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Compressed Gas Association

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CGA M-24—2020

(Formerly SB-31)

STANDARD FOR MITIGATING OXYGEN HAZARDS IN THE HEALTH CARE ENVIRONMENT

FIRST EDITION

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Work Item 18-015
Medical Gases Committee

NOTE—Technical changes from SB-31—2013 edition are underlined.

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1 Introduction

This publication is intended to give a broad overview of potentially hazardous situations associated with the handling and use of medical oxygen in the health care environment and the mitigation of those hazards.

For many applications in the medical field, gaseous and liquid oxygen are used or administered in equipment such as liquid oxygen base and portable units, oxygen concentrators, oxygen tents, incubators, and hyperbaric chambers. To avoid incidents involving oxygen, oxygen-rich gases, and oxygen-enriched atmospheres, it is important to understand the associated risks.

2 Scope

This publication provides general requirements for health care personnel handling and using oxygen and oxygen-rich gases and associated equipment in a health care environment.

This publication does not provide in-depth discussion of the hazards and handling of oxygen-rich gases and atmospheres. The reader is directed to Section 7 for additional references that should be consulted for this information.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Oxygen-enriched atmosphere

An atmosphere in which the concentration of oxygen is greater than 23.5% by volume.

3.2.2 Oxygen-rich gases

Gas mixtures having an oxygen content that exceeds 23.5% by volume at sea level or gas mixtures when the partial pressure of oxygen exceeds 175 torr (mm Hg).

NOTE—See CGA P-39, *Oxygen-Rich Atmospheres*, for additional information [1].¹

4 General properties and hazards

Oxygen is not flammable in itself, but supports and accelerates combustion. Materials that normally do not burn in air, such as the metal in oxygen regulators, plastic tubing used to supply oxygen, or fire-resistant drapes and gowns, can burn in an oxygen-enriched atmosphere.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

Materials that can be ignited in air require less energy to ignite in the presence of an oxygen-rich gas or oxygen-rich atmosphere. Many of these materials can be ignited by different sources of ignition such as friction or expansion when oxygen at high pressure is rapidly introduced into a system that is initially at low pressure. Operating rooms contain many possible sources of ignition such as electrosurgical units and lasers.

For equipment containing or using liquid oxygen there needs to be an additional awareness of its low temperature properties. To avoid accidents involving frostbite and cold burns, always use extreme caution and use appropriate personal protective equipment (PPE) when transferring liquid oxygen between oxygen containers and follow the equipment manufacturers' instructions and CGA P-2.6, *Standard for Transfilling of Liquid Oxygen Used for Respiration* [2].

5 General handling and use requirements

General requirements for equipment and personnel when using oxygen and oxygen-rich gases include the following.

5.1 Equipment

All equipment coming into contact with oxygen or oxygen-rich gases shall be specially cleaned for oxygen service. Either the supplier shall provide properly cleaned equipment for such use or the health care facility shall follow cleaning guidelines provided by the manufacturers of such equipment and be performed by qualified, properly trained personnel in accordance with CGA G-4.1, *Cleaning of Equipment for Oxygen Service* [3].

Once equipment is cleaned for oxygen service, it shall be kept clean.

Equipment such as valves, regulators, gauges, or fittings shall not come in contact with oils including skin oils, hand lotions (including alcohol-based hand cleansers), make-up, greases, or lubricants.

Equipment that comes in contact with oxygen or oxygen-rich gases shall not be contaminated with organic materials (e.g., chemicals, drugs, human products, insects, and animal products), dirt, dust, rubber, latex, any combustible substance, or any other equipment not cleaned for oxygen service.

Off-duty equipment shall be protected from contamination. This can be accomplished through the use of clean plugs, caps, and plastic bags.

Equipment shall be checked prior to use and routinely for proper function. Replace or send for cleaning/repair any contaminated, broken, malfunctioning, or leaking equipment.

5.2 Health care personnel

Personnel using oxygen and oxygen-enriched gases shall be adequately trained and knowledgeable in oxygen safety and familiar with the warnings, cautions, and precautions to be taken as specified on the medical oxygen and medical oxygen mixtures container labels and labeling, including any provided safety data sheets (SDS).

Personnel using oxygen equipment shall be adequately trained in its operation and have knowledge of the manufacturer's instructions, limitations, cautions, and warnings for using such equipment.

Personnel shall not allow smoking, flames, sparks or other sources of ignition in the vicinity of oxygen use and shall inform conscious patients of the hazards and "do's and don'ts" of oxygen use.

Personnel shall open cylinder valves on oxygen and oxygen-rich gases slowly and completely to lessen the heat produced and to achieve the desired flow conditions within the equipment.

Personnel shall check for leaks and releases of gaseous or liquid oxygen from the container connections, associated piping, and utilization equipment during its use.

