

**TRAINING TITLE**

**AIR LIQUEFACTION SYSTEM STARTUP, SHUTDOWN, NORMAL OPERATIONS AND TROUBLESHOOTING**

**Training Duration**

5 day

**Training Venue and Dates**

Ref. No. RM035	Air liquefaction System Startup, Shutdown, normal operations and troubleshooting	5	08-12 Sep. 2025	\$5,500	DUBAI, UAE
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In any of the 4 or 5-star hotels. The exact venue will be informed later.

**Training Fees**

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch

**Training Certificate**

**Define** Management Consultants Certificate of course completion will be issued to all attendees.

**TRAINING DESCRIPTION**

This 5-day course is designed to provide participants with a comprehensive understanding of the operation, startup, shutdown, and troubleshooting of air liquefaction systems within the oil and gas industry. Air liquefaction plays a critical role in producing liquefied gases such as nitrogen, oxygen, and argon, which are essential for various processes in the oil and gas sector. This training will equip participants with the skills and knowledge needed to safely and efficiently manage the air liquefaction system throughout its operational lifecycle.

**TRAINING OBJECTIVES**

**By the end of the course, participants will be able to understand**

- Understand the principles and components of air liquefaction systems used in the oil and gas industry.
- Perform safe and efficient startup and shutdown procedures for air liquefaction equipment.
- Operate air liquefaction systems under normal conditions, optimizing performance and energy efficiency.
- Diagnose and troubleshoot common operational issues and system failures.
- Apply best practices for system maintenance, safety, and regulatory compliance.

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## **WHO SHOULD ATTEND?**

This course is intended for:

- Plant operators and technicians working with air liquefaction systems.
- Engineers involved in the design, operation, and maintenance of air liquefaction units.
- Maintenance personnel responsible for troubleshooting and system optimization.
- Supervisors and safety officers in charge of air liquefaction system management.

## **TRAINING METHODOLOGY**

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

## **COURSE PROGRAM:**

### **Day 1: Introduction to Air Liquefaction Systems and Their Components**

- Introduction to the course and its objectives.
- Overview of air liquefaction principles: Compression, expansion, and cooling processes.
- Basic refrigeration cycle in air liquefaction.
- Key components of an air liquefaction system (compressors, turbines, heat exchangers, valves, control systems, etc.).
- Different types of air liquefaction systems used in the oil and gas industry.
- Safety practices and regulations specific to air liquefaction systems.
- Understanding pressure, temperature, and flow requirements.
- Air purification and filtration methods.
- Overview of energy efficiency considerations.

### **Day 2: Startup Procedures and Initial Operations**

- Detailed step-by-step process for starting up air liquefaction systems.

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- Pre-startup checks: Inspection and calibration of equipment, valves, and instrumentation.
- Sequence of operations for safe startup.
- Role of control systems in monitoring startup parameters.
- Hands-on training: Startup of air liquefaction system (simulated or through videos).
- Monitoring and adjusting the system during initial startup.
- Initial troubleshooting for startup issues: common problems like leaks, low pressure, or low temperature.
- Operator roles during startup phase.

### **Day 3: Normal Operations and Performance Optimization**

- Operating procedures for running the air liquefaction system under normal conditions.
- Optimizing performance: pressure, flow, and temperature management.
- Control systems during normal operation: role of PLC, DCS, SCADA, etc.
- Maintaining system efficiency and reducing energy consumption.
- Troubleshooting common operational issues (e.g., compressor failure, temperature deviations).
- Routine maintenance and inspection schedules.
- Managing system alarms and notifications: interpreting data.
- Continuous monitoring techniques: key performance indicators (KPIs).

### **Day 4: Shutdown Procedures**

- Preparing the system for a safe shutdown.
- Step-by-step shutdown procedures.
- Depressurizing and cooling down equipment.
- Understanding emergency shutdown protocols.
- Key considerations for ensuring safe and efficient shutdown.
- Shutdown of air liquefaction system (simulated or through training software).
- Addressing common shutdown failures: valve malfunctions, emergency stops, system de-energization.
- Post-shutdown checks and reporting.
- Shutdown impact on the overall process and restart readiness.

### **Day 5: Troubleshooting and System Diagnostics**

- In-depth troubleshooting techniques for air liquefaction systems.
- Diagnostics of pressure, flow, and temperature issues.

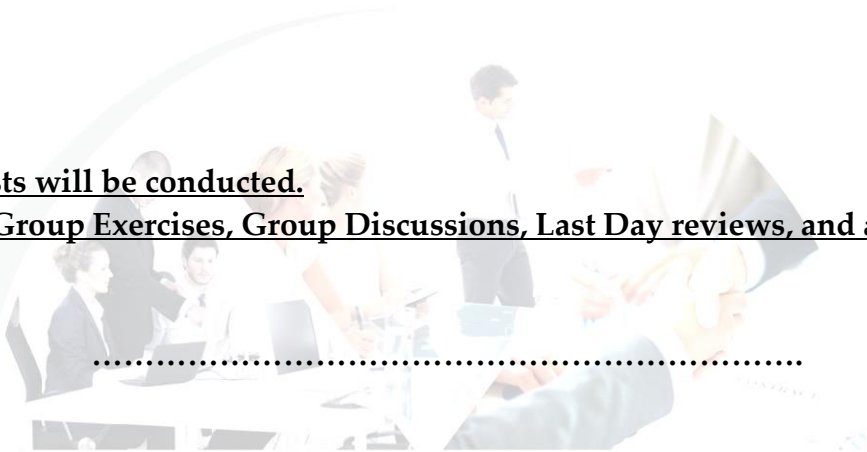
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- Identifying and addressing issues related to compressors, heat exchangers, and control systems.
- Troubleshooting exercises in simulated environments.
- Case studies: Real-world problems and their resolutions.
- Using advanced diagnostic tools and software for air liquefaction systems.
- Best practices for problem prevention: maintenance, monitoring, and training.
- Review of the entire course, Q&A session, and feedback.

**NOTE:**

**Pre-& Post Tests will be conducted.**

**Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.**



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