



# DUBAI AVIATION CITY CORPORATION OHSE CODE OF PRACTICES



DATE: 28.10.2019

DACC CODE OF PRACTICE - INDUSTRIAL COMPRESSED  
GAS CYLINDERS



INDUSTRIAL COMPRESSED GAS CYLINDERS  
DACC (DUBAI SOUTH) Code of Practice  
Document Reference No.: DACC.DS.OPS.OHSE.OST.08.IC

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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. If requirements of this document conflict with requirements set by another regulatory authority, employers / organizations are required to follow the more stringent requirement.
- (b) The duty holders, employers, entity or organization refers to the client, stakeholder, lessee who operates within Dubai South jurisdiction.
- (c) This COP establishes the requirements and standards so that the risks associated with handling, use, storage, transport, inspection and maintenance of industrial compressed gas cylinders are identified, assessed and that control measures are implemented to prevent injury and illness to persons and public who might be exposed to risk arising from those hazards.
- (d) Definitions applicable to this COP:
- (i) **Compressed Gas:** A compressed gas is any gas which when enclosed in a container gives:
    - 1. An absolute pressure reading greater than 276 kPa (40 psi) at 21°C (70°F) or
    - 2. An absolute pressure greater than 717 kPa (104 psi) at 54°C (129.2°F) or
    - 3. Any flammable liquid having a vapour pressure greater than 276 kPa (40 psi) at 38°C (100.4°F).
  - (ii) **Compressed Gas Cylinder:** a compressed gas cylinder is any metal cylinder of the type approved by the concerned authority for storage and transportation of gases under pressure. Including liquefied gases (ENOC, etc.). Approved metal cylinders shall be used for packaging compressed gases.
  - (iii) **Corrosive Gas:** a gas that in contact with living tissue causes destruction of the tissue by chemical action.
  - (iv) **Cryogenic Liquid:** a liquid with a normal boiling point below -150°C (-238°F).
  - (v) **Cryogenic Liquid Cylinder:** Pressurized container designed and fabricated to hold cryogenic fluids. There are three common types of liquid cylinders: gas dispensing; liquid dispensing; or gas and liquid dispensing.
  - (vi) **Cylinder Valve:** a mechanical device attached to a compressed gas cylinder that permits flow into or out of the cylinder when the device is in the open position and prevents flow when in the closed position.
  - (vii) **Dewar:** is an open-mouthed, non-pressurized, vacuum-jacketed container used to hold cryogenic fluids.
  - (viii) **Frangible Disk:** is a thin piece of metal in a pressure system to relieve excessively high pressure.
  - (ix) **Fusible Plugs:** are fittings with an alloy that melts at a predetermined temperature.
  - (x) **Flammable Gas:** a substance that meets the definition of a compressed gas which:
    - 1. Is flammable in a mixture of 13% or less (by volume) with air; or



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2. Has a flammable range with air wider than 12%, at atmospheric temperature and pressure, regardless of the lower limit.
- (xi) **Gauge Pressure:** the pressure above or below atmospheric pressure. Therefore absolute pressure minus local atmospheric pressure equals gauge pressure and is usually abbreviated as psig or kPa.
- (xii) **Handling:** moving, connecting or disconnecting a compressed or liquefied gas container under normal conditions of use.
- (xiii) **High Pressure Cylinders:** as defined by international standards are those marked with a service pressure of 900 psi or greater. The “term “high pressure” can therefore be any level prescribed for the equipment or system in use. For incident prevention purposes, any pressure system shall be regarded as hazardous.
- (xiv) **Highly Toxic Gas:** a compressed gas that has a median lethal concentration (LC50) in air of  $\leq 200$  ppm. A NFPA Health Hazard rating of 4 is given to gases having an LC50 in air  $\leq 1000$  ppm. An example of a highly toxic gas is flouring with a LC50 of 185 ppm.
- (xv) **High Pressure Gas:** a gas in a container that has a pressure of 3448 kPa (500 psig) or higher at 21.1°C (70°F).
- (xvi) **Inert Gas:** a gas which is chemically inactive.
- (xvii) **Liquefied Gas:** a fluid within a pressurized container, other than in solution, which exist both as a liquid and gas at 20°C (68°F). Examples include propane, butane, ammonia, carbon dioxide and sulfur dioxide.
- (xviii) **Low Pressure Tank:** a tank designed to operate at pressure above 0.35 kg/cm<sup>2</sup> but not to exceed 1.055 kg/cm<sup>2</sup>.
- (xix) **Manifold:** a gas distribution system, which transfers product through multiple outlets/inlets to or from compressed gas containers.
- (xx) **Non-flammable Gas:** a gas which, within the packaging, exerts an absolute pressure of 280 kPa (40 psi) or greater at 20°C (68°F) but is not a flammable gas as defined previously.
- (xxi) **Oxidizing Gas:** a gas that can support and accelerate combustion of other materials.
- (xxii) **Pressure Regulator:** a mechanical device used to safely control the discharge pressure of a compressed gas from a container.
- (xxiii) **Pressure Relief Device:** a pressure and/or temperature activated device used to prevent the pressure from rising above a predetermined maximum and thereby prevent rupture or a pressurized container.
- (xxiv) **Pyrophoric Gas:** a gas that will spontaneously ignite in air at or below 54.4°C (130°F). Examples include saline and phosphine.
- (xxv) **SCF:** one standard cubic foot of gas at 21°C (70°F) and 101.325 kPa (14.696 psia).
- (xxvi) **Safety Valves:** means frequently called “pop” valves because they pop full open when a preset pressure is exceeded.
- (xxvii) **Relief Valves:** do not “pop” but open slightly and then open further as pressure increases.
- (xxviii) **Storage:** holding of gas, in its packaging, either on a temporary basis or for an extended period in such a manner as to not constitute usage of the gas.



