koerner to access the members-only section of the Geosynthetic Institute website. Jamie can be reached by e-mail at Jamie@geosynthetic-institute.org. When you get into this members-only section, the following information is then available.

- **GRI Test Methods (all)**
- **GRI Reports**
- **GRI Technical Papers (419 Citations)**
- **Notes of GSI Meetings**
- **Links to the GSs World**
- **Keyword Search for Generic Papers**
- **Example Problems**
- **Frequently Asked Questions (FAQs)**

GRI Reports

To date, we have 48 GRI Reports available to members and associate members. Access to these reports are in the password protected section of the GSI website at www.geosynthetic-institute.org/member/reports.html. Non-members can purchase the reports from the online GSI bookstore. There are 45 Whitepapers which are free to everyone.

Progress within GEI (Education)

GSI Fellowships - 2024

GSI Fellowships to graduate students pursuing either a masters or doctoral degree related to geosynthetics will be awarded again this year.

Please note that proposals for individual student fellowship awards for the 2024-'25 Academic Year are due on **Monday, August 19, 2024**.

Webinars – Prerecorded

The following prerecorded webinars are available to purchase on our website. The GSI webinars (1 ½ hours in duration) cover a large variety of topics related to geosynthetics.

GSI 1	"A Data Base and Analysis of 320 Failed MSE Walls With Geosynthetic Reinforcement"
GSI 2	"MSE Wall Back Drainage Design"
GSI 3	"MSE Wall Remediation and Monitoring"
GSI 4	"MSE Wall Inspection"
GSI 5	"Geosynthetics in Hydraulic Applications"
GSI 6	"Geosynthetic Applications Used in Heap Leach Mining"
GSI 7	"Geosynthetics in Agriculture and Aquaculture"
GSI 8	"Geosynthetics Applications in the Private Sector"
GSI 9	"Behavior and Analysis of Twenty Solid Waste (Landfill) Failures"
GSI 10	"Wet (Bioreactor) Landfills for Rapid Degradation of MSW Organics"
GSI 11	"Lateral and Vertical Expansions Over Old and Existing Landfills"
GSI 12	"Landfill Covers: Past, Present, Emerging"
GSI 13	"Beneficial Uses of Abandoned and/or Closed Landfills"
GSI 14	"Lifetime Predictions of Covered and Exposed Geosynthetics"
GSI 15	"In-Situ Stabilization of Soil Slopes Using Nailed (or Anchored) Geosynthetics"
GSI 16	"Sand Drains-to-Wick Drains-to-Sand Columns (Including a Major Failure Case History)"
GSI 17	"Geosynthetics in Erosion Control"
GSI 18	"Pond Liner Design and Performance"
GSI 19	"Wave (or Wrinkle) Management [For Proper Deployment of GM]"
GSI 20	"Geosynthetic Drainage Materials: Applications, Design, Installation and Performance"
GSI 21	"A Brief Overview of Geosynthetics and Their Major Applications"
GSI 22	"Geosynthetic Reinforced MSE Walls; Overview, Failures and Items for Improvement"
GSI 23	"Geosynthetic Filters: Concerns and Issues"
GSI 24	"Disposal of Coal Combustion Residuals"
GSI 25	"Soil Consolidation by Wick Drains, aka PVDs"
GSI 26	"Applications and Design of Geotextile Tubes"
GSI 27	"Stability Design of Landfill Cover Soils"
GSI 28	"Geomembrane Puncture"
GSI 29	"QA/QC of Geosynthetics"
GSI 30	"Lifetime Durability of Geosynthetics"
GSI 31	"Laboratory Testing of Geosynthetics"
GSI 32	"Sustainability with Geosynthetics"
GSI 33	"Ultraviolet Resistance of Geosynthetics"
GSI 34	"Geosynthetics in Roadways"
GSI 35	"Geosynthetics used in Canal Linings"
GSI 36	"Geosynthetics as Hydraulic Barriers"

Each webinar provides 1.5 Professional Development Hours available upon completion of a short quiz

GSI Members Cost - \$200
(unlimited number of attendees for GSI Members)
Nonmembers Cost - \$250

Courses

The following pre-recorded courses are available through our online bookstore to both members and non-members.

