



DUBAI AVIATION CITY CORPORATION OHSE CODE OF PRACTICES



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DACC CODE OF PRACTICE - AMMONIA (NH₃) WORKS



AMMONIA (NH₃) WORKS
DACC (DUBAI SOUTH) Code of Practice
Document Reference No.: DACC.DS.OPS.OHSE.OPS.01.AW

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1.0 INTRODUCTION

- (a) This Code of Practice (COP) is mandatory to all duty holders, entities or organizations operating within the Dubai South jurisdiction. This COP is designed to incorporate requirements set by **Dubai Aviation City Corporation (DACC) – Dubai South** Occupational Health, Safety and Environment (OHSE) Department and Dubai South Management.
- (b) The intention of the COP is to assist duty holders of anhydrous ammonia (NH₃) storage and handling operations to assess their risk and take action to mitigate those risks. The Cop is designed for use in conjunction with the Implementation Guide and Appendices. These documents provide more definition of the requirements in the COP plus a description of identified best practices to improve risk management processes at the operation. If requirements of this document conflict with requirements set by another regulatory authority, employers / organizations are required to follow the more stringent requirement.
- (c) This Cop has been developed following “**Dubai Aviation City Corporation (DACC) – Dubai South OHERF – Regulation 2 – Risk Management**” to give clear current cross-sector guidance on the safe management of ammonia refrigeration systems.
- (d) Operational facilities means the business operating in Dubai South such as Offices, Educational Institutions, Medical Facilities, Logistics and Warehouse Facilities, Factories, Recreational Facilities, Multi Store Apartments, Retail Facilities, etc. and all other facilities which are registered under Dubai South License.
- (e) A duty Holder is defined as;
 - (i) the person(s) who owns or is in control, through contact or tenancy, of non-domestic premises;
 - (ii) With regard to multiple tenanted premises, the duty holder shall be the person who owns or is in control of the building, including access and egress
 - (iii) All other persons shall cooperate with the with the duty holder to allow them to comply with their duties requirements under this COP.

1.1 Hazards of Ammonia (NH₃)

1.1.1 Health

- (a) Ammonia (NH₃) gas is very irritating to the eyes, nose, and respiratory system. These health effects make it easy to detect low concentrations in the air. Because the gas is physically irritating, a person is unlikely to remain in an area contaminated with a detectable concentration of ammonia (NH₃), unless that person is trapped or unconscious.
- (b) Depending on the concentration, exposure to ammonia (NH₃) can cause coughing, chest pain, breathing difficulty, bronchopneumonia, pulmonary edema, and death from bronchial spasm.
- (c) Ammonia (NH₃) is a severe eye irritant; it can penetrate the eye quickly, causing permanent blindness. Contact with the skin or eyes can cause severe and potentially fatal burns.

1.1.2 Fire



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- (a) Ammonia's (NH₃) fire hazard rating is usually stated as "slight." Ammonia is explosive in the air at concentrations of 16 to 27 percent (by volume).
- (b) Ammonia (NH₃) is extremely reactive, however, which means it easily combines with other materials to form products typically more hazardous than ammonia alone. The presence of oil or other combustible materials increases ammonia's fire hazard. And when it comes into contact with strong oxidizers, such as chlorine, bromine, iodine, and hypochlorite bleaches, ammonia (NH₃) can form explosive mixtures.

1.1.3 Corrosive Action

Ammonia (NH₃) can cause chemical burns on all body surfaces. Ammonia (NH₃) vapor reacts with moisture in the air to form aqueous ammonia, which attacks copper, zinc, tin, cadmium, and most of their alloys. Ammonia (NH₃) will also corrode many rubbers and plastics.

2.0 COMPETENCE, TRAINING AND AWARENESS

- (a) Duty holders ensure that OHSE training complies with the requirements of:

Dubai Aviation City Corporation (DACC) – Dubai South – Dubai South OHSERF - Regulations 6 – Competence, Training and Awareness.