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(xxix) **Toxic Gas:** a gas having Health Hazard of 3 or 4 defined in NFPA 704, Standard System for the Identification of the Fire Hazards of Materials.

## 2.0 COMPETENCE, TRAINING AND AWARENESS

- (a) Employers / duty holders / stakeholders shall ensure that OHSSE training complies with the requirements of:
  - (i) *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF - Regulations 6 – Competence, Training and Awareness.*
- (b) Employers / duty holders / stakeholders shall ensure all relevant persons engaged in any tasks or activity with or near industrial compressed gasses receives a training that includes at a minimum:
  - (i) Physical and Health hazards associated with compressed gases;
  - (ii) Design specification, capabilities and limitations of compressed gas storage systems and their uses at the work site;
  - (iii) Methods and procedures that will prevent exposure to compressed gases and air or hazards associated with compressed gases and air;
  - (iv) The importance of control measures;
  - (v) Safe work practices;
  - (vi) Required use, inspection, maintenance and storage of PPE;
  - (vii) Emergency response procedures;
  - (viii) Safe handling and storage;
  - (ix) Signs and symptoms of exposure to compressed gases used at the work site; and
  - (x) Operator maintenance requirements for compressed gasses,
- (c) Employers / duty holders / stakeholders shall ensure that individual competency levels shall be verified regularly and ongoing competency shall be assessed. Where necessary, additional training and re-assessment shall be provided.
- (d) Employers / duty holders / stakeholders shall maintain a record of required training and competency for handling, storing, using and transporting compressed gases for all the persons performing the tasks.
- (e) Employers / duty holders / stakeholders shall ensure that a record of the required training contains the following:
  - (i) Company, name and company employee ID number;
  - (ii) Emirates ID number
  - (iii) Topic / subject of training;
  - (iv) Training provider;
  - (v) Date of training; and





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- (vi) Person conducting the training.

### 3.0 REQUIREMENTS

#### 3.1 Roles and Responsibilities

##### 3.1.1 Employers / duty holders / stakeholders

- (a) Employers / duty holders / stakeholders shall undertake their roles and responsibilities in accordance with the general requirements of *Dubai Aviation City Corporation (DACC) OHSERF – Regulation 5 – Leadership, Roles, Responsibility and Self-Regulation*.
- (b) Employers / duty holders / stakeholders shall be responsible for performing a risk assessment in accordance with *Dubai Aviation City Corporation (DACC) OHSERF – Regulation 2 – Risk Management* to identify all the hazards that may be present and to determine the risks associated from compressed gases. Employers / duty holders / stakeholders shall develop safe systems of work including control measures and safety rules to reduce employee's exposures that could cause an injury and to prevent property damage and negative impact of the environment.
- (c) Employers / duty holders / stakeholders shall implement the Occupational Health and Safety Hierarchy of Controls, refer to *Dubai Aviation City Corporation (DACC) OHSERF – Regulation 2 – Risk Management*, when developing control measures to remove or reduce employee exposure to hazards associated with exposure to compressed gases.
- (d) Employers / duty holders / stakeholders shall ensure that only competent persons are authorized to work on compressed gasses provided with adequate and necessary personal protective equipment or other control measures shall be used to keep the exposure of employee to compressed gases.
- (e) Employers / duty holders / stakeholders shall develop and implement an inspection, testing and preventative maintenance plan to ensure compressed gases are safe and working efficiently and in accordance to manufacture specifications and applicable legal requirements.
- (f) Employers / duty holders / stakeholders ensure that proper supervision is implemented for the use of compressed gases to ensure employees are using compressed gases appropriately.
- (g) Employers / duty holders / stakeholders shall ensure Emergency Response Plans are developed, implemented and regularly tested which address specific risks involved in compressed gasses and the control measures required managing these risks. Emergency Management shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) OHSERF – Regulation 13 –Emergency Management*.

##### 3.1.2 Employees

- (a) Employees shall undertake their roles and responsibilities in accordance with the requirements of *Dubai Aviation City Corporation (DACC) OHSERF – Regulation 5 - Leadership, Roles, Responsibility and Self-Regulation*.
- (b) Employees shall not perform any task requiring training unless they have received the required competency training, documented and authorized by employer to do so.



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- (c) Employees shall ensure that they follow all the rules and regulation with regards to perform task to use, handle, store, transport or work near the vicinity of compressed gasses, set by the employer including the proper inspection prior to use of personal protective equipment in accordance with the training and instruction provided to them.
- (d) Employees shall report any defect or activity relating to compressed gases that they believe is reasonably foreseeable to endanger their safety or that of another person.
- (e) Employees shall not operate any compressed gases that they are not familiar with and competent to operate and/or appropriately trained on its use.

