

Arlington County Fire Protection Manual

2018 Code Edition

for

Design and Installation Guide

Updated June 23, 2023

Arlington County

Inspection Service Division (ISD)

Department of Community Planning, Housing & Development (CPHD)

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<https://www.arlingtonva.us/Government/Departments/Community-Planning-Housing-Development/What-We-Do>

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CODE AND STANDARD IN FORCE

SUMMARY

Effective July 1, 2018

NOTICE: ALL PERSONS ARE REQUIRED TO CONSULT AND COMPLY WITH THE CODES. USE OF THE CODE REFERENCE PACKAGE DOES NOT EXEMPT THE USER FROM DIRECT USE OF THE CODES.

1. **Arlington County Code Compliance Manual (ACCCM)** current edition. Note that the ACCCM is continuously updated.
2. **Virginia Uniform Statewide Building Code (USBC), Virginia Construction Code (VCC Section 101.1)** 2018 edition, incorporating International Building Code (IBC), published by the International Code Council Inc. (ICC) 2018 with amendments. See <https://www.arlingtonva.us/Government/Programs/Building/Codes-Ordinances/Building/Standards> for more information

Virginia Construction Code 2018 (VCC)

Virginia Fire Code 2018

Virginia Maintenance Code 2018 (VMC)

Virginia Mechanical Code 2018

Virginia Plumbing Code 2018

National Electrical Code 2017 (NEC)

3. **Arlington County Fire Prevention Code**, incorporating the International Fire Code with emendations, and incorporating VA Statewide Fire Prevention Code (SFPC) 2018 <https://codes.iccsafe.org/content/VFC2018>
4. **Elevator Code** ASME A17.1-2016, Safety Code for Elevators and Escalators
5. **Accessibility Code** ICC A117.1-2009, Accessible and Usable Buildings and Facilities.
6. **Referenced Standards:** The following are the principal National Fire Protection Association (NFPA) standards used by Arlington County. This list is not exhaustive of the NFPA standards referenced by the VCC and the SFPC. Please refer to Chapter 35 of the VCC and Chapter 80 of the SFPC for the complete list of referenced NFPA standards.

NFPA 10	(2018) Portable Fire Extinguishers
NFPA 13	(2016) Installation of Sprinkler Systems
NFPA 13D	(2016) Installation of Sprinkler Systems in One and Two-family Dwellings and Manufactured Homes
NFPA 13R	(2016) Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height
NFPA 14	(2016) Installation of Standpipe and Hose Systems
NFPA 17	(2017) Dry Chemical Extinguishing Systems
NFPA 17A	(2017) Wet Chemical Extinguishing Systems

NFPA 20	(2016) Installation of Stationary Pumps for Fire Protection
NFPA 22	(2013) Installation Tanks for Private Fire Protection
NFPA 24	(2016) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25	(2014) Inspection, Testing & Maintenance of Water-Based Fire Protection Systems
NFPA 30	(2018) Flammable and Combustible Liquids Code
NFPA 30A	(2018) Code for Motor Fuel Dispensing Facilities and Repair Garages
NFPA 30B	(2015) Manufacture and Storage of Aerosol Products
NFPA 33	(2016) Spray Application Using Flammable or Combustible Liquids
NFPA 37	(2015) Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 58	(2017) Liquefied Petroleum Gas Code
NFPA 70	(2017) National Electrical Code (NEC)
NFPA 72	(2016) National Fire Alarm Code
NFPA 80	(2016) Fire Doors and Other Opening Protectives
NFPA 92	(2015) Standard for Smoke Control System
NFPA 2001	(2015) Standard for Clean Agent Fire Extinguishing Systems

PERMIT REQUIREMENT RESOURCES FOR MISCELLANEOUS PLAN TYPES

The following table has been provided for reference purposes regarding plan types that do not otherwise appear in this document: <https://codes.iccsafe.org/content/VFC2018>

PLAN TYPE	PRIMARY CODE REFERENCE	FURTHER REFERENCE
Assembly Occupancies	SFPC Section 401.2	See link above
Barbeque Grills	SFPC Section 308.3.1.1	See link above
Bonfires	SFPC Section 307.2	See link above
Candles & Open Flame Decorations	SFPC Section 308.3	See link above
Carnivals & Fairs/Festivals	SFPC Section 108.1	See link above
Controlled Burning	SFPC Section 307.2	See link above
Evacuation Planning	Dependent on Occupancy Type	See link above
Fireworks	SFPC Section 108.1.1	See link above
High-Piled Storage	SFPC Section 3201.2 and 108.2	See link above
Indoor Vehicle Displays	SFPC Section 108.3.5	See link above
Certificate of Occupancy	Arlington County Zoning	https://building.arlingtonva.us/permits/certificate-occupancy/
Portable Fireplaces ¹	SFPC Section 307.4.3	See link above
Recreational Fires	SFPC Section 307.5.1	See link above
Temporary Tents	SFPC Chapter 31	See link above
Blasting	SFPC Chapter 56	See link above

FEES: All fees are calculated per the fee schedule of County of Arlington. This includes work done in the Inspection Services, Systems Testing. Billing rate is per the published fee schedule.

¹SFPC provides a list of requirements, but no specific permit is required.

GENERAL GUIDELINES FOR PLAN SUBMITTALS & DOCUMENTS (Permit Arlington)

A. All Plans and Documents Submitted for Fire Protection Systems, as required by Chapter 9 of the VCC, must be prepared in accordance with the following guidelines:

1. Submitted plans drawn to a scale not less than 1/8 inch = 1 foot.
2. To submit plan for review – go to link: <https://aca-prod.accela.com/ARLINGTONCO/Default.aspx> and <https://www.arlingtonva.us/files/sharedassets/public/building/documents/permit-arlington/upload-plans-and-documents-to-complete-application-submittal.pdf> and follow the instructions. Remember that when the instruction provided on the link contradicts information provided below, the submission must follow the items below as minimum for review.
3. When executing the application for permit, an applicant must provide full description of work that captures the proposed scope accurately, for example - “Fire alarm work” or “Modification of sprinkler system” is not considered an acceptable description of the proposed work.
4. Data packages must be assembled in individual PDF files prior to upload on above link as applicable.
5. Data packages must have an integral cover sheet using the installing contractors’ letterhead noting the project address, complete scope of work narrative and any other pertinent information. This requirement is particularly important for work that does not require a plan or shop drawing.
6. A building “key plan” must be provided on drawings to pinpoint the location in the building of the area shown on that specific drawing sheet.
7. When submitting revised or as-built plans, all revisions must be “clouded” and tagged with a delta designation noting the revision date.
8. When resubmitting plans that have been rejected, the designer or responsible party must submit a narrative noting corrective action taken to address each rejection comment issued by the reviewer.

FIRE ALARM DEVICES AND SYSTEMS

CODE REQUIREMENTS STUDY GUIDE

NOTE: This list **DOES NOT** replace the requirement for everyone to consult and comply with the code. Codes and Standards key:

Virginia Uniform Statewide Building Code 2018 (USBC)
Virginia Statewide Fire Prevention Code 2018 (SFPC)
International Mechanical Code 2018 (IMC)
ASME A17.1 2016 Edition
NFPA 2016 Edition
NFPA 70 2017 Edition

POWER SUPPLY REQUIREMENTS

VCC 2702
NFPA 72, Section 10.6

FIRE ALARM SYSTEMS PLANS AND DOCUMENTS
SPECIFIC REQUIREMENTS

1. All information required by VCC 907.1.2, and NFPA 72, Failure to provide this minimum information will result in a rejection.
2. All submitted fire alarm system plans must be drawn to $\frac{1}{8}'' = 1'$ scale.
3. Submission must comply Chapter 7 of NFPA 72 2016

TENANT FIRE ALARM PANELS IN SINGLE STORY FULLY SPRINKLERED BUILDINGS

The following policy is to be implemented in the case of single-story, fully sprinklered buildings with central station monitoring per VCC 903.4 and tenant fire alarm systems.

1. Sprinkler flow and tamper are to be handled by the base building Digital Alarm Communicator Transmitter (DACT), with signals transmitted directly to the central station per VCC 903.4.
2. Tenant fire alarm panels can pick up a signal from the base building flow switch as an input to their panel. This signal can be used, along with other inputs, to provide an evacuation alarm for that tenant space. In the case of those tenants who have their own central station, they must partition the signals sent to that station and does not trigger base building alarm.
3. Additional devices attached to the tenant fire alarm panel (or DACT), such as smoke detectors (including e.g. elevator recall detectors for a mezzanine elevator), manual stations, duct detectors, can be used to:
 - a. Evacuate the individual tenant space by means of code compliant notification appliances and/or
 - b. Transmit a signal to a listed central station used by the tenant, in order to report the tenant address. Note: The tenant address must be distinguishable in some fashion from the base building address in order for this to be allowed.
4. Fire alarm tenant plans must provide information about the base building DACT; its location and capabilities

GENERAL ANNUNCIATOR PANEL LAYOUT SAMPLE

A Lamp needs to be on the Floor Maps

POWER ON ○ (Green)				
MANUAL STATION	○ (RED)	PENTHOUSE	RED,AMBER	○
SMOKE DETECTOR	○ (RED)	5TH. FLOOR	RED,AMBER	○
(Spare)	(RED)	4TH. FLOOR	RED,AMBER	○
HEAT DETECTOR	○ (RED)	3RD. FLOOR	RED,AMBER	○
ATRIUM SMOKE DETECTOR	○ (RED)	2ND. FLOOR	RED,AMBER	○
ELEVATOR LOBBY/MACHINE ROOM	○ (RED)	1ST. FLOOR	RED,AMBER	○
SMOKE DETECTOR	○ (RED)	CELLAR	RED,AMBER	○
SPRINKLER FLOW	○ (RED)	GARAGE #1 LEVEL	RED,AMBER	○
STANDPIPE FLOW	○ (RED)	GARAGE #2 LEVEL	RED,AMBER	○
FIRE SERVICE LINE	○ (RED)	STAIRWAY A	RED	○
CLEAN AGENT OR PRE-ACTION SYSTEM	○ (RED)	STAIRWAY B	RED	○
KITCHEN HOOD	○ (RED)	STAIRWAY C	RED	○
DUCT DETECTOR	○ (AMBER)	STAIRWAY D	RED	○
VALVE TAMPER	○ (AMBER)			
DRY PIPE HI/LO AIR	○ (AMBER)			
FIRE PUMP RUN	○ (GREEN)	GENERATOR RUN	(GREEN)	○
FIRE PUMP FAULT	○ (AMBER)	GENERATOR FAULT	(AMBER)	○
TROUBLE TROUBLE TROUBLE RESET TEST				
○ (AMBER)	□	○ (KEYED)	○ (KEYED)	○ (KEYED)
LIGHT	BUZZER	SWITCH	SWITCH	BUTTON

The above drawing is a sample: Number of floors, garage levels, etc., may vary. Certain lights may be omitted or additional ones may be needed.