- (b) Duty holders must ensure that any person who is employed to operate an ammonia refrigeration system of any capacity is adequately trained and qualified for the safe operation of that system.
- (c) Duty holders are required to document the training and instruction provided to workers in accordance with the requirements of *"Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 5 – Leadership, Roles, Responsibilities and Self-Regulations"* and workers must be able to demonstrate competency in doing their work according to the work procedures.
- (d) Duty holders shall ensure that no person is engaged in any work activity on or in the vicinity of ammonia (NH₃) systems unless such person has the competency gained from training, technical knowledge and experience of the precautions to be taken against the risk of death or personal injury, and is under such degree of supervision as may be appropriate having regard to the nature of the work. Such competency will be assessed and awarded based on a licensing scheme.
- (e) Training for employees shall be competency-based and include:
 - Hazards and risks associated with ammonia (NH₃) works and task;
 - Information on the safe system of work identified in the risk assessment including permit to work system if required;
 - Specific control measures to be followed by those involved working with any ammonia (NH₃) plant or system;



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- Specific control measures to be followed for the ammonia (NH₃) plant or system to be worked on;
- (f) Reporting procedure in the event of
- (g) Individual Ammonia (NH₃) works competency levels shall be verified regularly by the employer, operators and ongoing competency shall be assessed. Where necessary, additional training and re-assessment shall be provided. Individual Licenses shall be issued as a demonstration of attained competency.
- (h) Duty holders shall ensure that a record of the required training contains the following:
 - (i) Company, name and company employee ID number;
 - (ii) Emirates ID number / Dubai South ID Pass;
 - (iii) Topic / subject of training;
 - (iv) Training provider;
 - (v) Date of training; and
 - (vi) Person conducting the training.

3.0 REQUIREMENTS

3.1.1 Roles and Responsibilities

Duty holders shall undertake their roles and responsibilities in accordance with the general requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 5 – Leadership, Roles, Responsibility and Self-Regulation*.

3.1.2 Health and Safety Programs

- (a) In accordance with “*Dubai Aviation City Corporation (DACC) OHSERF - Regulation 4 – Objectives and Programs*” duty holder is obliged to develop and implement an effective health and safety program. Such program would include training workers and supervisors to understand and apply relevant sections of that program. Addressing the hazards associated with ammonia (NH₃) exposure would be one element of that program.
- (b) A health and safety program helps ensure the workplace remains safe and productive by outlining and reinforcing specific tasks and responsibilities for workers, supervisors, and employers.
- (c) An effective program for the use and storage of ammonia must include the following:
 - (i) A written health and safety policy in line with *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 1 – OHSE Policy* that:
 - States the employer’s commitment to health and safety



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- States the program's objectives
 - Defines the responsibilities and roles of the employer, supervisors, and workers
- (ii) Written safe work procedures and emergency response procedures
- (iii) Training for supervisors and workers
- (iv) Regular worksite inspections
- (v) Regular health and safety meetings
- (vi) Incident investigations
- (vii) Records and statistics
- (viii) A joint health and safety committee or worker health and safety representative, if required

3.1.2 Safe Work Procedures

Safe work procedures and programs show workers how to perform their duties safely. Duty holders must ensure that all workers understand these procedures well enough to perform their duties competently. Duty holders must review all written safe work and emergency procedures jointly with workers supervisors at least once a year and when there are any changes in operations or equipment as per *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 7 – Communication, Consultation and Participation*.

3.1.3 Workplace Hazardous Materials Information System (WHMIS)

In accordance with *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 7 – Communication, Consultation and Participation* a Workplace Hazardous Materials Information System (WHMIS) program helps ensure that workers who work with or near are instructed in its safe use, storage, handling, and. This includes the use of labels or other means of identifying ammonia containers or systems.

3.1.4 Exposure Control Plans

- (a) Written exposure control plans explain the work procedures and other controls employers, clients, stakeholders will need to use in order to reduce workers' risk of exposure to ammonia. It's essential that specified exposure controls are strictly adhered to and appropriate respiratory and skin protection is used.
- (b) In accordance with *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 9 – Project and Operational Control* Engineering and administrative controls are the first line of defense against exposure to ammonia (NH₃), and proper building design and ventilation offer important engineering considerations. Effective monitoring and alarm systems are also essential to preventing ammonia exposure.