## 3.2 PLANNING AND ASSESSMENT

### 3.2.1 Planning

- (a) Employers / duty holders / stakeholders shall ensure the following:
  - (i) Employers shall assess the risk arising from the use, handling, storage and transport of compressed gases, using risk management practices in accordance with the requirements of ***Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 2 – Risk Management***;
  - (ii) An assessment of the various risks is undertaken and system of work and safety rules are established for the use, handling, storage, transport or work nearby the vicinity of compressed gases on the result of documented risk assessment for all work activities which are safe to all parties involved, other employees or affected including the public;
  - (iii) That effective procedures and appropriate control measures are implemented in order to manage activities safely and without risk to employees and properties;
  - (iv) That control measures identified shall include provisions for personal protective equipment in accordance with the requirements of ***Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.10.PP - Personal Protective Equipment***
  - (v) That all foreseeable emergency situations are identified and appropriate emergency procedures developed to manage these situations;
  - (vi) That for the management of compressed gases requirements are included in the OHSSE Plan and in accordance with ***Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OPS.11.WA – Safety and Health Requirements in the Warehouse***.
  - (vii) That associated safe systems of work and site rules are included in the Occupational Health, Safety, Security and Environment Plan (OHSSE-Plan) in accordance with ***Dubai Aviation City Corporation (DACC) – Dubai South OHSERF and Dubai Aviation City Corporation (DACC) COP – DACC.DS.OPS.OHSE.OPS.11.WA – Safety and Health Requirements in the Warehouse***.
  - (viii) Nominate / appoint competent person to manage / supervise all work related such as use, handling, storage, transportation and including inspection/testing/maintenance of compressed gases.



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### 3.2.2 Assessment

- (a) Employers / duty holders / stakeholders shall ensure that when performing risk assessment it shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 2 – Risk Management*, and the following shall be considered:
- (i) The condition of the equipment being used such as compressors, hoses, couplings, torch, etc. and if they are rated by an appropriate International Standard for their intended use.
  - (ii) The type, frequency and duration of the compressed air work;
  - (iii) The environment in which the compressed air work is to be undertaken (e.g. dirty/dusty conditions, uneven work surfaces, cramped conditions, etc.);
  - (iv) The pressure at which the compressor is operating at;
  - (v) The level of experience of the personnel involved in the work; and
  - (vi) Other identified hazards associated with the work.
- (b) Following the assessment, the appointed competent person may need to prepare documented safe systems of work (e.g. permit to work system, isolation/barricading, training, etc.). Permit to work system shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.09.WS – Permit to Work Systems*.

### 3.2.3 Safe System of Work

- (a) Employers / duty holders / stakeholders shall ensure the documented safe system of work are designed to ensure that:
- (vii) Work with or work nearby the vicinity of compressed gases is systematically planned; and
  - (viii) Appropriate work methods and procedures are in place.
- (b) That documented safe system of work is reviewed and approved by the competent person within the organization.
- (c) Employers / duty holders / stakeholders shall ensure that when employees required to use compressed gases including such pneumatic tools, etc. the following requirements shall be met:
- (i) Pipes, hoses, and fittings shall display the rating of the maximum pressure of the compressor. Compressed air pipelines shall be identified and tested to maximum working pressure;
  - (ii) Under no circumstances shall the pressure of the compressed air exceed the maximum working pressure of any of the components in use;
  - (iii) Couplings shall have safety clips fitted to them to prevent inadvertent uncoupling when under pressure – makeshift tie-wire shall not be used;
  - (iv) Ensure all components comply with the appropriate International Standard for their intended use and are regularly maintained in a fit for a purpose condition;
  - (v) The setting of safety valves or reducing valves shall only be adjusted by a competent person;





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- (vi) Air supply shutoff valves shall be located as near as reasonably practicable at the point-of-operation;
- (vii) Air hoses shall be kept free of grease and oil to reduce the possibility of deterioration;
- (viii) Hoses shall not be located across floors or aisles where they are liable to cause personnel to trip and fall. When reasonably practicable, air supply hoses shall be suspended overhead or otherwise located to afford efficient access and protection against damage;
- (ix) Hose ends shall be secured using hose safety cable to prevent whipping if an accidental cut or break occurs;
- (x) Before pneumatic tools are disconnected (unless it has a quick disconnect plugs), the air supply shall be turned off at the control valve and the tool bled;
- (xi) Compressed gases or air shall not be used under any circumstances to clean dirt and dust from clothing or off a person's skin;
- (xii) Air used for cleaning shall be regulated to 15 psi unless equipped with diffuser nozzles to provide lesser pressure;
- (xiii) Static electricity may be generated through the use of pneumatic tools. This type of equipment shall be grounded or bonded if it is used where fuel, flammable vapours or explosive atmospheres are present;
- (xiv) When used for cleaning, the compressed air equipment air nozzle shall reduce the outlet (working) air pressure to less than 30 psi at the discharge tip. In-line chip protection shall be used when airlines are connected directly to a compressed air system. This does not mean that the supply air or line pressure be reduced to 30 psi as long as the static (dead head) pressure exiting the nozzle when restricted does not exceed the mandatory maximum 30 psi;
- (xv) Reduction of air pressure for cleaning can be done with nozzles and tips, designed for this purpose. Employees shall not remove, damage, cover (e.g. tape), replace or in any way alter the equipment provided for this purpose. Nozzles that have been altered or "home-made" shall not be used;
- (xvi) Appropriate PPE such as, but not limited to goggles, face shields or other eye and hearing protection shall be worn by personnel using compressed gases, air and pressurized system for cleaning equipment in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.10.PP – Personal Protective Equipment*;
- (xvii) All defects shall be immediately reported to the immediate supervisor / person in-charge and the use of the defected equipment shall be ceases; and
- (xviii) The use, handling, storage, transportation and inspection of all compressed gases, air and pressurized system in cylinders, portable tanks, rail tank-cars, or motor vehicle cargo tanks shall be in accordance with the current requirements of the:

1. *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.FLS.01.FL – Fire and life safety*;
2. *Emirate Authority for Standardization and Metrology (ESMA)*;

- (d) Prior to work commencement, pre-task briefing shall be conducted by the supervisor to his workforce discussing the safe system of work, PPE to be used and the emergency procedure.



