**Safe Work Requirement**

Compressed Gas Cylinder Safety Procedure

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| Summary ECDC operations use compressed and liquefied gas for a variety of different uses, including cutting, welding and inerting (nitrogen).  The compressed gas is stored in compressed gas cylinders (Figure 1) which can present a variety of hazards due to their pressure and/or contents. This procedure covers requirements which must be followed for the use of all compressed gas cylinders.  All ECDC personnel involved in the use, storage and transport of compressed gas cylinders must work in compliance with this procedure.  Compressed gas cylinder storage, handling and usage activities must follow this procedure.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\(D@32EQUTNBMU524[L{Y8M9.png  **Figure 1: Compressed gas cylinder** Introduction     Purpose The purpose of this procedure is to provide information on the safe usage of compressed and liquefied gases at ECDC worksite and workshop and afford employee protection from potential health and physical hazards associated with gas and cylinder usage. Application This procedure is applicable to all ECDC personnel involved in the use, storage and transport of compressed gas cylinders at any ECDC facilities.  This procedure also defines the following requirement of compressed gas cylinders:-   1. Stamp marking 2. Labels 3. Colour coding  Responsibilities    Rig Manager The Rig Manager has overall responsibility for the safety and health of rig personnel. The Rig Manager is responsible for the plant or location where the compressed gas cylinders are to be used. The Rig Manager/Area Manager will control the use of compressed gas via the permit to work procedure.  The Rig Manager will ensure that all hazards have been identified and will make recommendations for the implementation of various measures to reduce the risks to as low as reasonably practicable. The Rig Manager must personally inspect the job site along with the task leader.  He will sign the Hot Work Permit prior to use of any compressed gas that will be used for welding or burning in his area. He is also responsible for:-   1. Ensuring toolbox talks are conducted prior to work commencing 2. Ensuring a gas test is performed 3. Ensuring that all precautions stated on the Permit are implemented 4. Ensuring that personnel possess and use the required Personal Protective Equipment (PPE) that it is in a serviceable condition 5. Ensuring that personnel know how to use the PPE 6. Ensuring that any sub-contractor under the working with compressed gas cylinders are fully trained in the safe use, storage and transportation of compressed gas cylinders.   (See Appendix 1 - Training, competence and authorisation) HSE Supervisor The site HSE supervisor shall assist the Rig Manager in ensuring all personnel working with compressed gas cylinders are trained, certified and competent.  The HSE supervisor is responsible for:-   1. Ensuring the compressed gas cylinders are hydraulic pressure tested and the test is current 2. Ensuring the compressed gas cylinders are stored in a designated compressed gas cylinder storage area 3. Ensuring that safe working practices are being enforced at all times 4. Ensuring that defective equipment is withdrawn from service and repaired 5. Implementing the compressed gas cylinder procedure at rig site and facilities where work is carried out under their control.   (See Appendix 2 - Compliance and auditing) Welder The welder is normally a certified person to use compressed gas cylinders for welding or burning. Prior to and during work with compressed gas cylinders, the welder shall:-   1. Inspect the rubber hose periodically to see that it is free from cuts, cracks, burns and worn places 2. Arrange the rubber hose to ensure it cannot be cut by contact with sharp edges or corners, falling metal, sparks or the torch flame 3. Use only red hose for acetylene and other combustible gases 4. Use hoses of equal length, and do not coil any surplus hose around regulators or cylinders 5. Not site or use cylinders near to the intake of an air-compressor  Compressed gas cylinder procedure    Compressed gas characteristics All ECDC users of compressed and liquefied gases in cylinders must fully understand the potential hazards and properties of the gases they are using and have stored on site.  Each gas has its own characteristics, which affect its behaviour. Gases also change characteristics when subjected to external pressures and temperatures.  An important characteristic of a gas is its density relative to air because it may fall, rise or be dispersed if it leaks. Table 1 below gives the densities of some common gases.  