

POSITION STATEMENT

CLARIFICATION OF EXISTING HYDROGEN SETBACK DISTANCES AND DEVELOPMENT OF NEW HYDROGEN SETBACK DISTANCES IN NFPA 2

Background

NFPA 2, *Hydrogen Technologies Code* has requirements for separation distances between gas hydrogen systems and outside exposures in Chapter 7 [1]. It also has requirements for separation distances between liquid hydrogen systems and outside exposures in Chapter 8. However, installers of hydrogen systems sometimes encounter exposures that are not defined in the separation distance tables. Installers also find that the wording about some exposures is not clear and needs better definition.

Question

Two questions come from a review of NFPA 2 hydrogen setback distances:

1. How should installers of hydrogen storage systems deal with exposures not defined in Chapter 7 or Chapter 8?
2. How should installers of hydrogen storage systems deal with unclear requirements?

Answer

For exposures not defined in NFPA 2, installers of hydrogen storage systems should use the exposure type closest in nature to a defined exposure distance [1]. This position statement provides recommendations for dealing with undefined exposures and which defined exposures are closest in nature.

For unclear requirements, installers of hydrogen storage systems should use the recommendations in this position statement.

NOTE—All hydrogen storage requirements are now resident in NFPA 2 as of the 2023 edition and are no longer extracted from NFPA 55.

Question	Recommendation
Windows and other building openings are classified as openable or non-openable. What is the difference (i.e., what makes a window or a building opening non-openable)?	An opening is considered non-openable if the window, door, or other opening requires the use of a special key or tool operated by a knowledgeable and trained person. An ordinary window lock or door lock is not sufficient. Openable (or operable) is used to describe doors, louvers, and windows that open, etc. Non-openable (or inoperable) is considered a sealed window that does not open and also applies to pipe or duct penetrations that are sealed.
How should a transformer be treated? Should it be considered ordinary electrical equipment or considered flammable liquid storage because of the oil in it?	It should be treated as ordinary electrical equipment and follow the requirements for electrically classified areas. The amount of oil is small and therefore does not make it a storage system.

Question	Recommendation
How are trees treated?	Distances should be measured to the branch perimeter of the tree. They should be treated as a Group 3 exposure for gaseous hydrogen, which has one separation distance for heavy timber and for ordinary combustibles. They should be treated as a Group 3 exposure for liquid hydrogen and use the separation distances for heavy timber.
Both <u>Chapter 7</u> and <u>Chapter 8</u> have separation distances to parked cars [1]. What type of vehicles should fall under this category?	Any parking space for the general public or an employee who is not familiar with hydrogen or is not planning to work around the hydrogen system shall be located the separation distance away from the system. Non-hydrogen trailers that are dropped off should not be treated as parked cars but should be located based on their contents such as combustible materials.
How should manicured grass and lawns be treated?	Use <u>NFPA 55</u> Chapter 8 (cryogenic storage systems) separation distances to weeds and combustible materials for both gaseous and liquid hydrogen systems [2].
Is there a difference between air intakes and an exhaust? How should they be classified in the context of a wall opening exposure hazard in <u>NFPA 2</u> [1]?	Air intakes are typically under negative pressure as they draw outside air into a ductwork system. An exhaust system is typically under positive pressure as it expels building air to the outside atmosphere. Air intakes are classified as Group 1 exposures for both gaseous hydrogen (<u>table 7.3.2.1.2(B)(a)</u>) and liquid hydrogen (<u>table 8.3.2.3.1(a)</u>) [1]. An exhaust should be treated as a "wall opening (openable)" as the exhaust system can be deactivated thus rendering it as an opening. The exhaust may be considered as a "wall opening (unopenable)" if it has been designed with a high integrity seal that will prevent the migration of hydrogen vapors to the exhaust system and has been deemed acceptable by the authority having jurisdiction.
Neither <u>Chapter 7</u> nor <u>Chapter 8</u> calls out a separation distance to an inert gas storage system such as a liquid nitrogen supply system [1]. How should they be sited?	The inert gas storage system has no specific requirements for setback distances but consideration shall be given to electrical equipment that is a part of the inert gas storage system. Both <u>Chapter 7</u> and <u>Chapter 8</u> specify the electrically classified areas where ordinary electrical equipment is not allowed [1]. Electrical equipment in the inert gas storage system shall be outside of the area limits or be rated for the classified area.
How are distances measured to building openings and to exposures in general?	For building openings, use the actual distance traveled by the gas. The separation distance concept is based on the movement of gases in release conditions. The distances are intended to be guidelines for use in determining the likely safe distance for the various exposures. Barriers are intended to act as flame and heat flux protection for flammable gas fires in a release or flow diversion when any type of hazardous gas is released. In all separation distance cases, barrier walls add to the actual separation distances by creating a longer path between the exposure and the hydrogen storage systems. In some cases, fire barrier walls reduce the required separation distances. For examples, see Figures 1 and 2.