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### 3.3 Compression units and compressors

(a) Employers / duty holders / stakeholders shall ensure that:

- (i) Gas compressor discharge lines shall have a pressure-relieving safety device. There shall be no valve located between the pressure relieving safety device and the cylinder or cylinders it is to protect. The pressure-relieving safety device shall be set to open at a pressure not to exceed the maximum allowable working pressure of the cylinder. The relieving capacity of the pressure relieving safety device shall be such as to prevent a rise of pressure in the cylinders of more than 10% above their maximum allowable working pressure. The pressure-relieving valve shall be bench tested, calibrated and certified.
- (ii) While maintenance work of a nature requiring the opening of lines or equipment containing gas is being performed on a compressor, employees shall be protected from being endangered by escaping gas by closing and locking of the valves in the intake and discharge lines. If the closing and locking of the lines is inappropriate, the lines shall be blinded or other equally effective means taken to prevent the escape of gas. Lock out/Tag out shall be done.
- (iii) Air and gas compressor engines of over 30 horsepower shall be provided with means other than manual for starting, providing that manual starting may be used in emergencies.
- (iv) Electrical installation and connection shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.02.ES - Electrical Safety at Work*.
- (v) All air compressors must be inspected and certified by approved third party in annually.

### 3.4 Safety devices for pressure relieving

(a) Employers / duty holders / stakeholders ensure that:

- (i) Only qualified personnel shall be allowed to repair or adjust pressure regulating equipment.
- (ii) Valves, gauges and other regulating devices shall be installed on compressor equipment in such a way that cannot be made inoperative, normally locked open.
- (iii) Air tank safety valves shall be set no less than 15 psi or 10 percent (whichever is greater) above the operating pressure of the compressor but never higher than the maximum allowable working pressure of the air receiver.
- (iv) Air lines between the compressor and receiver shall not be equipped with stop valves. Where stop valves are necessary and authorized, standard safety valves shall be installed between the stop valves and the compressor.
- (v) The safety valves shall be set to blow at pressures slightly above those necessary to pop the receiver safety valves.
- (vi) Blow-off valves shall be located on the equipment and shielded so sudden blow-offs will not cause personnel injuries or equipment damage.
- (vii) Case iron seat or disk safety valves shall be approved in compliance to applicable standards and stamped for intended service application.



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- (viii) If the design of a safety or a relief valve is such that liquid can collect on the discharge side of the disk, the valve shall be equipped with a drain at the lowest point where liquid can collect.
- (ix) Safety valves exposed to freezing temperatures shall be located so water cannot collect in the valves. Frozen valves shall be thawed and drained before operating the compressor.
- (x) A permanent and progressive record of pressure-relieving safety devices in service, showing the serial or identification number, the location, the pressure setting, the free orifices area in sq. cm, the date of installation in service and the date of testing shall be maintained a copy at the location where the pressure relieving safety devices is located and original at the site office..
- (xi) Each pressure-relieving safety device installed on operating equipment shall be maintained so as to ensure the appropriate functioning of the device at the intended pressure. Such maintenance shall include inspection, testing and the repair of the pressure-relieving safety devices at frequencies as required by the service conditions.
- (xii) Each pressure-relieving safety device in service shall have serial or identification number stamped upon it and in addition a metal plate or metal tag shall be attached to each such device and shall show the pressure setting and the date the device was installed in service.
- (xiii) All safety valves shall be tested on a regular basis to ensure they are in good operating condition. This can be performed by a competent external party / person who is approved / accredited by *Dubai Aviation City Corporation (DACC) – Dubai South OHSE* and/or *Dubai Municipality Specialized Department*. Records shall be maintained at the facility and accessible to inspectors and maintenance staff.

### 3.5 Portable compressed gas cylinders

- (a) Employers / duty holders / stakeholders shall ensure that:
  - (i) The handling, storage, utilization and inspection of all compressed gases and air cylinders shall in accordance with:
  - (ii) Current requirements of the *Emirates Standardization and Metrology Authority (ESMA)*.
  - (iii) Compressed gas, air cylinders and pressurized systems require special handling, storage, and transportation and disposal techniques. This section describes requirements for safe handling of Compressed Gas within the workplace.
  - (iv) Gases drawn from cylinders are usually characterized as:
    1. Permanent gases having boiling points of -150°F or lower and cannot be liquefied at room temperature no matter how high the pressure. Such gases include oxygen, nitrogen and helium;
    2. Liquid gas which liquefy at temperatures of -130°F or higher at one atmosphere, but can be liquefied and maintained as liquids at higher pressures. Such gases include propane, chlorine and butane. Carbon dioxide is in this category, but becomes a solid rather than a liquid; and
    3. Dissolved gases in common use such as acetylene dissolved in acetone which holds 35 times its own volume of acetylene.



