




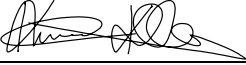
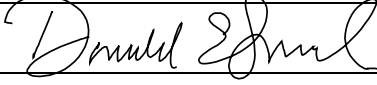

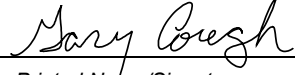
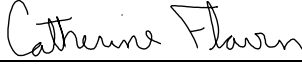
# UPF PAGE/PROCEDURE CHANGE NOTICE (PRCN)

PRCN Number:	PRCN-UPF-CP-225-R04-04	Effective Date:	10/04/23
<b>NOTE: PRCN Effective Date cannot precede effective date of associated document.</b>			
<input checked="" type="checkbox"/> Intent Change		<input type="checkbox"/> Non-Intent Change	
Associated Document Number:	UPF-CP-225	Rev:	4
Associated Document Title:	<i>Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases</i>		
Justification for Change:	Added requirements per 25774-000-GCA-GAM-04517, <i>Finding AS-5898-06: UPF Compressed Gas Cylinder Procedural Deficiencies in UPF-CP-225 (AS-5898)</i>		
Identify the scope of the change, including mark-up (i.e., strike-through for deletions, colored text for additions) of any new, removed, or changed content.			
<b>Delete from Section 2.3, Acronyms/Definitions:</b> <del>FSM — Field Safety Manager</del>			
<b>Update Section 3.2, Field Safety Manager (FSM):</b> <b>3.2 <span style="color: red;">Safety and Health Field Supervisor</span> <del>Field Safety Manager (FSM)</del></b> The <span style="color: red;">Safety and Health Field Supervisor</span> <del>FSM</del> has the overall authority for interpretation of the regulations associated with the procedure and the interpretation of the procedure as to intent and application. The <span style="color: red;">Safety and Health Field Supervisor</span> <del>FSM</del> notified the Y-12 Fire Department of the transporting and storage of compressed gas cylinders onsite to include flammable gases and oxidizers.			
<b>Add to Section 4.1.1, General Requirements:</b>			
<b>Add as last bullet at end of the section:</b>			
<ul style="list-style-type: none"> <li>• <span style="color: red;">Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces</span></li> </ul>			
<b>Add to Section 4.1.3, Cylinder Storage:</b>			
Add bullet at the end of the section stating:			
<ul style="list-style-type: none"> <li>• <span style="color: red;">Inside of buildings, cylinders shall be stored at least 20 feet from highly combustible materials such as oil or excelsior</span></li> </ul>			
<b>Change to Section 4.3, Liquefied Inert Gases:</b>			
<b>Update first sentence after Warning:</b>			
<b>Remove:</b> <del>Prior to using liquefied inert gas in a confined space, contact FSM.</del>			
<b>Add:</b> <span style="color: red;">Using liquefied inert gases in or around confined spaces can create an oxygen deficient atmosphere in those spaces. Confined space entry activities shall be performed in accordance with Y73-95-802, <i>Confined Space Entry Program</i>. It is prohibited to bring liquefied inert gas cylinders in a confined space.</span>			
<b>Add reference to Section 6.1, Source References:</b>			
<span style="color: red;">COMPRESSED GAS ASSOCIATION, INC. CGA P-1-1965, <i>Safe Handling of Compressed Gases</i> Y73-95-802, <i>Confined Space Entry Program</i></span>			

Preparer			
UPF ES&H Issues Management	Anton R. Panev		09/27/23
	Printed Name/Signature		Date



## UPF PAGE/PROCEDURE CHANGE NOTICE (PRCN)

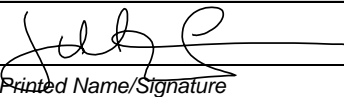
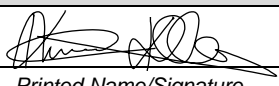

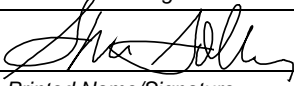
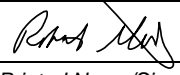
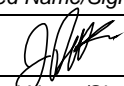
Approvals			
UPF ES&H Manager, BNI	Kieran S. Kelly		09/26/23
	<i>Printed Name/Signature</i>		<i>Date</i>
UPF ES&H Manager, CNS	Donald E. Sproul		09/27/23
	<i>Printed Name/Signature</i>		<i>Date</i>
Concurrence			
UPF Quality Assurance Manager, CNS	Lawrence L. Baldy		09/27/23
	<i>Printed Name/Signature</i>		<i>Date</i>
UPF Site Manager	Gary J. Cough		10/02/23
	<i>Printed Name/Signature</i>		<i>Date</i>
Senior Vice President and UPF Project Director	Catherine Flavin for John H. Platt II		10/03/23
	<i>Printed Name/Signature</i>		<i>Date</i>



