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Standard Guide for Deployment of Blast Resistant Trash Receptacles in Crowded Places[1]

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1. Scope

1.1 This guide identifies the key factors that should be considered prior to the deployment of blast resistant trash receptacles (BRTRs) in crowded places.

1.1.1 Guidance is included for their deployment at interior and exterior locations associated with the crowded places.

1.2 Facilities and venues where blast resistant trash receptacles may be deployed include, but are not limited to:

1.2.1 Airports,
1.2.2 Banks and other financial institutions,
1.2.3 Bars and nightclubs,
1.2.4 Convention centers,
1.2.5 Entertainment and event centers,
1.2.6 Hotels,
1.2.7 Health care locations,
1.2.8 Museums,
1.2.9 Places of worship,
1.2.10 Public government locations including fire and police stations,
1.2.11 Railway stations, bus stations, and related transit areas,
1.2.12 Restaurants,
1.2.13 Retail centers and malls,
1.2.14 Schools, universities, and related areas used for education,
1.2.15 Stadiums and arenas, and
1.2.16 Theaters.

1.3 Guidance on conducting a threat assessment or vulnerability analysis, and on responding to incidents associated with the deployment of blast resistant trash receptacles is beyond the scope of this document.

1.4 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D638 Test Method for Tensile Properties of Plastics
D747 Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D882 Test Method for Tensile Properties of Thin Plastic Sheeting
E2740 Specification for Trash Receptacles Subjected to Blast Resistance Testing

2.2 *Government Standards:*

DoD 4145.26 M Department of Defense: DOD Contractors Safety Manual for Ammunition and Explosives[3]
DoD 6055.9 STD Department of Defense: DOD Ammunition and Explosives Safety Standards[4]

2.3 *Association Standard:*

APTA SS-SIS-RP-001-08 Recommended Practice for Trash/Recycling Container Placement to Mitigate the Effects of an Explosive Event[5]

3. Terminology

3.1 For terminology generally associated with explosives, refer to the glossaries given in DoD 4145.26 M and DoD 6055.9 STD.

[1] This guide is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.08 on Operational Equipment.

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[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 the Defense Technical Information Center, 8725 John J. Kingman Road, Suite 0944, Ft. Belvoir, VA 22060 6128.

[4] Available from the worldwide web at: http://www.ddesb.pentagon.mil/DoD6055.9-STD%205%20Oct%202004.pdf.

[5] Available from the American Public Transportation Association, 1666 K Street, NW, Washington, DC, 20006-1215.

3.1.1 Some of the definitions in this standard (3.2) are either adopted as exact copies, or are adapted, from DoD 4145.26 M. Where adapted, changes to the DoD definitions were made only to clarify the meaning or to incorporate related terms that also are defined in this terminology section.

3.1.2 The DoD source is identified at the right margin following the definition. In addition, in cases where definitions have been re-printed from standards developed by technical committees other than E54, the ASTM source is also identified at the right margin following the definition.

3.2 *Definitions:*

3.2.1 *explosion, n*—chemical reaction of any chemical compound (or mechanical mixture) that, when initiated, undergoes a very rapid combustion or decomposition releasing large volumes of highly heated gases that exert pressure on the surrounding medium.

3.2.2 *explosive, n*—any chemical compound (or mechanical mixture) that, when subjected to heat, impact, friction, detonation, or other suitable initiation, undergoes a very rapid chemical change with the evolution of large volumes of highly heated gases that exert pressures in the surrounding medium. **DoD 4145.26 M**

3.2.3 *fireball, n*—a highly luminous, intensely hot cloud of dust, gas, or vapor, or a combination thereof, generated by an explosion.

3.2.4 *fragment, n*—solid material propelled from an explosion as a result of fragmentation.

3.2.4.1 *primary fragment, n*—fragment produced from the explosive device itself.

3.2.4.2 *secondary fragment, n*—fragment produced from the container or environment where the container is placed; a piece of receptacle broken off as a result of the charge being detonated inside of it.

3.2.5 *fragmentation, n*—breaking up of the confining material of a chemical compound (or mechanical mixture) when an explosion takes place. **D882**

3.2.6 *overpressure, n*—pressure, exceeding the ambient pressure, manifested in the shock wave of an explosion. **DoD 4145.26 M**

3.2.7 *rigid plastic, n*—for purposes of general classification, a plastic that has a modulus of elasticity, either in flexure or in tension, greater than 700 MPa [100 000 lbf/in^2] at 23°C [73 °F] and 50 % relative humidity when tested in accordance with Test Method D747, Test Methods D790, Test Method D638, or Test Methods D882. **D882**

3.2.8 *trash receptacle, n*—public or commercial use refuse bin that holds discarded items until collected.