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- (v) Compressed gas users shall maintain and refer to the specific Safety Data Sheets (SDS) for the substances contained in the cylinder for more details. Specific standards for some compressed gases such as acetylene, hydrogen, oxygen, etc., shall be considered.
- (vi) Safe systems of works are follows as prescribed in Section 3.2.3.

### 3.5.1 Compressed Gases Construction and Marking

- (a) Employers / duty holders / stakeholders shall ensure that:
  - (i) All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with the requirements of the **Compressed Gas Association (CGA)** and applicable local / national regulations and internationally recognized standards appropriate to the use or intended use of the cylinder.
  - (ii) Compressed Gas shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping or labeling and shall not be readily removable. Whenever reasonably practicable, the marking shall be located on the Schaller of the cylinder.
  - (iii) Labels shall be securely attached to cylinders so that they cannot be inadvertently or accidentally detached during use, transport and storage.
  - (iv) Numbers and markings stamped into cylinders shall not be tampered with.
  - (v) Compressed gas shall be equipped with connections complying with the applicable local / national regulations, internationally recognized standards including **American National Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, ANSI B57.1-1965**.
  - (vi) Cylinders with a water weight of over 30 pounds (13.6 kg) shall be equipped with a means of connecting a valve protection cap or with a collar or recess to protect valve.

### 3.5.2 Handling of Compressed Gas

- (a) Employers / duty holders / stakeholders shall ensure that:
  - (i) Cylinders shall always be considered full and shall be handled carefully.
  - (ii) Cylinders which are designed to accept valve protection devices shall be equipped with such devices when the cylinders are in transport, storage, not in use between shifts or otherwise not connected for use.
  - (iii) Unless cylinder valve is protected by a recess in the head, the metal cap shall be kept in place to protect the valve when the cylinder is not connected for use.
  - (iv) Threads on a regulator shall be identical to those on the cylinder valve outlet. Connections that do not fit shall not be forced on.
  - (v) All parts of a compressed gas cylinder shall be checked before use. All cylinders shall be in good condition with an operable valve or regulator. Cylinders without valves and regulators shall be capped.



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- (vi) Flashback devices/arrestors shall be fitted at both the regulator and torch end of oxygen/fuel gas systems and this extends to LPG cylinders. Safety devices in valves or on cylinders shall not be tampered with.
- (vii) Cylinder valves shall be opened slowly. Cylinders without hand wheel valves shall be opened with a spindle key, special wrench or other tool provided or approved by the gas supplier.
- (viii) Valves of empty cylinders shall be closed.
- (ix) Cylinders shall not be dropped or struck or permitted to strike each other violently.
- (x) Cylinder valves not provided with fixed hand wheels shall have keys or handles on valve spindles or stems while cylinders are in service. In multiple cylinder installations only one key or handle is required for each manifold.
- (xi) Cylinder valves shall not be tampered with nor shall any attempt be made to repair them. The supplier shall be contacted immediately if damage occurs.
- (xii) Complete removal of the stem from a diaphragm-type cylinder valve shall be avoided.
- (xiii) Cylinders shall never be used as rollers or supports.
- (xiv) Cylinders shall never be used without a pressure-reducing regulator attached to the cylinder valve except where cylinders are attached to a manifold – in which case the regulator shall be attached to the manifold header.
- (xv) Before making connection to a cylinder valve outlet, the valve shall be slightly opened for an instant to clear the opening of particles of dust or dirt. The valve and opening shall always be pointed away from the body and not toward anyone else.
- (xvi) Regulators and pressure gauges shall be used only with gases and air for which they are designed and intended.
- (xvii) There shall no attempt to repair or alter cylinders, valves or attachments. This shall be done only by the manufacturer / approved service agent.
- (xviii) Oil or grease shall never be used as a lubricant on valves or attachments of oxygen cylinders. Oxygen cylinders and fittings shall be kept away from oil and grease such cylinders or apparatus shall not be handled with oily hands, gloves or clothing.
- (xix) Oxygen shall not substitute for compressed air in pneumatic tools, in oil pre-heating burners, to start internal combustion engines or to remove dust from clothing. It shall be used only for the purpose for which it is intended.
- (xx) Cylinders shall never be brought into confined spaces or unventilated rooms.
- (xxi) Do not use or compress acetylene in a free state at pressure higher than 15 pounds per square inch (psi).
- (xxii) Never completely empty a cylinder; there shall always be a minimum residual gas pressure of 30 psi.
- (xxiii) Before a regulator is removed, the cylinder valve shall be closed and the gas released from the regulator.
- (xxiv) Unless the cylinder valve has first been closed tightly, no attempt shall be made to stop a leak between the cylinder and the regulator.





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(xxv) If a leak occurs in a fuel gas cylinder it shall be taken out of use immediately and handled as follows:

1. The valve shall be closed and the cylinders taken out doors are away from any ignition source. The cylinder shall be tagged (Do Not Use, No Smoking, No Ignition Source) and notify the supplier; and
2. A regulator attached to the valve may be used temporarily to stop a leak through the valve seat.