THE NATION'S  
URANIUM  
PROCESSING  
FACILITY

## UPF PAGE/PROCEDURE CHANGE NOTICE (PRCN)

PRCN Number:	PRCN-UPF-CP-225-R04-03	PRCN Rev:	0	Effective Date:	04/19/22
<b>NOTE: PRCN Effective Date cannot precede effective date of associated document.</b>					
<input type="checkbox"/> PRCN Eligible Intent Change		<input checked="" type="checkbox"/> Non-Intent Change			
Associated Document Number:	UPF-CP-225	Rev:	4		
Associated Document Title: Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases					
Identify the scope of the change, including any new, removed, or changed content. Notate any references, such as Condition Reports, that are driving the change					
Change the NFPA 55 reference in Section 6.1 to reflect the current standard that was issued in 2013. CR-03517 drives the revision. This CR was initiated by ES&H upon discovering an outdated reference in the published UPF-CP-225.					
<b>From:</b>					
Section 6.1 Source References (fourth bullet)					
<ul style="list-style-type: none"> <li>NFPA 55, <i>Compressed Gases and Cryogenic Fluid Code 2010 Edition</i></li> </ul>					
<b>To:</b>					
Section 6.1 Source References (fourth bullet)					
<ul style="list-style-type: none"> <li>NFPA 55, <i>Compressed Gases and Cryogenic Fluid Code 2013 Edition</i></li> </ul>					

Preparer			
UPF Issues Management:	Jill S. Logsdon		03/10/22
		Printed Name/Signature	Date
Approval			
UPF ES&H Manager, BNI:	Kieran S. Kelly		03/10/22
		Printed Name/Signature	Date
UPF ESH&Q Manager, CNS:	Steven A. Gauthier		03/10/22
		Printed Name/Signature	Date
UPF Site Manager:	Robert S. Solberg		03/10/22
		Printed Name/Signature	Date
UPF Project Quality Manager:	Robert L. Steele		03/14/22
		Printed Name/Signature	Date
UPF Project Director:	John H. Platt		03/17/22
		Printed Name/Signature	Date

RC-UPF DMC  
03/18/22 12:59



# UPF PAGE/PROCEDURE CHANGE NOTICE (PRCN)

PRCN Number: PRCN-UPF-CP-225-R04-02	PRCN Rev: 0	Effective Date: 11-11-2020
<b>NOTE: PRCN Effective Date cannot precede effective date of associated document.</b>		
Associated Document Number: UPF-CP-225	Rev: 4	
Associated Document Title: <i>Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases</i>		
Identify the scope of the change, including any new, removed, or changed content. Notate any references, such as Condition Reports, that are driving the change		
This PRCN is to clarify the requirement for posting storage areas in response to CR 25774-000-GCA-GAM-02755, <i>Noncompliant Compressed Gas Storage Signage (IMA-PM-801768-FY20-047)</i> .		
<b>From:</b>		
Section 4.1.3 Cylinder Storage – 2 <sup>nd</sup> bullet		
<ul style="list-style-type: none"> <li>• Storage areas shall be clearly posted “Compressed Gas Storage Area”</li> </ul>		
<b>To:</b>		
Section 4.1.3 Cylinder Storage – 2 <sup>nd</sup> bullet		
<ul style="list-style-type: none"> <li>• Storage areas/cages shall be clearly posted as to contents (e.g. Oxygen, Acetylene, etc.)</li> </ul>		

Implements Quality Requirements (Select One)			
<input checked="" type="checkbox"/> None	<input type="checkbox"/> BNI	<input type="checkbox"/> CNS	<input type="checkbox"/> BNI & CNS
Preparer			
UPF Construction Issues Management – Procedure Compliance Title:	Tammy D. Threat	 <i>Tammy D. Threat</i>	10/28/20
		<i>Printed Name/Signature</i>	Date
Approval			
UPF BNI ES&H Manager:	David B. Harold	 <i>David B. Harold</i>	10/28/20
		<i>Printed Name/Signature</i>	Date
CNS UPF ES&H Manager:	Jamie M. Horning	 <i>Jamie M. Horning</i>	10/28/20
		<i>Printed Name/Signature</i>	Date
UPF Site Manager:	W. Dave Ross	 <i>W. Dave Ross</i>	11/10/20
		<i>Printed Name/Signature</i>	Date
Senior Vice President and UPF Project Director:	John P. Howanitz	 <i>John P. Howanitz</i>	11/03/20
		<i>Printed Name/Signature</i>	Date

RC-UPF DMC  
 11/11/20 12:25



# UPF CHANGE NOTICE (PCN) FORM

PCN Number:	PRCN-UPF-CP-225-R04-01	PCN Rev:	0	Effective Date:	05/05/20
Associated Document Number:	UPF-CP-225			Rev:	4
Associated Document Title:	Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases				
Identify the scope of the change, including any new, removed, or changed content. Include any references, such as Condition Reports that are driving the change:					
<b>Section 4.1.3 Cylinder Storage</b>					
<b>Change From:</b>					
CGC shall be secured in an upright position and be properly secured by means of substantial chain, cable, or equivalent method. The use of combustible material (e.g. rope, etc.) is prohibited as a primary means for securing cylinders. Valve protection caps shall be in place.					
<b>Change To:</b>					
CGC shall be secured in an upright position and be properly secured by means of substantial chain, cable, <span style="background-color: yellow;">strap</span> , or equivalent method. Valve protection caps shall be in place.					