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3.1.5 Risk Assessments

Duty holders must ensure that a risk assessment is conducted for toxic process gases as per *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 2 – Risk Management*. Ammonia is a toxic process gas. Duty holders must also ensure that qualified persons perform a formal risk assessment to determine which workers may be affected by exposure to ammonia and the extent of any exposure.

3.1.6 Personal Protective Equipments

- (a) Providing protective equipment and ensuring that workers use it are essential to any effective health and safety program. Duty holders are required to develop and implement an effective personal protective equipment program to protect workers from chemical exposure, such as through inhalation and contact with the eyes and skin. This program must meet the requirements of the *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.10.PP – Personal Protective Equipment* and *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 3 – Legal Compliance*.
- (b) If duty holders provide self-contained breathing apparatuses (SCBAs), they must do air-testing on compressed breathing air, and retain records of this annual testing.
- (c) Duty holders must ensure that workers are trained in proper use and care of respirators. And when a worker is first fitted with a respirator, and at least once a year thereafter, they must provide fit testing.

3.1.7 Preventive Maintenance Procedure

- (a) In line with *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 5 – Leadership, Roles, Responsibilities and self-regulating and Regulation 9 – Project and Operational Control* duty holders must ensure that all equipment is inspected regularly and replaced when necessary.
- (b) Duty holders must also ensure everyone who works on the ammonia (NH₃) system has ready access to and understands the written preventive maintenance and emergency procedures you've developed for this type of work.
- (c) Duty holders must include plans for testing and replacing, where required, all ancillary (secondary) safety equipment, such as monitors and alarm systems, detection equipment, radios, eye washes, respiratory and skin protection equipment, and first aid kits.
- (d) Duty holders may develop checklist for inspecting and testing equipment to ensure nothing is overlooked.
- (e) Never apply heat to any part of an ammonia system containing liquid ammonia. The immediate increase in pressure can rupture the tank or pipe.

3.1.8 Checking on a Worker Working Alone

Duty holders must establish a system with written procedures in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP –*



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DACC.DS.OPS.OHSE.OST.14.LW - Safety Requirements for Lone Working and or in Remote Locations to ensure the continued well-being of workers who enter an ammonia enclosure on their own, or for those who work in isolation. Depending on the situation, person-check system may consist of visual checks, radio contact, or a telephone call-in procedure. The person-check system must include the following:

- A set interval between checks
- A record of each check
- A check at the end of the work shift
- Procedures to follow if the worker cannot be contacted or is injured

3.1.9 Storage & Handling of Ammonia (NH₃)

(a) Storage

All ammonia (NH₃) and refrigeration equipment must meet the requirements of the *Safety Standards Act and Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 3 – Legal Compliance*, the Electrical Safety *Dubai Aviation City Corporation (DACC) – Dubai South COP- DACC.DS.OPS.OHSE.OST.02.ES – Electrical Safety at work*, the Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Requirements *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OPS.13.BP - Health, Safety & Environmental Requirements for Boilers and Pressure Vessels*, and applicable local & relevant *Mechanical Refrigeration Code, and Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods*.

This section of COP describes what you must and must not do when storing ammonia.

- (i) Use signs to clearly identify all ammonia enclosures and tanks, to state that only designated qualified personnel are permitted to enter an ammonia storage area, and to provide precautions required for safe entry.
- (ii) Indicate the total weight of ammonia contained in the system on a sign that is both readable and accessible.
- (iii) When storing ammonia inside, store ammonia cylinders and containers in a well-ventilated building and away from any heat sources. Never allow cylinders and containers to reach 50°C.
- (iv) Store cylinders upright, and secure them against falling. Cylinders will discharge vapour when upright, and liquid when upside-down.
- (v) Do not store materials that may react violently with ammonia in the same room as ammonia (for example, iodine, bromine, chlorine, and hypochlorite bleaches).
- (vi) Do not block access to emergency equipment and doors.
- (vii) Use cylinders on a “first-in, first-out” basis.
- (viii) Clearly tag or mark empty cylinders, and separate them from full cylinders.



