



AEROSPACE INFORMATION REPORT

AIR825™/1

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Introduction to Oxygen Equipment for Aircraft

RATIONALE

AIR825/1 has been reaffirmed to comply with the SAE five-year review policy.

FOREWORD

This is the first document of a set of fourteen related documents. The fourteen documents are needed to comprehensively address the "Introduction to Oxygen Equipment for Aircraft", and are defined as slash documents versus chapters. This way, the documents may be obtained as a set or individually. This set of slash documents replaces a single document written by one author. As the field of oxygen systems for aircraft has evolved, it became impractical for one author to cover the full range of subject matter. Each of these slash documents was drafted by individuals who are specialists in oxygen systems for aircraft. The reader who is seeking overall familiarity with oxygen systems for aircraft should read all fourteen slash documents which, together, form a general reference to oxygen systems. The reader who is familiar with oxygen systems for aircraft may want to obtain only the slash documents that pertain to topics that are of specific interest.

The fourteen-document set is written at an introductory level, suitable for anyone who would like to understand the basics of oxygen systems in aircraft, and specifically for the engineer who has just recently been assigned to aircraft oxygen systems. Many of these documents will point the reader toward more detailed treatments, located in other SAE documents.

The SAE Aerospace Division has three major types of documents: Listed below are the document acronyms with their expanded definitions that the reader will find referred to throughout the slash documents.

- a. AIR - Aerospace Information Report: The Aerospace Information Report contains information pertaining to the state of the art in a technical subject for the reader regarding some aspect of Aerospace Technology. The information may suggest how something could be done but nothing requires the user to follow the suggestion.
- b. ARP - Aerospace Recommended Practice: The Aerospace Recommended Practice contains advice proposing an accepted or preferred way to accomplish some task. The implication here is that, if the reader chooses not to follow the advice, then the reader should understand why the alternate way chosen is appropriate.

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SAE WEB ADDRESS:

Full document details: SAE AIR825_1

For more information on this standard, visit
<https://www.sae.org/standards/content/AIR825/1>

Documents
Document Sharing Hub

- c. AS - Aerospace Standard: The Aerospace Standard establishes requirements relating to the performance of equipment and procedures. Many of these documents have been adopted by the FAA and used as the basis for official rules, procedures, and Technical Standard Orders (TSOs).

NOTE: These documents have no official standing as regulations unless, and to whatever extent, they are adopted as such by a regulatory authority.

HISTORY

The first known flights where supplemental oxygen was used were balloon flights in France. The type of equipment used was not recorded. By World War I, some military aircraft used mass-produced oxygen systems that included a high-pressure tank and regulator connected to a mask that also had a microphone connection and a flow indicator. Another early use was by Wiley Post, who flew a mission over Mt. Everest in preparation for a climbing assault on the mountain. Post's oxygen system consisted of a cylinder filled with oxygen, a pressure reducer, and a tube resembling a pipe stem, held in the mouth.

The elements of the first system included a supply source, regulation means, and a dispensing unit. Today all oxygen systems components include those same basic elements with added features incorporated into the design. The SAE A-10 Committee has more than fifty documents defining/describing the range of such equipment, and methods for testing and using it.

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1. SCOPE:

1.1 Purpose:

The purpose of this document is to give the reader an overview of the document package which makes up AIR825, Introduction to Oxygen Equipment for Aircraft, and a basic overview (see Section 4) of the operational concerns driven by human physiology during altitude exposure.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AIR825/1	Introduction to Oxygen Equipment for Aircraft
AIR825/2	Effects of Acute Altitude Exposure in Humans: Requirements for Physiological Protection
AIR825/3	Gaseous Oxygen and Oxygen Equipment, Introductory
AIR825/4	Chemical Oxygen Systems
AIR825/5	Liquid Oxygen Systems
AIR825/6	On Board Oxygen Generator Systems (OBOGS) Molecular Sieve
AIR825/7	On Board Oxygen Generator Systems (OBOGS) Other Oxygen Generating Technologies
AIR825/8	Continuous Flow Oxygen Systems
AIR825/9	Demand and Pressure Demand Oxygen Systems
AIR825/10	Protective Breathing Equipment for Flight Deck and Flight Crew Member
AIR825/11	Closed Cycle Breathing Apparatus
AIR825/12	Oxygen System Integration and Performance Precautions
AIR825/13	Guide for Evaluating Combustion Hazards in Oxygen Systems
AIR825/14	Basic Systems Design, Schematics Charts, Tables

3. BRIEF SUMMARY OF THE SLASH DOCUMENTS:

3.1 AIR825/1, Introduction to Oxygen Equipment for Aircraft:

This document contains a brief paragraph describing the contents of each of the slash documents. The documents are published by the SAE and are available as a complete set of fourteen slash documents or may be obtained individually. However, a copy of this document (AIR825/1) is included with any order for one or more of the slash documents.

This document also contains a brief section on the effects of acute altitude exposure in humans. This section gives the reader a very basic overview of AIR825/2, Effects of Acute Altitude Exposure in Humans: Requirements for Physiological Protection. This is written with little theory and in a form which gives examples of what one is expected to observe in the average human at altitude. However the reader must recognize that the “average” human is a myth. An individual might be able to exceed the examples given or may not measure up to the average in all areas. We have oxygen systems in aircraft to furnish a reasonable degree of protection against foreseeable conditions. This protection pertains to a range of individuals within the traveling population.

3.2 AIR825/2, Effects of Acute Altitude Exposure in Humans: Requirements for Physiological Protection:

Scientific concepts that relate to the physiological needs of the human body at altitude are introduced in partial detail with particular focus on the need for supplemental oxygen. The major sections include: (1) a description of our earth's atmosphere, (2) a description of our body's respiration and circulation system, (3) hypoxia is defined and explained, (4) hyperventilation is explained and a description of what to do about it, (5) an explanation of gas dilation and compression related to the body at altitude, (6) air embolism or decompression sickness is defined and protection methods explained.

3.3 AIR825/3, Gaseous Oxygen and Oxygen Equipment, Introductory:

The two major types of gaseous oxygen systems on board aircraft are portable and fixed.

Any aircraft flying above 12,500 ft will carry on board at least one and maybe more of the following systems: continuous flow, demand flow, diluter-demand, and pressure-demand.

3.4 AIR825/4, Chemical Oxygen Systems:

This AIR provides an orientation to aircraft engineers regarding the general technology of chemical oxygen generators, for assistance in determining whether chemical oxygen generators are an appropriate oxygen supply source for hypoxia protection in a given application, and as an aid in specifying such generators.