Implements Quality Requirements (Choose One)			
<input checked="" type="checkbox"/> None	<input type="checkbox"/> BNI	<input type="checkbox"/> CNS	<input type="checkbox"/> BNI & CNS
Preparer			
UPF Construction Issues Management – Procedure Compliance:	Tammy D. Threat		05/05/20
	Printed Name/Signature		Date
Approval			
UPF BNI ES&H Manager:	David B. Harold		04/24/20
		Printed Name/Signature	Date
CNS UPF ES&H Manager:	Jamie M. Horning		04/23/20
		Printed Name/Signature	Date
UPF Site Manager:	W. Dave Ross		04/30/20
		Printed Name/Signature	Date
Senior Vice President and UPF Project Director:	John P. Howanitz		05/01/20
		Printed Name/Signature	Date

**RC-UPF DMC**

05/05/20 07:25



**UPF PROJECT PROCEDURE**

Title: **COMPRESSED GAS CYLINDERS, LIQUEFIED PETROLEUM GAS, AND LIQUEFIED INERT GASES**  
Document Number: **UPF-CP-225**  
Revision: **004**  
Page: **1 of 14**

Prepared by:

Brian Garrett,  
BNI UPF ES&H Lead

03/07/16

Date

Approved by:

Ed Kelley,  
BNI UPF ES&H Manager

03/08/16

Date

Gary Hagan,  
UPF ES&H Manager

03/08/16

Date

Concurrence by:

Lynn Nolan,  
UPF Manager of Construction

03/07/16

Date

Michael Pratt,  
UPF Project Manager, Execution

03/08/16

Date

James W. Sowers,  
UPF Quality Assurance Manager

03/08/16

Date

03/09/16

Effective Date

**RC-UPF DMC**

03/09/16 06:40



Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases
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### Revision History

Revision	Reason/Description of Change
004	This revision is a complete rewrite, therefore no revision bars are shown. This procedure further implements Bechtel Core Process 225, <i>Compressed Gas Cylinders</i> , Bechtel Core Process 211, <i>Fire Prevention and Protection</i> , and Project specific requirements; and supersedes UPF-CP-225, <i>Compressed Gas Cylinders</i> and Y73-400, <i>Compressed Gas Cylinder Safety</i> .
003	Adopted initial issue from Bechtel Core Process 225 at its current revision 3.

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## Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases

**1.0 PURPOSE**

To establish requirements that minimize the hazards of using and handling compressed gas cylinders, liquefied petroleum gas, and liquefied inert gases, including cylinders containing gases used for heating, breathing air, fire protection, etc. at the Uranium Processing Facility (UPF) Project.

**2.0 GENERAL****2.1 Description**

This procedure is applicable to UPF construction site personnel and subcontractors (including lower-tier subcontractors) who use and handle compressed gas cylinders, liquefied petroleum gas and liquefied inert gas, etc. during the course of the Project.

**2.2 Applicability**

Describe the extent of applicability of the procedure. This section may also address limitations on applicability or effectivity. A grandfather clause may be used, as needed.

**2.3 Acronyms/Definitions****Acronyms**

<b>CGC</b>	Compressed Gas Cylinders
<b>CLC</b>	Cryogenic Liquid Cylinder
<b>CM</b>	Construction Manager
<b>DS</b>	Discipline Superintendent
<b>FSR</b>	Field Safety Representative
<b>LPG</b>	Liquid Petroleum Gas
<b>PPE</b>	Personal Protective Equipment

**Definitions**

<b>Combustible Material</b>	A material that, in the form in which it is used and under the conditions anticipated, has the potential to ignite and burn.
<b>Containers</b>	As used in this procedure, means all vessels such as tanks, cylinders, or drums used for transportation or storing liquefied petroleum gases.
<b>Corrosive Gas</b>	A gas that causes visible destruction of or irreversible alterations in living tissue by chemical action at the site of contact.
<b>Cryogenic Liquid Cylinders (liquid inert gas cylinders)</b>	As it pertains to this procedure are double-walled pressure vessels.
<b>Fire Resistance</b>	A material characterized as resistant and able to confine a fire so that, for specified time and under conditions of a standard heat intensity, it does not fail structurally nor permits the area away from the fire to become hotter than a specified temperature. For purposes of this procedure, fire resistance is determined by NFPA

## Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases

251, Standard Methods of Fire Tests of Building Construction and Materials.