1. Panel to be located at main lobby or in Fire Command Center as applicable.
2. Annunciator shall indicate type of alarm received by device and floor level. Sub-zoning required when floor area exceeds 22,500 square feet.
3. Layout of building will be required for zoning purposes and identification of areas/stairways/risers.
4. Submit sets of plans, riser diagrams, cut sheets, and annunciator panel diagram for approval.
5. Ring back required on trouble and reset switch (if it is not a momentary switch).
6. Sprinkler annunciation shall be by floor and device (sprinkler flow) only. Exception:
 - a. If sprinkler system piping is separated into zones and not cross-connected between zones, and
 - b. Sprinkler system zones coincide exactly with graphic fire alarm zoning.

NOTE: Generators are not mandatory on low-rise buildings. If present, they shall annunciate as above.

FIRE ALARM ACCEPTANCE TESTING

1. **Every fire alarm system shall be 100% pre-tested by the installing contractor or his representative before the inspection service acceptance test begins.** This will help to alleviate multiple retesting and free up more appointment time for other tests to be held.
2. To set up fire alarm acceptance tests, please call 703-228-3846.
3. All fire alarm annunciator panels, control panels, and associated equipment are to be “buttoned up” with no loose wire hanging before the inspection service acceptance test will be conducted. Test area shall have completed painting, carpeting, etc., in final form. Areas with smoke detectors shall be free of dirt, dust, and sanding residue.
4. During testing of the fire alarm systems, the following installers or representatives should be present to assist in testing the fire alarm systems if applicable:
 - a. Fire Alarm installer
 - b. Sprinkler installer
 - c. Elevator installer
 - d. Air handling unit’s installer (duct smoke detector) and Stair Pressurization system installer if applicable
 - e. Fire alarm control panel representative
 - f. Fire alarm panel programmer
5. The acceptance test will not be conducted without approved plans (cut sheets and electrical floor plans, fire alarm sequence of operation, etc.) on site.
6. All permit and test fees shall be paid before the test.
7. The inspection service’s acceptance test will include but is not limited to the following:
 - a. All smoke detectors will be tested with smoke (use approved smoke can, etc.)
 - b. All heat detectors will be tested
 - c. All pull stations will be tested
 - d. All flow switches (i.e., sprinkler, standpipe, and main fire line) will be tested by actual flowing of water. Sprinkler flows will be tested through a test orifice equal in size to the smallest sprinkler orifice in the system. Sprinkler flow retard switch shall be adjusted to no less than 20 seconds retard to avoid false alarms due to water hammer.
 - e. All duct smoke detectors will be tested. Air handling units are to be “running” during duct smoke detector test to witness “shut down” of unit when duct smoke detector activates.
 - f. All smoke removal and stair pressurization systems shall be tested by a Special Inspector per VCC 1708.18. The Special Inspector must be approved by the Building Official.
 - g. Trouble circuits will be “spot checked” periodically during the tests, and the alarm system will be checked with the system in “trouble.”
 - h. Any concealed detector must have a remote, readily visible, red LED light and descriptive label, as close as possible to the actual device location.
 - i. Floor call buttons for elevator shall be tested while elevator is in Phase I and Phase II. Elevator inspector approval must be obtained before testing.
 - j. If the sprinkler system is divided by zone, annunciator of sprinklers will be by floor, device (sprinkler flow), and proper zone.

- k. A high/low air pressure condition in the dry sprinkler system shall set off a supervisory light and a buzzer on the annunciator panel. A separate circuit shall be on the control panel showing high/low air pressure.
 - l. All suppression and detection devices and equipment in the building shall be tied to the alarm system and tested.
 - m. All Digital Alarm Communication Transmitters (Dialers) shall be tested. Approved DACT plans shall be on site for test. UL/FM central station listing documentation is required. Central station shall be online with no alarms or troubles for 24 hours prior to test.
 - n. Generator (if present) shall show fault when turned off or when load side breaker to building is open or experiences any condition that would cause failure under emergency operation. NFPA 110 2016, Section 5.6.5.2
 - o. All ceiling tile, floor covering, and interior finish shall be in place for testing of audibility and visibility. Visual appliance coverage shall be complete. For shell building tests, interior walls shall be prime coated and floors broom swept. When fire alarm tests are to be conducted in occupied buildings, the building shall be posted 24 hours prior to the test to notify the occupants.
 - p. Detection devices shall not be installed until after construction clean-up of all trades is complete. Detectors that are contaminated shall be cleaned or replaced. NFPA 72
 - q. R-2 occupancies with copper loops under breezeways will be required to conduct flow tests from remote points. NFPA 13R, Section 6.5.3
8. All testing equipment (smoke machines, etc.) shall be supplied by the contractor. Where required, UL approved Central Station shall be online, and is part of the Fire Alarm System. Central Station documentation (listing, etc.) is required. The sequence of operation/installation manual shall be maintained on site for the life of the system for inspection by the fire official. For further assistance, please call 703-228-3800
9. **POSTING OF CENTRAL STATION MONITORING COMPANY.** The name, telephone number, and account number of the current central station monitoring company shall be posted and maintained inside the locked Fire Alarm Control Panel (FACP). If the fire alarm system is not monitored, that fact shall be posted inside the locked FACP.

HIGH-RISE ANNUNCIATOR PANEL LAYOUT

THIS IS A SAMPLE ONLY

<u>DEVICE</u> (RED)	<u>LOCATION</u> (RED)
○ Manual Station	○ PH
○ Smoke Detector	○ 20th Floor
○ Heat Detector	*
○ Atrium Smoke Detector	○ 10th Floor
○ Elevator Lobby/ Machine Room Smoke Detector	*
○ Sprinkler Flow	*
○ Clean Agent (or) Pre-Action System	○ 1st Floor
○ Kitchen Hood	○ Atrium
	○ Basement
	○ Cellar
	○ Garage Level P1
	○ Garage Level P2
(YELLOW)	
○ Duct Detector	
○ Standpipe Flow	○ System Trouble (with buzzer)
○ Stair A	
○ Stair B	
○ Stair C	☑ Trouble Silence
○ Fire Service Line	
○ Valve Tamper	☑ Reset
○ Dry Pipe Hi/Lo Air	○ Lamp Test
Fire Pump Remote Start	Stair Door Locks
☑ ON (GREEN)	☑ Unlocked (GREEN)
AUTO (YELLOW)	○ Locked (RED)
○ Fire Pump Run	
○ Fire Pump Fault	
Generator Remote Start	
☑ ON (GREEN)	○ Generator Run
AUTO (YELLOW)	○ Generator Fault
<u>LEGEND</u>	
☑ = Keyed Switch	
○ = Annunciation Light	

1. **The above drawing is a sample.** Fan control panel must be adjacent to this panel and both, plus FACP and VOICE/PAGING/FIREFIGHTER'S PHONE panels, must be in 1-hr rated fire control room or at the main lobby as applicable. See VCC 911 for all equipment, including elevator panel.
2. Maximum annunciation zone size = 22,500 sq. ft. (VCC 907.6.4). Sprinklers zoned by floor only, except for atriums. All sprinklers in atrium must annunciate as atrium sprinklers.

3. Floor, zone and type of device must annunciate, except see Note 2 above.

HIGH-RISE CENTRAL FIRE CONTROL SYSTEMS REQUIREMENTS AND ACCEPTANCE TESTING

I. DEFINITION

- a. In all buildings having floors used for human occupancy which are greater than 75 feet above the lowest level of Fire Department vehicle access. VCC 403, Ch. 2

II. FIRE ALARM AND DETECTION SYSTEMS

- a. All fire alarm and detection systems, fire and life safety system controls and system supervision shall conform to the "High-Rise Buildings" section of the current Virginia Uniform Statewide Building Code (VCC Section 403) and to the referenced editions of applicable NFPA documents, including but not limited to: NFPA 13, 14, 20, 37, 70, 72, and 110.
- b. Manufacturer's installation and testing instructions, where applicable.

