



Fire Codes

Technical Bulletin 370.05

Purpose

This bulletin provides consulting engineers and facility managers overview of the two Fire Codes in use as of 2018 and an interpretation of their applicability regarding the Halogen Valve System's Terminator and Eclipse emergency shutoff systems for toxic gas cylinders and ton containers.

Background

Every state and county has regulations that provide the standards for the construction of residential, commercial and industrial buildings in their jurisdiction. The regulations involve electrical, plumbing, mechanical and fire prevention codes that all designs and construction must meet. In the preparation of these regulations, the legislative bodies writing the regulations use guide codes that are produced by "model code organizations". These codes have the force of law when adopted. The governing body can adopt one of the two available model codes or modify the code to meet local situations. Of primary interest to those using chlorine, sulfur dioxide, ammonia and other compressed gases are the Building Code and the Fire Code. These two codes provide standards and criteria for the storage and use of toxic or hazardous materials. Chlorine meets the toxic standard while sulfur dioxide and ammonia have less hazardous classifications. The two codes are reissued every three years with supplements published during the intermediate years. Local Fire Chiefs or Fire Marshals have the final say on installations in their region and have been known to provide variances depending on the local needs. Therefore, all local officials should always be consulted regarding the installation of new chlorine,

sulfur dioxide and ammonia facilities or revisions to existing facilities.

History

Fire Codes were expanded in the 1980s to meet the increased use of a wide variety of toxic, highly toxic and hazardous gases. This is particularly apparent in those industries using highly toxic gases such as the semi-conductor industry. There were three (3) Fire Codes developed and issued at that time. They were the Uniform Fire Code (UFC), the Standard Fire Code (SFC) and the National Fire Code (NFC).

By 2001, there was a shuffle in the Model Code organizations. The UFC continued to be produced but combined with the National Fire Protection Association (NFPA). The SFC and the NFC combined with the International Code Council (ICC) to produce the International Fire Code (IFC). Thus there are two codes available today— The UFC and the IFC and these codes as well as the originals differed in their requirements. Original codes and their requirements included the following:

1. The Uniform Fire Code (UFC) was originally published by the International Fire Code Institute of Whittier, California and produced by the Western Fire Chiefs Association, Temecula, California. The UFC has been adopted by and is used primarily in states west of the Mississippi River. The UFC had rigid regulations regarding the use of chlorine. Referred to as "Article 80"; the UFC required "exhausted enclosures" and "treatment systems" (scrubbers) when more than one cylinder was stored or used. In 1994 revisions, exempt amounts of 150-pound cylinders in storage were allowed when sprinklers were included and the enclosure walls had a one-hour fire rating (Table 1). By 2003 UFC allowed

150 lb. cylinders and Ton Containers to be excluded from using scrubbers when Automatic Valve Shutoff Systems were employed.

2. The Standard Fire Code (SFC) was published by the Southern Building Code Congress International of Birmingham, Alabama and produced by the Southeastern Fire Chiefs Association and the Southwestern Fire Chiefs Association. The SFC has been adopted by and is used primarily in states east of the Mississippi River and south of the Mason-Dixon Line. The SFC required treatment systems as identified in the UFC but allowed the use of containment methods using the Chlorine Institute (CI) Emergency Kits A (for 150 pound cylinders) and B (for ton containers) in lieu of scrubbers. The SFC also allowed for storage in sprinkler areas with walls of a one-hour fire rating. (Table 1) The 2003 IFC allowed 150 lb. cylinders and ton containers to be excluded from using scrubbers when Automatic Valve Shutoff Systems were employed

3. The National Fire Code (NFC) was published and produced by the Building Officials and Code Administrators of America (BOCA). The NFC has been adopted by and is used primarily in states east of the Mississippi River and north of the Mason-Dixon Line. The NFC required treatment systems but allowed the use of containment systems including the CI Emergency Kits as well as cylinder "coffins". The NFC also allowed for storage in sprinkler areas with walls of a one-hour fire rating (Table 1). The 2003 the IFC allowed 150 lb. cylinders and ton containers to be excluded from using scrubbers when Automatic Valve Shutoff Systems are employed.

TABLE 1
MAQ Amounts of Hazardous Gases per Control Area
Summary of Uniform Fire Code, 2016 Edition, Chapter 55, Table 55:6.3.1.1
Maximum Quantities per Control Area storage and use combined

Material	Unsprinklered No Gas Cabinet Liquified / NonLiq.	Unsprinklered Gas Cabinet Liquified / NonLiq.	Sprinklered No Gas Cabinet Liquified / NonLiq.	Sprinklered Gas Cabinet Liquified / NonLiq.
Toxics	150 lb. / 810 ft ³	300 lb. / 1,620 ft ³	300 lb. / 1,620 ft ³	600 lb. / 3,240 ft ³



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Note: Although the above was abstracted from the 2016 UFC is also applicable to the IFC and the NFPA. The data is presented only as background to illustrate the development of the Fire and Building Codes as applicable to chlorine, sulfur dioxide and ammonia. Chlorine is considered a toxic gas and sulfur dioxide and ammonia have lower designations.