Most gases are colourless and odourless in their natural state so there is little or no warning of a leak. Most fuel gases have or are given a “smell” to aid leak detection.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\82L3UDZ03KQH~H_OTRT8PYP.png  **Table 1: Gas density compared to air**  Industrial gases are categorised as follows.   1. **Oxidants**   Oxidant gases do not themselves burn but support combustion. By increasing the amount and type of oxidant many things will burn that are not normally flammable, for example, air and oxygen.   1. **Inert**   Inert gases do not generally react with other materials, they do not support combustion nor do they support life. Inert gases should be regarded as asphyxiants because if they leak they displace air and hence oxygen in the atmosphere. Examples include Nitrogen and Argon shield gases.   1. **Flammables**   Flammable gases, when mixed with an oxidant and provided with the right ignition source, will burn. An increase in the temperature of the fuel/oxidant mix can also cause ignition. Examples include Acetylene, Hydrogen and Propane.   1. **Toxics**   Toxic gases have the potential to cause injury or threaten life, even in small concentrations. Examples include Carbon Monoxide, test gases such as H2S, Chlorine and Ammonia.   1. **Corrosives**   Corrosive gases react chemically with other materials causing reactions and deterioration. Toxic gases may be given off. Examples include Chlorine and Sulphur Dioxide. Compressed and liquefied gas cylinder - general Many gases are considered harmless at normal atmospheric pressure and temperature. However, if they are subjected to high pressure or temperature they are potentially hazardous.  A good example is air; it is perfectly safe until pressurized, when its stored energy can make it hazardous.  Cylinders used for storing gases under pressure are designed and built to a high specification and are subjected to regular pressure tests.  How often the cylinder needs to be tested will depend on the following:-   1. The gas contained in the cylinder 2. Fuel gas cylinders are tested more frequently than compressed air cylinders for example 3. The working pressure the cylinder is subject to   The supplier can establish when the cylinder is due for test from stampings on the neck of the cylinder and by using shaped and coloured “test rings” fitted around the neck of the cylinder.  Each colour and shape of test ring will determine in which year the test is to be carried out.  Cylinders are filled to different pressures, depending on the characteristics of the gas and the capability of the cylinder. They are made of steel, composite or aluminium alloys.  Some cylinders are welded most are solid drawn from a single steel billet. This gives them strength and robustness.  ECDC rules of compressed gas cylinder safety include:-   1. Never tamper with cylinders 2. Never re-paint, change markings or identification or interfere with threads 3. Never disguise damage to a cylinder or valve 4. Never attempt to repair a cylinder 5. Never mix gases in a cylinder 6. Never transfer or “decant” gas from one cylinder to another 7. Never subject cylinders to abnormally high or low temperature 8. Never try to ref ill a cylinder 9. Never use them as rollers or supports 10. Never subject cylinders to abnormal mechanical shocks, which could damage the valve or safety device  Compressed and liquefied gas cylinder - identification The contents of any compressed gas cylinder must be clearly identified. Such identification should be stencilled or stamped on the cylinder and have a label and be colour coded (Figure 2).  No compressed gas cylinder should be accepted for use that does not legibly identify its contents by name. If the identification stencilled on a cylinder becomes unclear or an attached tag is defaced to the point the contents cannot be identified, the cylinder should be marked "contents unknown" and returned directly to the manufacturer.  Compressed gas cylinder colour refers to the gas contents of cylinder and is used to compliment a cylinder stencil which is the primary method of indicating cylinder contents.  Compressed gas cylinder colours are a visual method of identification when it is not possible to read the stencil or label, particularly when it is not possible to approach close to a cylinder.  (See Appendix 4 - Compressed gas cylinder specification)  (See Appendix 5 - Compressed gas cylinder colour codes)  (See Appendix 6 - Cylinder shoulder colours by specific gas)  Always check the colour and tag on the cylinder conforms to the gas contents of the compressed cylinder as detailed in the stencil marking on the cylinder. Colour coding is not always reliable because cylinder colours may vary with the supplier.  **Key**   1. Company name 2. Risk and safety information relating to the product 3. Hazard symbol   Figure 2: Compressed gas cylinders identification  If there is a mismatch between the colours of the cylinder and the gas identified on the label do not use the cylinder. Inform the HSE supervisor. Compressed gas cylinder - storage  1. **Storage Requirements**   All gas cylinders:-   1. Shall not be stored in exits or egress routes 2. Shall be stored within a well-ventilated area 3. Shall not be stored in damp areas, near salt or corrosive chemicals, fumes, heat or where exposed to the weather 4. Shall be stored in an upright position 5. Shall be secured with a chain or appropriate belt above the midpoint, but below the shoulder. Laboratory cylinders less than 500mm tall may be secured by approved stands or wall brackets 6. Shall be capped when not in use or attached to a system (if the cylinder will accept a cap) 7. Shall be kept at least 6 metre away from all flammable, combustible or incompatible substances. Storage areas that have a non-combustible wall at least 2 metre in height and with a fire resistance rating of at least 30 minutes may be used to separate gases of different hazard classes which are stored close to each other 8. Shall be stored so that cylinders are used in the order in which they are received 9. Shall be stored so that gases with the same hazard class are stored in the same area. Inert gases are compatible with all other gases and may be stored together 10. Shall not be stored longer than one year without use 11. Shall be stored so that full cylinders remain separate from empty cylinders 12. **Compressed gas cylinder - storage area layout**   Compressed gas cylinders (Figure 3) stored in exposed extreme weather conditions shall be:-   1. Protected against excessive temperature 2. Not in direct contact with tarpaulin or any other cover used to shield the cylinders 3. Have signs indicating “No hot work” in this vicinity displayed 4. Protected from rusting and corrosive conditions   Cylinders of combustible gas, such as propane or acetylene, should not be stored with other high pressure gases or with cylinders of oxygen. They shall not be stored in close proximity to open flames, areas where electrical sparks are generated, or where other sources of ignition may be present.  Lighting and switches for storage areas containing acetylene or other combustible gas cylinders shall be of an approved flame-proof type.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\$4Z}%D`J}~9JZU)B9%K800N.png  **Figure 3: Compressed gas cylinder storage warning sign**   1. **Combustible gas cylinder storage**   Combustible gas cylinders must be stored:-   1. In separate areas 2. Where this is not possible, they must be kept at a minimum of 3 metres apart 3. Full cylinders should be kept separated from empty cylinders 4. Gas cylinder tags (“empty” or “full”) must be attached to all portable gas cylinders on the site 5. Gas cylinders must always be stored upright - not horizontally - and secured by chain or rope 6. Gas Cylinder protective valve caps must always be fitted on stored cylinders 7. **Oxygen cylinder storage**   Oxygen cylinders (Figures 4 and 5), full or empty, shall not be stored in the same vicinity as combustible gases. The proper storage for oxygen cylinders requires that a minimum of 6 metres be maintained between flammable gas cylinders and oxygen cylinders or the storage areas be separated, at a minimum, by a fire wall 2 metres high with a fire rating of 0.5 hours.  (See Appendix 3 - Compressed gas cylinder storage)  Greasy and oily materials shall never be stored around oxygen; nor should oil or grease be applied to fittings.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\TUD]~LO32DV%`Z0$D[Q[U{H.png  **Figure 4: Compressed gas cylinder storage racks**  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\0LUM7}3@{5780X])P2@KU$0.png  **Figure 5: Individual compressed gas cylinder storage** Compressed gas cylinder - handling Personnel must regard every compressed gas cylinder as being fully charged and handle it carefully when manually moving a compressed gas cylinder.  