3.2.8.1 *Discussion*—The capacity of a trash receptacle specified according to this standard is typically less than 200 L [50 gal].

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *blast resistance, n*—the non-numerical attribute of a trash receptacle that is established when the results of explosive testing of the submitted specimens meet all performance requirements given in Specification E2740.

3.3.2 *blast resistant trash receptacle, n*—a trash receptacle that conforms to the requirements given in Specification E2740.

3.3.3 *crowded places, n*—public areas where groups of people may concentrate for a continuous or limited period of time.

3.3.3.1 *Discussion*—Examples of public areas that may be crowded include:

(1) buildings and related structures such as parking garages, including their access and egress points,

(2) entertainment and event venues,

(3) transportation terminals such as airports, train stations, and other public transportation stations,

(4) ticket counters, concession stands, retail stores, and dining establishments, and

(5) pedestrian walkways, sidewalks, streets, alleys, parks, plazas, playgrounds, schoolyards or other similar areas.

3.3.4 *force protection, n*—numerical level of blast resistance of a trash receptacle expressed in the mass equivalent of trinitrotoluene (TNT) explosive.

3.3.5 *public area, n*—a space or place that is open and accessible to all people, regardless of whether it is publicly or privately owned.

4. Summary of Guide

4.1 This guide takes into account two major factors, operational and explosive effects considerations, that need to be considered when deploying blast resistant trash receptacles.

4.2 The guide provides a list of factors to be considered in developing a threat assessment evaluating the basis of the deployment. For purposes of this standard, a major reason for conducting the threat assessment is to estimate the force protections required of the blast resistant trash receptacles being considered for deployment throughout the facility or venue.

4.3 Guidance for deployment is given in the form of directives indicating where it is recommended or not recommended for generally placing the blast resistant trash receptacles at both exterior and interior locations of the facility or venue. This guidance addresses both operational considerations and explosive effects considerations.

4.3.1 Operational considerations pertain to those factors that impact the use of blast resistant trash receptacles with regard to the collection and removal of trash from the facility or venue and factors relevant to bomb squads in the investigation and neutralization of a suspicious package.

4.3.2 Explosive effects considerations pertain to those factors that contribute to mitigating the effects of an explosion occurring as a result of an explosive device placed in the receptacle.

5. Significance and Use

5.1 This standard is intended to provide guidance on the deployment of blast resistant trash receptacles that focuses on the mitigation of human injury. It is not in general intended to provide guidance on the protection of structures in the vicinity of where the blast resistant trash receptacles are deployed.

5.2 The importance of a strategy and procedures for the deployment of blast resistant trash receptacles in crowded places cannot be overly emphasized. Trash receptacles in crowded places have been, and continue to be, an attractive repository for explosives. The selection of deployment locations impacts both the mitigation of the effects of an explosion occurring within one as well as the convenience of using the receptacles.

5.3 Two major effects resulting from an explosion in a trash receptacle are the production of primary and secondary fragments as well as overpressure from the detonation. The recommendations in this guide are intended to mitigate the damaging effects of fragmentation and overpressure in crowded places.

5.4 Another effect resulting from an explosion in a trash receptacle is the fireball. This effect may cause burns to people caught within or near to the fireball. Also, it is possible that the heat output from an explosion may cause nearby combustible material to ignite. It is important, therefore, that blast resistant trash receptacles are not placed near combustible materials.

5.5 The deployment of blast resistant trash receptacles provides a means for decreasing injury and lethality during an explosive event no matter their location when compared to the protection afforded by ordinary trash receptacles or clear plastic bags. Fragments resulting from explosions create the greatest danger to people as fragments may travel several hundred meters and still have velocities that could be lethal or injurious. Blast resistant trash receptacles that meet the requirements of Specification E2740 when subjected to internal explosions equal to or less than the force protection rating contain horizontal primary fragments and do not produce secondary fragments.

5.6 This guide provides general provisions for the deployment of blast resistant trash receptacles. Every facility or venue has unique features associated with factors such as demographics, location, and functions. Operational and explosive effects considerations (see Section 7) provide basic recommendations that may be sufficient for many facilities buildings and venues, but may not be specifically applicable to others. For example, special security concerns at high value facilities or high pedestrian count venues will require guidance concerning the deployment of blast resistant trash receptacles from security personnel familiar with that facility.

5.7 The guide is intended for use by individuals in both the private and public sectors who are considering the purchase and deployment of blast resistance trash receptacles.

