



TechNotes

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Best of NFSA's Expert of the Day: NFPA 13 – Discharge Rules

The NFSA processes over 1,200 informal interpretations a year from its members. This is done through the Expert of the Day (EOD) program, where members ask the industry's top experts questions on fire sprinkler related rules, codes, and standards.

One of the committees within NFPA 13 is the Discharge Criteria Committee. This committee is responsible for the classification of fire hazards and the determination of associated discharge criteria, sprinkler system plans and calculations, and water supplies. This includes the chapters on definitions, general requirements, water supplies, design approaches, the protection of storage, special occupancies, and plans and calculations.

Based on the data collected from the EOD program, as it pertains to the discharge committee's responsibilities, hazard classification and commodity classification generate most of the requests for interpretation. This indicates that these topics are of great interest and in many cases the most fundamental and challenging items to address in NFPA 13.

To that end, the NFSA and our partner organizations agree that determining both the hazard and commodity classification is the role of an engineer. This position can be reviewed in more detail at [Engineer and the Engineering Technician Designing Fire Protection Systems](#).

The engineer is responsible for establishing the objectives and design criteria. This includes classification of the hazard(s), storage arrangements and commodities to be protected, and the design criteria.

Therefore, EOD responses to hazard and commodity classification questions include this statement: *Questions regarding hazard or commodity classification are difficult except in those circumstances where an NFPA committee has specifically addressed the issue. This is especially true because the classification is considered in many states to be the most important aspect of fire protection system design and an obligation of the responsible design professional. One reason many states require the involvement of a responsible design professional is to ensure that the site-specific attributes of the project are recognized and properly addressed, which cannot be accomplished in a generic manner.*

Hazard Classification

NFPA 13, 2022 edition, Chapter 4 provides general requirements and includes the requirements for hazard classification. Hazard classification is based on fuel load and not simply how the space is being used or occupied. It is important to note that the occupancy classifications provided in the standard are to help determine the hazard classification and they are for the sole purpose of determining the sprinkler design. They are based on the normal expected fuel load for that type of occupancy. Unusual or abnormal fuel loading or combustible characteristics should be considered when determining the hazard classification.

The hazard classifications include miscellaneous storage, low pile storage, miscellaneous tire storage, light hazard, ordinary hazard, extra hazard, high pile storage, or special occupancy hazards.

Miscellaneous storage is defined as storage not exceeding 12 ft. in height, not more than 10 percent of the building area or 4,000 ft² of the sprinklered area, not exceeding 1,000 ft² in one pile or area, and separated from other storage piles or areas by at least 25 ft.

Low-piled storage is defined as storage of Class I through Class IV commodities not exceeding 12 ft. and storage of Group A plastics not exceeding 5 ft.

Miscellaneous tire storage is defined as tire storage not exceeding 2,000 ft² and for storage piles on-tread, not exceeding 25 ft. in the direction of the wheel holes.

The associated protection criteria for miscellaneous, low-piled, and miscellaneous tire storage are provided in Chapter 4.

Light, ordinary, and extra hazard are defined based on the quantity and combustibility of the contents as well as stockpile height. The following table provides a summary of this information.

Hazard Classification	Quantity of Contents	Combustibility of Contents	Stockpile Maximum Height	Additional Notes
Light	Low	Low	N/A	
Ordinary Group 1	Moderate	Low	8 ft.	
Ordinary Group 2	Moderate to High	Moderate to High	Moderate 12 ft. High 8 ft.	
Extra Group 1	High	High	N/A	The presence of dust or lint with the probability of rapidly developing fires
Extra Group 2	High	High	N/A	Substantial amounts of flammable and combustible liquids or extensive shielding of combustibles

Annex A for the hazard classification sections, while not part of the requirements of the standard, includes informational and explanatory material. Examples of occupancies are provided for each hazard classification. As noted above, please use caution, as the hazard classification is based on quantity and combustibility of the contents. For example, educational (school) occupancies are included in the annex as light hazard. However, a school could have several spaces that would be considered by the standard as ordinary hazard, such as laboratories, machine shops, commercial kitchens, and automobile parking. High-piled storage is defined as storage arrangements that do not meet the requirements of miscellaneous storage, low-piled storage, or miscellaneous tire storage having storage of Class I through Class IV commodities more than 12 ft. or Group A plastics more than 5 ft. in height. For high-piled storage, the commodity classification and protection criteria are deferred to the storage chapters (20-26).

