



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 G93; 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 cleaning 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 given in the appendices.

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 applies to chemical-, solvent-, and aqueous-based processes.

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 contamination levels to exist. Furthermore, it does not propose specific ways to measure or monitor these levels from among the available methods.

1.6 The values stated in both inch-pound and SI units are to be regarded separately as the standard unit. 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 Sheet (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:²

- A380 Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
- D1193 Specification for Reagent Water
- E312 Practice for Description and Selection of Conditions for Photographing Specimens Using Analog (Film) Cameras and Digital Still Cameras (DSC)
- E1235 Test Method for Gravimetric Determination of Non-volatile Residue (NVR) in Environmentally Controlled Areas for Spacecraft
- E2042 Practice for Cleaning and Maintaining Controlled Areas and Clean Rooms
- F312 Test Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters
- F331 Test Method for Nonvolatile Residue of Solvent Extract from Aerospace Components (Using Flash Evaporator)
- G63 Guide for Evaluating Nonmetallic Materials for Oxygen Service
- G88 Guide for Designing Systems for Oxygen Service
- G121 Practice for Preparation of Contaminated Test Coupons for the Evaluation of Cleaning Agents
- G122 Test Method for Evaluating the Effectiveness of Cleaning Agents
- G125 Test Method for Measuring Liquid and Solid Material Fire Limits in Gaseous Oxidants
- G127 Guide for the Selection of Cleaning Agents for Oxygen Systems
- G128 Guide for Control of Hazards and Risks in Oxygen Enriched Systems

¹ This practice is under the jurisdiction of ASTM Committee G04 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 1, 2011. Published April 2011. Originally approved in 1987. Last previous edition approved in 2003 as G93 – 03e01. DOI: 10.1520/G0093-03R11.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.