Designation: E3211 – 22

Standard Practice for Selection, Integration, and Verification of Active Vehicle Barrier Safety Devices[1]

This standard is issued under the fixed designation E3211; 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 This practice is intended to provide methods for selecting, integrating, and verification of active vehicle barrier safety devices so that vehicle barrier systems are reliably and safely controlled when in operation.

1.2 There are a number of risks associated with the operation and use of active vehicle barrier systems (AVBS). One of the risks is that of undesired collision between an active vehicle barrier (AVB) and an authorized vehicle. Such risks can be minimized through proper design, construction, installation, operation, and training in the use of such systems.

1.3 The proper selection, installation, and use of safety devices that will prevent an AVBS from activating or deploying while an authorized vehicle is transiting the barrier, or when such an authorized vehicle is stopped while a portion of the vehicle is located in the path of or in an unsafe proximity to a barrier, can minimize the likelihood of unintended collision between a barrier and authorized vehicle.

1.4 For this practice, safety refers to the ability of the barrier to operate without causing unintended damage to vehicles or injury to people via operation or deployment of the barrier, when an authorized vehicle is transiting the barrier. Security refers to the ability to operate or deploy the barrier to serve its intended purpose of stopping an unauthorized vehicle from passing through the barrier location.

1.5 Pedestrians are excluded from the scope of this practice. It is assumed, for the purposes of this practice, that pedestrians are excluded from potentially hazardous locations in the immediate vicinity of AVBS moving components. It is recognized that authorized pedestrians may be present in the area of the movable AVBS for required purposes, such as inspection of vehicles that are stopped. The presence of "casual" pedestrians shall be kept away from the movable elements of the AVBS.

1.6 This practice is not intended to address any of the following:

1.6.1 Overall performance of vehicle barrier systems or effectiveness as a barrier against any vehicles (see Test Method F2656/F2656M).

1.6.2 Impact energy able to be withstood by vehicle barrier systems.

1.6.3 Serviceability of barrier systems.

1.6.4 Selection of vehicle barrier systems for any particular use.

1.6.5 *Pedestrian Detection Safety Devices*—This practice considers that pedestrians are excluded from hazard zones in the vicinity of vehicle barrier systems; and that only trained and authorized people, such as maintenance staff and security officers performing necessary functions, will be present in the hazard areas when the active barriers are in operation.

1.6.6 Design and installation of vehicle barrier systems, other than performance of associated vehicle detection safety devices, and the verification that safety devices are able to be overridden under designated emergency conditions, as required by owners.

1.6.7 Operating procedures or instructions for operational use of active vehicle barrier systems once they are installed and placed into service. Although such operating procedures are essential for the safe operation of AVBS in practice, development and implementation of such procedures is beyond the scope of this practice.

1.7 *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.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This practice is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.06 on Electronic Security Systems.

Current edition approved Feb. 1, 2022. Published February 2022. DOI: 10.1520/E3211-22.

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]

F2200 Specification for Automated Vehicular Gate Construction

F2656/F2656M Test Method for Crash Testing of Vehicle Security Barriers

2.2 *ANSI/UL Standard:*[3]

ANSI/UL 325 Standard for Safety – Door, Drapery, Gate, Louver, and Window Operators and Systems

2.3 *ASHRAE Standard:*[4]

Guideline 0 "The Commissioning Process."

2.4 *IMSA Standards:*[5]

Specification 50-2 Polyethylene insulated, polyethylene jacketed, loop detector lead-in cable

Specification 51-1 Polyvinyl chloride insulated, nylon jacketed loop detector wire

Specification 51-3 Cross linked polyethylene insulated loop detector wire

Specification 51-5 Polyvinyl chloride insulated, nylon jacketed, loosely encased in a polyvinyl chloride or a polyethylene tube loop detector wire

Specification 51-7 Cross linked polyethylene insulated loosely encased in a polyvinyl chloride or a polyethylene tube loop detector wire

2.5 *NFPA Standard:*[6]

NFPA 70 National Electric Code (NEC)

3. Terminology

3.1 *Definitions:*

3.1.1 *active vehicle barrier, AVB, n*—mechanized and controlled barrier that is capable of stopping a moving vehicle, automatically or manually operated to place or remove an obstruction in the path of a vehicle to prevent such vehicle from passing through the barrier when the lane is closed.

3.1.2 *active vehicle barrier system, AVBS, n*—mechanized system, complete with all associated controls and devices that may be installed in the factory or in the field to effect operation of an active vehicle barrier in its installed configuration, to either permit or deny access by automobiles, trucks, or similar transportation equipment; active vehicle barrier system includes an active vehicle barrier along with controls and other devices that may be necessary to operate the barrier in practice.

3.1.3 *agency, n*—specifier, responsible party, or owner.

3.1.4 *basis of design, BOD, n*—documentation of the primary decision-making process and assumptions behind design decisions made by the responsible designer to meet the Owner's Project Requirements.

3.1.4.1 *Discussion*—Consult ASHRAE Guideline 0 for additional information regarding basis of design and commissioning.

3.1.5 *bollard, n*—vertical post or series of posts used to channel or restrict vehicular traffic.

3.1.5.1 *Discussion*—Bollards used for vehicle control are usually steel, concrete, or a combination of multiple materials. Bollards may be fixed-in-place, removable, or actively controlled operable/retractable. This practice is concerned primarily with those that are actively controlled to allow or restrict passage of vehicles through a portal or access point.

3.1.6 *condition designation, n*—relates vehicle type and vehicle velocity to the kinetic energy for which testing is conducted.

3.1.7 *confidence interval, n*—range of values that may include the true value of a parameter of interest, such as the probability that a barrier will prevent access to an unauthorized vehicle.

3.1.8 *confidence level, n*—probability value associated with a confidence interval; the percentage of times that the confidence interval can be expected to include the true population parameter in the long run.

3.1.9 *continuous barrier, n*—any perimeter barrier that relies on a continuous foundation or a continuous structural element to resist penetration by vehicles.

3.1.10 *hazard zone, n*—area in and around the moving components of an active vehicle barrier (AVB) assembly and associated moving elements system in which significant potential for impact or collision exists.

3.1.10.1 *Discussion*—Extent or boundaries of hazard zones may be different under different circumstances or operating conditions. For example, if an active vehicle barrier system (AVBS) and associated moving control components, such as control arms or gates, are used only in an area in which vehicles are stopped, checked, or verified and then permitted to pass through the barrier system at low speed after the access control point is opened, then the hazard zone may only extend a short distance beyond the actual moving components of the system. If, however, the AVB is used in a different manner, such that it is normally retracted (open) and closed to prevent a vehicle that may be moving at a higher speed from passing the control point upon detection of a threat condition, then the hazard zone may be much larger—and dependent on the approach distance and speed of the vehicle.

3.1.11 *interposing relay, n*—electrical control device between two systems that enables one system to connect to—or control—a second electrical circuit while retaining direct electrical isolation between the two systems.

3.1.11.1 *Discussion*—Typically used to control a high-power device or circuit from a low-power control signal.

[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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, http://www.ashrae.org.

[5] Available from the International Municipal Signal Association, 597 Haverty Court, Suite 100 - Rockledge, FL 32955.

[6] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.