



Standard Practice for Shredder Explosion Protection¹

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1. Scope

1.1 This practice covers general recommended design features and operating practices for shredder explosion protection in resource recovery plants and other refuse processing facilities.

1.2 Hammermills and other types of size reduction equipment (collectively termed shredders) are employed at many facilities that mechanically process solid wastes for resource recovery. Flammable or explosive materials (for example, gases, vapors, powders, and commercial and military explosives) may be present in the as-received waste stream. There is potential for these materials to be released, dispersed, and ignited within or near a shredder. Therefore, explosion prevention and damage amelioration provisions are required.

2. Referenced Documents

- 2.1 *National Fire Protection Association Standards:*
[National Electrical Code](#)
[NFPA 13 Sprinkler Systems](#)
[NFPA 68 Guide for Explosion Venting](#)
[NFPA 69 Explosion Prevention Systems](#)
[NFPA 497A Classification of Class I Hazardous \(Classified\) Locations for Electrical Installations in Chemical Process Areas](#)

3. Terminology

3.1 Definitions:

3.1.1 *deflagration*—an explosion in which the flame or reaction front propagates at a speed well below the speed of sound in the unburned medium, such that the pressure is virtually uniform throughout the enclosure (shredder) at any time during the explosion.

3.1.2 *detonation*—an explosion in which the flame or reaction front propagates at a supersonic speed into the unburned medium, such that pressure increases occur in the form of shock waves.

3.1.3 *explosion*—a rapid release of energy (usually by means of combustion) with a corresponding pressure buildup capable of damaging equipment and building structures.

3.1.4 *explosion venting*—the provision of an opening(s) in the shredder enclosure and contiguous enclosed areas to allow gases to escape during a deflagration and thus prevent pressures from reaching the damage threshold.

3.1.5 *explosion suppression*—the technique of detecting and extinguishing incipient explosions in the shredder enclosure and contiguous enclosed areas before pressures exceed the damage threshold.

3.1.6 *inerting*—the technique by which a combustible mixture is rendered nonflammable by addition of a gas incapable of supporting combustion.

3.1.7 *shredder*—a size-reduction machine that tears or grinds materials to a smaller and more uniform particle size.

4. Significance and Use

4.1 Shredder explosions have occurred in most refuse processing plants with shredding facilities. Lessons learned in these incidents have been incorporated into this practice along with results of relevant test programs and general industrial explosion protection recommended practices. Recommendations in this practice cover explosion protection aspects of the design and operation of shredding facilities and equipment used therein.

4.2 This practice is not intended to be a substitute for an operating manual or a detailed set of design specifications. Rather, it represents general principles and guidelines to be addressed in detail in generating the operating manual and design specifications.

5. Design Practices

5.1 Design Rationale:

5.1.1 Each of the following design features is better suited for some types of combustible/explosive materials and shredders than for others. The selection of a particular combination of explosion prevention features or damage control features, or both, should be made with an understanding of the types of refuse entering the shredder, shredder operating conditions, the inherent strength of the shredder and surrounding structures, and the operating controls for screening input materials and restricting personnel access during shredding operations.

¹ This practice is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.03 on Treatment, Recovery and Reuse.

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