The following guides must be followed prior to moving a compressed gas cylinder:-   1. Be aware of the identification of the compressed gas cylinder contents and the potential hazards 2. Familiarise with the appropriate Material Safety Data Sheet (MSDS) 3. Cylinders should not be dragged or physically carried. Transport cylinders with a hand truck designed for the transport of cylinders. Cylinder caps shall be secured during transport 4. Avoid damage to valves and fittings and do not use them for lifting and carrying 5. Do not use cylinders as rollers to move equipment as work supports or as jacks 6. Cylinders must not be allowed to drop or come into violent contact with each other 7. Cylinders shall not project beyond the sides or ends of the quads, and they must not be loaded loosely, whereby they could come into violent contact with each other when the quad is lifted 8. Ropes, chains and slings shall not be used to suspend cylinders, unless the cylinder was designed for such magnets shall not be used for lifting cylinders 9. Where appropriate lifting attachments have not been provided on the cylinder/container, suitable cradles or platforms to hold the containers shall be used for lifting   Only the supplier’s standard keys may be used for operating cylinder valves, and these keys will be left in place on the cylinder at all times that the cylinder is in use. Compressed gas cylinder - valves The compressed gas cylinder valve is an important feature of the cylinder and its overall safety. Valves vary depending on the application, for example some are designed for liquid withdrawal, others for gaseous withdrawal.  Compressed gas cylinder valves are opened by a hand wheel or with a spindle key. Most industrial gas cylinder valves require a spindle key, though some have wheels. Where a spindle key is used it must be left in position until completion. Standard cylinder-valve outlet connections have been devised to prevent mixing of incompatible gases. The outlet threads used vary in diameter; some are internal, some are external, some are right-handed, some are left-handed.  The threads on cylinder valves, regulators and other fittings should be examined before use to ensure they correspond and are undamaged.  Cylinder valves must never be removed or tampered with. If there is a fault or the valve is leaking contact the supplier immediately and if possible remove the cylinder to a well vented area away from any heat or source of ignition. Put a warning notice around the valve.    The cylinder valve is a safety mechanism. If grit, dirt, oil or dirty water gets into the cylinder, the valve may leak. It is extremely dangerous to attempt to repair cylinder valves. Never apply any form of lubrication or sealing compounds to threads. Any fittings and equipment used must be fit for its purpose and suitable for the gas in the cylinder.  Compressed gas cylinders must never be transported with the regulators and hoses attached, unless a proper trolley or carrier is used. When transporting by a trolley, the cylinder valve must be shut and the tubes coiled neatly around the trolley before the cylinder is moved from place to place.  Welding or cutting apparatus must not be used unless automatic pressure regulators and flashback arrestors are fitted to the oxygen and fuel gas cylinders. In addition, non-return valves should be fitted to torches (both oxygen and acetylene).  The cylinder valve must always:-   1. Be accessible at all times 2. Be opened slowly. Cylinder valve spindles always have right-hand threads irrespective of whether the cylinder contains a fuel gas or non-combustible gas 3. Be closed sufficiently to shut off the gas; excessive force must not be used 4. Be closed when work has been stopped for more than a few minutes, or when the cylinder is empty   The main cylinder valve should be closed as soon as it is no longer necessary that it be open. For example, it should never be left open when the equipment is unattended or not operating. This is necessary not only for safety when the cylinder is under pressure, but also to prevent corrosion and contamination resulting from diffusion of air and moisture into the cylinder after it has been emptied.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\%]@G5RGF0BLEWH0_3N@IC)W.png  **Figure 6: Typical equipment used in gas welding and similar processes** Compressed liquefied gas cylinder - regulators A compressed gas cylinder regulator is a device, which accepts gas at a high pressure and reduces it to a much lower working pressure. Regulators are robust enough to withstand the full gas pressure within the cylinder, yet can maintain effective control of the outlet gas pressure.  Regulators are precision instruments containing machined components, which need to be handled with care. Avoid rough treatment, which could damage sensitive springs, diaphragms, valve seats and safety valves.  Using incorrect or damaged regulators on high-pressure gas cylinders is potentially hazardous:-   1. Check the equipment every time it is used to ensure you are not working in an unsafe situation 2. Check that the regulator is suitable for use at the pressures in the cylinder. If not do not use it 3. Only use the regulator with the gas for which it is designed and labelled 4. Ensure the pressure adjustment knob/screw is fully out when the regulator is not in use   There are different regulators for different applications. It is vital that only equipment designed for the particular gas should be used.  