1. Quality Assurance/Quality Control of Geosynthetic in Waste Containment Facilities
(Recordings are available)
2. Construction Inspection of Mechanically Stabilized Earth (MSE) Walls, Berms and Slopes
(Recordings are available)

The third and newest of GSI courses is an On-Line "Designing with Geosynthetics (DwG)" course. Please go to www.geosynthetic-institute.org/courses.htm and scroll down to Course #3. Here you will see the requisite details. The course itself is completely synchronized with the 6th Edition of the DwG textbook. It consists of 1540 slides with \approx 18 hours of voice over; about one minute for each slide.

Contact Jamie Koerner at jamie@geosynthetic-institute.org if you want additional information.

Activities within GAI (Accreditation)



GAI-Lap met for its semi-annual meeting in conjunction with ASTM D35 in Louisville Kentucky USA on January 25. As you can see by the above picture, we had a full house. The agenda for the meeting was as follows:

- Announcement
- Accreditation value
- Demographics and welcome to new labs
- On site Audit scheduling
- Proficiency Test Program
- Customer Survey
- Conflict Resolutions
- Calendar
- Deliverables
- Open Discussion

On March 13th we conducted an in-person round robin test on ASTM D4886 Test Method for abrasion Resistance of geotextiles (Sandpaper/sliding block method) at Solmax's Pendergrass facility. The round robin testing was informative and certainly showed procedural, supply and equipment variability. As you can see by the pictures below, we had three different sliding block CSI abrasion testers on site. We also had four different types of 100 grit sandpaper all conforming to the standard.



We know from experience that the sandpaper and the geotextile needs to remain flat and affixed to the platen throughout the 250 abrasion cycles. This is not easy with robust geotextiles. We have aided this process with improved clamping of the geotextile. In addition, we

adhered the sand paper (if it has a flimsy paper backing) to the platen with spray glue or two-sided tape. Unfortunately, affixing the sandpaper to the platen has a downside of residual glue build-up. If not cleaned up completely between tests, it can lead to uneven abrasion wear and strange gapping of the platens. At this point I am not a fan of using any adhesives with the test. I think it might be doing more harm than good.

What needs to happen is twofold. First the geotextile must be clamped evenly and securely on the top platen. This is done meticulously with shims, clamps and the tensioning bolt at the head of the top platen. Secondly, the sandpaper needs to have a good strong backing so that it lays flat and affixed to the lower platen without shimmying around during the abrasion cycle.

It is very important to observe the exposed geotextile sample coupon and the sandpaper after the abrasion. You should observe an even wear pattern on both the geotextile and sandpaper. This is not easy. The leading edge of the platen is often problematic.

The above procedural, supply and equipment variability explains why we are seeing double digit uncertainty with the test. We would like to thank Solmax and SGI for participating in the round robin and help with this riddle of abrasion variability. We will use this information going forward to provide added clarification within the ASTM D4886 standard test methods.

The GAI-LAP program continues to grow steadily with much interest internationally and with the proficiency test program (PTP)

- Began in 1995 w/ISO 17025 as model.
- GSI operates under 17011.
- 123 labs, 24 different countries, 265 possible tests

The following laboratories are accredited by the GAI-LAP for the number of test methods listed in parenthesis.

