STARK STATE COLLEGE

GENERAL SYLLABUS

Course Information

Course Name: Cylinder Hydro Testing
Course Number: ARL144

Required Materials

Textbook(s): Hydrostatic Testing Handbook Ariel Corp.
Required Readings: None
Additional Materials: Scientific Calculator, Laptops, Note Pads, Writing Utensils, Web Links, Handouts and related items as provided in class.

Course Outline/Calendar

The date of coverage and order of coverage may be modified based on the faculty member and events beyond the control of faculty members that interfere with class times and teaching.

Week	Chapter/Topic/Lab
1 – Introduction to Hydrostatic Testing	• Module 1.1: Principles of pressure testing (hydrostatic vs. pneumatic). • Module 1.2: Purpose of hydro-testing: integrity, strength, and leak checks. • Module 1.3: Introduction to common compressor types (reciprocating, centrifugal, rotary screw) and their pressure-containing components. • Module 1.4: Overview of relevant codes and standards (e.g., ASME, API, NFPA).
2 – Safety Protocols and Risk Management	• Module 2.1: Personal protective equipment (PPE) requirements for high-pressure testing. • Module 2.2: Risk assessment and hazard identification (potential energy of compressed fluids, component failure). • Module 2.3: Emergency procedures, including depressurization and leak response. • Module 2.4: Safe handling and disposal of test fluids.
3 – Tools, Equipment, and Instrumentation	• Module 3.1: Types of test pumps (manual, electric, air-driven). • Module 3.2: Pressure gauges, digital recorders, and chart recorders. • Module 3.3: Hoses, fittings, valves, and other test accessories. • Module 3.4: Equipment calibration and certification.
4 – Documentation and Record-Keeping	• Module 4.1: Interpreting piping and instrumentation diagrams (P&IDs) and isometric drawings. • Module 4.2: Test pack compilation and review (drawings, schematics, material certificates). • Module 4.3: Creating hydrostatic test procedures and checklists. • Module 4.4: Test reports and certification requirements.

Week	Chapter/Topic/Lab
5 – Test Fluid and Environment	• Module 5.1: Choosing the right test medium (water, glycol, inhibitors). • Module 5.2: Water quality and treatment (chlorination, filtration). • Module 5.3: Temperature considerations and its effect on test pressure. • Module 5.4: Winterization procedures and freezing precautions.
6 – System Isolation and Setup	• Module 6.1: Defining the test boundaries and segmenting the system. • Module 6.2: Isolating components not rated for the test pressure (instruments, valves). • Module 6.3: Installing temporary test headers, caps, and connections. • Module 6.4: Visual inspection of welds, fittings, and components prior to testing.
7 – Filling and Venting	• Module 7.1: Filling the system with the test medium. • Module 7.2: Techniques for air elimination and proper venting. • Module 7.3: Managing water sources and volumes. • Module 7.4: Laboratory practice: System fill simulation and venting demonstration.
8 – Pre-Pressurization Checks	• Module 8.1: Verifying all isolation points and temporary connections. • Module 8.2: Confirming all gauges and recorders are correctly installed and zeroed. • Module 8.3: Final safety and area checks. • Module 8.4: Mid-course review and practical demonstration preparation.
9 – Pressurization and Stabilization	• Module 9.1: Gradual, controlled pressurization of the system. • Module 9.2: Techniques for managing and stabilizing pressure. • Module 9.3: Interpreting mass or volume balance readings. • Module 9.4: Laboratory practice: Pressurization of a test rig.
10 – Holding Priod and Inspection	• Module 10.1: Maintaining the required test pressure for the specified duration. • Module 10.2: Conducting visual inspections for leaks during the hold period. • Module 10.3: Using soap solution and other methods for leak detection. • Module 10.4: Laboratory practice: Conducting a leak inspection on a pressurized system.
11 – Troubleshooting and Leak Repair	• Module 11.1: Identifying and diagnosing common leak points. • Module 11.2: Procedures for depressurizing and safely repairing leaks. • Module 11.3: Repeat testing after repairs. • Module 11.4: Hands-on lab: Identifying and simulating a leak repair procedure.
12 – Test Acceptance Criteria and Data Evaluation	• Module 12.1: Evaluating test data for signs of a successful test or hidden leaks. • Module 12.2: Analyzing pressure versus temperature graphs. • Module 12.3: Understanding acceptance standards based on relevant codes. • Module 12.4: Case studies of previous test failures and successes.
13 – Depressurization and Dewatering	• Module 13.1: Safe, controlled depressurization of the system. • Module 13.2: Procedures for dewatering the system after the test. • Module 13.3: Managing water discharge and environmental considerations. • Module 13.4: Hands-on lab: System depressurization and dewatering.
14 – Post-Test Procedure	• Module 14.1: Drying procedures (air, nitrogen, vacuum). • Module 14.2: Post-test checks and reinstallation of isolated components. • Module 14.3: Final documentation and test report completion. • Module 14.4: Review of course material and exam preparation.
15 – Practical Examination	• Module 15.1: Students perform a complete hydrostatic test on a designated compressor system. • Module 15.2: Evaluation of safety adherence, procedural accuracy, and documentation. • Module 15.3: Students troubleshoot a simulated issue during the test.
16 – Review and Certification	• Module 16.1: Course review and Q&A session. • Module 16.2: Final written and/or practical exam.