Note: Air or nitrogen regulators must not be used with Oxygen and vice versa. Where air is supplied directly from compressors the compressed air could contain traces of oil, which can contaminate the regulator and would be highly dangerous if used with oxygen. Compressed liquefied gas cylinder - flashback arrestors A flashback is the result of mixture of fuel gas and Oxygen burning within the hose. The flame travels or burns its way towards the gas source at great speed.  Flashback can result in fire or explosion in either or both the Oxygen and fuel gas cylinders. Flashback arrestors must be fitted to regulators on both cylinders to comply with British Compressed Gas Association code of practice 7, and they must be designed to comply with EN 730-1 2002, formerly BS 6158.  If the gas/Oxygen mixture leaves the nozzle at a velocity that is slower than the combustion velocity or flame speed of the fuel then the flame will tend to burn back along the mixture and will in effect “backfire”. If the mixture within the hose ignites then we have a “flashback”.    Which hose the flashback will occur in is dependent on the velocity the gases are traveling at. The flame will travel either back towards the fuel, pulling behind it the Oxygen needed to sustain combustion or back towards the Oxygen, pulling behind it the fuel to sustain combustion.  Flashback arrestors must be fitted to the outlets of both Oxygen and fuel gas regulators.  The common reasons for a flashback are:-   1. Incorrect purging of the hose and torch prior to use 2. Incorrect gas pressure 3. Incorrect nozzle 4. Damaged torch valves allowing cross flow feeding of gas within the torch 5. Gas passages within the torch blocked 6. Kinked or trapped hose   A flashback has two components; the flame front and a pressure wave.  A physically damaged flashback arrestor may not operate effectively. If it has been dropped it may require testing for correct operation or replacement.  Replace flashback arrestors showing any of the following defects:-   1. External damage 2. Badly dented body 3. Reset lever/button broken or bent 4. Inlet /out let connect ions bent 5. Evidence of non-original Poly tetrafluoro ethylene tape or sealing compounds   Flashback arrestors should only be used with the gas they are labelled for and at the pressure they are designed for. Compressed liquefied gas cylinder - gauges and hoses  1. **Hoses**   The correct hose bore size, pressure rating, length and colour coding are essential for safety. European Standard EN 559-1 2003 (formerly BS 5120) sets the requirements for the manufacture of hoses, including their colour for different gases:-   1. Blue-Oxygen 2. Red-acetylene and other fuel gases (except Liquefied Petroleum Gas) 3. Black-inert and non-combustible gases   Never use hoses that are longer than necessary and never use equipment while hoses are wrapped around the cylinders or trolley.  The length of the hose should be suitable for the task. The longer the hose the more likely it is to get damaged.  Only best quality hose is to be used, and must be firmly attached to the torch and other connections by clips or other suitable means (the use of Jubilee clips is prohibited).   1. Lengths of hose which are supplied for connecting to standard regulator outlets and torch inlets should be used in preference to any other hose 2. Lengths of hose must be joined by means of suitable connecting fittings when more than the standard length is required 3. Unnecessary long lengths of hose must not be used 4.  Hose piping systems should be inspected for leaks on a regular basis 5. **Gauges** 6.  Only pressure gauges recommended by the suppliers may be used. Gauges for oxygen must be marked “oxygen” and must NOT be tested with oil 7.  Gauges used to show the contents of oxygen, nitrogen, or hydrogen cylinders must have a maximum dial reading of not less than 225 bar  Compressed liquefied gas cylinder - connecting to system It is essential that personnel handling a container of compressed gas or cryogenic liquid are certain of the contents before the container is connected to a system. Discharging a gas or cryogenic liquid into a system not intended for the material could cause a fire, explosion, equipment failure, gas leak, or other hazard resulting in a serious or fatal injury.  