6 References

Unless otherwise specified, the latest edition shall apply.

[1] CGA P-39, *Oxygen-Rich Atmospheres*, Compressed Gas Association, Inc. www.cganet.com

[2] CGA P-2.6, *Standard for Transfilling of Liquid Oxygen for Respiration*, Compressed Gas Association, Inc. www.cganet.com

[3] CGA G-4.1, *Cleaning of Equipment for Oxygen Service*, Compressed Gas Association, Inc. www.cganet.com

7 Additional references

For more detailed discussion on the hazards and handling of oxygen-rich gases and atmospheres, see the following publications:

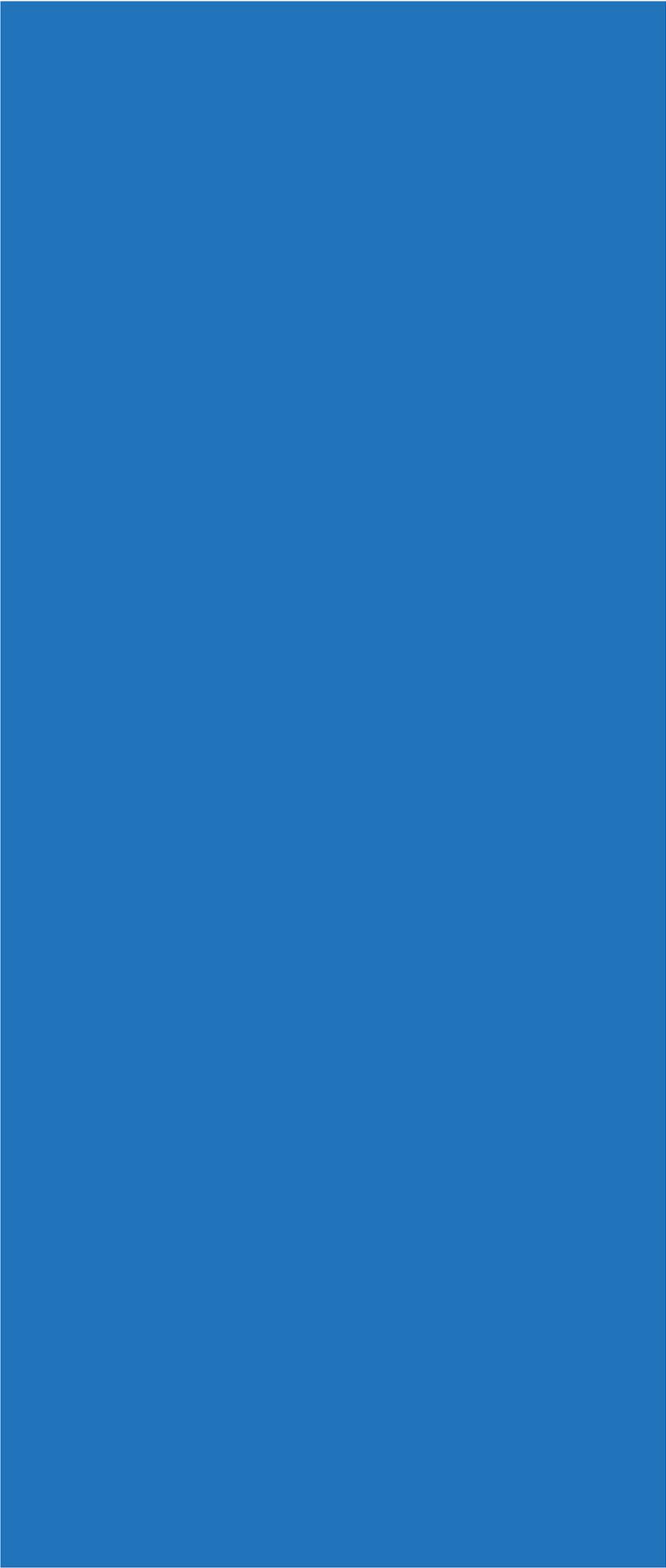
CGA P-45, *Fire Hazards of Oxygen and Oxygen-Enriched Atmospheres*, Compressed Gas Association, Inc. www.cganet.com

NFPA 53, *Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres*, National Fire Protection Association. www.nfpa.org

CGA P-2, *Guidelines for Characteristics and Safe Handling of Medical Gases*, Compressed Gas Association, Inc. www.cganet.com

CGA P-2.5, *Standard for Transfilling of High Pressure Gaseous Oxygen Used for Respiration*, Compressed Gas Association, Inc. www.cganet.com

CGA P-2.7, *Guideline for the Safe Storage, Handling, and Use of Small Portable Liquid Oxygen Systems in Health Care Facilities*, Compressed Gas Association, Inc. www.cganet.com



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