

# Fiberglass Reinforced Plastics Institute, Inc.

## Syllabus

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**Course Name:** FRP831 – Field Inspection of Aboveground Chemical Bulk Storage Tanks

**Duration:** Four (4) days totaling thirty-two (32) hours, with continuing education PDH credit opportunity.

**Description:**

This course provides a comprehensive review and discussion of essential information pertaining to inspection of Fiberglass Reinforced Plastic (“FRP”) Aboveground Storage Tanks (“AST’s”) that are in operation, whether in or out of service. Learning objectives and course content support credentialing of FRPI SP8310 plus SP9100 AST and Odor/Air Pollution Control Vessel Installation Inspectors as well as career development for Junior Inspectors working to meet SP8310 personal experience requirements. Courses are conducted in the FRPI training and demonstration theater, with a maximum of twelve (12) participants per one (1) instructional leader. The one-hundred-twenty (120) inch projection screen with stereo sound, supplemented by dozens of hands on demonstrations integrating actual production materials, laminate cutouts and runouts, specimens extracted from equipment taken out of service, laboratory test remains plus inspection tools, provides for a tremendously interactive learning involvement. FRP laminate identification, visual imperfections, damage mechanisms plus integrity and leak testing course content makes up a significant portion of this course. This content also applies to inspection of pressure vessels, piping, ductwork, odor and air pollution control systems, underground storage tanks plus other such related process equipment.

**Key Learning Objectives:** After attending this course, participants should be able to:

1. Identify tank component laminate types, express composition by layer and calculate thicknesses.
2. Recognize originally manufactured laminate visual quality as benchmark for material performance.
3. Correlate FRP tank construction features with industry standards and use correct terminology.
4. Differentiate between API, ASTM, ASME and AWWA industry standards.
5. Recite and put to use appropriate inspection tools.
6. Assess adequacy of new and existing AST plus Odor/Air Pollution Control Vessel installations.
7. Qualify and quantify laminate damage mechanisms and describe their potential causes.
8. Investigate integrity and leak testing options based on advantages, disadvantages and limitations.
9. Perform visual inspection as a means of integrity and leak testing in accordance with SP8310.
10. Calculate estimated laminate degradation rates and remaining useful life.
11. Determine AST suitability for continued service.
12. Establish inspection intervals based on findings.
13. Apply principals governing proper use of applicable FRPI Standard Practices.
14. Implement minimum reporting and record keeping procedures.

**General Course Content and Outline:**

DAY 1 – Introductions. Overview of course content, agenda, learning objectives and activities plus FRPI SP8310 Inspector certification and licensing protocol. Tank construction features and basic design. Explore and expand on FRPI SP1010 and SP1020, including: raw materials, laminating methods, fabrication, secondary bonding (welding), quality control, manufacturing variables affecting laminate performance, laminate specification writing plus relevant sections of industry standards. Standard Practice use, learning exercise and quiz.

DAY 2 – Standards review, including sections of API 12P, ASTM C582, D2563, D3299, D4097 and D5421, ASME RTP-1 plus AWWA D-120 as defined in FRPI SP8310. General comparison and contrast between ASTM and ASME RTP-1 tank construction standards plus standards governing visual imperfections in new laminates. FRPI SP8310 tank installation inspection and checklist use for new and existing tanks. Learning exercise and quiz.

DAY 3 – Explore and expand on FRPI SP1030 and SP1040, including: normal aging process related to laminates in chemical service, visual inspection and damage assessment, basis and deterioration of design safety factors, proper inspection tools, damage mechanism examples plus closer look at Barcol hardness testing, cross-sectional evaluation, conventional and advanced ultrasound evaluation and acoustic emission testing. Standard Practice use, learning exercise and quiz.

DAY 4 – Explore and expand on sections of FRPI SP8310, including: basic inspection procedure, tank inspection checklist and test plan, determination of estimated laminate degradation rates, remaining useful life, suitability for continued service and inspection intervals plus minimum reporting and record keeping. Review inspection and failure analysis case histories as application of examples of course principals. Summarize key elements of course content for prequalified exam participants. Standard Practice use, learning exercise and quiz.

NOTE: Each day involves practical exchange of experience, with discussion of individual participant challenges and opportunities as time permits.

### **Who Should Attend:**

- Personnel associated with or directly responsible for inspection, condition and risk assessment, failure analysis, maintenance and regulatory compliance of FRP AST's.
- Individuals desiring to be credentialed as a certified "FRPI 8310 Inspector" for FRP AST's or as a means for demonstrating or otherwise differentiating their expertise when meeting employer, tank Owner and/or government regulator tank inspection requirements.
- FRPI SP9000 Certified "Manufacturer" independent sales representatives and consultants interested in conducting new FRP AST and Odor/Air Pollution Control Vessel installation inspections as an authorized inspector in accordance with the FRPI SP9100 Certified "Equipment" industry practice.

**Prerequisites:** Purchase and review of FRPI "Aboveground Storage Tank Inspector Certification and Licensing Manual". Course participants will be required to present a Manual copy at time of course check in, with their name included in original authentic unaltered license stamp on all Manual pages. Total of all participants from a given employer shall not exceed number of Manual copyright licenses employer has purchased. Although not required, it is recommended that participant obtain and review standards referenced within Manual. Prior understanding of FRP industry standards, laminate design, manufacturing and inspection may result in establishing broader and deeper learning experience.

**Recognition:** A course completion certificate will be issued to all attendees who participate in entire program, with thirty-two (32) Professional Development Hours ("PDH's") recorded for professional engineers. FRPI has been vetted and is recognized by RCEP ([www.rcep.net](http://www.rcep.net)) since 2011 as a provider of continuing education for licensed professional engineers. Participants desiring PDH credits will be given a program evaluation survey at the end of course and required to complete it. See Terms and Conditions of Course Registration for more information pertaining to PDH credit opportunities.

**Skills Assessment:** A short interactive quiz will be conducted at the conclusion of each day, with answers discussed live within the group as an ungraded learning confirmation exercise. Two (2) different exams are available for prequalified and preregistered participants on the day following the course, or as otherwise may be scheduled. The first exam is one-hundred-sixty (160) questions. It is made available to individuals desiring to be a certified "FRPI 8310 Inspector" per terms and conditions outlined in FRPI SP8310. This exam also covers credentialing in accordance with FRPI SP9100 for installation inspectors if the individual completes the FRP831 course. The second exam is forty (40) questions. It is made available exclusively to individuals who complete FRP831 and desire to only be a certified "FRPI 9100 AST and Odor/Air Pollution Control Vessel Installation Inspector".

**Instructional Leader:** Gary L. Arthur – FRPI Executive Director and President (see Bio/CV)