Before attempting to connect a container to a system, be certain of the following:-   1. Personnel using the container are trained and knowledgeable regarding the product, container, fittings, equipment, and proper connection procedures 2. The container is clearly and properly marked or labelled with the identification of the contents, and there are no conflicting markings, labels, or colouring. Do not rely solely on the colour of the container to identify the contents. If there is any conflict or doubt about the contents, do not use the container 3. The labelled contents are the correct product for use in the system 4. The container has the proper outlet connection(s) for its contents 5. The connection(s) on the container and the system fit together properly without being too loose or too tight. A proper connection will go together smoothly; do not use adapters or excessive force   Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\9PZG~P5S{4242T@EFDGO@QE.png  **Figure 7: Compressed gas cylinder system**  All gas lines leading from a compressed gas supply should be clearly labelled to identify the gas, the laboratory or area served, and the relevant emergency telephone numbers. Compressed gas cylinder – safety    Transporting compressed gas cylinders Cylinders that contain compressed gas should not be handled roughly. Such misuse can seriously weaken the cylinder and make it unfit for further use.   1. To protect the valve while you are moving a cylinder, screw on the cover cap until it is hand tight and make sure it stays on until the cylinder is in place and ready for use 2. Never roll or drag cylinders 3. When moving large cylinders, strap them to a properly designed wheeled cart to make sure they remain stable (Figure 8) 4. Only move one cylinder at a time   Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\T]B%I0]CJ~{`8K`QH~HC]@1.png  **Figure 8: Compressed gas cylinder ‘trolley’**  When the cylinder needs to be removed or when it is empty (Figure 9):-   1. Close all valves 2. Bleed the system to remove the last traces of the gas 3. Remove the regulator 4. Replace the valve cap 5. Clearly mark the cylinder as ‘empty’; and 6. Return the cylinder to a storage area for the supplier to collect   Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\02VJQ${)AI`FV~[}[99)4UC.png  **Figure 9: Compressed gas cylinder “Do not use Cylinder empty” sign** Faulty cylinders You must report any damaged or leaking cylinders to the Site Controller. If a cylinder is leaking but the leak has not ignited, and if it safe to do so follows the instructions below:-   1. Eliminate all sources of ignition 2. Make sure the valve is closed, but do not try to over tighten it 3. Put the cylinder in a safe place that is well ventilated 4. Mark the cylinder as faulty and not to be used 5. Warn staff in the area of the gas leak 6. Make sure the work area is thoroughly ventilated before continuing with any work 7. Do not try to tighten the cylinder valve in the body or tamper with safety devices   If a cylinder has been dropped or physically damaged check it for leaks.  Clearly mark, and take out of use, any cylinder which has been exposed to excessive heat, for example a fire. Compressed gas cylinder - fire safety The hazards associated with gas cylinders in fires depend on the following:-   1. The gas in the cylinder 2. Whether the gas is alight at the cylinder valve 3. Whether the cylinder has come into contact with severe pressure as a result of the heat from the fire   The action you must take depends on the nature of the hazard. If cylinders are involved in a fire or come into contact with excessive heat, the basic safety precautions are as follows:-   1. Do not approach any compressed gas cylinders in the affected area 2. Activate the emergency alarm 3. Evacuate the area 4. Cal l the emergency response team 5. Tell the emergency response team leader the number, types and location of the cylinders  Personal protective equipment Personal protective equipment - general  Personal Protective Equipment (PPE) is an essential component in protecting employees from on-the-job injuries. We must provide all staff with the proper Personal Protective Equipment they need to protect them from hazards at work.  All staff and visitors must at least wear the following approved Personal Protective Equipment when working in operational areas:-   1. Hard hats 2. Steel-toed footwear 3. Safety glasses 4. Flame retardant coveralls   Always use safety glasses (preferably with a face shield) when handling and using compressed gases, especially when connecting and disconnecting compressed gas regulators and lines.  If you move or handle compressed gas cylinders, we should also provide you with the following:-   1. Heavy gloves 2. A cylinder trolley or other suitably designed device for transporting compressed gas cylinders 3. A chain for securing the compressed gas cylinders while you are moving them  Appendix 1 - Training, competence and authorisation All staff directly involved with transporting, storing and using compressed gas cylinders will have received training in applying this Control of Work procedure.  