- 1^A - TRI/Environmental Inc. (158 tests)
Jarrett Nelson -- (512) 263-2101
jnelson@tri-env.com
- 3^A - WSP (43 tests)
Henry Mock -- (770) 492-1893
Henry.Mock@wsp.com
- 4^C - Geosynthetic Institute (108 tests)
George Koerner -- (610) 522-8440
gsigeokoerner@gmail.com
- 8^B - Solmax Geosynthetics (Propex) - Ringgold (18 tests)
Todd Nichols -- 438-553-3757
tnichols@solmax.com
- 9^B - Lumite (17 tests)
Rebecca Kurek -- (770) 869-1787
rkurek@lumiteco.com
- 13^A - Precision Geosynthetic Labs (TRI Env.) (77 tests)
Chad Blackwell -- (714) 520-9631
cblackwell@tri-env.com

- 14^A - Geotechnics (55 tests)
J. P. Kline -- (412) 823-7600
JPkline@geotechnics.net
- 20^A - GeoTesting Express, MA (63 tests)
David Norton - (978) 635-0424
dnorton@geotesting.com
- 22^B - CETCO Hoffman Estates (11 tests)
Minerals Technologies Inc.
Dennis Wind -- (847) 851-1904
Dennis.wind@mineralstech.com
- 24^B - CETCO Lovell (12 tests)
Minerals Technologies Inc.
Ryan Nicholls -- (307) 548-6521
Ryan.Nicholls@mineralstech.com
- 25^B - Solmax (TenCate), Pendergrass (13 tests)
Randy Johnson-- (706) 693-2226
rjohnson@solmax.com
- 26^B - Agru America Inc. (27 tests)
Vicky Bryant-- (843) 546-0600
Vbryant@AgruAmerica.com
- 29^E - FITI Testing and Research Institute (80 tests)
Hang Won-Cho -- 82-2-3299-8071
hwcho@fitiglobal.com
- 31^D - NYS Dept. of Transportation (8 tests)
Jim Simonds -- (518) 485-5707
Jim.Simonds@dot.ny.gov
- 34^B - Solmax (GSE) - Houston, TX USA (24 tests)
Sai Prasad Namburi
sprasad@solmax.com
- 38^C - CTT Group SAGEOS (125 tests)
Oliver Vermeersch -- (450) 771-4608
overmeersch@gcttg.com
- 40^B - Solmax (GSE) - Kingstree, SC USA (14 tests)
Bruce Pressley -- (843) 382-4603
bpressley@solmax.com
- 41^A - SGI Testing Service, LLC (19 tests)
Zehong Yuan -- (770) 931-8222
ZYuan@sgilab.com
- 45^B - Solmax (TenCate) Malaysia SDN Bhd. (29 tests)
Boon Kean Tan -- (603) 519 28576
bktan@solmax.com
- 46^B - TAG Environmental Inc. (13 tests)
Manpreet Saini-- (705) 725-1938
manpreet.Saini@tagenv.com
- 49^B - Engepol Geosintéticos (16 tests)
Patricia Natali -- (55) 51 3303-3901
patricia@engepol.com
- 50^B - ADS, Inc. Hamilton (8 tests)
Justin Elder -- (513) 896-2065
justin.elder@ads-pipe.com
- 51^B - SOLMAX - Canada (20 tests)
Claude Cormier -- (450) 929-1234
ccormier@solmax.com
- 53^B - Polytex Autofagasta (19 tests)
Mario Contreras Cardenas -- 011 55-288-3308
mcontreras@polytex.cl
- 55^B - Atarfil Geomembranas (21 tests)
Gabriel Martin Sevilla -- 34 958 439 200
gmartin@atarfil.com
- 56^B - Polytex Santiago (15 tests)
Sebastian Iturriga Monroe-- 011 56-2-677-1000
Siturrita@polytex.cl
- 57^B - Solmax (TenCate) - Cornelia (26 tests)
Taylor Kolesnick-- (706) 778-9794
kolesnick@solmax.com
- 58^B - Propex Furnishing Solutions - Hazlehurst (10 tests)
Lee Branch -- (912) 375-6180
Lee.Branch@propexglobal.com
- 59^B - Holcim Solutions & Products (9 Tests)
Janie Simpson -- (864) 439-5641
Janie.Simpson@holcim.com
- 60^B - TDM Geosintéticos S.A. (21 tests)
Henry De La Cruz -- 051-1-6300330
Hdelacruz@tdmgeosinteticos.com.pe

