



Standard Test Method for Evaluating the Effectiveness of Cleaning Agents¹

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INTRODUCTION

Many systems require a high degree of cleanliness. For example, gaseous and liquid oxygen systems must be clean, particularly of hydrocarbons, to avoid the potential hazard of a reaction and subsequent fire or explosion. Typically, chlorinated solvents have been used to clean systems and equipment that must be free of hydrocarbons and other contaminants. Environmental concerns dictate that suitable replacements are needed. This test method presents a procedure that may be used to evaluate candidate aqueous or non aqueous cleaning agents.

1. Scope

1.1 This test method covers a procedure for evaluating the capability of cleaning agents and processes to remove contamination to the desired level.

1.2 The test coupons provide a relatively rough surface to which contamination can easily adhere.

1.3 The capability of a particular cleaning agent depends upon the method by which it is used and the characteristics of the article being cleaned, such as size, shape, and material. Final evaluation of the cleaning agent should include testing of actual products and production process.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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.* Specific precautionary statements are given in Note 2.

2. Referenced Documents

2.1 ASTM Standards:

D 1193 Specification for Reagent Water²

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods³

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³

F 331 Test Method for Nonvolatile Residue of Halogenated Solvent Extract from Aerospace Components (Using Ro-

tary Flash Evaporator)⁴

G 94 Guide for Evaluating Metals for Oxygen Service³

G 121 Practice for Preparation of Contaminated Test Coupons for the Evaluation of Cleaning Agents³

2.2 ANSI Standard:

D46.1 Surface Texture (Surface Roughness, Waviness, Lay)⁵

3. Terminology

3.1 Definitions:

3.1.1 *cleaning effectiveness factor (CEF), n* —the fraction of contaminant removed from an initially contaminated test coupon and determined by gravimetric techniques.

3.1.2 *residual contamination R_c , n* —the absolute mass of contaminant remaining after the cleaning process and expressed in milligrams per square centimetre of area or optionally as milligrams per square foot.

3.1.3 *surface roughness, R_A , n* —the arithmetic average deviation of the surface profile from the centerline, normally reported in micrometres.

4. Summary of Test Method

4.1 This test method provides quantitative results as to the ability of a specific cleaning agent/process for removing selected contaminants from standard coupons. The coupons used for testing are prepared in accordance with Practice G 121. Cleaning is performed using a cleaning tank with or without ultrasonic agitation, elevated temperature or other cleaning enhancement features and depends on the manufacturer's instructions. The effectiveness of the cleaning process is represented as CEF, the cleaning effectiveness factor, that is the fraction of the contaminant removed as determined by gravimetric techniques. A control coupon is used to account for any

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Annual Book of ASTM Standards, Vol 15.03.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.