Special occupancy hazards are defined in Chapter 27. This includes thirty-four defined special occupancies. In many cases, NFPA 13 will reference another NFPA standard for special occupancies. For example, Section 27.10 for laboratories using chemicals refers to NFPA 45. NFPA 45, Chapter 6, provides the appropriate hazard classification.



Commodity Classification

Chapter 20 provides the general requirements for storage and includes the requirements for commodity classification. Commodity classification is based on the types and amounts of materials that are a part of a product and its packaging. This includes not only the actual product being stored,

but also the packaging materials and pallets being used. In many cases it is difficult to determine the appropriate classification and testing may be needed to properly characterize the commodity. When specific test data by a nationally recognized testing agency is available, the data may be used to determine the commodity classification.

Commodity classifications include Class I, Class II, Class III, Class IV, cartoned nonexpanded plastic, cartoned expanded plastic, exposed nonexpanded plastic, and exposed expanded plastic. Plastic commodities are further defined as Group A, B, or C.

Pallets used to carry the loads must also be considered when determining the commodity classification. Section 20.3.2 provides several requirements associated with the type of pallet used and the adjustment required to determine the proper commodity classification. For example, Class I through Class IV commodities using an unreinforced polypropylene or unreinforced high-density polyethylene plastic pallet, are required to have the commodity classification increased by one class.

Class I commodities are defined as noncombustible products directly on wood pallets, in single-layer corrugated cartons, or shrink-wrapped or paper-wrapped as a unit load.

Class II commodities are defined as noncombustible products in slatted wooden crates, solid wood boxes, multiple-layered corrugated cartons, or equivalent combustible packaging material.

Class III commodities are defined as products fashioned from wood, paper, natural fibers, or Group C plastics. They are permitted to contain 5 percent or less by weight of nonexpanded plastic or 5 percent or less by volume of expanded Group A or Group B plastics.

Class IV commodities include:

1. Group B plastics
2. Free-flowing Group A plastics
3. Products that are cartoned, or within a wooden container, with greater than 5 percent and up to 15 percent by weight of Group A nonexpanded plastic or greater than 5 percent and up to 25 percent by volume of expanded Group A plastics
4. A mix of Group A expanded and nonexpanded plastics that complies with Figure 20.4.3.3(a)
5. Exposed, with greater than 5 percent and up to 15 percent by weight of Group A nonexpanded plastic
6. Exposed, with a mix of Group A expanded and nonexpanded plastics and complies with Figure 20.4.3.3(b)

Plastics, elastomers, and rubber are defined as Group A, Group B, or Group C and several examples of each are provided within the body of the standard. Chapter 3 provides the definitions of cartoned,

exposed, and expanded plastics. Additional specific commodity classifications include rubber tires, rolled paper, baled cotton, and cartoned records.

Again, Annex A for the commodity classification sections, while not part of the requirements of the standard, includes informational and explanatory material. Examples for each commodity classification are provided. The annex material cautions users that in actual storage situations, many storage arrays do not fit precisely into one of the fundamental classifications; therefore, the user needs to make judgments after comparing each classification to the existing storage conditions. The annex also identifies several specific commodities that are not addressed by the standard.

It is very common to have a mix of commodities. In this case, mixed commodity storage must be protected based on the requirements for the highest commodity classification. There is an exception that allows up to 10 randomly placed pallet loads of a higher hazard commodity in an area not exceeding 40,000 ft² to be protected based on the lower commodity classification assuming there are no adjacent loads in any direction (including diagonally). The standard also makes provisions to allow mixed commodities to be segregated.

This TechNotes is a quick review of the two most common NFPA 13 Discharge Committee related questions submitted to NFSA's EOD program. The NFSA will continue responding to our members' EOD questions and use this information to improve the codes and standards. The EOD service is a direct member benefit that also improves the entire fire sprinkler industry.



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