



Standard Test Method for Ignition Sensitivity of Materials to Gaseous Fluid Impact¹

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1. Scope

1.1 This method describes a technique to determine the relative sensitivity of materials to dynamic pressure impacts by gases such as oxygen, air, or blends of gases containing oxygen.

1.2 This method describes the test apparatus and test procedures that may be employed in the evaluation of materials for use in gases under dynamic pressure operating conditions up to gage pressures of 10 000 psi (69 MPa) at ambient temperature.

1.3 This method is primarily a test for ranking of materials. This method is not necessarily valid for determination of the sensitivity of the materials in an “as-used” configuration since the material sensitivity may be altered because of changes in material configuration, usage, and environment. This method can be employed to provide batch-to-batch acceptance data. Acceptability of any material may be based on its performance at a particular test pressure, or test pressure may be varied to determine the reaction threshold of a material, as specified by the user.

1.4 The criteria used for the acceptance, retest, and rejection of materials for any given application shall be determined by the user and are not fixed by this method.

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.* For specific precautions see Section 7.

2. Referenced Documents

2.1 ASTM Standards:

D 1193 Specification for Reagent Water²

G 63 Guide for Evaluating Non-Metallic Materials for Oxygen Service³

G 93 Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments³

MNL36 Safe Use of Oxygen and Oxygen Systems: Guidelines for Oxygen System Design, Materials Selection, Operations, Storage, and Transportation⁴

2.2 Military Standards:⁵

MIL-D-16791-E Detergent, General Purpose (Liquid, Non-ionic)

MIL-0-27210E, Amendment 1-Oxygen, Aviator’s Breathing, Liquid and Gas

3. Summary of Method

3.1 The gaseous impact test system is designed to expose material specimens or small components/elements to high-velocity (dynamic) gaseous impact environments. The basic configuration consists of a high-pressure accumulator, a high-speed pressurization (impact) valve, test system pressurization lines, test chamber/fixture, test chamber purge and vent systems, and a valve sequencer/control device. Fig. 1 is a schematic of a typical test system.

3.2 The general procedure is to prepare the test specimen, record significant pretest data, and place the test specimen in the test chamber. The test specimen is then subjected to sequential gaseous impacts by alternately opening and closing the test chamber pressurization (impact) and vent valves. The test data obtained may include test chamber pressures and temperatures, test chamber pressure rise times, pressurization and vent valve actuation times, and sequence times. The test specimen is then removed and examined for any significant changes and evidence of reactions. Pertinent data are recorded. The test is repeated using a fresh specimen for each impact test cycle until the desired user-selected criteria are met.

4. Significance and Use

4.1 This test evaluates the relative sensitivity of materials to dynamic pressure impacts by various gaseous fluid media (may include mixtures of gases).

4.2 Any change or variations in test specimen configurations, thickness, preparation, and cleanliness may cause a significant change in impact sensitivity/reaction.

4.3 A reaction is indicated by an abrupt increase in test specimen temperature or by obvious changes in odor, color, or material appearance, or a combination thereof, as observed

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 14.04.

⁴ Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.