III. FIRE COMMAND CENTER

- a. **Construction and Size** — minimum 96 square feet & minimum 8 feet in any direction. See also exceptions, up to 200 sq. ft. VCC 911.1.3
- i. One hour fire barrier with 45-minute label door. VCC 911.1.2
 - ii. Fire command center must be accessed from exterior of the building and have interior door into the building lobby (i.e. two doors). Fire command center location must be approved by the Fire Marshal.
 - iii. Sized to allow minimum of 3 feet working clearance to front of panels. NFPA 70, Section 110.13
 - iv. Clearance at rear and top of panels per equipment manufacturer's recommendations. NEC, Section 110.13
 - v. Provided with adequate ventilation necessary for removal of heat generated by equipment. NEC, Section 110.13
 - vi. Electrical, mechanical, or plumbing equipment other than those associated with the system shall not be located in the Fire Control Room.
 - vii. One copy of approved fire sprinkler and fire alarm plans to be in Fire Control Room.
 - viii. Layout must be approved.
 - ix. Number of master keys in room to be provided – 15 sets for high rise and 7 sets for low rise buildings per Fire Code Officials requirement (contact as necessary).
- b. **Location** VCC 911.1.1
- i. Located near main lobby entrance.
 - ii. Located on an outside wall.
 - iii. Not located next to or adjacent to boiler rooms, transformer rooms, etc.
 - iv. Bulk piping not to be run through Fire Control Room.
 - v. FCC Must have direct entry from outside and direct entry to main lobby (from FCC)

IV. SHOP DRAWINGS AND SPECIFICATIONS

- a. **General (All submissions shall include, but are not limited to the following):**
- i. A set of drawings and specifications shall be submitted for review and approval.
 - ii. All equipment shall be listed by a recognized testing authority for its intended use. The submittal shall include the following:
 1. Name of the Manufacturer, model number, etc. of each device to be installed (materials list)
 2. Specifications on the type of wire to be used NEC 760; NFPA 72, chapter 12
 3. Wiring diagrams, annunciator panel detail, fan control panel detail, voice/paging panel detail
 4. Floor plans showing the location of each device including legend
 5. Operational description of system, including overall program matrix
 6. Any mechanical reference sheets (e.g. riser diagrams, fan schedules, etc.) pertaining to the system
 7. A complete operational description, including volume calculations, for all smoke control and pressurization systems, including a proposed test protocol and testing measurement locations per NFPA 92 2015 and other applicable codes specific to the project
 8. Provide generator load breakdown/summary, and battery calculations
 9. Speaker load calculation (amp and watts etc.)
 10. Initiating device list describing programming number and its location.
 - iii. It is suggested that submittal of atrium or other smoke control design calculations and sequences be submitted prior to or simultaneously with building permit drawings to insure timely feedback to the designer. VCC 909, 404.5

V. CENTRAL CONTROL STATION: ALARM DETECTION, COMMUNICATION AND STATUS INDICATION

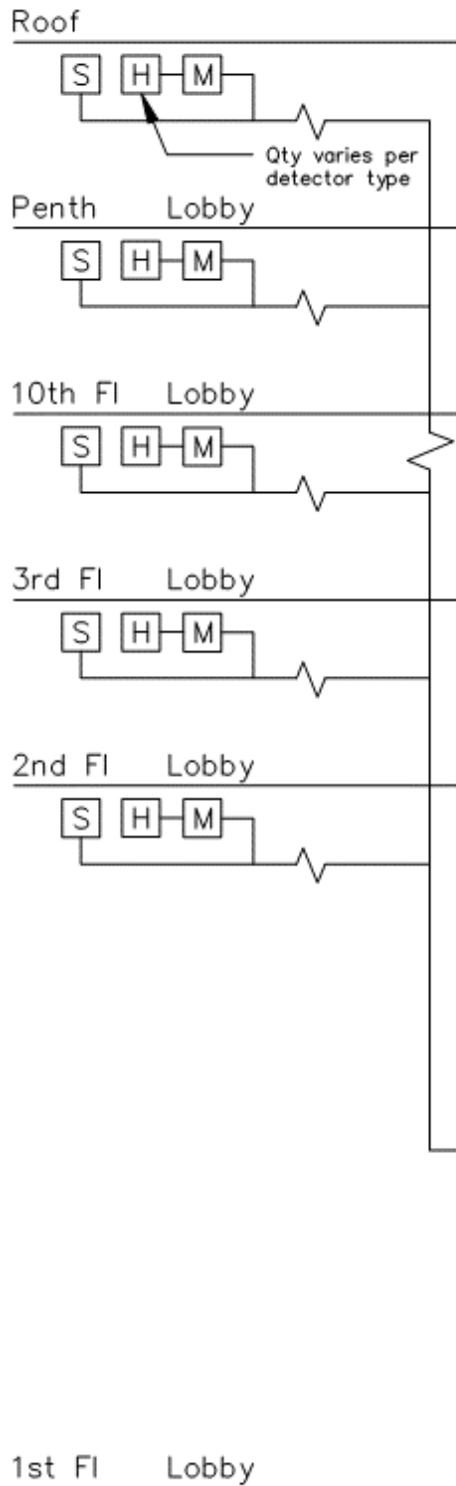
- a. **Receive Fire Alarm Indication and Annunciation From:**
- i. Manual fire alarm stations; NFPA 72, Section 23.8.5.2 and Section 17.4
 - ii. Heat detectors
 - iii. Smoke detectors (by location and zone: elevator lobby detectors and atrium detectors to be on individual zones) VCC 3003.2, 907.2.13
 - iv. Duct detectors; Virginia Mechanical Code (VMC) 606; VCC 907.2.13
 - v. Sprinkler flow switches (atrium sprinkler to be on separate zone); NFPA 72, Section 17.12, and Section 23.8.5.5
 - vi. Supplemental fire suppression systems.
- b. **Receive or Transmit Communications From:**
- i. Firefighter's 2-way telephone (dedicated phones, NOT jacks) VCC 911, 907.2.12.2 if radio system provided, this is not applicable
 - ii. The emergency responders radio coverage per 907.2.12.2
 - iii. Public telephone – in Fire Control Room, line direct to outside VCC 911.1

iv. Voice Alarm and Public Address Systems...VCC 907.5.2.2

c. Receive Status Indication From:

- i. Fire pump (run or fault)...NFPA 20
- ii. Emergency power system (run or fault)...VCC 911.1.6
- iii. Elevators (recalled or not) (status and location)...VCC 911.1.6
- iv. Stairway pressurization system (on, off) ...VCC 911.1.6
- v. Smoke control systems (on, off)...VCC 911.1.6
- vi. Air handling systems (on, off) ...VCC 911.1.6
- vii. Stairway door unlock (open=green, locked=red)...VCC 911.1.6
- viii. The above shall be provided with a status indicator light as follows: ON (green); OFF (red); Elevator emergency recall (yellow)
- ix. The Fire Service Elevator Status information per NFPA 72 section 21.5 on the panel within the Fire Command Center (FCC)
- x. See Panel sample below:

HIGH-RISE FIRE SERVICE ACCESS ELEVATOR STATUS PANEL SAMPLE



Symbol List

[H] Heat Detector Preferred Digital capable (If fixed temp. then provide one for 100F and 135F etc.)

[M] System Monitor Module

[S] Smoke Detector

G – Green

A – Amber

R – Red

Panel Located at
Fire Command Center FCC

Temp./Smoke Status					
	T<100F	100F<T<135F	T>135F	Real Time (Temp)	Smoke (R)
LED Color (G)	(A)	(R)			
Penth.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>
10th Fl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>
4-9 Fl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>
3rd Fl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>
2nd Fl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>
1st Fl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	000.00 F	<input type="radio"/>

d. Receive and Annunciate Supervisory and/or Trouble Indications:

- i. Tamper switches on sprinkler, fire pump and standpipe water control valves (supervisory) NFPA 72
- ii. Duct detectors
- iii. Electrical circuits and wiring
- iv. See Sections A, B, and C above, except public telephone
- v. Voice alarm system and all components
- vi. Standpipe flow switch (trouble light)
- vii. Fire pump flow switch (trouble light)
- viii. Generator (trouble light)
- ix. Hi/Lo air pressure for dry pipe systems (supervisory signal)

e. Operational Controls

- i. Operational controls shall be provided for and located in the Fire Control Room for the following: VCC 911
 1. Voice Alarm and Public Address System.
 2. Firefighter's 2-way communications system
 3. Fire pump (ON, auto only)
 4. Emergency generator (ON, auto)
 5. Stairwell pressurization system (separate controls for each stairwell required) (H-O-A)
 6. Smoke control systems (H-O-A) (separate controls required for each system, on a per floor basis)
 7. Off normal conditions on H-O-As shall sound a trouble buzzer
 8. Air handling systems (separate controls required for each system, on a per floor basis (H-O-A)
 9. Elevators

VI. OPERATIONAL REQUIREMENTS

a. Receipt of Any Alarm Signal Shall:

- i. Initiate a signal to an approved Central Station (or to a proprietary system conforming to NFPA 72). VCC 907.6
- ii. Activate the voice alarm system and the visual fire alarm indicators on the floor level where the alarm was initiated, the floor directly above and below.
- iii. Activate the stairwell pressurization system.
- iv. Activate mechanical smoke control (if provided) on the fire floor, except if signal originates from a manual pull station. (NOTE: Per floor smoke control is often not found today; AHU controls are still necessary.)
- v. If the signal originates from an elevator machine room or elevator lobby smoke detector, activate the elevator recall system. If the primary floor level of return is the floor of alarm origin, the elevators shall be automatically directed to the secondary floor level of return. ASME A17.1, 2016

b. Design and Installation

i. Voice Alarm and Public Address System

1. The alarm and communication system shall be designed and installed so damage to any terminal unit or speaker will not render more than one zone of the system inoperative. VCC 907.6.4. NFPA 72, Section 24.4.2.8.5.1.
2. The system shall be continuously electrically supervised against component failure of the audio path including amplifiers, speaker wiring, switches, and electrical contacts and shall detect opens, shorts and grounds which might impair the function of the system. Both a visual and audible trouble signal shall operate at a location as indicated in Heading VI Section a.1 above.
3. All wiring installation shall be in a manner which will afford the maximum protection against the effects of fire and which will facilitate repair or replacement. NEC 760; NFPA 72
4. The system shall be installed so trouble can be readily detected by floor and device.
5. There shall be a maintained contact push button and visual indicator for each floor level or zone. An "all call" position is also required. Operation shall be by selective basis, i.e., one zone, any combination of zones, or by all zones. One set of maintained push buttons for the fire alarm system and one set for the public address system is required.
NFPA 72, Section 24.4.2.5.6
6. Zones shall be limited to a maximum of 22,500 square feet. In no instance shall a zone encompass more than one floor level. Floors shall alarm on a per floor basis and alarms shall annunciate by floor, zone and device. VCC 907.6.3.
7. Speakers shall be installed in the following locations: elevators, elevator lobbies, corridors, exit stairwells at every 3rd level, rooms or tenant spaces exceeding 1,000 square feet, dwelling units in apartments, and hotel guest rooms or suites.
NOTE:
8. Speakers shall be listed by a recognized testing authority for fire alarm use. Speakers shall provide the sound levels specified in NFPA 72 at all locations in the structure. VCC 907.5.2.1; NFPA 72, Section 23.9, Section 18.4.1, Section 18.4.2, Section 7.4.5, Section 24.3.1, Section 24.4.1.2
9. Wall mounted speakers shall be installed so sound reproduction is in one direction only. In no instance shall corridor speakers be installed so sound reproduction is directed towards the opposite wall. NFPA 72, Section 18.4 (all)
10. Speaker spacing shall be in accordance with the recommendation of the manufacturer, the listing authority, and above all, to provide the required sound reproduction listed above.
11. The pre-taped message shall be: "There is a fire emergency in the building. You are to leave the building by the nearest exit or exit stair. Do not use the elevators." Visual indication that the message is being delivered to the required zones shall be installed at the control panel.
12. Failure of the message for any reason shall cause the fire alarm signal to sound continuously in the required zones until the system has been restored to normal or is silenced at the control panel.

