



Designation: G 93 – 96

Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments¹

This standard is issued under the fixed designation G 93; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the selection of methods and apparatus for the cleaning of materials and equipment intended for service in oxygen-enriched environments. Contamination problems encountered in the use of enriched air, mixtures of oxygen with other gases, or any other oxidizing gas may be solved by the same cleaning procedures applicable to most metallic and nonmetallic materials and equipment. Cleaning examples for some specific materials, components, and equipment, and the cleaning methods for particular applications, are described in detail in the appendix.

1.2 This practice includes levels of cleanliness used for various applications and the methods used to obtain and verify these levels.

1.3 This practice discourages the use of chlorinated fluorocarbon solvents in cleaning operations and encourages the use of alternate methods. A substitute method for the use of solvents in the verification methods is in development and will be issued as a separate standard.

1.4 This practice describes nonmandatory material for choosing the required levels of cleanliness for systems exposed to oxygen or oxygen-enriched atmospheres.

1.5 This practice proposes a practical range of cleanliness levels that will satisfy most system needs, but it does not deal in quantitative detail with the many conditions that might demand greater cleanliness or that might allow greater levels of contamination to be present. Furthermore, it does not propose specific ways to measure or monitor these levels from among the available methods.

NOTE 1—Although this practice has been found applicable for assisting qualified technical personnel to establish necessary cleanliness levels, each system is unique and departures from these suggestions may be warranted.

1.6 The values stated in both inch-pound and SI units are to be regarded separately as the standard. The values given in parentheses are for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Federal, state and local safety and disposal regulations concerning the particular hazardous materials, reagents, operations, and equipment being used should be reviewed by the user. The user is encouraged to obtain the Material Safety Data Sheets (MSDS) from the manufacturer for any material incorporated into a cleaning process. Specific cautions are given in Section 8.

2. Referenced Documents

2.1 ASTM Standards:

- A 380 Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems²
- D 1193 Specification for Reagent Water³
- E 312 Practice for Description and Selection of Conditions for Photographing Specimens⁴
- E 1235 Test Method for Gravimetric Determination of Non-volatile Residue (NVR) in Environmentally Controlled Areas for Spacecraft⁵
- F 312 Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters⁶
- F 331 Test Method for Nonvolatile Residue of Halogenated Solvent Extract from Aerospace Components (Using Rotary Flash Evaporator)⁵
- G 63 Guide for Evaluating Nonmetallic Materials for Oxygen Service⁶
- G 88 Guide for Designing Systems for Oxygen Service⁶
- G 121 Practice for Preparation of Contaminated Test Coupons for the Evaluation of Cleaning Agents⁶
- G 122 Test Method for Evaluating the Effectiveness of Cleaning Agents⁶
- G 125 Test Method for Measuring Liquid and Solid Material Fire Limits in Gaseous Oxidants⁶

¹ This practice is under the jurisdiction of ASTM Committee G-4 on Compatibility and Sensitivity of Materials in Oxygen Enriched Atmospheres and is the direct responsibility of Subcommittee G04.02 on Recommended Practices.

Current edition approved April 10, 1996. Published August 1996. Originally published as G 93 – 87. Last previous edition G 93 – 88 (1993)ε¹.

² *Annual Book of ASTM Standards*, Vol 01.03.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 06.01.

⁵ *Annual Book of ASTM Standards*, Vol 15.03.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.