- 61^B - Viaflex (24 tests)
Clint Boerhave -- (605) 335-0288
Clint.Boerhave@viaflex.com
- 62^B - SOLMAX - Selangor - Malaysia (18 tests)
Pei Ching Teoh -- (450) 929-1234
pcteoh@solmax.com
- 63^A - TRI-SC Labs (20 tests)
Jay Sprague -- (864) 346-3107
Jesprague@tri-env.com
- 64^B - Agru America (NV) (14 tests)
Ryan Steele -- (775) 835-8282
RSteele@AgruAmerica.com
- 65^C - Bombay Textile Research Assoc. (BTRA) (25 tests)
PK Panda (0) 022-25003651
geotech@btraindia.com
- 66^B - Rowad International Geosynthetics Co. Ltd (15 tests)
Mohammad Ishad Hussain-- +966-3-812-1360
irshad@rowadplastic.com
- 69^B - Solmax - Rayong - Thailand (18 tests)
Siriporn Chayaporenler -- 66-386-36758
siripornc@solmax.com
- 70^A - RSA Geo Lab LLC (49 tests)
Rasheed Ahmed -- (908) 964-0786
geolab13@yahoo.com
- 71^B - Plásticos Agrícolas y Geomembranas S.A.C. (25 tests)
Manuel Constantino Olivares Espinoza --
073-511814-511829
calidad@pqapag.com
- 72^B - Tensar Corp. GA (5 tests)
Lynn Cassidy-Potts (770) 968-3255
lcassidy@tensarcorp.com
- 73^B - Gai Loi JSE (10 tests)
Paul Wong 84-650-362-5825
paul905677@gmail.com
- 74^B - Agru America Inc. (9 tests)
Mark Locklear - (843) 221-4121
mlocklear@agruamerica.com
- 75^B - GeoMatrix S.A.S. (45 tests)
Javier Diaz Cipagauta (571) 424-9999
jdiaz@geomatrix.com.co
- 76^B - Tehmco (Chile) (18 tests)
Rodrigo Campoy 56-22-580-2852
rcampoym41@gmail.com
- 78^B - PAG Mexico (16 tests)
Cesar Augusto Arcila (669) 954-8202
directorcalidad@payg.mex
- 79^A - TRI Geosynthetic Testing and Services (32 tests)
Mansukh Patel 86-512-6283-1396
Mpatel@tri-env.com
- 80^B - Texel Technical Materials (Alkegen) (10 tests)
Eric Trudel (418) 387-4801
Etrudel@alkegen.com
- 81^B - Solmax (GSE) - Reclin - Germany (18 tests)
Evelyn Kroeger 49-40-767420
ekroeger@solmax.com
- 83^B - Solmax Geosynthetics S.A.E. (13 tests)
Ahmed Abdel Tawab - 202-2-828-8888
atawab@solmax.com
- 85^B - PAG Tacna (26 tests)
Manuel Olivares Constantino Espinoza --
073-511814-511829
calidad@pqapag.com
- 86^B - BOSTD China (29 tests)
Zheng Hong - 86-532-8780-6917
zhenghong@bostd.com
- 87^B - Willacoochee Industrial (19 tests)
Miranda Adams - 912-534-5757
miranda@winfabusa.com
- 88^B - Geosynthetic Testing Services Pvt. Ltd. (16 tests)
Ravi Kant - 02717-250019
rkant@gts-pl.com
- 89^B - Megaplast India Pvt. Ltd. (13 tests)
Tatwadarsi Tripathy - 91-937404-4620
geo.sqc@megaplast.in
- 90^B - Techfab (India) Industries Ltd. - Daman (10 tests)
Anant Kanoi - 91-22-2287-6224
