CGA G-4.6—2014

OXYGEN COMPRESSOR INSTALLATION AND OPERATION GUIDE

FOURTH EDITION

CGA
Compressed Gas Association
The Standard For Safety Since 1913

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NOTE—Technical changes from the previous edition are underlined.

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1 Introduction

Compression of oxygen is attended with potential hazards that shall be recognized and addressed. The hazards include gases under pressure and the ability of oxygen to accelerate combustion.

An oxygen compressor fire can result in a powerful jet of oxygen with entrained molten metal and metal oxides. This jet can be fatal to unprotected personnel and can severely damage adjacent equipment. Depending on the pressure at the source of the jet and the diameter of the hole through which it emerges, the danger zone can extend to 100 ft (30.5 m) or more.

2 Scope and purpose

2.1 Scope

This guide contains a summary of current industrial practices used in oxygen compressor installations and applies to oxygen compressors that compress oxygen gas with purities of 90% or greater. Oxygen with a water content of 10 ppm or more can cause corrosion and condensate problems that have not been addressed in this guide. Installations that have operating conditions beyond this scope should be jointly reviewed by the equipment user, installer, and compressor supplier.

Some of the practices presented represent conservative compromise, and not all possible situations are described. The designer is cautioned that this publication is not a design handbook and does not discard the need for competent engineering judgment and interpretation. The user should review any special problems or concerns with others who are knowledgeable in the design of oxygen compression systems such as suppliers of oxygen compressors or major oxygen producers. For more information, see CGA G-4.11, *Reciprocating Compressors for Oxygen Service* and CGA G-4.13, *Centrifugal Compressors for Oxygen Service* [1, 2].[1]

2.2 Purpose

This guide is intended to serve the interests of anyone who may be associated or concerned with the compression of oxygen. It also acquaints persons not familiar with compressor application, installation, or operation with factors considered important to safety.

3 Compression system design

3.1 General

It is imperative that oxygen compression systems be designed to prevent fires and to vent the oxygen inventory as quickly as possible in case of a fire or potential ignition. Fires in oxygen compressors, once started, are almost impossible to extinguish until the contained oxygen gas is consumed in the fire or vented to the atmosphere. While this happens rapidly and the actual oxygen fire is over quickly, extensive damage is likely and materials not normally considered combustible will be consumed. Other combustible material such as oil can be ignited and burn with great vigor in the presence of elevated oxygen concentrations. These materials will continue to burn after the actual oxygen-promoted fire is out.

3.2 Design considerations

Careful attention to the following design considerations will greatly reduce the risk of equipment damage and personal injury:

- materials of construction of the compressor and the ancillary equipment from a standpoint of the conditions of service and consequences of significant rub or impact in the event of a malfunction;
- design of monitoring and control systems to detect and/or avoid potentially hazardous conditions; and
- effective isolation of the oxygen compressor gas path from the compressor lubrication system.

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