**Flammable Gas**

A material that is a gas at 68 degrees or less at an absolute pressure of 14.7 psi, that is ignitable at an absolute pressure of 14.7 psia when in a mixture of 13% or less by volume with air, or that has a flammable range at an absolute pressure of 14.7 psia with air of at least 12%, regardless of the lower limit.

**Inert Gas**

A non-reactive, nonflammable, non-corrosive gas such as argon, helium, krypton, neon, nitrogen, and xenon.

**Noncombustible Barrier**

A barrier that, in the form in which it is used and under the conditions anticipated, does not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat.

**Valve Protection Cap**

A rigid removable cover provided for container valve protection during handling, transport, and storage.

**3.0 RESPONSIBILITIES****3.1 Construction Manager (CM)**

The CM has the overall responsibility for ensuring the implementation of this procedure, ensuring that all project personnel actively participate; and provides worker support, facilities, and other resources necessary to effectively carry out this procedure.

**3.2 Safety and Health Field Supervisor**

The Safety and Health Field Supervisor has the overall authority for interpretation of the regulations associated with the procedure and the interpretation of the procedure as to intent and application. The Safety and Health Field Supervisor notified the Y-12 Fire Department of the transporting and storage of compressed gas cylinders onsite to include flammable gases and oxidizers.

**3.3 Field Safety Representative (FSR)**

The FSR has the responsibility of compliance oversight with the procedure through periodic field inspections and is responsible for supplying technical advice and interpretation of the environmental, safety, and health codes included in the procedure.

**3.4 Discipline Superintendent (DS)**

The DS is responsible for being thoroughly familiar with this procedure and their individual responsibilities regarding compliance with and implementation of this procedure, pre-planning work activities to identify the appropriate PPE to use and ensuring workers understand the requirements of the procedure.

**3.5 Supervisor**

The Supervisor is responsible for ensuring the applicable safety controls and processes are incorporated into planning and execution of the work and that the workers are implementing and complying with this procedure within their area of responsibility.

**3.6 Worker**

The worker is responsible for understanding and complying with the requirements of this procedure.

Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases

## 4.0 PROCESS

### 4.1 Compressed Gas Cylinders

**NOTE:** Welding and cutting activities using compressed gas cylinders will be located in a UPF ES&H procedure under development.

#### 4.1.1 General Requirements

- Follow the equipment manufacturer's operating instructions at all times.
- Damaged or defective CGC shall not be used (e.g. valves, safety relief devices). The cylinder shall be tagged with a "DANGER – Defective Equipment/Tool, Do Not Use" tag and removed from service and arrangements made for returning them immediately to the vendor.
- No person shall:
  - Attempt to mix gases in a cylinder other than the gas supplier
  - Refill a cylinder except the owner of the cylinder or person authorized by the owner.
  - Use a cylinder's contents for purposes other than those intended by the supplier.
- The cylinder valve shall be closed when:
  - Work is finished,
  - Cylinders are empty, or
  - Cylinders are moved at any time.
- Cylinders, whether full or empty, shall not be used as rollers or supports.
- Cylinders will not be dragged or slid. The user shall use a suitable hand truck, fork truck, roll platform, or similar device with the cylinder secured for transporting in an upright position. Cylinders may be manually manipulated over a short distance for repositioning/adjusting to transport carts or storage areas by tilting and rolling them on their bottom edges.
- Unless cylinders are firmly secured on a special carrier intended for the purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.
- CGC will not be hoisted by the valve cap or by means of magnets or slings.
- Cylinders will be transported in an upright position and will not be hauled in equipment beds or truck beds on their side.
- When using a crane, forklift or similar equipment to lift cylinders from one elevation to another, a rack, or container designed for the purpose of lifting and carrying cylinders must be used.
- Trucks equipped with lift gates will be utilized for loading and unloading cylinders. A crane, forklift, or similar equipment may also be used. Cylinders shall not be dropped when being unloaded from or loaded onto trucks or loading docks.
- Manifold systems on wheeled carts must have the wheels chocked and secured to prevent motion when not being repositioned.
- CGC will be protected against shock, especially falling, or high temperature extremes.
- CGC will not be used as, or placed where they may become part of an electrical circuit or grounding path.
- Bars will not be used to pry or loosen protective caps. Use warm water to loosen caps when frozen.
- Cylinders will be returned to the main storage area when empty.
- Cylinders are uniquely threaded (by cylinder type) to minimize contamination. The use of adaptors or systems that compromise this safeguard is prohibited.

## Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases

- Cylinder-to-cylinder connections are prohibited for the purpose of gas transfer. Manifold or multiple cylinder systems designed for this purpose are an exception.
- Cylinders are to be equipped with a means of connecting a valve protection cap, a collar, or recess to protect the cylinder valve. For cylinders with a cap, the cap shall be kept on a cylinder at all times, except when a cylinder is in service or being connected to a line or hose. Caps should be hand tightened.
- When using individual oxygen cylinders, locate the pressure regulator directly on the cylinder.
- DO NOT USE oil, grease, or pipe compound on any component associated with oxygen.
- Oxygen is not compressed air. As such, never use oxygen as a substitute for “compressed air” to run pneumatic tools, in oil heating burners, to start internal combustion engines, to blow out pipelines, or to create pressure for ventilation.
- Static producing equipment located in flammable gas areas shall be grounded.
- Never heat a cylinder to raise the pressure of the gas, this can defeat the safety mechanisms built in by the supplier.
- Never use compressed gas to dust off clothing, this could cause injury to the eyes or body and possibly create a fire hazard. Clothing can become saturated and catch fire if touched off by an ignition source such as a spark or cigarette.
- Whenever there is danger of material flowing back into the cylinder, a check valve shall be installed on the regulator valve. In addition, for flammable gases, use a flashback arrestor with an internal valve.
- Only use wrenches or tools that are provided by the cylinder supplier to open or close a valve. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in an emergency. In the case of manifolded or coupled cylinders, at least one such wrench shall always be available for immediate use. Never use pliers to open a cylinder valve. Check regulators, requiring washers, before the regulator is fitted.
- Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.
- Select a regulator suitable for use on the cylinder. Never draw gas from a cylinder without a suitable regulator.
- Ensure that all connections are gas tight and remain so and that the connected hose is in good condition and does not have any leaks.
- Inspect the regulator and cylinder for grease, oil, dirt, and solvents. Never use grease or oil to lubricate regulators or cylinder valves because they can cause an explosion.
- Cracking (quickly opening and closing the cylinder valve) is required prior to connecting components to clear debris, dust, and water and to prevent plugging of the hoses, torches, regulator or other systems. Do not stand in front of the valve during cracking activities, stand to one side. Never crack valves near sparks, flame, or other possible sources of ignition.
- Use the cylinder valve for turning gas off, not the regulator.
- Ensure compressed (non-liquefied) gas cylinder valves are opened all the way during use (e.g. oxygen, argon, helium, carbon dioxide).
- At the end of shift or when no longer being used, whichever comes first, remove CGC regulators and gages and install cylinder caps.

Compressed Gas Cylinders, Liquefied Petroleum Gas, and Liquefied Inert Gases

- Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces

#### 4.1.2 Identification

- Verify gas cylinders are properly labeled. Generally gas identification is stenciled or stamped on the cylinder; however, a manufacturer label is acceptable.
- Cylinders on which the identification is missing or illegible shall not be used and shall be tagged out of service. Contact supervision to have these items returned to the supplier.
- Do not rely on the color of the cylinder for identification. Color-coding is not reliable because cylinder colors can vary with supplier. Also, never rely on labels on caps because they are interchangeable.

#### 4.1.3 Cylinder Storage

- CGC shall be secured in an upright position and be properly secured by means of substantial chain, cable, strap, or equivalent method. Valve protection caps shall be in place.
- Storage areas/cages shall be clearly posted as to contents (e.g., Oxygen, Acetylene, etc.)
- CGC locations shall be configured to protect cylinders from being struck, toppled, or damaged by passing vehicles or falling objects.
- Cylinders shall be stored in a well-ventilated, dry location and away from elevators, stairs, gangways, or egress routes. To prevent bottom corrosion, cylinders shall be protected from direct contact with soil or surfaces where water may accumulate.

**NOTE:** LPG containers can only be stored outside – Reference section 4.2.10

- CGC will be stored/located out of direct sunlight and away from sources of heat and ignition so as to avoid exposure to sparks, hot slag, or flames. If these cannot be avoided, fire-resistant shields shall be provided.
- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one hour.
- Storage areas shall be segregated by types of gas, full or empty.
- Inside of buildings, cylinders shall be stored at least 20 feet from highly combustible materials such as oil or excelsior

## 4.2 Liquefied Petroleum Gas (LPG)

### 4.2.1 Equipment and System Approval

- Each system shall have containers, valves, connectors, manifold valve assemblies, and regulators of an approved type.
- All cylinders shall meet the Department of Transportation specification identification requirements published in 49 CFR Part 178, Shipping Container Specifications.
- Onsite transportation and storage of compressed gas cylinders shall be in accordance with applicable Department of Transportation (DOT) regulations and Y-12 requirements.

### 4.2.2 Welding on LPG Containers

- Welding is PROHIBITED on containers.