anant@techfabindia.com
- 91^B - Techfab (India) Industries Ltd. - Rakholi (3 tests)
Rajendra Chavan - 91-982-593-9922
geogrid.qualitylab@techfabindia.com
- 92^B - Techfab (India) Industries Ltd. - Khadoli (2 tests)
Navir Kumar - 91-22-229-76224
woven.qualitylab@techfabindia.com
- 93^B - Garware Technical Fibres (19 tests)
Rajendra K. Ghadge - 0-932-601-8083
rghadge@garwarefibres.com
- 95^B - Mexichem Colombia (Pavco) (8 tests)
Jenny Colmenares Chavez - 57-1-782-5100 (ext. 1534)
jjenny.colmenares@wavin.com
- 96^B - Tensar China (7 tests)
Zhu Shaolian - 603-6148-3276
zsl@tensar.com.cn
- 97^A - TUV SUD PSB Singapore (17 tests)
CHA Ming Yang - 65-6885-1514
ming-yang.CHA@tuv-sud.psb.sg
- 99^B - Atarfil Middle East (16 tests)
Mohammad Hneine - 971-564-33-1271
mhneine@atarfil.com
- 100^B - Atarfil Geomembranes USA (12 tests)
Alejandro Carreras - 757-263-4057
acarreras@atarfil.com
- 101^B - Solmax (GSE) - Spearfish, SD USA (7 tests)
Chuck Taylor - 605-642-8531
ctaylor@solmax.com
- 102^B - SKAPS Industries (12 tests)
Sadhvi Arora - 706-336-7000
sadhvi.Arora@skaps.com
- 103^B - STRATA Geosystems Pvt. Ltd. (30 tests)
C. V. Kanade - 91-22-4063-5100
cv.kanade@strataindia.com
- 104^A - Advanced Terra Testing (32 tests)
Kerry Repola - 303-232-8308
krepola@terratesting.com
- 105^B - Pavco Wavin - Peru (8 tests)
Nestor Sifuentes Boggio - 51 990 277 136
nestor.sifuentes@wavin.com
- 107^A - TRI Australasia PTY LTD (39 tests)
Warren Hornsey - +617-5535 7227
Whornsey@tri-env.com.au
- 108^B - Solmax Geosynthetic Co. Ltd. Suzhou (13 tests)
Pei Ching Teoh - 86512-66667-6100
pcteoh@solmax.com
- 109^B - Hock Technology Co. Ltd. (17 tests)
Song Binghong - 186-7873-9722
Binghong.Song@sdhock.com
- 110^C - Geofabrics Australia Pty. Ltd. - GRID (53 tests)
Ryan Hackney - 61-42-781-0392
r.hackney@geofabrics.com.au
- 111^B - Huesker Inc. - Shelby (9 tests)
Callie Kesterson - 704-406-8308
ckesterson@huesker.com
- 112^C - Instituto Mauá Tecnologia Brazil (13 tests)
Henrique Nelson Satkunas
Henrique.satkunas@maua.br
- 113^B - Azul Pack Filmes - Embalagens (11 tests)
Camila Nicoletti Brito
Camila.brito@azulpack.com.br
- 114^B - Lonax Industria Brasileira DeLonas Ltda. (13 tests)
Felipe Diniz
qualidade@lonax.com.br
- 115^B - Doha Waterproof Factory (21 tests)
Ahmed Al-Masre
infor@dohawaterproof.com
- 116^B - Soleno Textile Techniques Inc. (6 tests)
Kathie Fleury
kfleury@soleno.com
- 117^B - Reinforced Earth India Pvt Ltd. (4 tests)
Robert Lozano
Rlozano@reinforcedearth.com