6. Threat Assessment Considerations

6.1 Facilities and venues that do not have a security threat assessment should develop one when considering the deployment of blast resistance trash receptacles.

6.2 *Facility and Venue Threat Assessment Considerations*—The facility and venue threat assessment provides the force protections desired at various deployment locations. The threat assessment should include a site survey of the facility or venue. The survey team should include all stakeholders of the facility, security personnel, and the first responder community that would come to the facility for emergencies. This site survey should consider, at a minimum, the following:

6.2.1 Crowded places.

6.2.2 Access and egress points for pedestrians.

6.2.3 Pedestrian bottlenecks.

6.2.4 Walkways and related areas.

6.2.5 Security checkpoints.

6.2.6 Locations of critical structural elements such as columns, beams, and load-bearing walls.

6.2.7 Locations where combustible, flammable, and toxic materials are located.

6.2.8 Enclosed spaces such as alcoves and passageways.

6.2.9 Exterior of the facility or venue.

6.2.10 Parking areas and parking structures.

6.2.11 *Landscaping*—Landscaping is important because it can provide locations for possible concealment of explosives.

6.2.12 Materials used in, and methods of, construction for components such as walls, ceilings, floors, platforms, stairways.

6.2.13 Ceiling heights.

6.2.14 *Doors, Windows and Skylights*—Location, type of structural surroundings and glazing component composed of glass or rigid plastic.

6.2.15 Locations of utilities such as HVAC, electrical, communications, gas lines, fire life-safety systems and steam lines.

6.2.16 Existing security assets such as security staff deployment, closed-circuit TVs, gates, intruder deterrents.

6.2.17 Secure public areas where screening occurs before entry.

6.2.18 Building areas not accessible to the public.

6.2.19 Operational considerations of first responders.

7. Guidelines for Deployment-Considerations Applicable to All Facilities and Venues

7.1 *General Considerations*—This guide delineates factors that should be recognized in the deployment of blast resistant trash receptacles into two categories: operational considerations and explosive effects considerations. Explosive effects considerations are further subdivided into two additional categories: considerations for deployment at exterior locations and consideration for deployment at interior locations.

7.2 *Operational Considerations:*

7.2.1 Blast resistant trash receptacles should be deployed such that trash may be regularly collected.

7.2.2 Blast resistant trash receptacles should be placed in positions where they can be viewed and accessed by the public. If the blast resistant trash receptacles are not conveniently located, operational considerations are defeated.

7.2.3 *Specific Operational Factors*—Operational factors to be considered prior to the deployment of blast resistant trash receptacles include both their practice usage for trash collection and disposal plus their accessibility for first responders in emergency situations. The following are specific considerations:

7.2.3.1 Current placement of existing trash receptacles; distance between receptacles.

7.2.3.2 Blast resistant trash receptacle servicing procedures.

7.2.3.3 Number of trash receptacles anticipated to be deployed and trash volume expected to be collected.

7.2.3.4 Trash accumulation and removal; frequency of collections; time required to complete the removal.

7.2.3.5 Facility or venue custodial staffing.

7.2.3.6 Distance from the receptacle to the central trash disposal point.

7.2.3.7 Distance from receptacle to ingress point for emergency responders.

7.2.3.8 Deployment such that the exterior and interior of the receptacle can be accessed using robots and other explosive ordinance tools including those for imaging of the contents.

7.3 *Explosive Effects Considerations for Deployment at Exterior Locations.*

7.3.1 *Plan for Exterior Deployment*—If not already available, a plan of the exterior locations under consideration for the deployment such as parking areas, walkways, grounds, and other areas accessed by the public should be prepared.

7.3.1.1 *Force Protection*—The plan should include the force protection required at each deployment location as determined by the threat assessment. Deployed blast resistant trash receptacles should met or exceed the force protection, as shown by conformance to Specification E2740.

7.3.1.2 Possible locations for deployment of the blast resistant trash receptacles should be marked on the plan. This layout should take into account the expected usage of the trash receptacles as determined from the reviews performed in accordance with 7.2.

7.3.2 Next an exterior site survey should be performed to check every location marked on the plan to confirm that the selected locations are appropriate for receptacle deployment, taking into account all operational and explosive effects considerations.

7.3.3 In performing the exterior site survey, the following guidance should be taken into consideration. The deployment of blast resistant trash receptacles provides a means for decreasing injury and lethality during an explosive event no matter their location when compared to the protection afforded by ordinary trash receptacles or clear plastic bags. Blast resistant trash receptacles should be located, whenever possible:

7.3.3.1 To the side of walking pathways.

7.3.3.2 A minimum of 1 m [3 ft] from building facades of brick, concrete filled block, stone panels, stucco, concrete panels, pedestrian bottlenecks, benches, fountains, congregation areas, ingress and egress points.