### 4.2.3 Container Valves and Container Accessories

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- Valves, fittings, and accessories connected directly to the container, including primary shut off valves, shall have a rated working pressure of at least 250 p.s.i.g. and shall be of material and design suitable for LPG service.
- Connections to containers, except safety relief connections, liquid level gauging devices, and plugged openings, shall have shutoff valves located as close to the container as practicable.

#### 4.2.4 Safety Devices

- Every container and every vaporizer shall be provided with one or more approved safety relief valves or devices.
- These valves shall be arranged to afford free vent to the outer air with discharge not less than 5 feet horizontally away from any opening into a building which is below such discharge.
- Shutoff valves shall not be installed between the safety relief devices and the container, or the equipment or piping to which the safety relief device is connected, except that a shutoff valve may be used where the arrangement of this valve is such that full required capacity flow through the safety relief device is always afforded.
- Container safety relief devices and regulator relief vents shall be located not less than 5 feet in any direction from air openings into sealed combustion system appliances or mechanical ventilation air intakes.

#### 4.2.5 Dispensing

- Filling of fuel containers for trucks or motor vehicles from bulk storage containers shall be performed:
  - Not less than 10 feet from the nearest masonry-walled building,
  - Or not less than 25 feet from the nearest building or other construction and,
  - In any event, not less than 25 feet from any building opening.
- Filling of portable containers or containers mounted on skids from storage containers shall be performed not less than 50 feet from the nearest building.

#### 4.2.6 Requirements for Appliances

- LP-Gas consuming appliances shall be approved types.
- Any appliance that was originally manufactured for operation with a gaseous fuel other than LP-Gas, and is in good condition, can be used with LP-Gas only after it is properly converted, adapted, and tested for performance with LP-Gas before the appliance is placed in use.

#### 4.2.7 Containers and Regulating Equipment Installed Outside of Buildings or Structures

- Containers shall be upright upon firm foundations or otherwise firmly secured. The possible effect on the outlet piping of settling shall be guarded against by a flexible connection or special fitting.

#### 4.2.8 Containers and Equipment Used Inside of Buildings or Structures

When operational requirements make portable use of containers necessary, and their location outside of buildings or structures is impracticable, containers and equipment shall be permitted to be used inside of buildings or structures in accordance with the paragraphs below:

- "Containers in use" means connected for use.
- Systems utilizing containers having a water capacity greater than 2 1/2 pounds (nominal 1 pound LP-Gas capacity) shall be equipped with excess flow valves. Such excess flow valves

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shall be either integral with the container valves or in the connections to the container valve outlets.

- Regulators shall be either directly connected to the container valves or to manifolds connected to the container valves. The regulator shall be suitable for use with LPG. Manifolds and fittings connecting containers to pressure regulator inlets shall be designed for at least 250 p.s.i.g. service pressure.
- Valves on containers, having water capacity greater than 50 pounds (nominal 20 pounds LP-Gas capacity), shall be protected from damage while in use or storage.
- Aluminum piping or tubing shall not be used.
- Hose shall be designed for a working pressure of at least 250 p.s.i.g.
  - Design, construction, and performance of hose, and hose connections shall have their suitability determined by a nationally recognized testing agency.
  - The hose length shall be as short as practicable. Hoses shall be long enough to permit compliance with spacing provisions of this section, without kinking or straining, or causing hose to be so close to a burner as to be damaged by heat.
- Portable heaters, including salamanders, shall be equipped with an approved automatic device to shut off the flow of gas to the main burner, and pilot if used, in the event of flame failure.
- Portable heaters, including salamanders, having inputs above 50,000 B.t.u. per hour, shall be equipped with either a pilot, which must be lighted and proved before the main burner can be turned on, or an electrical ignition system.
- **NOTE:** The provisions of paragraph (7) and (8) do not apply to portable heaters under 7,500 B.t.u. per hour input when used with containers having a maximum water capacity of 2 1/2 pounds.
- Container valves, connectors, regulators, manifolds, piping, and tubing shall not be used as structural supports for heaters.
- Containers, regulating equipment, manifolds, pipe, tubing, and hose shall be located to minimize exposure to high temperatures or physical damage.
- Containers, having a water capacity greater than 2 1/2 pounds (nominal 1 pound LPG capacity) connected for use, shall stand on a firm and substantially level surface and, when necessary, be secured in an upright position.
- The maximum water capacity of individual containers shall be 245 pounds (nominal 100 pounds LP-Gas capacity).
- For temporary heating, heaters (other than integral heater-container units) shall be located at least 6 feet from any LP-Gas container.
  - This shall not prohibit the use of heaters specifically designed for attachment to the container or to a supporting standard, provided they are designed and installed so as to prevent direct or radiant heat application from the heater onto the container.
  - Blower and radiant type heaters shall not be directed toward any LPG container within 20 feet.
- If two or more heater-container units, of either the integral or non-integral type, are located in a non-partitioned area on the same floor, the container or containers of each unit shall be separated from the container or containers of any other unit by at least 20 feet.
- When heaters are connected to containers for use in a non-partitioned area on the same floor, the total water capacity of containers, manifolded together for connection to a heater

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or heaters, cannot be greater than 735 pounds (nominal 300 pounds LPG capacity). Such manifolds shall be separated by at least 20 feet.