13. The alarm signal shall be the slow whoop signal. The alarm signal shall sound for a maximum of 15 seconds followed by the pre-taped message. Both shall sound alternately in sequence until silenced at the control panel or when the fire alarm panel is restored to normal. There shall be no more than a 5 second pause between the alarm signal and the pre-taped message for each revolution.
 14. Upon activation of any manual alarm or automatic fire detection or suppression device, the fire alarm system shall operate on the floor level of origin, the floor levels directly above and below, in all elevators and in all stairwells. Atriums shall be alarmed as one space, including all levels open to the atrium.
 15. The system shall be designed so the fire alarm signal and pre-taped message may be transmitted to any floor while voice messages are being transmitted to other floors. If the voice instructions are required to be transmitted to any floor, the fire alarm signal and pre-taped message shall automatically restart or continue in the required sequence after the voice transmission is completed.
 16. The microphone for the transmission of voice messages shall be hand-held type.
 17. Alarm tone generators, preamplifiers, power amplifiers and power supplies shall be continuously supervised. Backup units shall automatically provide the required signaling in the event of component failure. NFPA 72, Section 10.19
- ii. Fire Detection and Alarm System Annunciator Panels – Sprinkler Valve and Water Flow Detector Panels
1. Panels may be the graphic annunciator type or labeled device type with adjacent fixed building diagram. No LCD per Arlington Fire Department
 2. Annunciator panel or individual device panels shall clearly indicate the type of initiating device, the floor level of alarm, and the zone (see above Heading VI Section B.1 Item 'f', "Voice Alarm and Public Address Systems"). VCC 907.6.3.
 3. Stairwells shall be clearly shown and labeled on graphic or building diagram. A "YOU ARE HERE" indicator shall be shown and labeled on graphic or diagram. If stairs discharge at other than entrance level, so indicate. The labeling shall be alphabetic (such as A, B, C etc.) not numeric
 4. All manual or automatic fire detection or suppression devices shall be annunciated including the following: Fire alarm manual stations, smoke detectors, heat detectors, elevator lobby smoke detectors, duct smoke detectors, atrium smoke detectors, sprinkler flow switches, standpipe flow switches and tamper switches. VCC 907.6.3.
 5. Activation of any of the above listed devices, with the exception of the standpipe flow switches, duct detectors or tamper switches, shall cause the activation of the stairwell pressurization systems and the fire alarm signal and pre-recorded message to the required zones.
 6. Activation of the standpipe flow switches, fire pump flow switch, or tamper switches shall initiate an audible and visual supervisory signal at the Fire Control Panel and to a central station or continuously staffed station.
 7. All wiring and power supply shall be continuously supervised. Detection of any fault shall initiate a visual and audible trouble signal at the control panel and to a location

8. The system shall be designed and installed so trouble conditions may be readily detected by floor level and/or zone. Visual trouble indicators at the control panel shall indicate type of device.
- iii. Status Indicator for Elevators
 1. Status indicators shall be provided for each elevator car. A green light for normal operations, red light for power off, and a yellow light for emergency recall shall be provided. VCC 911, VCC 3003
 2. Activation of any elevator lobby smoke detector shall initiate elevator recall (Machine Room Detector included). NFPA 72, Section 21.3
 3. The elevator emergency recall system shall be programmed to return all elevators to the main lobby floor level of return. There shall be a secondary floor level of return in the event the primary floor is in alarm. The secondary floor shall be as directed by the inspection service or fire department as applicable for the specific building need or logic.
 4. The elevator emergency controls are to be located at the main lobby. This shall be a three-position switch – normal operation – manual over-ride – emergency recall. It is recommended that an additional control be located in the Fire Control Room which shall have a permanently attached key.
 5. Elevator speakers time out at 30 second.
 - iv. Status Indicators and Controls for the Fire Pump, Emergency Generator, Air Handling Systems, Smoke Removal Systems, Stairwell Pressurization Systems. VCC 911
 1. Status indicators, green light – on, red light – off, and operational controls shall be provided for each of the above in the Fire Control Room.
 2. Where there is more than one system; i.e., air-handling systems, smoke removal systems or stairwell pressurization systems, status indicators and controls shall be provided for each separately, on a per floor basis (H-O-A's) or per stair basis. Labeling shall clearly show any system integrated with smoke control.
 3. Comply section 21.5 of NFPA 72 as applicable
 - v. Stairway Door Unlocking Systems
 1. Controls shall be provided to unlock all stairwell doors simultaneously from the Fire Control Room. No door may be locked in the direction of egress travel except under provisions of VCC 1010.1.9.12 and VCC 403.5.3
 2. Call-out telephones shall be provided inside the stairwell at a minimum of every 5th floor for occupant use. They shall provide direct communication to the Fire Control Room, and to an approved emergency monitoring service. VCC 403.5.3.1
 3. Telephone communication wiring and power supplies shall be continuously supervised for open, short, or ground conditions. Detection of any trouble fault shall initiate a visual and audible trouble signal at the control panel and at the central station.
 4. Stairway speakers do not sound on alarm.
 - vi. Public Telephone

1. A public telephone shall be provided inside the Fire Control Room. The telephone shall not be coin operated. It is suggested that the telephone be an extension of the building owner or management telephone rather than a separate telephone number. VCC 911.1.6 (10)

VII. EMERGENCY AND STANDBY POWER SYSTEMS

a. Standby Power

- i. The following systems or equipment shall be connected to the standby power system:
VCC 2702.2.16, 403.4.7, 403.4.8

1. All fire alarm equipment (b)
2. All stairwell pressurization systems (b)
3. Elevator designated for firefighter's use (a)
4. Emergency lighting and exit lights (b)
5. Fire Pump (b)
6. Smoke Control System (a)
7. Emergency responders radio coverage (a)

ii. Load Acquisition for Standby Power

1. The following systems shall be supplied with standby power within 60 seconds of loss of primary power.
 - a. Firefighter's elevator
 - b. Stairwell pressurization

NOTE: a) for Standby and b) for Emergency power. Stairwell pressurization systems DO require standby power. Likewise, atrium and floor opening smoke control do require standby power. VCC 404.7

b. Emergency power

1. Egress lighting, exit signs, elevator car lighting, emergency voice, fire pump, fire alarm, and door unlocking are emergency systems and shall be supplied with backup power within 10 seconds of primary power failure. VCC 403.4.8; NFPA 72, Section 10.6.7.1

VIII. TEST AND INSPECTION REQUIREMENTS

a. General

- i. No inspection or tests shall be made without approved and stamped plans, and all submittals on the job site.
- ii. Tests and inspections shall be made by appointment only.
- iii. Each component shall be tested.
- iv. Spot checks of the system shall be made while operating on the emergency power system.
- v. A representative of the equipment supplier shall be present during all tests and inspections of the system.

- vi. A sound pressure level meter shall be provided by the contractor for use in testing the system.
- vii. The system shall be pre-tested by the contractor to assure proper operation prior to requesting inspection by the Inspection Service.
- viii. Tests and inspections of the system should commence no later than 30 days prior to anticipated or desired occupancy. Past experience indicates the time required to complete inspections and tests takes four inspectors approximately one week.
- ix. The supplier shall furnish complete operating instructions and personnel necessary to instruct and train fire department personnel in the operation of the system.
- x. Areas with smoke detectors shall be free of dirt, dust, and sanding residue.

AUTOMATIC SPRINKLERS

FIRE SPRINKLER SYSTEM PLANS AND DOCUMENTS SPECIFIC REQUIREMENTS

All submitted automatic sprinkler system plans must show and/or note all information applicable to the submitted design as detailed in 2016 NFPA 13, Section 23.1.3 items 1 through 46. In addition, the following specific information must be shown and/or noted on all plans:

1. Sprinkler head locations / spacing in areas with no gridded ceiling or exposed structure must be fully dimensioned. Fully dimensioned is defined as dimensions from walls to sprinklers (both directions), dimensions between sprinklers on branch lines and dimensions between branch lines. Center-to-center or pipe cutting dimensions may be provided but are not acceptable alternatives to full dimensioning.
2. All areas with exposed construction (no ceiling) must clearly show the location of all structural steel or concrete elements. The size / depth must be clearly noted for each element in addition to the top of joist / beam, joist bearing or top of concrete slab elevation relative to the floor / level.
3. All areas with exposed construction (no ceiling) must clearly show the location of all mechanical duct work / plumbing pipe, electrical conduit / cable trays and lights. The size, diameter, depth and/or width must be clearly noted for each element in addition to the finished top or bottom elevation for each relative to the floor / level.
4. Finished ceiling articulation must be captured clearly through notation on the floor plan and/or section views where necessary. Of particular note will be “cloud ceilings” and any ceiling openings.
5. Sprinkler relocates shall be piped from existing original branch line tee outlets or branch line weld-o-lets. Compound relocates (new relocate piped from existing relocate piping) are not permitted **without supporting hydraulic calculations**.
6. Where flexible drops are proposed to supply added or relocated sprinklers, the designer must submit hydraulic calculation support with number of bends used for installation.