7.3.3.3 A minimum of 2 m [6 ft] from light building facades such as hollow block, exterior insulation and finish systems (EIFS), vinyl, metal, wood or similar materials.

7.3.3.4 A minimum of 4 m [13 ft] from glass panes or situated such that a direct path from the blast resistant trash receptacles to glass panes is avoided. An indirect path would be one where glass panes are shielded or angled from the perpendicular sight line of the receptacles.

7.3.3.5 On the opposite side of columns from walking pathways.

7.3.3.6 Away from lightweight building overhangs such as metal panels less than 4 m [13 ft] in height from grade.

7.3.3.7 Away from vehicle drop off and pick up lanes.

7.3.4 Also the following should be checked and to the extent possible placement of blast resistant trash receptacles should be avoided at or near:

7.3.4.1 Important underground or near above ground utility mains such as natural gas, water, main electrical or communication lines.

7.3.4.2 Hazardous material storage, or transport lines (for example, gas lines).

7.3.4.3 Combustible materials.

7.4 *Explosive Effects Considerations for Deployment at Interior Locations:*

7.4.1 *Plan for Interior Deployment*—If not already available, a plan of the interior of the building including ingress and egress points and areas accessed by the public should be prepared.

7.4.1.1 *Force Protection*—The plan should include the force protection required at each deployment location as determined by the threat assessment. Deployed blast resistant trash receptacles should meet or exceed the force protection, as shown by conformance to Specification E2740.

7.4.1.2 Possible locations for deployment of the blast resistant trash receptacle locations should be marked on the plan. This layout should take into account the expected usage of the trash receptacles, as determined from the reviews performed in accordance with 7.2.

7.4.2 Next an interior building survey checking every location marked on the plan should be performed to confirm that the selected locations are appropriate for deployment, taking into account all operational and explosive effects considerations.

7.4.3 In performing the interior building survey, the following guidance should be taken into consideration. The deployment of blast resistant trash receptacles provides a means for decreasing injury and lethality during an explosive event no matter their location when compared to the protection afforded by ordinary trash receptacles or clear plastic bags. Blast resistant trash receptacles should be located, whenever possible:

7.4.3.1 A minimum of 2 m [6 ft] from main walking pathways, escalators, elevator lobbies, pedestrian bottlenecks, service counters, waiting lobbies, people congregation areas and ingress and egress points.

7.4.3.2 A minimum of 4 m [13 ft] from a direct, non shielded path to interior or exterior glass panes.

7.4.3.3 A minimum of 0.5 m [1.5 ft] from solid structural walls.

7.4.3.4 Away from corridors or congregation areas with structural walls that are less than 4 m [13 ft] apart.

7.4.3.5 In high ceiling areas with over 4 m [13 ft] clearance from the floor.

7.4.3.6 Away from small confined spaces or lobbies with an area less than 84 m^2 [900 ft^2].

7.4.3.7 Away from balconies and open or glass walkways.

7.4.4 Also the following should be checked and to the extent possible placement of blast resistant trash receptacles should be avoided at or near:

7.4.4.1 Building entrances, exits, and evacuation routes.

7.4.4.2 Overhead utility mains such as water, natural gas and electrical or communication lines.

7.4.4.3 Specialty utility mains such as chilled water, hot water, steam, sprinkler lines or fire hose cabinets.

7.4.4.4 Hazardous material storage or transport lines (for example, gas pipes).

7.4.4.5 Combustible materials.

8. Guidelines for Deployment—Considerations Applicable to Specific Facilities and Venues

8.1 *Transit-Related Facilities and Venues*—For additional guidance on deployment of blast resistant trash receptacles at transit-related facilities and venues, users of this guide should refer to APTA SS-SIS-RP-001-08.

9. Documentation

9.1 Documentation of the deployment of the blast resistant trash receptacles should be prepared describing, at a minimum, the following:

9.1.1 The facility or venue where the receptacles were deployed.

9.1.2 The results of the threat assessment performed when considering the deployment.

9.1.3 The locations of the trash receptacles.

9.1.4 The brand name or names of the trash receptacles.

9.1.5 The physical dimensions, interior volume, and weight of the trash receptacles.

9.1.6 The force protection level at which each of the deployed blast resistant trash receptacles conformed to Specification E2740.

10. Keywords

10.1 blast resistance; building survey; deployment; explosive; facility; fragments; security; trash receptacle; venue