- Storage of containers awaiting use shall be in accordance with Section 4.2.10.

#### 4.2.9 Multiple Container Systems

- Valves in the assembly of multiple container systems shall be arranged so that replacement of containers can be made without shutting off the flow of gas in the system. This provision is not to be construed as requiring an automatic changeover device.
- Heaters shall be equipped with an approved regulator in the supply line between the fuel cylinder and the heater unit. Cylinder connectors shall be provided with an excess flow valve to minimize the flow of gas in the event the fuel line becomes ruptured.
- Regulators and or low-pressure relief devices shall be rigidly attached to the cylinder valves, cylinders, supporting standards, the building walls, or otherwise rigidly secured, and shall be so installed or protected from the elements.

#### 4.2.10 Storage of LPG Containers

##### **Inside Buildings**

Storage of LPG within buildings is prohibited.

##### **Storage Outside of Buildings**

- LPG storage locations are to be established with the following:
  - Appropriate signs (e.g. – Flammable Propane, No Ignition Sources within 25 feet).
  - Cylinders secured in an upright position
  - Be at least 20 ft. from other combustible material
  - Have at least one approved portable fire extinguisher rated not less than 20 lb Class B and C and be located no more than 50 feet from the storage location.
- Containers shall be in a suitable ventilated enclosure or otherwise protected against tampering.
- Storage outside of buildings for containers awaiting use, shall be located from the nearest buildings, in accordance with the following LPG storage locations are to be established with the following:

**TABLE 1**

Quantity of LPG Stored	Distance (Feet)
500 lbs. or less	0
501 to 6,000 lbs	10
6,001 to 10,000	20
Over 10,000	25

- Cylinders are to be stored a minimum of 20 ft. from oxygen cylinders, or be protected by a noncombustible barrier of at least five feet height having a fire resistant rating of one hour or greater.
- Cylinders in storage shall be located to minimize exposure to excessive temperature rises, physical damage, or tampering.
- Cylinders shall not be stored on roofs.



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- Cylinder valves shall be protected.
- Screw on caps or collars shall be in place on all cylinders stored and cylinder outlet valves shall be closed.

#### 4.2.11 Industrial Trucks Inside Buildings

- LP-Gas-fueled industrial trucks are permitted to be used in buildings and structures.
- No more than two LP-Gas containers shall be used on an industrial truck for motor fuel purposes.
- Total water capacity of the fuel cylinders on an individual truck shall not exceed 105 lbs. (nominal 45 lbs. propane capacity).
- Industrial trucks shall not be parked and left unattended in areas of possible excessive heat or sources of ignition.

### 4.3 Liquefied Inert Gases

**WARNING:** Breathing argon, nitrogen, or helium enriched air can cause asphyxiation due to lack of oxygen essential to maintain life. A person can become unconscious without sensing the lack of oxygen and without any warning. Any area in which a liquefied inert gas is used or stored is to be properly ventilated.

Using liquefied inert gases in or around confined spaces can create an oxygen deficient atmosphere in those spaces. Confined space entry activities shall be performed in accordance with Y73-95-802, *Confined Space Entry Program*. It is prohibited to bring liquefied inert gas cylinders in a confined space.

#### 4.3.1 General Requirements

- If a cryogenic liquid cylinder (CLC) is not labeled to show what product is contained, return the unit to the supplier unused.
  - Due to the extreme low temperatures of liquefied inert gases, the physical properties of materials with which they come into contact are apt to be greatly altered. This fact must be considered wherever liquefied inert gases are handled.
  - Never attempt to transfer liquefied inert gas into a container or vessel that has not been specifically designed for that product.
  - Never dispose of liquefied inert gas in an indoor work or storage area.
  - CLCs shall be provided with pressure relief devices to ensure that the maximum design pressure of the vessel is not exceeded.
  - Equipment used in liquefied inert gas service is to be kept clean.
  - All pipelines or vessels in which liquefied inert gases can be trapped between closed valves must be equipped with pressure release devices. In cases where liquefied inert gas can be trapped in any valve cavity, means of venting must be provided.