Inspector Certification Test Results 2006-2024

- 118^B Layfield Canada (9 tests)
Richard Langford
Richard.Langford@layfieldgroup.com
- 119^B Mexichem Brasil (10 tests)
Nathalia Miyahara
Nathalia.Miyahara@wavin.com
- 120^B Gold-Joint Testing Technology. (26 tests)
ACE Geosynthetics
Amy Tang
amy.tang@geoace.com
- 121^B Techfab (India) Karajgam (18 tests)
Prabhu Tripathy
p.Tripathy@techfabindia.com
- 122^B TDM Geosinteticos Brasil (6 tests)
Wladimir Caressato
Wcaressato@TDMbrasil.com.br
- 123^B Tecelagem Roma Ltda (6 tests)
Marcos Fernando Leme
qualidade@roma.ind.br
- 124^B Geo Source (7 tests)
Pravin Dilip Bhokare
gc@geosource.in

^AThird Party Independent ^CInstitute
^BManufacturers QC ^DGovernment

If anyone desires more information on the GAI-LAP program, its test methods, the associated laboratories, etc., please go to our website www.geosynthetic-institute.org/gai/lab.htm or contact George Koerner.

Activities within GCI (Certification)

GSI presently has three separate inspector certification programs. One (began in 2006) is focused on QA/QC of field inspection of waste containment geosynthetics and compacted clay liners. The second (began in 2011) is focused on MSE Wall, Berm and Slope field inspection. The third, on Geosynthetic Designer Certification began on September 1, 2016. See our website at www.geosynthetic-institute.org under "certification" for a description and information on all three of them.

Applications to sit for the GCI-ICP exams need to be submitted to the Geosynthetic Institute for approval prior to taking the exams. Applications and payment information for the exams can be found at: <https://geosynthetic-institute.org/applications.htm>

Program #1 - Inspection of Liner Systems for Waste Containment Facilities

TRI Environmental Inc. teaches two courses, "Construction QA/QC for Geosynthetic Installation" and "Construction QA/QC for Compacted Clay Liners and GCL Installation" in preparation for taking the Inspector Certification exams. They are offering this virtual course again on April 22-26, 2024. If you are interested, please register with TRI Environmental.

Year	Geosynthetic Materials		Compacted Clay Liners	
	No. of people taking exam	No. of people failing exam	No. of people taking exam	No. of people failing exam
2006	141	5 (3%)	128	12 (9%)
2007	82	11 (13%)	73	12 (16%)
2008	95	25 (26%)	89	20 (22%)
2009	36	7 (19%)	36	2 (5%)
2010	59	12 (20%)	54	7 (13%)
2011	54	6 (11%)	53	3 (6%)
2012	34	5 (15%)	28	3 (11%)
2013	32	4 (12%)	30	1 (3%)
2014	45	1 (3%)	42	3 (7%)
2015	56	6 (11%)	51	6 (12%)
2016	36	3 (10%)	35	5 (18%)
2017	78	5 (6%)	66	3 (4%)
2018	53	5 (10%)	51	1 (3%)
2019	114	20 (18%)	119	15(13%)
2020	100	14 (14%)	92	10 (11%)
2021	70	14 (20%)	61	8 (13%)
2022	89	15 (17%)	80	13 (16%)
2023	81	18 (22%)	76	13 (17%)
2024	5	-	4	-
Total	1260	176 (14%)	1177	137 (12%)

The Geosynthetic Institute has a pre-recorded "QA/QC of geosynthetics in waste containment facilities" course that can be purchased by anyone wanting to take the course online (accommodates your schedule) in preparation for the GCI-ICP certification exams. More information can be found at: www.geosynthetic-institute.org/courses.htm

Program #2 - Inspection of MSE Walls, Berms and Slopes

While a field inspector cannot require proper design or direct a contractor how to build a wall, flaws can be identified for possible design modification or mitigation action. Furthermore, and at minimum, construction practices can be observed and corrected if inadequate or improper. The official launch of this inspection program was on December 1, 2011 with a course and the examination afterward. A somewhat revised course on November 29, 2012 was presented. Presently, the corresponding course for this certification program has been transferred into a series of six presentations that have been recorded and can be viewed at your leisure.

Program #3 - Geosynthetic Designer Certification

Please see www.geosynthetic-institute.org/gdcpintro.pdf for the requisite details. Included are introduction requirements, application, reference material, sample questions, proctor manual and proctor application. You must have six-months of geosynthetic designer experience to take the exam.

