
Ammonia Refrigeration Operations Leadership: Process Safety, Integrity and Leak Control Course

1 – 5 February 2027
Tokyo





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Programme Summary

Ammonia refrigeration operations are the subject of this one-week training course for plant managers, engineering and operations heads and safety leaders, ending in a process safety and integrity plan for one ammonia refrigeration plant. Ammonia is toxic and flammable at concentration, so a missed inspection, an informal change or a slow leak response can harm people and stop production. The programme moves from plant fundamentals and operating discipline through diagnosis of integrity and leak risks to design of controls, then applies them to one plant. Mars Training Centre UK delivers this programme on ammonia refrigeration operations for mixed-organisation cohorts.

The Business Case

Food, cold storage, chemical and process sites depend on ammonia refrigeration for continuous cooling, and the plant is often run by small teams with long-standing habits. Managers who tie operating routines, inspection records and emergency arrangements to one safety system find weak points before an incident and protect both people and product.

- Leak Frequency: Falls as inspection, ventilation and detection routines are kept current.
- Unplanned Downtime: Reduces as defrost, oil handling and equipment checks follow written procedures.
- Incident Exposure: Narrows as emergency roles, contractor control and change approval are defined.

Principles and Evidence Base

- Process safety management: It structures hazard review, operating procedures, mechanical integrity, management of change and emergency planning across Sessions 2 to 4.
- IIAR Process Safety Management Guidelines for Ammonia Refrigeration: These industry guidelines shape the review of written procedures and records in Sessions 3 and 4.
- Hierarchy of controls: It ranks leak prevention, detection and response measures in Session 4.

Intended Participants

- Plant managers who answer for the safe and continuous running of an ammonia refrigeration plant.
- Engineering heads who oversee maintenance, inspection and plant modification.
- Operations leaders who supervise operators and shift routines.
- Safety leaders who own hazard review, audit and emergency arrangements.

Typical settings include food processing, cold storage, beverage production and chemical manufacturing.



Learning Outcomes

1. Participants will be able to describe the main components of an ammonia refrigeration plant and the duty each performs.
2. Participants will be able to diagnose leak, pressure and integrity risks from operating records and inspection findings.
3. Participants will be able to evaluate written operating procedures, defrost and oil handling practice against process safety principles.
4. Participants will be able to construct inspection, change approval and contractor control routines for one plant.
5. Participants will be able to prioritise leak prevention, detection and response measures by risk.
6. Participants will be able to justify a process safety and integrity plan to site leadership.

Programme Structure

Day 1: Ammonia Refrigeration Operations and Plant Fundamentals

How does an ammonia refrigeration plant work, and where does its hazard sit?

- Refrigeration Cycle Diagram
- Plant Component Map
- Ammonia Hazard Profile
- Piping and Instrument Drawing Reading Sheet
- Roles and Responsibilities Matrix

Day 2: Diagnosing Operating and Integrity Risks

Where do operating habits and ageing equipment create leak and failure risk?

- Operating Log Review
- Hazard Review Worksheet
- Defrost and Oil Handling Case Study
- Relief and Ventilation Check
- Near-Miss and Leak History Register

Day 3: Procedures, Inspection and Change Control

How are procedures, inspection and change kept reliable over time?

- Written Operating Procedure Audit
- Mechanical Integrity Inspection Plan
- Management of Change Form
- Contractor Control Checklist
- Operator Competence Matrix



Day 4: Designing Leak Control and Emergency Response

Which controls prevent, detect and contain an ammonia release?

- Hierarchy of Controls Ranking
- Leak Detection and Alarm Map
- Emergency Response Role Chart
- Evacuation and Isolation Decision Tree
- Incident Review and Corrective Action Template

Day 5: Applying the Approach to One Plant

Does the plan hold when it is tested on one ammonia refrigeration plant?

- Applying the Session 2 Hazard Worksheet to the Plant
- Testing the Session 3 Inspection Plan Against Records
- Rehearsing the Session 4 Emergency Decision Tree
- Revising the Plan after Peer Feedback
- Completing the Process Safety and Integrity Plan

Methodology

The programme uses a structured exercise method built on anonymised operating logs, inspection records, procedures and short written cases from food, cold storage and chemical sites. Participants work in small groups on one plant, explain their decisions to peers who act as operators, maintenance staff and site leaders, and receive facilitator feedback on each work product.

- Suggested activity: Reviewing an operating log for signs of a developing leak.
- Suggested activity: Rewriting a defrost procedure that leaves gaps in operator duties.
- Suggested activity: Rehearsing the first ten minutes of a release from a case description.

Capstone Output

Each participant completes a process safety and integrity plan for one ammonia refrigeration plant. It holds a hazard worksheet, an inspection and change control routine, a contractor and competence arrangement, and an emergency response outline. The plan is used at work to brief site leadership, set maintenance priorities and guide the next plant review.



Frequently Asked Questions

Is training on ammonia refrigeration operations suitable for managers who are not refrigeration engineers?

Yes. Ammonia refrigeration operations are taught from the plant cycle upward, and the programme assumes responsibility for a plant or its safety, not design experience.

Which frameworks do ammonia refrigeration operations rest on in this programme?

Ammonia refrigeration operations here rest on process safety management, the IIAR Process Safety Management Guidelines for Ammonia Refrigeration and the hierarchy of controls.

How is the plan for ammonia refrigeration operations used at work?

You use the ammonia refrigeration operations plan to brief site leadership, set maintenance priorities and guide the next plant review.

How do ammonia refrigeration operations differ from a programme on general plant maintenance?

Ammonia refrigeration operations centre on toxic release risk, procedures, integrity and emergency response for one plant type, while general plant maintenance centres on asset care across many systems.