#### 4.3.2 Cylinder Storage

- CLCs shall be stored in a well-ventilated area, preferably outdoors. Heat leakage into the CLCs will gradually increase the internal pressure of a cryogenic liquid cylinder not in use until the relief valve setting is reached. Vapor will then be vented, creating a possible oxygen-deficient atmosphere if the area is not well ventilated.
- Secure CLCs to prevent containers from being struck, toppled, or tipped over.
- CLCs must not be stored near flammable or combustible materials.

#### 4.3.3 Moving Cylinders

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- Prior to moving a CLCs ensure valves are closed and all outlet protection devices are in place.
- CLCs have an inner container suspension system designed for minimum heat leak. Never subject cylinders to shocks, falls, or impacts.
- Full CLCs are very heavy and are to be moved only on a two-wheeled or four-wheeled cart designed for that purpose or crane and proper rigging using manufacturer installed rigging points. Rolling liquid cylinders is extremely hazardous because the inner container could be permanently damaged causing loss of insulating vacuum and resulting in uncontrolled venting of the product.

**NOTE:** CLCs are not to be lifted by or rigged to the protective ring.

#### 4.3.4 Use

- Before using inert gases, read and understand all the labels and the material safety data sheet.
- CLCs are dependent upon the vacuum insulation space between the double walls to provide the required degree of insulation. If this vacuum is lost, excessive amounts of gaseous product will vent through the pressure release devices. In this case, move the CLCs outdoors and notify the CLC supplier.
- When using a CLC, only regulators, valves, hoses, or other equipment designed and conditioned for that particular service are to be used.
- Some CLCs contain vaporizing and superheating coils in the insulation space to provide gaseous product at near ambient temperature to the user. If the use rate is excessive, the outer shell of the CLC will frost heavily and the gaseous product can be extremely cold.

**NOTE:** Some degree of frosting of the outer shell during use is normal. Never apply heat to the CLC in an attempt to correct this condition; instead, reduce the use rate.

- A CLC is equipped with a filling valve, a product withdrawal valve, a vent valve, a pressure gage, a liquid level gage, and various regulators and PRDs. Do not operate or adjust any device other than the product withdrawal valve.

#### 4.3.5 Guideline process when using inert gas

- Before connecting any equipment to the product withdrawal valve, crack open the valve for an instant to clear the opening of particles of dust or dirt being careful to point the valve opening away from any personnel;
- Connect a pressure-reducing regulator to the CLC;

**NOTE:** Never use inert gas from a CLC without reducing the pressure through a suitable regulator attached to the CLC or manifold header outlet.

- Ensure that the threads on the regulator or other unions correspond to those on CLC valve outlets. Never force connections that do not fit;

**WARNING:** Never interchange regulators, hoses, or other appliances with equipment intended for use with other gases. Never use adapters. Fatalities have been caused by switching the CGA outlet connections to allow connection of a CL-cylinder to a distribution system containing product different from the product in the CLC.

- Before the CL-cylinder valve is opened, ensure that the regulator is closed;
- Ensure that all connections are gas tight and remain so and that the connected hose is in good condition and does not have any leaks;

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**NOTE:** Inert gas should enter the regulator slowly. Stand to one side and away from the regulator gage faces when opening the CL-cylinder valve. Never use wrenches or tools except those provided or approved by the inert gas manufacturer. Never hammer the valve wheel in attempting to open or close the valve. If the valve cannot be opened by hand, notify the supplier.

#### 4.3.6 Empty Cryogenic Liquid Cylinders

When CLCs are emptied, close all valves and replace all outlet protection devices and return the CLC to supplier.

### 5.0 RECORDS

All records generated as a result of this procedure are maintained in accordance with Y15-101, *Records and Controlled Documents*, and Y15-95-800, *UPF Document Management*.  
None.

### 6.0 REFERENCES

#### 6.1 Source References

- 29 CFR 1910.110, *Storage and handling of liquefied petroleum gases*
- 29 CFR 1926.153, *Liquefied petroleum gases*
- 29 CFR 1926.350, *Gas Welding and Cutting*
- NFPA 55, *Compressed Gases and Cryogenic Fluid Code 2013 Edition*
- NFPA 58, *Section 8.2.1.1, Liquefied Petroleum Gas Code 2008 Edition*
- COMPRESSED GAS ASSOCIATION, INC. CGA P-1-1965, *Safe Handling of Compressed Gases*
- CGA P-9-2008, *The Inert Gases: Argon, Nitrogen, and Helium*
- ANSI Z-49.1, *Safety in Welding, Cutting, and Allied Processes 2005 Edition*
- Bechtel ES&H Core Process 211, *Fire Prevention and Protection*
- Bechtel ES&H Core Process 225, *Compressed Gas Cylinders*
- Department of Transportation (DOT) 49 Code of Federal Regulations (CFR)
- Y73-501, *Y-12 Transportation Safety*
- Y73-95-802, *Confined Space Entry Program*

### 7.0 EXHIBITS / APPENDICES / FIGURES

None.

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