The GSI Affiliated Institutes

It has long been realized that the information generated within the GSI group should have a timely outlet to all countries, and in all languages. GSI has affiliated institutes in two countries (Korea and India), and potentially others in the future. These affiliated institutes are full members of GSI and are empowered to translate and use all available information so as to create similar institutes and activities in their respective countries.

GSI-Korea was formed on February 9, 1998 as a collaborative effort between FITI Testing and Research Institute (a quasi-government organization) and INHA University (through its Geosynthetics Research Laboratory). **INHA University** is located in Incheon and the geosynthetics laboratory is led by Professor Han-Yong Jeon.

Dr. Jeon is happy to announce and chair the **2nd International Conference on Geosynthetics and Environmental Engineering (ICGEE2024)** to be held on April 19–20, 2024, in Busan, South Korea. The ICGEE2024 combines Academia with Industry to adapt scientific achievements into practical applications in the field of Geosynthetics and Environmental Engineering. The 2nd ICGEE will continue to promote relevant engineering research and applications in a vast range of topics, including Geosynthetic applications and sustainability, Civil and Structural Engineering, Environmental Engineering and Science. The event will give researchers and engineers from around the world the opportunity to present and discuss recent developments in the field. The call for papers is open. Please choose one of the following links to submit your contributions:

<https://www.icgee.com/openconf/openconf.php>
Email: cfp@icgee.com

Registration Deadline: April 15, 2024

GSI-India under the direction of Dr. T.V. Sreekumar was formed in 2015. The hosting organization is the Bombay Textile Research Association (BTRA) which is a premier textile research institute providing testing, research, training and consultancy services. BTRA is located in Mumbai, India and is accredited as per ISO 17025. The Geosynthetic test lab is also GAI-LAP accredited. Testing at BTRA is performed as per the latest EDANA, ASTM, INDA, AATCC, ISO, EN and AASHTO international standards. BTRA is known for its excellence in textile R & D and is currently branching out into all forms of geosynthetics with a fantastic R & D laboratory.

GSI Member Organizations

We Sincerely Thank all 63 (47 full and 16 associate) Members Organizations of the GSI family for their continued guidance and support. Without members, GSI could not exist. The current GSI member organizations and their contact members are listed below.

Solmax

*Mark Harris/Jacques Cote/Simon Gilbert St-Pierre/
Jimmy Youngblood/Guillaume Beaumier/*

U.S. Environmental Protection Agency

David A. Carson [BOA]

Federal Highway Administration

Silas Nichols/Daniel Alzamora

WSP Inc.

Frank Adams/Paul Whitty/Linda Grover/Henry Mock [BOA]

Tensar International Corporation

Mark H. Wayne/Joseph Cavanaugh/Jacek Kawalec [BOA]

Solmax Geosynthetics

John Henderson/John Lostumbo/Rene Laprade [BOA]

Minerals Technology/CETCO

Reza Gorakhki/Stacy Byrd/Michael Donovan/Hilary Walker

Huesker, Inc.

Flavio Montez/Andreas Elsing/Leite Gembus

NAUE GmbH & Co. KG

Alexander Naue/Henning Ehrenberg [BOA]

Propex Operating Company LLC

Drew Loizeaux/Noah Nichols

TRI Environmental Inc.

Sam R. Allen [BOA]/C. Joel Sprague

U. S. Army Corps of Engineers

Richard DePasquale

Chevron Phillips Chemical Co.

Ashish Sukhadia/Lawrence Szmuto/Miranda Rine [BOA]

CARPI, Inc.

Alberto M. Scuerto/Francois Tronel/John A. Wilkes

Civil & Environmental Consultants, Inc.

Tony Eith/Steve Menoff

AGRU America, Inc.

Gunther Niedermoser/Tom Nichols/Markus Haager/

Anthony Johnson [BOA]

INHA (GSI-Korea)

H.-Y. Jeon

Waste Management Inc.