(xxvi) When flammable gas lines or other parts of equipment are being purged of air or gas, open lights of other sources of ignition shall not be permitted near uncapped openings.

### 3.5.3 Compressed Gas Cylinder Shifting and Transportation

(a) Employers / duty holders / stakeholders shall ensure that:

- (i) Unless cylinders are secured on a specifically designed rack / equipment customs built trolley, regulators and hoses shall be removed and valve-protection devices put in place prior to movement.
- (ii) Compressed gas in portable service shall be conveyed by appropriate trucks to which they are securely fastened; all gas cylinders in service shall be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.

Note: Exception when it is not reasonably practicable to transport cylinders neither by truck nor to bring in racks to point of operation, as in some areas of workplace, cylinders may be carried in, appropriately secured in an appropriate manner. For short distances, cylinders may be moved by tilting and rolling them on their bottom edges.

- (iii) Gas cylinders transported by crane, hoist, forklift or derrick shall be handled in appropriate cradles baskets and shall never be lifted by magnet or by slings. Lifting of cylinders shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.13.LA - Safety Requirements for Cranes, Hoists, Lifts and other Lifting Appliances*.
- (iv) Valve protection devices shall not be used for lifting cylinders. Exception to be consider only if the valve protection devices is designed for the purpose to use for manual lifting.
- (v) Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended.
- (vi) Ensure cylinder valves shall be closed before moving cylinders.

### 3.5.4 Compressed Gases Storage

(a) Employer / duty holders / stakeholders shall ensure that:

- (i) Cylinders shall always be secured to prevent them falling over. Chains or a clamp-plus-strap is an acceptable method of keeping cylinders upright. The chain or strap shall be placed above the midpoint of the cylinder to keep it from falling over.



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- (ii) Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc or high temperature steam lines.
- (iii) Inside of temporary structures, cylinders shall be stored in a well-protected well-ventilated, dry location, at least six meters from highly combustible materials such as oil or excelsior. Designated storage shall be located where cylinders will not be damaged by passing or falling objects, or subject to tampering by unauthorized persons.
- (iv) Storage rooms for cylinders containing flammable gases shall be well ventilated to prevent the accumulation of explosive concentrations of gas; no source of ignition shall be permitted; smoking shall be prohibited.
- (v) Storage areas shall contain the appropriate safety signage.
- (vi) Only authorized persons have access to compressed gases storage areas.
- (vii) Cylinders are not stored in temperatures above 51 degrees Celsius or near sources of heat such as radiators / fumes or near highly flammable substance like gasoline, oil or volatile liquids.
- (viii) Do not store incompatible gases together. Oxygen cylinders in storage shall / are separated from fuel gas cylinders or combustible materials such as oil and grease, etc. A minimum distance of 6 meters or by a non-combustible barrier at least 2 meters high or a minimum of 46 cm above the tallest cylinder and having a fire-resistance rating of at least one hour.
- (ix) Compressed gas cylinders are stored or transported in a manner to prevent creating a hazard by tipping, falling or rolling.
- (x) Liquefied fuel-gas cylinders are stored or transported in a position so that the safety relief device is in direct contact with the vapour space in the cylinder at all times.
- (xi) Acetylene and liquefied fuel gas cylinders are stored with the valve end up.
- (xii) Cylinders stored in the open areas are protected from contact with the ground and against weather affects.
- (xiii) Cylinders are not placed where they might form part of an electric circuit.

### 3.6 Gases with specified hazard classes

- (a) Employer / duty holders / stakeholders shall ensure that the following information regarding specific classes of gases is offered as additional requirements to be used in conjunction with the general usage requirements listed in this COP and shall be in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.CGF.01.SH - Control of Substances Hazardous to Health and Dangerous Goods*.

#### 3.6.1 Flammable Gases:

- (a) Employer / duty holders / stakeholders shall ensure that the following information applies to the use and handling of flammable gases. Some common examples of flammable gases include acetylene, hydrogen, methane, propane and butane:



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- (i) Flammable gases, except for protected fuel gases, shall not be used near ignition sources. Ignition sources include open flames and sparks, sources of heat, oxidizing agents and ungrounded or non-intrinsically safe electrical or electronic equipment;
- (ii) Portable fire extinguishers shall be available for fire emergencies. The fire extinguisher shall be compatible with the apparatus and the materials in use;
- (iii) Flames shall not be used for detecting leaks. A compatible leak detection solution shall be used for leak detection;
- (iv) Spark proof tools shall be used when working with or on a flammable compressed gas cylinder or system;
- (v) Access doors to areas which use or store flammable gases shall be posted “No Smoking” and “No Open Flames” and other appropriate signage as necessary;
- (vi) Manifold systems shall be designed and constructed by competent personnel who are thoroughly familiar with the requirements for piping of flammable gases. Manifolds shall comply with the applicable standards;
- (vii) Standard specifications shall be identified before starting design and construction; and
- (viii) Consultation with the gas supplier shall be completed before installation of manifolds.

