Designation: F3664 – 24

Standard Practice for Blast Testing[1]

This standard is issued under the fixed designation F3664; 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 *Purpose*—The primary purpose of this practice is to define good commercial and customary practice for conducting blast tests of physical security products, related devices, and systems. The goal is to harmonize results between test facilities and maximize the consistency and repeatability of the results obtained from these blast tests. This practice shall be used for blast simulator testing, where applicable.

1.2 *Objectives*—Objectives guiding the development of this practice are:

1.2.1 Formalize standard practices for conducting blast tests.

1.2.2 Facilitate high-quality, standardized results processing and reporting of test results.

1.2.3 Use as a starting point for a best practice standard that will grow into an industry standard both domestically and internationally.

1.2.4 It is anticipated that this practice will evolve over time as requirements and facility capabilities change.

1.2.5 This practice should not be considered the limit of requirements for proper completion of a given test program. There may be additional requirements depending on the application and the threat.

1.3 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.4 *Omissions*—The omission of any specific explosive, instrumentation type, material type, or test configuration does not necessarily preclude its use in accordance with this practice, as long as all applicable provisions are satisfied.

1.5 The following is a table of contents for this practice:

TABLE 1 Section Numbers and Titles

[1] This practice is under the jurisdiction of ASTM Committee F12 on Security Systems and Equipment and is the direct responsibility of Subcommittee F12.10 on Systems Products and Services.

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TABLE 1 *Continued*

Section Number	Title
7.4	Global Movement Mitigation
7.5	Face of Reaction Structure
7.6	Reflections
7.7	Enclosed Space Behind Test Article
7.8	Clearing Effects
7.9	Reaction Structure Construction Specifics
8	**Test Plan**
8.1	Submission
8.1.1	Test Article(s)
8.1.2	Blast Loading
8.1.2.1	Specified Pressure and Impulse
8.1.2.1(1)	Calibration Tests and Validation
8.1.2.1(2)	Pressure Gauge Redundancy
8.1.2.1(3)	Targeted Pressure and Impulse
8.1.2.1(4)	Charge Shape and Configuration
8.1.2.2	Specified TNT Equivalence
8.1.2.3	Specified Shape and Configuration of Charge
8.1.2.3(1)	Cylindrical Shape with TNT Impulse-Equivalence 113.4 kg (250 lbm) or Greater
8.1.2.3(2)	TNT Impulse-Equivalence Less Than 113.4 kg (250 lbm)
8.1.2.4	Explosive Mass
8.1.2.5	Detonation
8.1.3	Instrumentation Plan
8.1.4	Reaction Structure
8.1.5	Witness Panel
9	**Pre-Test Through Post-Test**
9.1	Test Site Visit by the AHJ
9.1.1	Observation of Setup
9.1.2	Pre-Test Walkthrough
9.1.3	Post-Test Examination
9.2	As-Tested Article
9.2.1	Fabrication
9.2.2	Installation
9.2.3	Materials of Construction
9.3	Reporting Deviations
9.4	On-Site Documentation by the AHJ
9.5	On-Site Review of Results
9.6	Range Safety
10	**Data Processing and Reduction**
10.1	Raw Data
10.2	Processed Data
10.3	Time Scale
10.4	Videos
10.5	Peak Pressure
10.6	Impulse Calculation
11	**Report**
11.1	Report Contents
11.2	References
11.3	Results
11.4	Event Setup
12	**Keywords**
Annex A1	**Airblast Test Plan Checklist**
Table A1.1	Airblast Test Plan Checklist
Annex A2	**Blast Simulator Test Plan Checklist**
Table A2.1	Blast Simulator Test Plan Checklist
N/A	Related Materials

1.6 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1642 Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

3. Terminology

3.1 This section provides definitions, descriptions of terms, and a list of acronyms for many of the terms used in this practice. These terms are an integral part of this practice and are critical to an understanding of this practice and its use.

3.2 *Definitions:*

3.2.1 *ammonium nitrate, fuel oil, ANFO, n*—a mixture of technical grade (TG) ammonium nitrate (AN) prills and fuel oil (FO), typically No. 2 diesel fuel; by mass, approximately 94 % AN and 6 % FO; a common, stable, and relatively inexpensive explosive commonly used for blast testing.

3.2.1.1 *Discussion*—Per 5.5, non-uniformity ANFO such as "clumping" or "caking" of the prills shall be considered as defects and shall not be used under this practice.

3.2.2 *authority having jurisdiction, AHJ, n*—organization, office, or individual having the responsibility to see that customer's or end user's requirements are properly addressed.

3.2.2.1 *Discussion*—The AHJ is the customer's technical representative having direct or delegated authority to represent the technical interests of the customer or end user. The AHJ works in cooperation with the test director during test planning, test execution, and test reporting.

3.2.3 *approved, adj*—acceptable to the authority having jurisdiction (AHJ).

3.2.4 *blast, n*—synonym for *explosion*.

3.2.5 *blast load, n*—load applied from a blast wave, which is described by the combination of pressure, impulse, and duration.

3.2.6 *blast simulator, n*—device or system using a high-energy source to generate a target pressure versus time having a positive phase shape, pressure, and impulse that replicates airblast pressure loads.

3.2.6.1 *Discussion*—A blast simulator may not be capable of producing an airblast negative phase pressure history.

3.2.7 *clearing effect, n*—clearing effect or "clearing" is a hydrodynamic phenomenon caused by blast pressure waves diffracting around the edges of a structure that in turn generates a relief wave propagating inward from the edges.

3.2.7.1 *Discussion*—The effect of these relief waves is to reduce the impulse placed on the structure.

3.2.8 *dynamic response, n*—deformation, stress, and other behavior of structure or structural element caused by the action of a time-varying loading while considering inertia, stiffness, and, in some cases, damping effects.

[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.