FIRE SPRINKLER SYSTEM HYDRAULIC CALCULATIONS SPECIFIC REQUIREMENTS

1. Generally, sprinkler installations / modifications in areas built-out with “cloud ceilings” will require hydraulic remote area calculation support showing sprinklers above and below

the cloud ceiling flowing simultaneously. In order to avoid unnecessary construction delays where “cloud ceilings” are encountered, the designer should contact the reviewing Fire Protection Engineer (FPE) prior to the submission of plans to determine whether hydraulic calculation will be required for each instance. The FPE will accept e-mailed .pdf format plans of the area in question and will effort a response within 2 business days, workload dependent.

2. Each submitted floor plan for all new construction (includes tenant fit-ups) requiring hydraulic calculation must be annotated with a finished floor elevation provided on approved architectural plans or an elevation in feet relative to (above or below) a “zero” elevation at the finished floor where the water service enters the building.

FIRE SPRINKLER SYSTEM TENANT AND EXPRESS PLANS SPECIFIC REQUIREMENTS

Each submitted express and take-in plan sheets for tenant modifications to existing automatic sprinkler systems must be annotated using the following information boxes:

<u>BASE BUILDING REFERENCE DRAWING</u>
Original Contractor: ABC Sprinkler, Inc.
Drawing Sheet Number: 2 of 6 etc.
Drawing Sheet Title: Second Floor Piping Plan, etc.
Drawing Sheet Date / Approval Date: 5-29-1978 / 6-23-1978 etc.

(Note: Information shown in boxes is for example only)

<u>BASE BUILDING SYSTEM HYDRAULIC DESIGN</u>
Design Standard Year: NFPA 13 1976 etc.
Hazard Classification: Light etc.
Design Density Remote Area: .10 1500 s.f. etc.
Calculated Spacing and Minimum Flow: 196 s.f. 19.6 gpm etc.
Sprinkler Type and Response: Recessed Pendent Standard Response etc.
Sprinkler K Factor: 5.6 etc.
Calculated Line Sizing: 1” - 1” - 1¼” - 1¼” - 1½” etc.

Tie-In | Feed Main Sizing: 2½” 2” etc.

Calculated Safety Factor: 11.5 psi etc.

(Note: Information shown in boxes is for example only)

Failure to provide these boxes in itself will not constitute a rejection. If however an archived approved base building plan of the commensurate area cannot be located within one-half hour to verify the submitted design, the submission will be rejected and the designer will be required to provide ALL the information shown above.

SPRINKLER SYSTEM WATER SUPPLIES

Effective October 1, 2020, all automatic sprinkler hydraulic designs submitted to this office shall provide:

1. Copy of the flow test data and hydrant map for an on-site hydrant which is connected to the water supply main for the building's sprinkler system and is provided by and attested to by the water supplier to the site concerned, with the date of the flow test. If an on-site hydrant is not available for the test, the closest available hydrant (whether existing or proposed) shall be used. The hard copy may be a print-out of the e-mail from the water supplier. In addition to the flow test data an adjusted water supply information must be shown on the sprinkler drawings. The test data must be of within one year.
2. Elevation and street location of the test hydrant.
3. An adjusted water supply curve for the test hydrant based on the low hydraulic grade line (H.G.L.) as provided by the water supplier (if applicable). High and low hydraulic grade lines shall be obtained from the water supplier and shall be referenced to a specific date. Adjustment of the water supply curve at the test hydrant by use of the low hydraulic grade shall consist of adjusting the entire water supply curve by subtracting the elevation of the test hydrant from the low hydraulic grade, converting the difference to psi, and if the psi values obtained from the flow

WATER SUPPLY CALCULATION EXAMPLE

Flow Test: Static (S) = 97 psi, Residual (R) = 30 psi, Flow (Q) = 800 gpm, Test elev.
= 400 feet

Low H.G.L. = 600 feet

$600 \text{ ft} - 400 \text{ ft} = 200 \text{ ft} (0.433) = 86.6$ or 87 psi (adjusted S) 97 psi

$- 87 \text{ psi} = 10 \text{ psi}$ (pressure difference)

$30 \text{ psi} - 10 \text{ psi} = 20 \text{ psi}$ (adjusted R)

Hence use S =87 psi, R = 20 psi, Q = 800 gpm as the adjusted water supply curve at the test hydrant location.

Note: for all new construction with a fire pump, flow test data must also be adjusted to show the maximum expected pressure using the High H.G.L. elevation reported by the water supplier.

test (static and residual) are greater than the low hydraulic grade, dropping the test hydrant water supply curve to the level of the low hydraulic grade.

4. A combined curve graph of the water supply for new construction with a fire pump. The combined curve must include a graph of the flow test, the adjusted water supply curve, the fire pump curve, and the fire pump combined discharge graph based on the adjusted water supply.
5. Effective October 1, 2020 the safety factor below the adjusted water supply curve for **all design shall be minimum of 10 psi**

Please note: The additional 5 psi for fire pump supplied installations will account for new requirements in NFPA 25 (2008 Edition and later) allowing fire pump performance to drop to 95% of the fire pump rated pressure at the rated flow.

These safety factors may not necessarily accommodate all potential increases in water supply requirements due to tenant fit outs. Final responsibility for long-term and short-term system adequacy rests with the designer/contractor/installer.

STANDPIPE CALCULATIONS AND FIRE HOSE VALVES

Standpipe calculations must be performed in accordance with the requirements of VCC 905 and NFPA 14:

1. Calculations for sizing the supply piping to standpipes must be performed in accordance with NFPA 14, Section 7.10.1.1 and Section 7.10.1.2. A minimum flow of 500 gpm is required for the first riser and 250 gpm for each additional riser up to 1250 gpm. (1000 gpm for fully sprinklered buildings.)
2. A minimum residual pressure of 100 psi must be maintained at outlet of the hydraulically most remote 2½" hose connection on each standpipe riser while flowing the minimum quantities of water required in NFPA 14. The fire department's hose is to be supplied by the pumper with the following pressures and flows at the Siamese connection: 200 psi @ 0 gpm, 199 psi @ 750 gpm, 150 psi @ 1250 gpm. For buildings over 150' in height, standpipes must be supplied by an on-site fire pump in compliance with VCC 905.2. Where pressures in excess of 175 psi are encountered at any point in the system, plans and specifications must show the use of listed high-pressure fittings.
3. Sprinkler and standpipe calculations must take into account the low hydraulic grade line for the site, generate a total demand within the limits of the water supply curve, and comply with requirements for Sprinkler System Water Supplies detailed in this package.

FIRE PUMP CALCULATIONS

In all buildings requiring fire pumps, hydraulic calculations shall be submitted to prove that sufficient pressure will be available at the time of the fire pump test. The calculation shall prove that not less than 20 psi is available at the suction flange of the fire pump while the pump is operating at 150% of its rated capacity (per Virginia Department of Environmental Quality requirements for public water supply). Fire pump calculations must take into account the low hydraulic grade line (if applicable) for the site and demonstrate the safety factor requirements for Sprinkler System Water Supplies detailed in this package have been met.

Hydraulic calculations shall be submitted for all fire pumps installed in buildings over 150' in height to demonstrate that minimum pressure and flow rates will be achieved in accordance with the requirements of VCC 905 and NFPA 14, when applicable, as detailed in this package.

Where pressure reducing / regulating valves (PRVs) are installed, the high hydraulic grade line must also be taken into account (if applicable) when performing hydraulic calculations.

PRESSURE REDUCING/REGULATING VALVES STANDPIPE HOSE OUTLETS

The following policy is adopted to define the type of fire hose pressure reducing valves to be installed in Arlington County. NFPA 14, Section 7.2.3.2

Pressure reducing / regulating fire hose valves shall be capable of delivering a residual flow pressure between 150 psi to 170 psi, at 250 gpm. This standard shall be applied to all Class I and III systems.

Pressure reducing / regulating fire hose valves shall be capable of external adjustment to higher pressures by the fire department. The external mechanism for reducing or regulating shall be capable of being removed completely, allowing the fire hose valve to function fully open. Installation of pressure reducing/regulating valves shall not occur until:

1. Approved by the Inspection Services (CPHD)
2. Certification is received from the manufacturer on testing and pressure settings using 1³/₄" hose with a 100 psi tip pressure.
3. Valves are tested on site by the installing contractor and witnessed by the systems testing personnel from the Inspection Division.
4. Valves, once adjusted and approved, shall be fixed with a plastic break-away seal. This seal shall contain the date of test, valve identification and contractor conducting test. Once installation has occurred, the installing contractor shall forward a report to the Inspection Division with valve identification (i.e., numbering system), set points, location and floor level.
5. Valves shall be inspected visually each year to ensure that the settings have not changed and there is no damage to the valves. A flow test is required every 5 years per NFPA 25. If there is a question due to damage, change of settings, missing tag, etc., the valve shall be removed and retested. The retest shall be witnessed by the Inspection Division personnel.

ELEVATOR HOISTWAYS AND MACHINE ROOMS FIRE PROTECTION SYSTEMS

The following discussion is intended to clarify requirements for removing electrical power from elevator machinery prior to automatic sprinkler activation. In the interest of brevity this discussion assumes that automatic sprinkler protection is required and has been installed in the elevator pit, elevator hoistway and elevator machine room.

I. APPLICABLE CODES AND STANDARDS

1. Virginia Uniform Statewide Building Code (VCC) 2018 Edition, 3005.5 and 3005.7. ASME A17.1 2016 Edition section 2.27.3.2
3. NFPA 13 2016 Edition, Section 8.15.5
4. NFPA 72 2016 section 21.3 through 21.5 the Fire Service Elevator

II. AUTOMATIC SPRINKLER PROTECTION

1. Provide and install listed sprinkler that is applicable based on the ambient condition of the space, such as in the elevator pit, at the top of the hoistway, and in the elevator machine room. It is to note that for the Highrise building taller than 120 ft. must comply VCC section 3007 for fire service access elevator requirements to its entirety and further note that the building code precedes NFPA requirements where there is a contradiction between the codes.