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- (ix) Do not consider cylinders or other ammonia system containers empty and safe until they have been thoroughly purged with nitrogen, steam, or water.
 - (x) Do not use open flames in ammonia storage or holding areas.
 - (xi) Do not smoke in ammonia storage or holding areas.
 - (xii) Always ground storage containers to minimize the buildup of static electricity.

(b) Handling

- (i) Handle cylinders with care when moving or storing them. Do not allow cylinders to strike objects, and do not drop cylinders.
- (ii) Do not use slings or magnetic devices to move ammonia cylinders.
- (iii) Do not stand in line with valve or fitting openings, particularly pressure-relief valve openings.
- (iv) Ensure that cylinders have valve protection hoods in place when not connected to a system.
- (v) Do not lift a cylinder by its valve protection hood. The hood is not designed to carry the weight of a cylinder.
- (vi) Do not modify, alter, or repair cylinders and valves. Only the supplier should carry out these tasks.
- (vii) Ensure all of your refrigeration systems are kept clean, which means that they are free of accumulations of water, oily dirt, and other debris, and readily accessible at all times.
- (viii) Welding or any other heating of an ammonia system is extremely hazardous. Isolate and purge system parts before welding.
- (ix) Guardrails are required to protect workers in any situations where can:
 - Fall 122 cm (4 ft.) or more from:
 - An open-sided floor or similar structure
 - Around the perimeter of an open container or containment area
 - Fall onto machinery
 - Fall into work areas or other hazardous environments
 - Fall 2 m (6.5 ft.) or more

3.1.10 Ammonia Plant Installation



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- (i) Consideration shall be given to the physiological effects of ammonia as well as to adjacent fire hazards in selecting the location for a storage container. Containers shall be located outside of buildings or in buildings or sections thereof especially provided for this purpose.
- (ii) Permanent storage containers shall be located at least 50 feet from a dug well or other sources of potable water supply, unless the container is a part of a water-treatment installation.
- (iii) Storage areas shall be kept free of readily ignitable materials such as waste, weeds, and long dry grass.
- (iv) All appurtenances shall be designed for not less than the maximum working pressure of that portion of the system on which they are installed. All appurtenances shall be fabricated from materials proved suitable for anhydrous ammonia service.
- (v) Excess flow valves where required by these standards shall close automatically at the rated flows of vapor or liquid as specified by the manufacturer. The connections and line including valves and fittings being protected by an excess flow valve shall have a greater capacity than the rated flow of the excess flow valve so that the valve will close in case of failure of the line or fittings.
- (vi) Excess flow and back pressure check valves where required by the standards in this section shall be located inside of the container or at a point outside as close as practicable to where the line enters the container. In the latter case installation shall be made in such manner that any undue strain beyond the excess flow or back pressure check valve will not cause breakage between the container and the valve.
- (vii) All piping, tubing, and fittings shall be made of material suitable for anhydrous ammonia service.
- (viii) All piping, tubing, and fittings shall be designed for a pressure not less than the maximum pressure to which they may be subjected in service.
- (ix) Tubing made of brass, copper, or other material subject to attack by ammonia shall not be used.
- (x) Threaded connections shall not be back-welded. Brass, copper, or galvanized steel pipe shall not be used.
- (xi) Tubing made of brass, copper, or other material subject to attack by ammonia shall not be used.
- (xii) Joint compounds shall be resistant to ammonia.
- (xiii) Hose and hose connections located on the low-pressure side of flow control of pressure-reducing valves shall be designed for a bursting pressure of not less than 5 times the pressure setting of the safety relief devices protecting that portion of the system but not less than 125 p.s.i.g. All connections shall be so designed and constructed that there will be no leakage when connected.
- (xiv) Where hose is to be used for transferring liquid from one container to another, "wet" hose is recommended. Such hose shall be equipped with approved shutoff valves at the discharge end. Provision shall be made to prevent excessive pressure in the hose.
- (xv) The discharge from safety-relief valves shall be vented away from the container upward and unobstructed to the atmosphere. All relief-valve discharge openings shall have suitable rain caps that will allow free discharge of the vapor and prevent entrance of water. Provision shall be made for draining condensate which may accumulate.
- (xvi) Safety-relief valves shall be so arranged that the possibility of tampering will be minimized. If the pressure setting adjustment is external, the relief valves shall be provided with means for sealing the adjustment.



