



Standard Test Method for Bird Impact Testing of Aerospace Transparent Enclosures¹

This standard is issued under the fixed designation F330; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers conducting bird impact tests under a standard set of conditions by firing a packaged bird at a stationary transparency mounted in a support structure.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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 hazard statements, see Section 8.

2. Terminology

2.1 Definitions:

2.1.1 *bird, n*—the carcass that is used to impact the test article.

2.1.2 *bird package, n*—the bird and container that encases the bird to prevent disintegration enroute to target.

2.1.3 *gun, n*—the device that propels the bird toward the target.

2.1.4 *sabot, n*—the container that is used to carry the bird package down the gun barrel.

2.1.5 *stripper, n*—the device that stops the sabot at the end of the gun barrel so that only the bird package impacts the test article.

2.1.6 *test article, n*—the transparency and supporting structure.

3. Summary of Test Method

3.1 This test method employs a smooth-bore bird gun that fires a chicken carcass so that it impacts a stationary aerospace transparency mounted in a supporting structure.

¹ This test method is under the jurisdiction of ASTM Committee F07 on Aerospace and Aircraft and is the direct responsibility of Subcommittee F07.08 on Transparent Enclosures and Materials.

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3.2 The specific parameters described by this test method are:

3.2.1 Bird weight and condition,

3.2.2 Bird velocity, and

3.2.3 Instrumentation.

4. Significance and Use

4.1 This test method shall be used for: bird impact testing of aircraft crew compartment transparencies and supporting structure to verify the design; compilation of test data for use in verification of future transparency and supporting structure design and analytical methods; and comparative evaluation of materials.

5. Apparatus

5.1 *Gun*, compressed gas, conforming in principle to Fig. 1, comprising:

5.1.1 *Pressure Tank*, of capacity and working pressure as discussed in Note 1.

NOTE 1—A gun capable of propelling a 4-lb (1.81-kg) bird in excess of 650 knots (334 m/s) has a barrel 60 ft (18.3 m) long, bore of 6 in. (153 mm), and a pressure tank volume of 30 ft³ (0.849 m³) with an allowable working pressure of 250 psi (1.725 × 10⁶ Pa).

5.1.2 *Release Mechanism*, comprised of a firing solenoid, diaphragm, and a cutter. Upon initiation of the firing sequence, the release mechanism allows the compressed gas stored in the pressure tank to flow rapidly into the gun barrel and propel the projectile.

NOTE 2—The most common designs normally use either one or two diaphragms in the release mechanism. In the single diaphragm design, the diaphragm is mechanically ruptured upon firing (see Fig. 1). In the dual diaphragm system, pressurized gas between the two pressurized gas diaphragms is bled to initiate firing by allowing the stored gas to burst each diaphragm in rapid succession.

5.1.3 *Barrel (Launch Tube)*, a smooth bore tube that guides the packaged bird (and sabot if used) during its acceleration by the expanding air from the pressure tank. The bore and length of the barrel is chosen both to accommodate the largest of the projectiles to be used and for the overall performance requirements of the gun.