### 3.6.2 Fuel, High Pressure and Oxidizing Gases:

- (a) Employer / duty holders / stakeholders shall ensure that the following information applies to the use and handling of fuel, high pressure and oxidizing gases:
  - (i) Use of fuel gases shall comply with the applicable national and international standards including *UAE Fire and Life Safety Code of Practice 2018* and *NFPA*.
  - (ii) Provision of qualified engineer or other appointed competent person design and oversee the installation of Oxygen-Fuel Gas Systems to be used for Welding, Cutting and Allied Processes in accordance with the requirements of and *Dubai Aviation City Corporation (DACC) – Dubai South CoP – DACC.DS.OPS.OHSE.OST.09.WS – Permit to Work Systems*;
  - (iii) High pressure gases can be rated up to 3000 pounds per square inch (psi). typical uses include MIG (Metal Inert Gas) welding gas mixtures, cryogenics, non-toxic gas distribution, medical gas distribution and emergency oxygen services;
  - (iv) In addition to any gas specific hazards, high pressure gases shall carry the following hazard label, “CAUTION: HIGH PRESSURE GAS”; and
  - (v) Do not use oil in any apparatus where oxygen will be used. Gauges and regulations for oxygen shall bear the warning “OXYGEN – USE NO OIL”.

### 3.6.3 Toxic and Highly Toxic Gases

- (a) Employers / duty holders / stakeholders shall ensure that the following information applies to the use of toxic and highly toxic gases:
  - (i) Where it is reasonably practicable not to use and store Toxic and Highly Toxic Gases on projects;



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- (ii) Where it is not feasible to substitute or prohibit the use of Toxic or Highly Toxic Gases, it is recommended unless otherwise indicated, all gases shall be stored in a continuously mechanically ventilated gas cabinet, fume hood or other enclosure;
- (iii) Small quantities such as lecture cylinders, etc. or dilute concentrations of these gases may be stored outside of a ventilated enclosure;
- (iv) Audible alarm shall be utilized in ventilated hoods that are dedicated to toxic gas usage or storage; and
- (v) Standard Operation Procedures (SOP's) and Safe System of Work for processes or procedures which use Toxic or Highly Toxic Gases shall be developed that include emergency response actions.

### 3.6.4 Corrosive Gases

- (a) Employers / duty holders / stakeholders shall ensure that the following information applies:
  - (i) When using corrosive gases, equipment and lines shall be checked daily for damage and leaks;
  - (ii) A diaphragm gauge shall be used with corrosive gases that would destroy a steel or bronze gauge. Check with gas supplier for recommended equipment; and
  - (iii) After removing regulators, inspection are perform for damage and flush them with dry air or nitrogen.

### 3.6.5 Cryogenic Liquids and Gases

- (a) Cryogenic liquids and their boil-off vapours rapidly freeze human tissue and cause embrittlement of many common materials which may crack or fracture under stress. All cryogenic liquids produce large volumes of gas when they vaporize at ratios of 600:1 to 1441:1, gas: liquid, and may create oxygen-deficient conditions. Examples of common cryogenic liquids include liquid oxygen, hydrogen, helium and liquid neon.
- (b) Employers / duty holders / stakeholders shall ensure that the following information applies to the use and handling of cryogenics:
  - (i) Employees shall use appropriate personal protective equipment (PPE) including, but not limited to insulated gloves and eye protection (goggles and a face shield) during any transfer of cryogenic liquid. Refer to *Dubai Aviation City Corporation (DACC) – Dubai South COP – DACC.DS.OPS.OHSE.OST.10.PP - Personal Protective Equipment*;
  - (ii) Emergency procedures shall be developed for accidental exposures to include skin contact with cryogenic liquid;
  - (iii) Only equipment, valves and containers designed for the intended product and service pressure and temperature shall be used;
  - (iv) Inspect containers for loss of insulating vacuum. Repairs shall be made by the manufacturer or an manufacturer approved company;
  - (v) Transfer operations involving open cryogenic containers such as Dewar's shall be conducted slowly to minimize boiling and splashing of the cryogenic fluid;



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- (vi) Ice or other foreign matter shall not be allowed to accumulate beneath the vaporizer or the tank;
- (vii) All cryogenic systems including piping shall be equipped with pressure-relief safety devices to prevent excessive pressure build-up;
- (viii) Pressure-relief safety device shall be directed to a safe location;
- (ix) Employees shall not tamper with pressure-relief safety device/valves or the setting for the valves; and
- (x) Hot air, steam or hot water shall be used to thaw frozen equipment. Do not use water to thaw liquid helium equipment.

### 3.7 Disposal of gas cylinder

- (a) Employers / duty holders / stakeholders shall ensure that:
  - (i) When feasible, purchase compressed gas only from manufacturers that will agree to take back the empty cylinder.
  - (ii) A cylinder is considered empty when the container pressure is 35 psi or less.
  - (iii) If a refillable cylinder is encountered that does not have a manufacturer label, contact **Dubai Aviation City Corporation (DACC) – Dubai South OHSE Department** for advised on disposal and/or identifying the manufacturer through stamp marks on the cylinder.
  - (iv) Maintain manufacturer labels and label the cylinder as “Empty”.
  - (v) Appropriate identification of the contents of all cylinders is required.

