

Aircraft oxygen systems and equipment —

Part 7: Guide to cleaning labelling and packaging

ICS 13.340.30; 49.080

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ACE/38, Aircraft oxygen equipment, upon which the following bodies were represented:

- British Airways
- British Compressed Gases Association
- Civil Aviation Authority
- Health and Safety Executive
- Ministry of Defence
- Society of British Aerospace Companies Limited
- South Bank University

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Foreword

This part of BS N 100 has been prepared by Technical Committee ACE/38 and specifies general requirements for oxygen systems and equipment for use on aircraft and ground support equipment. This part provides guidance on cleaning procedures, labelling and packaging requirements.

This revision supersedes BS 4N 100-7:1999 which is withdrawn.

BS N 100 consists of the following parts:

- *Part 1: Design and installation;*
- *Part 2: Tests for the compatibility of materials in the presence of oxygen;*
- *Part 3: Testing of equipment and systems;*
- *Part 4: Guide to the physiological factors;*
- *Part 5: Guide to fire and explosion hazards associated with oxygen;*
- *Part 6: Guidance and recommendations on the selection of materials for use with oxygen;*
- *Part 7: Guide to cleaning, labelling and packaging.*

NOTE The prefix number before the “N” indicates the latest revision of an aerospace series standard.

Insufficient cleanliness of components used in oxygen rich systems can result in ignition of the contaminants or the components by; for example, particle or mechanical impact, adiabatic compression, etc. Control of contamination in oxygen enriched systems is essential to minimize hazards and component failures. Contamination also needs to be minimized to ensure the purity of the oxygen-enriched gases. The removal of contamination from materials and components is dependent on the system configuration, the materials used in the construction, and the types and quantities of contaminants. Many cleaning agents used in the past for cleaning oxygen service components are now prohibited for use on account of environmental damage. It is necessary to consider many factors in selecting a suitable cleaning process that is environmentally friendly, non-injurious to health and cleans to an adequate standard.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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1 Scope

This part of BS N 100 provides guidance on the selection of methods and apparatus for the cleaning, packaging and labelling of materials and equipment intended for service for airborne oxygen-enriched breathing systems, including oxygen storage and generation equipment. It is also applicable to associated ground support equipment and non-aerospace applications using oxygen equipment.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 1133-19, *Packaging code — Part 19: Use of desiccants in packaging*.

BS 2540, *Specification for granular desiccant silica gel*.

BS 4N 100-2, *Aircraft oxygen systems and equipment — Part 2: Tests for the compatibility of materials in the presence of oxygen*.

BS 5295-0, *Environmental cleanliness in enclosed spaces — Part 0: General introduction, terms and definitions for clean rooms and clean air devices*.

BS 5295-3, *Environmental cleanliness in enclosed spaces — Part 3: Guide to operational procedures and disciplines applicable to clean rooms and clean air devices*.

BS EN ISO 14644-4:2001, *Cleanrooms and associated controlled environments — Part 4: Design construction and startup*.

BS IEC 60877, *Code of practice for procedures for ensuring the cleanliness of industrial process measurement and control equipment in oxygen service*.

BS ISO 14951-10, *Aerospace series — Space systems — Fluid characteristics — Part 10: Water*.

DEF STAN 81-75, *Issue 2, dated 25 July 97, Barrier Materials, Aluminium Foil Laminate, Flexible, Heat Sealable, Water Vapour Resistant*.

3 Definitions

For the purpose of this standard the following definitions apply.

3.1

brush cleaning

method of cleaning a hard-to-reach surface which involves physically brushing it with synthetic bristles soaked in solvent or cleaning agent

3.2

component

individual part of a unit of two or more assembled parts which have been designed to allow disassembly for servicing

3.3

contaminant

foreign or unwanted substance that can have deleterious effects on the operation, life, safety, or reliability, of an oxygen service system

3.4

de-ionized water

water, free of dissolved organics, particulates and ionized substances. It should have an electrical conductivity of 10^{-7} , Ω^{-1} , cm^{-1} or less, and have been passed through an activated carbon cartridge to remove organic contamination and particulates down to 50 μm .

3.5

fibres

particulate matter with a length of 100 μm or more, and a length to width ratio of 10 to 1, or greater

3.6

high efficiency particulate air (HEPA) filter

air filter which removes 0.3 µm diameter particles with an efficiency that exceeds 99.97% (by volume)

3.7

non-metallics

organic and inorganic materials such as ceramics, glasses, polymers, rubbers, greases and other lubricants, cloth, wool, and paper products

3.8

non-volatile residues

greases, such as hydrocarbon greases, fluorocarbon greases etc., cutting oils, cleaning agents after the volatile components have evaporated

3.9

oxygen clean component

component or item to be used in an oxygen system, which has been specially cleaned to remove and/or substantially reduce the concentrations of contaminants, in particular particles, fibres, greases and oils, to minimize the risks of fire and explosions occurring due to the presence of these contaminants; and which has been protected after cleaning from re-contamination by appropriate packaging, storage and warning labels

NOTE Oxygen cleaning is often carried out as an additional cleaning process after components, items, etc. have been cleaned, to remove burrs, swarf, flux, etc., to the appropriate engineering standards for non-oxygen systems.

3.10

particulate

finely divided solid of organic or inorganic matter, including metals

3.11

wipe cleaning

method of cleaning a surface which involves physically rubbing or swabbing it with a material such as cloth or paper moistened with, or soaked in, a cleaning solution or solvent

4 General

4.1 Work area

4.1.1 It is essential to maintain a clean work area to ensure that cleaned oxygen service components remain clean until packaged or reassembled. Ideally, the work environment should be a clean room area in accordance with BS 5295 with facilities to handle the cleaned components without danger of re-contamination. Doors from the workroom should not open to the weather and the room should be in an area remote from contaminants, particularly oil and grease. Assembly/disassembly benches should be clean and free from oil and grease and have a suitable covering which can easily be replaced. The air inside the room should be filtered to remove over 100 µm size particles and smoking or eating in the room should not be permitted. Tools and equipment should be clean and maintained for use only with oxygen service equipment. The work area should be well ventilated if in situ solvent cleaning operations are being carried out, to ensure that occupational exposure limits are not exceeded.

4.1.2 If the work room does not fully meet the requirements of BS 5295, a localized clean area for cleaning and assembling small components may be achieved using a laminar flow bench or cabinet.

NOTE Although the level of cleanliness obtained in the local area will be better than in the outside structure, it will be affected by the presence of high levels of particulates that can penetrate the laminar flow.

4.1.3 Personnel undertaking cleaning operations should have clean hands and should wear protective clean room grade gloves to prevent contamination of components after cleaning. If shoes are brought in from the outside, they should be covered to prevent the introduction of contamination into the workspace. Barrier, moisturising or cosmetic creams of any description should not be applied to the hands or face, etc., either whilst in the work area or before entering it. The protective clothing worn during cleaning should be lint free and not be worn when visiting other areas where industrial operations are taking place, particularly those associated with oil and grease. All lint producing clothing should be prohibited in the clean room area.