Greg Cekander/Burrill (Bo) McCoy [BOA]

GeoComp/GeoTesting Express

W. Allen Marr/Gary Torosian/Joe Tomei

ATARFIL

Emilio Carreras Torres/Jorge Fernandez Lopez/

Gabriel Martin/Nacho Garcia Arroyo

Republic Services Inc.

Joe Benco/Mike Beaudoin/Dave Vladic

InterGEO Services Co.

Şükrü Akçay/Archie Filshill

Viaflex

Clint Boerhave/Stacy Coffin/Greg Anderson

CTI and Associates, Inc.

Te-Yang Soong / Kevin Foye

GSI Member Organizations (cont.)

Advanced Earth Sciences, Inc.

Kris Khilnani/Suji Somasundaram

Carlisle Syntec, Inc.

Paul Markel/Vivian Zhang

EPI, The Liner Co.

Daniel S. Rohe/Paul Livingston

Weaver Consultants Group, Inc.

Mark Sieracke

Aquatan (Pty) Ltd.

Piet Meyer/ Sanet van der Merwe

Jones Edmunds, Inc.

George Reinhart/Tobin McKnight

Afitex-Textel

Pascal Saunier/Stephan Fourmont

BTRA (GSI-India)

T. V. Sreekumar/ R.A. Shaikh

Watershed Geosynthetics LLC

Michael Ayers/Steve Mayes/ Bryan Scholl

Maccaferri

Moreno Scottto/Sachin Mandavkar

Jones & Wagener (Pty) Ltd.

Jabulile Msiza/Angelique Grieve

American Wick Drain

Scott Morris /Seth Marlow/Jeff Quill

INOVA Geosynthetics/AERO Aggregates

Archie Filshill/Theresa Loux

SKAPS Industries

Nilay Patel/Anurag Shah

Duke Energy

Asha Sree/Ken Karably

Chesapeake Containment Systems (CCS)

Ryan Kamp

Layfield Group

Deepaksh Gulati/Mark Simpson/Brian Fraser

Engepol Geosintéticos Ltda

Patricia Ferreira/Andréia Machado/Ildo Oliveira

Concrete Canvas

Lee Church/Melanie Fuhrman/Nathan Ivy

Jet Filter System

Doug Stoutin/David Heilman

Cooley Inc.

Lance Reed/Ray Peebles

Doha

Ahmad Al-Masre/Chandran Sekaran/Shahas Shareef

Dow Inc.

Dell Doyle/ Rhythm Chokshi

Azul Pack Filmes & Embalagens Ltda

Leonardo Dhein-Azul Pack/Camila do Valle/

Daniel Moreno Meucci

IKO-Axter SAS (Colanche)

Bertrand Breul/Preston Kendall/Natalie Daly

Seaman Corporation

Craig Hoffman/Tina Oliver/Bill Shehane/Jason Spruell

Associate Members

Delaware Solid Waste Authority

Robin Roddy/Lindsey Baer

Nebraska Department of Environmental Quality

Michael Behrens

New York Department of Environmental Conservation

Sheri Mazurek

Maine Department of Environmental Protection

Victoria Eleftheriou

New York Department of Transportation

Steve Heiser

California Water Resource Control Board

Scott Couch/ Brianna St. Pierre/Joshua Munn

New Jersey Department of Environmental Protection

Tom Farrell

Pennsylvania Department of Environmental Protection

Jason Dunham

Florida Department of Environmental Protection

Joe Dertien

U.S. Bureau of Reclamation

Brian Baumgarten/Peter Irey

Michigan Dept. of Environmental Quality

Margie Ring/Tiffany Johnson

Environment Agency of U. K.

Darren Legge

Florida Department of Transportation

David Horhota

National Resource Conservation (NDCSME)

Laura Wilson

Virginia Department of Environmental Quality

Jenny Poland

Massachusetts Department of Environmental Protection

Tom Adamczyk

Pennsylvania Department of Transportation

Beverly Miller/Kruz Schrann