### 3.8 Inspection and maintenance

- (a) Employers / duty holders / stakeholders shall ensure that compression Units as per **Ministerial Order 32 of 1982** shall be inspected by a competent person that licensed by the ministry of labor at a minimum annually.
- (b) Gas Cylinders:
  - (i) Gas cylinders shall be hydrostatically tested at a minimum every five (5) years which shall be conducted by a qualified testing facility. The test date shall be stamped onto the cylinder each time the cylinder is tested;
  - (ii) Cylinders in use are allowed to exceed the five (5) year limit, but shall be tested prior to refilling or before the sixth (6<sup>th</sup>) year, whichever is sooner; and
  - (iii) Inspection of Low-Pressure Cylinders (0.35 kg/cm<sup>2</sup> to 1.055 kg/cm<sup>2</sup>) is exempted from the Hydrostatic Test.
  - (iv) For LPG cylinder, no cylinder are allowed to be used with fifteen (15) years of service.
- (c) Air Receiver shall be tested by a competent person or a third party company / person approved by **Dubai Aviation City Corporation (DACC) – Dubai South OHSE** and/or **Dubai Municipality Specialized Department** at a frequency defined by the applicable legal requirements, manufacturer recommendations and/or employer's inspection and maintenance scheme. Inspection shall include, but not limited to:





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- (i) Visual Examination each six (6) month by competent person;
  - (ii) Thorough internal and External Visual Inspection plus a Gas Leak Test at full working pressure or Internal overpressure test plus a Gas Leak Test at full working pressure; and
  - (iii) Thorough internal and external visual examination and gas leak test to maximum working pressure. If the competent person deems it necessary, an overpressure test to 1.1 times the maximum working pressure shall be conducted.
- (d) Pipework shall be tested by a competent person or a skilled third party company approved by **Dubai Aviation City Corporation (DACC) – Dubai South OHSE** and/or **Dubai Municipality Specialized Department** at a frequency defined by the applicable legal requirements, manufacturer recommendations and/or employer's inspection and maintenance scheme in line with the requirements of **Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulations 3 – Legal Compliance**. Inspection shall include, but not limited to:
- (i) Visual examination;
  - (ii) Gas leak test at maximum working pressure of the system; and
  - (iii) Internal pressure test to 1.5 time's maximum working pressure of the system plus gas leak test at maximum working pressure of the system.
- 3.9 Emergency response
- (a) Employers / duty holders / stakeholders shall ensure that:
- (i) Emergency Response procedures are developed for all compressed gas, air and pressurized system and in accordance with the requirements of **Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 13 –Emergency Management**. Requirements for emergencies involving compressed gas cylinders include leaks, fire, explosion, etc. as identified through the documented Risk Assessment as required by this COP.
  - (ii) Nominate and appoint competent person and team as emergency response coordinator and team. Appointment shall be in written;
  - (iii) First aid and medical procedures shall be in accordance with the requirements of **Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulations 3 – Legal Compliance**
  - (iv) Emergency and first aid procedures shall include, but not limited to:
    - 1. The provision of first aid facilities, kits and officers to appropriately deal with compressed air injuries, such as air and foreign particle injection;
    - 2. Provisions to immediately shut down air compressors isolate gas cylinders etc. in the event of an emergency;
    - 3. Contact details for external emergency services including Dubai South and other relevant authority; and
    - 4. For toxic gases leaks, the cylinder shall be removed to an isolated, well ventilated area, but only if this is reasonably practicable while maintaining personal safety. Only a trained emergency response personnel wearing appropriate PPE may approach the cylinder.



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#### 4.0 RECORD KEEPING

- (a) Employers / duty holders / stake holders shall ensure record keeping is in accordance with the requirements of *Dubai Aviation City Corporation (DACC) – Dubai South OHSERF – Regulation 8 – Document Control and Record Management* for 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*.
- (b) Contractor shall ensure records of the below but not limited to:
- (i) Competency and Licensed of operators and inspectors;
  - (ii) Personnel training and awareness to other person involve for handling, use, transport, etc.;
  - (iii) Inspection and test report;
  - (iv) Regular maintenance inspection report;
  - (v) Damage and repair report;
  - (vi) Compressed Gas, Air and Pressurized Systems registers;

#### 5.0 REFERENCES

NO.	DOCUMENT NAME	DOCUMENT NO.
1	Risk Management	DACC OHSERF – Regulation 2
2	Leadership, Roles, Responsibilities and Self-Regulations	DACC OHSERF – Regulation 5
3	Competence, Training and Awareness	DACC OHSERF – Regulation 6
4	Document Control and Record Management	DACC OHSERF – Regulation 8
5	Emergency Management	DACC OHSERF – Regulation 13
6	Performance Management	DACC OHSERF – Regulation 14
7	Management Review	DACC OHSERF – Regulation 19
8	Personal Protective Equipment	COP – DACC.DS.OPS.OHSE.OST.10.PP
9	Fire & Life Safety	COP – DACC.DS.OPS.OHSE.FLS.01.FL
10	Electrical Safety at Work	COP – DACC.DS.OPS.OHSE.OST.02.ES
11	Safety Requirements for Cranes, Hoists, Lifts and other Lifting Appliances	COP – DACC.DS.OPS.OHSE.OST.13.LA
12	Control of Hazardous Substances Hazardous to Health and Dangerous Goods	COP – DACC.DS.OPS.OHSE.CGF.01.SH
20	Permit to Work Systems	COP – DACC.DS.OPS.OHSE.OST.09.WS
24	UAE Fire and Life Safety Code of Practice	2017
25	Ministerial Order 32 of 1982	
26	Emirate Authority for Standardization and Metrology (ESMA)	
27	Standard System for the Identification of the Fire Hazards of Materials, NFPA 704	
28	American National Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, ANSI B57.1-1965	
29	Compressed Gas Association (CGA)	