

# Fiberglass Reinforced Plastics Institute, Inc.

## Syllabus

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**Course Name:** FRP701 – Repair and Alteration of Chemical Process Equipment

**Duration:** Two (2) days totaling sixteen (16) hours, with continuing education PDH credit opportunity.

**Description:** This course provides a comprehensive review and discussion of essential information pertaining to repair and alteration of Fiberglass Reinforced Plastic (“FRP”) chemical process equipment. Concepts taught apply to tanks, ASME pressure vessels and piping, covers, ductwork, vessels, stacks plus other related equipment. Learning objectives and content of this course build on relevant ASME, ASTM, DIN, FRPI and NBIC industry standards pertinent to FRP repair and alteration plus lessons learned in other FRPI courses. Numerous case histories will be shared exemplifying theory put to work in practice. Courses are conducted in a training and demonstration theater setting, with maximum of twelve (12) participants per one (1) instructional leader and large projection screen including stereo sound. Instruction is supplemented by hands on demonstrations integrating actual failed laminate, core specimens extracted from equipment taken out of service, pulled bond test laminates and other demonstrations providing for an interactive learning involvement. Repair and alteration scope includes procedures to address FRPI SP1020 Visual Imperfections, SP1030 Damage Mechanisms and other fabrication anomalies or alteration necessities, where SP1010 Laminate Identification and SP1040 Integrity and Leak Testing practices are integrated into repair system qualification. Concepts covered help guide repair versus replacement decisions considering equipment damage types, deterioration rates, remaining useful life and reparability.

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

1. Classify types of repairs following NBIC and ASME standards.
2. Define detailed repair systems per ASME protocol and incorporating other standards.
3. Integrate FRPI SP1010, SP1020, SP1030 and SP1040 into repair and alteration plans.
4. Apply practical repair types that address most failure mechanisms and their root cause.
5. Write standards complaint repair system specifications for laminate damage and imperfections.
6. Fill in specifications with technical requirements where standards are silent.
7. Conduct quality control for repairs and alterations.
8. Recognize pertinent health and safety considerations.
9. Qualify repair companies, installers, laminators, and secondary bonders.
10. Implement repair and alteration consistent with ASME, ASTM, DIN, FRPI and NBIC standards.

### General Course Content and Outline:

DAY 1 – Participant introductions plus course content, agenda and learning objectives overview. Introduction to and practical application of FRP repair and alteration standards. Present and discuss repair type classifications. Explore and expand on repair system definition, design, engineering, hand tools, equipment, supplies, material preparation, postcuring, environmental controls, managing unexpected conditions, surface preparation, bond testing and material application. The day will wrap up with a quiz and open participant review.

DAY 2 – Review practical applications of NBIC, ASME and other repair types for damage mechanisms, relining tanks and other structures, core specimen extraction areas, bond test sites, bottom and shell section replacement, flanges, nozzles and manways, the infamous “quick fix” plus visual imperfections found in laminating work. Concepts for quality assurance and control, health and safety related to FRP work plus ASME, NBIC and DIN standards governing installer, laminator and secondary bonder qualifications will be examined. Guidance for repair company qualification plus owner/end user support and repair oversight will be shared. The day will wrap up with a quiz and open participant review.

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

**Who Should Attend:**

- Inspectors and QA / QC Personnel
- FRPI 8310 Inspectors and RIT's
- Designers, Engineers and PE's
- Owners / End Users
- Resident Engineers
- Asset Mechanical Integrity Managers
- Specification Writers
- Operators
- Maintenance Planners
- Shop and Field Technicians

**Prerequisites:** Registrants are required to present upon request their FRPI course completion certificate received for their successful participation in either FRP301, FRP401 or FRP831. This course completion certificate prerequisite may be waived for registrants holding other FRPI recognized fiberglass training certificates or with a minimum of one (1) year full time professional fiberglass experience within the past five (5) years. It is also required to purchase and review the FRPI "Aboveground Storage Tank Inspector Certification and Licensing Manual", which includes standard practices extensively discussed during the 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. The 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 for participants to obtain and review standards referenced within the 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 sixteen (16) 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 interactive quiz will be conducted at the conclusion of each day, with answers discussed live within the group as an ungraded learning confirmation exercise.

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