All staff handling or using compressed gas cylinders will have received training that includes the following:-   1. Information on the hazards associated with compressed gas 2. The risk of fire and explosion 3. Toxic effects from certain gases 4. Physical hazards associated with pressurized systems 5. Storing, using and handling precautions necessary to control these hazards   Staff will need refresher training in the following circumstances:-   1. Changes in the workplace mean that previous training is out of date 2. Changes in the types of compressed gas cylinder used, or the way in which they are stored and transported, mean that previous training is out of date  Appendix 2 - Compliance and auditing We will regularly review work related to compressed gas cylinders, including reviewing the overall procedure. The reviews may also include:-   1. Checking that staff are keeping to this procedure and any local procedures 2. Maintaining a register of compressed gas cylinders 3. Maintaining a register of compressed gas cylinder storage areas   **Auditing**  Every year, Safety and Production Operations will audit the compressed gas cylinder procedure to assess how it has been used over the period since the last review and to make sure it is being managed as intended.  We will use these assessments to provide feedback to managers of staff who are not following this procedure and to assure managers that work involving storing, transporting and using compressed gas cylinders is being controlled safely.  There should also be a periodic inspection of supplier facilities to ensure cylinders meet the standards at a supplier’s facilities prior to shipping and to emphasize that ECDC will not accept non-compliant cylinders.  All cylinders, prior to shipping, should be subjected to hydro test procedures and valve overhaul procedures at the supplier’s site. Cylinder hydro tests should be witnessed, prior to shipment, to provide reassurance that cylinders are not just being re-stamped without a test.  **Inspecting and storing compressed gas cylinders**  The HSE Supervisor will-   1. Make sure that we are storing all compressed gas cylinders safely with appropriate safety signs 2. Make sure that compressed gas cylinders are certified, labelled and colour-coded 3. Identify any problems and take action to correct these   As a HSE Supervisor cannot always be available every time a shipment of cylinders arrives at a Warehouse, unless permanently sited there, Warehouse staff will complement the work of a HSE Supervisor by being specifically trained to Inspect incoming cylinders for compliance. A receiving document should include a sign-off on the cylinders meeting the required standards which will prevent any non-compliant cylinders from entering into the system. Appendix 3 - Compressed gas cylinder storage Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\ASY5JO5~TO``F`B(Y$_H1%A.png  **Figure 10: Compressed gas cylinder - incorrect storage**  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\GC5}B7(X}(PIB2[4B86M}$E.png  **Figure 11: Compressed gas cylinder - correct storage** Appendix 4 - Compressed gas cylinder specification Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\P@_@ZK4UQQC8%3%$}NU%E}K.png  **Figure 12: Identification of gas cylinder contents** Appendix 5 - Compressed gas cylinder colour codes **Table 2: Compressed gas cylinder colour codes**  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\6)HK(%}A$8DMP39Q@0@XC58.png Appendix 6 - Cylinder shoulder colours by specific gas A cylinder colour standard (Table 3) helps improve safety standards and in an emergency situation, where the cylinder label is not clearly visible, chemical hazards of the gases can be quickly identified which reduces the likelihood of a major incident occurring.  **Table 3: Cylinder shoulder colours by specific gas**  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\GO[LDLC2EO${RQF)M7CHAXM.png Appendix 7 - Cylinder gas mixtures by hazard property The following top shoulder colours (Table 4) apply to cylinders containing Special Product mixtures.  Red = Flammable  Yellow = Toxic or corrosive  Light blue = Oxidising  Bright green = Inert  Red and yellow = Flammable and toxic  Yellow and light blue = Toxic and oxidising  **Note:** More than one hazard property may be shown on the cylinder, for example, red and yellow.  **Table 4: Cylinder should colour by hazard property**  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\EPSWB~QISNYDBS73NQG[)KG.png Appendix 8 - Compressed gas cylinder identification chart A range of colour coded cylinders containing pure gases is shown below for reference purposes.  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\CB3)V%`WNY63A9UIB@(}6VW.png  Description: C:\Users\USER\AppData\Roaming\Tencent\Users\1045450198\QQ\WinTemp\RichOle\Z](W36MG9]6Q1A2UV84T3UQ.png |