III. FIRE ALARM PROTECTION

A. Heat Detectors

- a. Provide and install a listed temperature heat (less than 10 degree of the selected sprinkler temperature) detector within 24 inches of each sprinkler installed in the elevator pit, at the top of the hoistway and in the machine room.
- b. These heat detectors are part of the building fire alarm system and will be connected directly to the shunt trip disconnect(s) to the affected elevator(s).
- c. Activation of these heat detectors will disconnect power to the affected elevator(s).
NOTE: The fire alarm system supervises the elevator power circuit as well as the initiating device circuit.

B. Smoke Detectors

- a. Provide and install listed smoke detectors in the elevator machine room, control space, or control room.
- b. Provide and install listed smoke detectors in the elevator hoistway ONLY when automatic sprinklers are present, or the smoke detector is used to activate a hoistway vent.

C. Additional Notes

- a. See NFPA 13, Section 8.15.5.2 and Section 8.15.5.6 which allow omission of automatic sprinkler protection at the bottom of the elevator hoistway (pit) and the top of the elevator hoistway respectively.
- b. In no case shall automatic sprinkler or fire alarm protection be omitted from elevator machine rooms.
- c. Machine-room-less elevator installations (elevator machine is located within the elevator hoistway) shall be protected with automatic sprinklers as a machine room in accordance with VCC 3005.7.

HYDROSTATIC TESTING OF SPRINKLER TENANT WORK

A. Gauges Used in Performing Acceptance Tests on Fire Suppression Systems Witnessed by the Inspector Must Meet the Following Criteria:

- a. The gauge shall be appropriate for the type of test, i.e., air gauge for an air pressure test, a water gauge for a hydrostatic test.
- b. Air gauges shall have increment markings of 2 pounds or less. Water gauges must have increment marking of 10 pounds or less.
- c. The gauge shall be capable of registering pressures above the minimum pressures required during the test. The pressure registered during the actual test shall be at least the minimum required for the test and less than the maximum of the gauge register.
- d. Gauges must be listed by recognized testing laboratories such as by UL and/or FM testing laboratories etc.
 - i. All new piping shall be hydrostatically tested.
 - ii. All standpipes shall be flushed (prior to charging or connection to floor system).
- e. Where sprinkler heads only have been replaced, visual inspection with approved cut sheets is the only requirement, i.e., defective, corroded ordinary heads that have been replaced with quick response heads.

FIRE PUMP/STANDPIPE TESTING AND RETESTING

A. Fire Pump/Standpipe Testing and Retesting

- a. All fire pumps will be acceptance tested in accordance with NFPA 20. All controllers shall be signed off by the electrical inspector per NFPA 20, Section 10.3.4, and NEC-11 695 prior to the acceptance test.
- b. Prior to the fire pump acceptance test, all hydrostatic tests for shell building piping shall be completed.
- c. All fire pump test gauges shall be approved (UL/FM) type or on-site documentation of calibration must be provided. NFPA 20, Section 14.2.6.1.2
- d. Standpipe flow test will be done in those buildings having standpipes at the time of fire pump acceptance testing. Gauge must be provided at the top of standpipe riser per NFPA 14, Section 5.5.1. It is the responsibility of the contractor to provide all hoses and equipment needed and to make acceptable arrangements for disposal of the water released.
- e. Manufacturer acceptance test shall be available at all time inside the cabinet of the fire pump controller.

SITE PLAN / SUBDIVISION REVIEW CHECKLIST

The following checklist is provided to serve as a general guideline for the purpose of identifying major items of review by the Inspection Services of the Arlington County CPHD Office as required by the Arlington County Department of Environmental Services (DES).

Department of Environmental Services (DES)
Virginia Uniform Statewide Building Code, 2018 Edition (VCC), Virginia Construction Code (VCC) and
Virginia Statewide Fire Prevention Code, 2018 Edition (SFPC)

BUILDING PLAN

1. Submitter name, address, telephone in full..... VCC 109.2
2. Building name, address in full..... VCC 109.2
3. County site plan number (if any)
4. Type of construction – VCC classification
5. Use Group – VCC classification
6. Number of stories
7. Building height in feet
8. Footprint area of building.
9. Gross floor area of building
10. If fire walls are to be built, label on plan with hour rating
11. State on plan if building is to be sprinklered, in full or partial
12. If sprinklered, show fire department Siamese connection(s), fire line locations, and size of pipe (with correct valve arrangement)
13. Fire hydrants to be shown on site plan, water mains to be shown and size of pipe labeled
14. Provide available fire flow at 20 psi and state source of information with detail as applies

EMERGENCY VEHICLE ACCESS

- 1. Adequate emergency vehicle access, turning radii.....SFPC 503.2.4
2. Fire lanes to be labeled for curb painting and signage SFPC503.3
3. Buildings more than 30 ft. high need aerial ladder truck access.....D105.3SFPC
4. Dead-end fire lanes greater than 150 ft. require a turnaround.....D103.5 SFPC
5. Emergency vehicle access to within 100 ft. of main entrance to every building
6. Height restrictions blocking emergency accessSFPC503.2.1 (low overhead like canopy) Minimum clearance required 13'-6"
7. Multi-story parking structure obstructions to access,SFPC503.1.2 also design live load to carry weight of fire department vehicles (83,000 pounds)

FIRE HYDRANT (FH) COVERAGE AND LOCATION

- 1. The Fire Hydrant to be within 75 feet from the FDC
2. FH coverage: Measured from the hydrant to the most remote point of vehicular access on the site, via the vehicular travel path:
Industrial building and warehouse250'
Schools, day care centers 300'
Offices, commercial, church, hospital, nursing home 350'
Apartments, multi-family dwellings 350'
Single family dwellings 500'
4. Dead-end water main to FH distance per DES:
6" (150 mm.) line 380 ft. max.distance
8" (200 mm.) line 1550 ft. max.distance
10" (250 mm.) line 4600 ft. max.distance
12" (300 mm.) line 11,150 ft. max.distance TBD by DES

Note: It is recommended to check DES for further information prior to design

- 5. No obstructions within 3 feet of hydrant and the FDC.
6. All fire hydrants and water mains located in or on parking structures shall be protected from freezing (Use of heat tape is limited and can be applied case by case basis with approval by fire protection engineer of the County)
7. FH location for single family dwellings:.....DES
• lot line and/or
• curve of pavement
8. Siamese located on street front, address side of buildingSFPC
9. Siamese connection visible, accessible (no obstructions within 10 ft.)
10. Water supply must be available as soon as combustibles present on site

HEIGHT AND AREA CHECK

- 1. VCC Tables 504.3, 504.4, and606.2 height and area check VCC503

FIRE FLOW

- 1. Adequate fire flow (at 20 psi) to be available on site DES

2. Fire line properly sized DES

FIRE LANE DESIGNATION

1. Appropriate signage and curb markings indicated on all plans SFPC 503(all)

FIRE LANES STANDARDS FOR PLANS REVIEW AND SITE INSTALLATION

Posting and marking of fire lanes was required for all sites regardless of Use Group classification. Under Fire Prevention Code, the Inspection Service Office is authorized to designate fire lanes on public streets and on private property where necessary. This is to prevent parking in front of or adjacent to fire hydrants and to provide access for firefighting equipment. Additional areas may be designated as fire lanes as conditions warrant. Markings and signs are to be provided by the owner or agent of the property involved. Parking or otherwise obstructing such areas is prohibited.

FOR EXISTING PROJECTS, fire lanes will be designated at the request of the property owner, or agent, or if conditions warrant. The owner will be required to submit scaled site plan drawings for designation by the Inspection Service Office.

FOR NEW PROJECTS, fire lanes will be designated during site plan approval. All fire lane information must be applied in a clear and orderly manner to the original drawing. All fire lanes must be shown on a site plan that is part of the site plan submittal set and all sets must have the fire lane plan included. The site plan scale can be no smaller than 1 inch = 30 feet. Street names and building addresses are to be shown. Plans submitted must indicate fire lanes designated in accordance with Fire Prevention criteria. A summary of the information necessary to create fire lanes acceptable to Arlington County Fire and Rescue follows.

I. FIRE LANES

A. General

1. Fire lanes shall be installed where required by the Inspection Service Office and in accordance with Appendix D of 2018 IFC (plus check any local amendments)
2. Fire lanes shall be marked with both sign and curb delineation per Headings V and VI below. All fire lane markings, locations and types of signs, etc., shall be subject to approval by the Fire Marshal's Office.

II. HYDRANTS

A. General

1. Parking is prohibited within 15' of a fire hydrant located along the curb line or edge of any public or private roadway. No special curb marking is required for enforcement.
2. Fire hydrants installed in parking lots are to be located within a fire lane. Curb and/or roadway marking are required in accordance with Headings V and VI below.

III. FIRE LANE PLANS REVIEW CHECKLIST

The following checklist is provided to serve as a general guideline for the purpose of identifying major items of review by the Inspection Services Division.

USBC/VCC = Virginia Uniform Statewide Building Code / Virginia
Construction Code, 2018 Edition

A. Building Data

1. Submitter name, address, telephone number, in full
2. Building name, address in full
3. County site plan number – if any
4. Number of stories
5. Building height in feet
6. If sprinklered, show fire department Siamese connection(s) (FDC), fire- line locations and size of pipe labeled (with correct valve arrangement)
7. Fire hydrants to be shown on the site plan, water mains to be shown and size of pipe labeled

B. Fire Lane Designation

1. Appropriate signage and curb markings indicated on all plans

IV. NOTICES TO APPEAR ON SITE PLANS

A. The following Notices Must Appear on the site plans

1. The Inspection Service Office field inspection is necessary for final approval of fire lanes. Fire lanes must have final approval prior to request for occupancy permit.
2. Owner shall notify the Inspection Service Office, call 703-228-3846 when fire lanes have been installed.

B. The Following Notices will be shown on the Site Plans as Required

1. To be an all-weather surface designed to support fire department vehicles.
2. To be identified as a fire lane at entrance.
3. To be maintained clear and accessible all year.
4. To have a mountable curb at entrance.
5. Provide manufacturer's specifications and installation instruction for items used in access lanes to the Inspection Service Office for approval prior to installation.
6. Access lanes must be clearly delineated for entire length and at ends by shrubs, lights, etc.