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(xvii) Safety-relief valves shall have direct communication with the vapor space of the container.

3.1.11 Preparing for Emergencies

To prepare for workplace emergencies duty holders must do as follows as per the requirement of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 13 – Emergency Management*:

- Keep an up-to-date inventory of hazardous substances.
 - Conduct a risk assessment.
 - Prepare an emergency plan with detailed response procedures, including:
 - Escape and evacuation protocols
 - Steps for notifying emergency services and other parties that may be interested or affected by a large leak (e.g., neighboring facilities, offices)
 - Steps to bring the emergency under control
 - Steps to ensure that the workplace is safe for re-occupancy
 - Train workers on these emergency procedures, which should include conducting drills.
 - Inform your local fire department about your workplace fire emergency plan
- Duty holders shall provide emergency equipment eye wash, shower facilities and first aid kits. Employees must have immediate access to each of these items and must know how to use them in case of emergency.

3.2 Employees roles and Responsibilities

- (a) Employees shall undertake their roles and responsibilities in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 5 – Leadership, Roles, Responsibility and Self-Regulation*.
- (b) Employees shall not work on Ammonia (NH₃) plant unless they have the required competency and qualification and are individually authorized by the employer.
- (c) Employees shall cooperate with the employer to enable any duty placed on that employer, client, stakeholder and consultant by the provision of this COP to be complied with.
- (d) Employees shall ensure that they follow all the rules and regulation with regards to work on ammonia (NH₃) plant set by this COP and by the employer including the proper use of personal protective equipment provided to them.

4.0 RECORD KEEPING

- (a) Employers/duty holders / stakeholders shall ensure record keeping in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 8 – Document Control and Record Management* or the purpose of performance review in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 14 – Performance Management* and *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 19 – Management Review*.



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- (b) Contractor shall ensure records of the below but not limited to:
- (i) Competency and Licensed of Individual;
 - (ii) Personnel training and awareness;
 - (iii) Inspector competency certificate;
 - (iv) Inspection and test report;
 - (v) Regular maintenance inspection report;
 - (vi) Damage and repair report;
 - (vii) Equipment / device registers;

5.0 REFERENCES

NO.	DOCUMENT NAME	DOCUMENT NO.
1	OHSE Policy	DACC OHSERF – Regulation 1
2	Risk Management	DACC OHSERF – Regulation 2
3	Legal Compliance	DACC OHSERF – Regulation 3
4	Objectives and Programs	DACC OHSERF - Regulation 4
5	Leadership, Roles, Responsibilities and Self-Regulations	DACC OHSERF – Regulation 5
6	Competence, Training and Awareness	DACC OHSERF – Regulation 6
7	Communication, Consultation and Participation	DACC OHSERF – Regulation 7
8	Document Control and Record Management	DACC OHSERF – Regulation 8
9	Project and Operational Control	DACC OHSERF – Regulation 9
10	Emergency Management	DACC OHSERF – Regulation 13
12	Performance Management	DACC OHSERF – Regulation 14
13	Management Review	DACC OHSERF – Regulation 19
14	Electrical Safety at work	COP – DACC.DS.OPS.OHSE.OST.02.ES
15	Health, Safety & Environmental Requirements for Boilers and Pressure Vessels	COP – DACC.DS.OPS.OHSE.OPS.13.BP
16	Personal Protective Equipment	COP – DACC.DS.OPS.OHSE.OST.10.PP
17	Safety Requirements for Lone Working and or in Remote Locations	COP – DACC.DS.OPS.OHSE.OST.14.LW
18	Environment Protection Regulations in Dubai	Local Order No. 61/1991
19	Defining Works that are Hazardous or in which it is Permissible to Reduce the Legally Decided Working Hours	Ministerial Resolution No. 4/1 of 1981
20	Federal Regulation for Handling Hazardous Materials, Hazardous Wastes and Medical Wastes	Issued by Cabinet Decree No. 37 of 2001
21	UAE Life and Safety Code of Practice 2018	2018
22	DACC OHSSE Regulatory Framework	2019