

Guideline for Specifying Steel Doors and Frames for Blast Resistance



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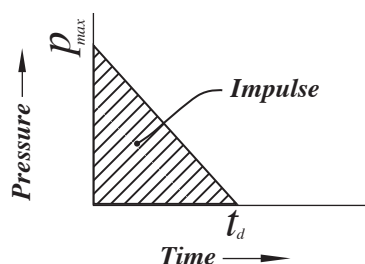
1 Introduction

Blast-resistant hardening, or the structural strengthening of buildings, is one measure an owner may employ to minimize the risk to people and equipment from the hazards of accidental or intentional explosions. Many architects are finding it necessary to include blast-resistant products in new and existing construction. These products do not fall under any building code, but are required by a number of government agencies such as the Department of Defense (DoD), Veterans Affairs (VA), Department of State (DOS), and the General Services Administration (GSA). They are backed by analysis or 3rd party test data (from an accredited lab) to show their performance level under blast load conditions. This document will serve as a guide to identify the proper criteria, and to give brief explanations of each criterion. Additional requirements, fire rating, swing, etc. are not covered.

2 Definitions

2.1 Blast Resistant Product: Assembly comprised of a door (or pair of doors) and a frame with hardware, or a glazing system that is rated to resist a specified blast peak pressure and impulse to a required performance level. Higher level doors and frames are typically sold and shipped as one unit in order to be certified by the manufacturer that it will meet the projected blast and performance requirements.

2.2 Blast Pressure: The maximum pressure to be exerted on the assembly by the blast event, typically specified as peak-reflected pressure.



Blast Wave (Idealized)

2.3 Positive Phase Impulse: The area under the curve formed by the integral of blast pressure (P_{max}) vs. time (T_d).

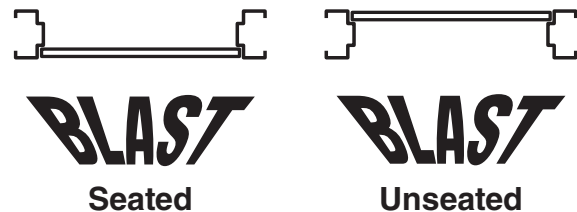
2.4 Charge Weight: The equivalent explosive weight (lbs or kg) of TNT in the blast event. Different agencies have specific requirements for charge weight to be used. See agency specific criteria for DoD, VA, GSA, and DOS to determine required charge weight and in some cases, the required standoff distance.

2.5 Duration: The amount of time it takes the peak pressure to decay to ambient conditions (or zero), typically specified in milliseconds (ms).

2.6 Rebound: Load acting in the opposite direction of the initial blast load that may be a result of negative phase pressure loading and system response, and is typically expressed as a percentage of the initial peak blast pressure.

2.7 Stand-off Distance: The distance from the centroid of the explosive device to the specified opening or structure.

2.8 Seated/Unseated: The orientation of the door in the frame, in relation to the blast origin.



2.9 Blast Product Response & Damage Category (Also referred to as **Level of Protection** in the Unified Facilities Criteria (UFC)): The amount of structural damage (permanent deformation) present after the blast event. With respect to a door and frame unit, the operability of the door, and whether or not the door and/or frame become detached and present a debris hazard. With respect to a glazing system, whether or not the glazing fractures, and if it presents a flying debris hazard. There are multiple standard test methods written that outline test procedures to follow to show how a blast-resistant unit will react in a blast event.