V. SIGN SPECIFICATIONS

A. Approved Fire Lane Signs Must Meet the Following Specifications

1. Sign Details

- a. Metal construction 12 inches by 18 inches.
- b. Red letters on reflective white background with $\frac{3}{8}$ -inch red trim strip around entire outer edge of sign. Lettering on sign to read: "NO PARKING OR STANDING FIRELANE"
- c. There shall be a one inch spacing between lines "No Parking" and "or". There shall be a one inch spacing between the lines "or" and Standing". There shall be a three-inch space between the lines "Standing" and "Fire Lane". Lettering size to be as follows:

STANDARD WORDING

"NO PARKING"	(2 inches)
"OR"	(1 inch)
"STANDING"	(2 inches)
"FIRE LANE"	(2 ½ inches)

- d. Arrow (if required) shall be 1 inch by 6 inches with a solid head 1 ½ inches wide by 2 inches deep.

2. Sign Types

SIGN TYPE "A"



Figure 503.3.1.2.1

Standard wording with an arrow at bottom pointing to the right. One sign mounted parallel to the line of curbing or pavement edge at the end of the painted area.

See Figure 503.3.1.2.1 Above

SIGN TYPE "C"



Figure 503.3.1.2.2

Standard wording with an arrow at bottom pointing to the left. One sign mounted parallel to the line of curbing or pavement edge at the end of the painted area.

See Figure 503.3.1.2.2 Above

SIGN TYPE "D"



Figure 503.3.1.2.3

Standard wording with no arrow. Two signs, back-to-back, mounted perpendicular to line of curbing or pavement edge. To be seen from either side. Located every **100 feet** in long stretches of a marked, painted fire lane.

See Figure 503.3.1.2.3 Above

3. Sign Posts

- a. Posts for fire lane signs shall be metal and securely mounted.

- b. Signs shall be located and spaced as shown on the approved plans.
- c. In long stretches, the maximum distance between fire lane signs shall be **100'**.
- d. Fire lane signs are to be mounted 7' above the finished grade to the bottom of the sign.

VI. CURBS AND PAINTING

A. All Curbs or Paved Spaces Designated as Fire Lanes

1. Shall be indicated by yellow (highway grade) paint as approved by the fire code official.
2. In areas without curbing, a 6" wide yellow stripe shall be applied to the edge of the pavement.
3. The property owner or designee shall repaint whenever the paint begins to fade or when directed by the fire code official.

VII. EMERGENCY OPERATION FOR GATES AND BARRICADES

A. Gates and Barricades Must Meet the Following Specifications

1. In accordance with SFPC 503.6.1, gates and barricades that are installed across a fire apparatus access road that is normally intended for vehicular traffic shall be installed with a fire department access system which has an emergency override fire department masterkey switch as approved by the fire official.
2. Gates and barricades shall be maintained operational at all times.

UNDERGROUND FIRE MAINS / FIRE LINES

STANDARDS FOR INSTALLATION AND TESTING

The provision of adequate water supplies and distribution systems for fire suppression is the basic component of risk reduction. The purpose of this guideline is to provide the basic information necessary to meet minimum requirements for the design and installation of private hydrant and/or sprinkler supply underground piping in accordance with the provisions of the 2018 Virginia Statewide Fire Prevention Code (SFPC), the 2018 Uniform Statewide Building Code (VCC) and the 2016 editions of NFPA 24, NFPA 13, NFPA 13R, and locally adopted amendments to these codes. This guideline is not applicable to underground piping serving fire sprinkler systems designed in accordance with 2016 NFPA 13D and some systems designed in accordance with 2016 NFPA 13R.

This guideline is provided to assist the contractor, owner, developer/builder with assembling a comprehensive set of plans that will result in their project moving smoothly through the building review process in the least amount of time. This checklist contains the minimum standard information required for a project submitted for the plan review of Fire Service Mains.

Plans sets submitted without the minimum information listed below cannot be accepted for review. This publication does not replace, nor supersede, any provisions of the Fire Prevention Code or other codes and/or ordinances adopted by Arlington County.

A. General (All submissions shall include, but are not limited to, the following):

1. An electronic copy of drawings in PDF format with all supporting data shall be provided with permit application for review of the system prior to installation.
2. All installation and testing shall be conducted per NFPA 24 and NFPA 13.

3. Provide a copy (PDF) of the approved stamped site plan showing the location of the fire line.
4. The project name and address shall be clearly indicated on all plans.
5. Provide Designer and Company name with phone number.
6. Provide data cut sheets of all piping material per NFPA 24.
7. Provide data cut sheets of joining of piping and fittings per NFPA 24.
8. Show on the drawing all joint restraints per NFPA 24. Restraint is required on all tees, plugs, caps, bends, reducers, valves, and hydrant branches per NFPA 24.
9. Provide detailed diagram of the restrained joint system, per NFPA 24.
10. Provide detailed diagram and calculations for thrust blocks per NFPA 24.
11. Plans shall clearly indicate the method of providing corrosion protection for bolted/threaded assemblies, retaining rods, clamps, and other restraining devices. NFPA 24.
12. Provide detail of rods used for restraint, shall be sized in accordance with NFPA 24.
13. Specific detail(s) shall be provided for pipe material transitions, changes in pipe connections (slip joint, fixed flange, mechanical joints, mega-lug joints) per NFPA 24.
14. Provide a detail showing connection to the fire protection system per NFPA 24.
15. Pipe shall not be run under buildings per NFPA 24, unless exceptions are met per NFPA 24. Provide illustration where pipe must be run under buildings, special precautions shall be taken, including the following arching the foundation walls over the pipe, running pipe in covered trenches, or providing valve to isolate sections of pipe under buildings.
16. Electrical ground wires shall not be connected to underground fire line. NFPA 24
17. Illustrate the depth of Cover of the fire lines from the top of the pipe in accordance with NFPA 24, Section 10.4.
18. The fire main sizing and calculation for each proposed private fire service main shall be submitted for approval by the Arlington County ISD.
19. Each calculation shall be performed, sealed, and signed by a professional fire protection engineer registered in Commonwealth of Virginia.
20. Each calculation package shall include supporting documents showing the following:
 - a) Most recent (within one year) water flow information issued by the Arlington County DES
21. A Civil Site Plan.
 - a) Prepared, sealed and signed by a professional Civil Engineer registered in Commonwealth of Virginia
 - b) Showing proposed routing of the private service main
 - c) Elevation of the location where the water flow information was taken
22. Enlarge drawing of the fire sprinkler room.
 - a) Showing the fire pump and/or sprinkler riser manifold
 - b) Indicating the elevation of the finished floor of the room