Table I required definitions for storage and use as follows:

1. Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas with a building used for retail or wholesale sales shall not exceed two. The control areas in buildings with other uses shall not exceed four.
2. The aggregate quantity in use and storage shall not exceed the quantity listed in Table 1.
3. Quantities may be increased 100 percent in buildings with sprinklers.
4. Quantities may be increased 100 percent when stored in approved storage cabinets or exhausted enclosures specified in Chapter 55.
5. 100 lbs. of Chlorine liquid equals 810 Cu Ft of Chlorine gas

Current Status

The 2016 UFC and 2018 IFC Fire Codes still require Treatment Systems like gas scrubbers. Exception: the codes allow emergency containment systems or vessels to be used for storage. For tanks with open valves or in "Use", as it is called, Automatic Shutoff Systems are allowed for Toxic gases like Chlorine gas.

IFC

The 2018 IFC provides an exception to the use of containment systems when gas detectors and automatic valve operators (shut off systems) are provided. The following is an abstract from the current IFC 2018 statements regarding the use of automatic valve closing devices:

From **Treatment Systems** - 6004.2.2.7 – Exceptions to the requirement for a scrubber are allowed in storage or use areas for toxic and highly toxic gases in use - where (there is)

- a) Approved gas detection system with a sensing interval not exceeding 5 minutes.
- b) An approved automatic-closing fail-safe valve located immediately adjacent to cylinder valves.
- c) Treatment systems are not required for toxic gases supplied by portable tanks not exceeding 1,700 lbs. (772 kg.) water capacity. (2,492 lbs. of Liquid Chlorine.)

Comments: The 2018 IFC allows the storage and use of 150 pound cylinders and ton containers without the requirement of scrubbers or other containment systems when an automatic, fail-safe shut off valve is employed in the facility at the tank valve.

Note: The reader is urged to obtain a copy of the current IFC code to ensure the exact wording and to assist in proper system design.

To obtain a copy of the International Fire Code (IFC) use (888) 422-7233 ex 33804 or www.iccsafe.org.

UFC

The 2016 UFC allows the use of toxic or highly toxic gases where treatment systems (scrubbers) or containment systems are provided. However, an exception to the use of these systems when gas detectors and automatic shut off valves is provided. The following is an abstract from the current UFC 2016 statements regarding the use of automatic valve closing devices:

From **Treatment Systems** – 55:7.9.3 - exceptions are provided when (there is)

- a. A gas detection system with a sensing interval not exceeding 5 minutes.
- b) An approved automatic-closing fail-safe valve located immediately adjacent to active container, cylinder valves.

Note: there is no limit either provided or mentioned about the size of the gas container, cylinder or tank.

Comments: The 2016 UFC allows the storage and use of 150 pound cylinders and ton containers without the requirement of scrubbers or other containment systems when an automatic, fail-safe shut off valve is employed in the facility at the tank valve.

Note: The reader is urged to obtain a copy of the current UFC code to ensure the exact wording and to assist in proper system design.

To obtain a copy of the Uniform Fire Code use (800) 344-3555 or www.nfpa.org.

The Chlorine Institute (CI) follows the development of the Fire Codes with an active committee. The committee and its consultant provide technical input regarding the storage and use of chlorine liquid and gas. Some changes that their input has provided include the acceptance of threaded joints for piping of ¾" and 1" rather than welded joints and the removal of the requirement for double walled piping. The Chlorine Institute Manual is an approved American National Standards Institute (ANSI) document. This allows the CI Manual to be cited by the Fire Codes groups in the development of the model codes.



HALOGEN VALVE'S EMERGENCY GAS SHUTOFF - ADVANTAGES

Halogen Valve Systems, Inc. valve closure systems offer the complete answer to the needs published in the 2016 UFC and 2018 IFC. These systems feature the following:

- An electronic automatic valve closure system that is a “close only device” requiring an operator to visit the site after valve closure. The operator will determine the cause of the closure, correct the condition, check the facility, and then manually reset the valve before restarting the system.
- The IFC and UFC recognize and approve automatic shutoff devices for use on cylinders and ton containers valves as a replacement for scrubber systems. Halogen is the leading supplier of these devices.
- A self-contained battery power and computer control system insures operation in the event of an electrical power failure for a minimum of three (3) days.
- Easy installation on existing, industry standard ton or cylinder hardware and can be tested by the operator on-site to assure correct operation.
- No interference with manual valve operation. The chlorine valve can be opened or closed manually with the actuator installed and ready to operate.
- Meets the recommended torque requirement published by the Chlorine Institute for emergency closing of 150 lb cylinder or ton container valves, using patented technology.
- Operating personnel can quickly terminate leaks in valves, flexible connectors and manifolds preventing exposure to personnel or surrounding communities.
- A safety device that can be used, as required in Process Safety Management Programs (PSM) and Risk Management Planning (RMP), to mitigate the impact of chlorine leaks.

Find out for yourself how fast the Halogen Valve Systems' emergency valve actuator will close one or several 150 lbs. cylinders or ton containers. A quick and simple demonstration of the systems capabilities can be arranged by contacting Halogen Valve Systems, Inc. at (877) 476-4222 or calling your local rep/distributor.