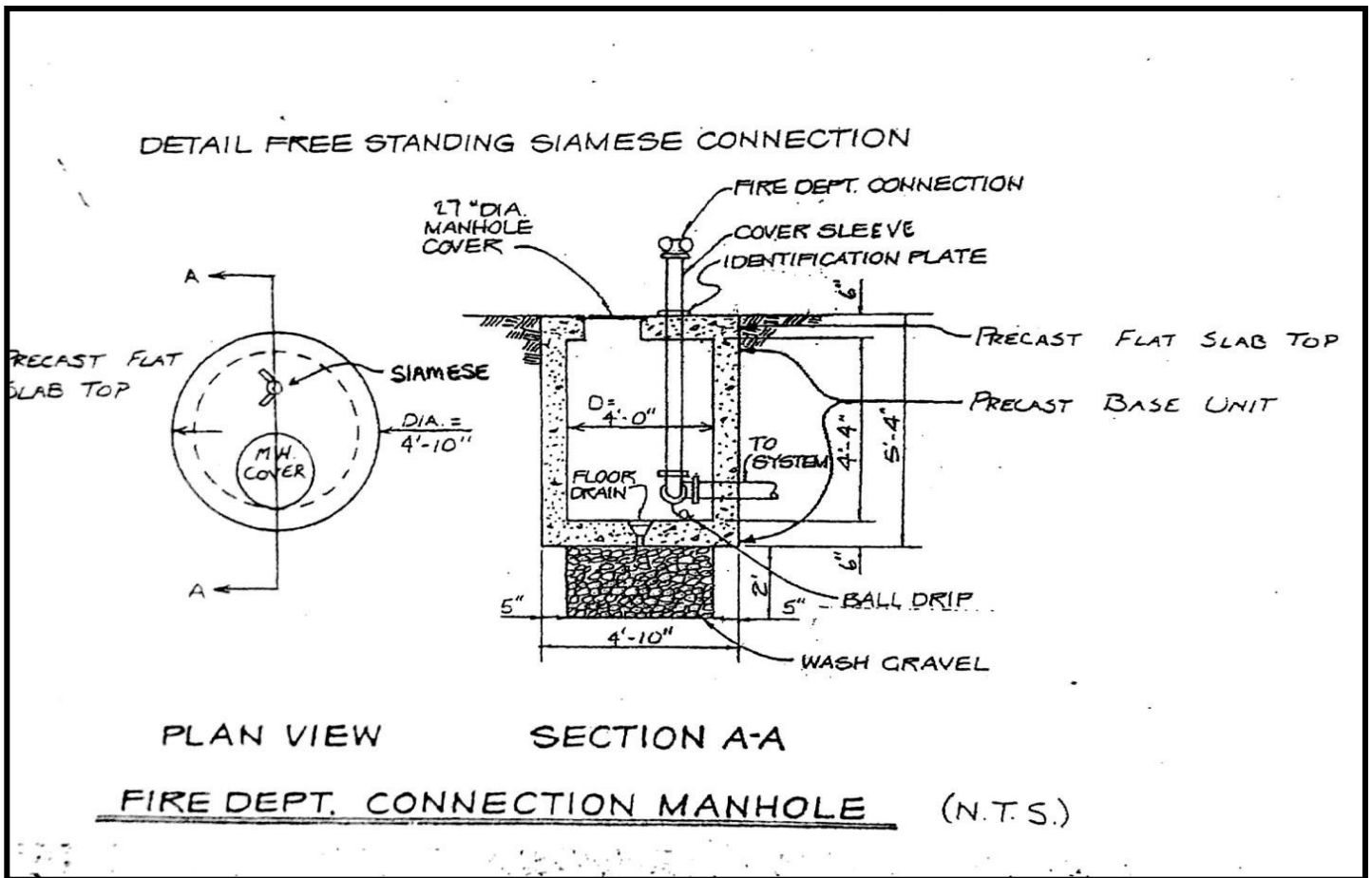
B. Aboveground Pipe and Fittings

1. Aboveground pipe and fittings shall comply with the applicable sections of NFPA 13 that address pipe, fittings, joining methods, hangers, and installation and NFPA 24
2. Aboveground piping for private fire service mains shall not pass-through hazardous areas and shall be located so that it is protected from mechanical, and fire damage.
3. Aboveground piping shall be permitted to be in hazardous areas protected by an automatic sprinkler system. NFPA 24
4. Where aboveground water-filled supply pipes, risers, system risers, or feed mains pass through open areas, cold rooms, passageways, or other areas exposed to freezing temperatures, the pipe shall be protected against freezing by the following: NFPA 24
 - a) Insulating coverings
 - b) Frostproof casings
 - c) Other reliable means capable of maintaining a minimum temperature between 40°F and 120°F (4°C and 48.9°C)
5. Where corrosive conditions exist, or piping is exposed to weather corrosion-resistant types of pipes, fittings, and hangers or protective corrosion-resistant coatings shall be used. NFPA 24
6. To minimize or prevent pipe breakage where subject to earthquakes, aboveground pipe shall be protected in accordance with the seismic requirements of NFPA 13
7. Mains that pass-through walls, floors, and ceilings shall be provided with clearances in accordance with NFPA 13.

C. Fire Department Connection (FDC)

1. A fire department connection (FDC) is required for most NFPA 13 and 13R automatic sprinkler systems and standpipe systems. They are not required for automatic sprinkler systems protecting one- and two-family dwellings and townhomes. The FDC's to be located within 75' of the operational fire hydrant. Unless the requirements are met, a fire department connection shall be provided as described in VCC Section 912 and NFPA 13. (See below for Detail of Free Standing Siamese Connection).

D. Underground Fire Lines and Other Utilities



In order to maintain proper physical clearances between underground fire lines and other utilities, the following physical distances are necessary:

1. All underground fire lines are to be minimum 4 feet underground (below finished grade) to top of pipe, per NFPA 13 Chapter 10. Maximum cover allowed for a water main, or fire line (DIP) is 7.5 feet to top of pipe.
2. Fire Line – Storm Sewer crossings (at 90 degrees more or less): If fire line is above storm, then 6 inches clearance required. If fire line is below storm, then 12 inches clearance is required.
3. Fire Line – Sanitary Sewer crossing (90 degrees more or less): fire line above sewer, 18 inches clearance required. (If above, must meet Virginia Health Code.)
4. Fire Line – Gas Main crossings (90 degrees, more or less): 12 inches clearance above or below.
5. Fire Line – Electrical Service Entrance Conductor: 12 inches. Fire line is below electrical service, and maximum depth of electrical service is no greater than 36 inches. Minimum depth of electrical service is 24 inches.
6. All other electrical underground wiring (e.g., cable TV, fiber etc.) is to be treated as in Number 5 above.

Note: OTHER UTILITIES ARE NOT TO RUN IN THE FIRE LINE TRENCH. At crossings, where other utility is above, intervening fill to be compacted granular material, 90 percent Standard Proctor, AASHTO T-99. (Per DIPRA, Installation guide for DIP).

E. Summary Table of Crossing Clearances

Fire line to Storm	6 inches if fire line is above, 12 inches if fire line is below storm
Fire line to Sanitary Sewer	18 inches, sanitary must be below fire line. (Unless all health code requirements are met).
Fire line to Gas Main	12 inches, above or below
Fire line to Electrical Service	12 inches, electrical above, fire line below

1. The following factors shall be considered in providing adequate separation of water mains and sewers: Virginia General Assembly (12VAC5-590-1150) [Legislative Information System](#) or [Code 12VAC5-590-1150](#)
2. A visual inspection by the Inspection Service Office shall be made before pipe is covered. An appointment for a visual inspection can be made by calling 703-228-3800
3. If pipe is covered, no drop in pressure during test is allowed. The contractor shall remain responsible for locating and correcting any leakage.
4. Backfill shall be well tamped, free of rocks, and free of corrosives per NFPA 24, Section 10.9.
5. A hydrostatic test of 200 pounds or 50 pounds over system working pressure, whichever is greater, shall be conducted for 2 hours per NFPA 24.

F. Other Means of Hydrostatic Test

1. Where required by the authority having jurisdiction, hydrostatic test shall be permitted to be completed in accordance with the requirements of AWWA C600, AWWA C602, AWWA C603, and AWWA C900. NFPA 24 (During months where temperatures are routinely at or near freezing, underground testing shall be done with air. Chemicals, anti-freeze, etc. SHALL NOT be used).
2. Gauges used in performing acceptance tests on fire suppression systems witnessed by the Inspection Service Office must meet the following criteria:
 - a) The gauge shall be appropriate for the type of test; i.e., air gauge for an air pressure test, a water gauge for a hydrostatic test.
 - b) Air gauges shall have increment markings of two pounds or less. Water gauges must have increment marking of 10 pounds or less.
 - c) The gauge shall be capable of registering pressures above the minimum pressure required during the test. The pressure registered during the actual test shall be at least the minimum required for the test and less than the maximum of the gauge register.
 - d) Gauges must be marked as accepted by UL and/or FM testing laboratories.

3. No valves shall be installed in the fire line between street valve at water main and OS&Y valve inside of building.
4. Domestic water line take off shall be connected at least 5 feet outside of building with a 200-pound shut off valve on the domestic water line only.
5. All fire lines shall be flushed with not less than 4-inch opening in accordance with NFPA 24, Section 10.10.2.1. The flush shall be witnessed by the Fire Marshal's Office (FMO).
6. Site plans approved by this office showing size and location of pipe shall be on the job site accompanied with the underground shop drawings and cut sheets before the inspection or test is performed. The cover sheet and site plan page shall have an original FMO stamp by the original approved reviewer.
7. The underground pipe joint restraints to be per NFPA 24 section 10.8

G. Galvanized Spool Piece (Potable Water)

1. The procedure for installing a galvanized pipe between the ductile iron fire line and the OS&Y valve is as follows:
 - a) If a spool piece is used between the fire line stub and the OS&Y valve to raise the valve off of the fire line stub, then it shall be galvanized pipe or shall be rated per AWWA C104, C110 for potable water. This spool piece may be hydrostatically tested as part of the underground, or part of the sprinkler riser.

OR

 - b) If the OS&Y valve is rated by the AWWA as suitable for connection to a potable water system, this valve is a suitable transition piece between the fire line stub and the check valve. This OS&Y valve may be attached directly to the fire line stub if there is adequate clearance for proper operation of the valve, and then no galvanized pipe is required.
2. Above items shall be inspected by the Inspection Service Office prior to any backfill.
3. All test and permit fees shall be paid before an inspection or test is performed. If you have any questions, please contact the Systems Acceptance Testing at 703-228-3800

MARKING OF HIGH-RISE BUILDING STAIRWELLS AND FLOORS

Stairway Identification Signs

(See sample 1 and 2). Signs shall be provided at each floor landing in exit enclosures and stairways connecting more than 3 stories. Sign shall comply with the following requirements:

- **Stair & Floor Designation.** Signs shall identify the stairway with a letter of the alphabet and indicate the floor number. Letters and numbers shall be a minimum of 5" in height and shall be located in the center of the top half of the sign with stairway letter(s) positioned to the left of the floor number. All stairway lettering shall correspond with the stairway location schematic described below.
- **Assignment of Stairway Letters.** Assignment of stairway designation letters shall start with stairway next to the main entrance with the letter "A" and continue in a clockwise or left to right pattern.
- **Lettering Height.** With the exception of stairway designation letters and floor numbers being at least 5" in height, all other signage lettering and numbers shall be a minimum of 1" in height.
- **Exit Discharge.** Signs shall identify the floor level or story of, and the direction to, the exit discharge.

- **Roof Access.** Signs shall indicate the availability of roof access from the stairway. The stairway shall be marked “ACCESS TO ROOF” at street and floor levels indicating that the stairway has access to the roof. Stairways without roof access shall be marked “NO ACCESS TO ROOF.”
- **Stairway Terminus.** Signs shall identify the terminus of the top and bottom of the stairway.
- **Minimum Sign Size.** The signs shall be a minimum size of 18” x 12”. However, stairway identification information may be stenciled directly onto the wall provided other requirements are met.
- **Location & Visibility of Signs.** The sign shall be located 5’ above the floor landing in a position that is readily visible when the doors are in the open and closed positions.
- **Non-Glare Finish.** Characters and their background shall have a non-glare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.
- **Uniformity.** Placement and dimensions of stairway identification signs shall be consistent and uniform throughout the same exit enclosure or stairway. All floor designation shall match for elevators, stairs etc. at fire alarm annunciator.
- **Tactile Signs.** Where required by the VCC, floor level identification signs in tactile characters complying with ICC A117.1 shall be located at each floor level landing adjacent to the door leading from the enclosure into the corridor to identify the floor level.
- **Luminous Signs.** When signs are installed in interior exit enclosures of buildings subject to VCC 1025, “Luminous Egress Path Markings”, the signs shall be made of the same materials as required by VCC 1025.4.

Stairway Location Schematic

(See Sample 2)

- All stairway designation letters shall be illustrated on the schematic and shall correspond with each stairway.
- Stairway identification signs and location schematics can significantly assist fire and rescue personnel manage fire emergencies in multi-story buildings.

Elevator Designation

All Elevator designations shall be numeric (such as 1, 2, 3 etc.) and correspond with each level. Destination Dispatch elevators shall follow the same numeric designations.

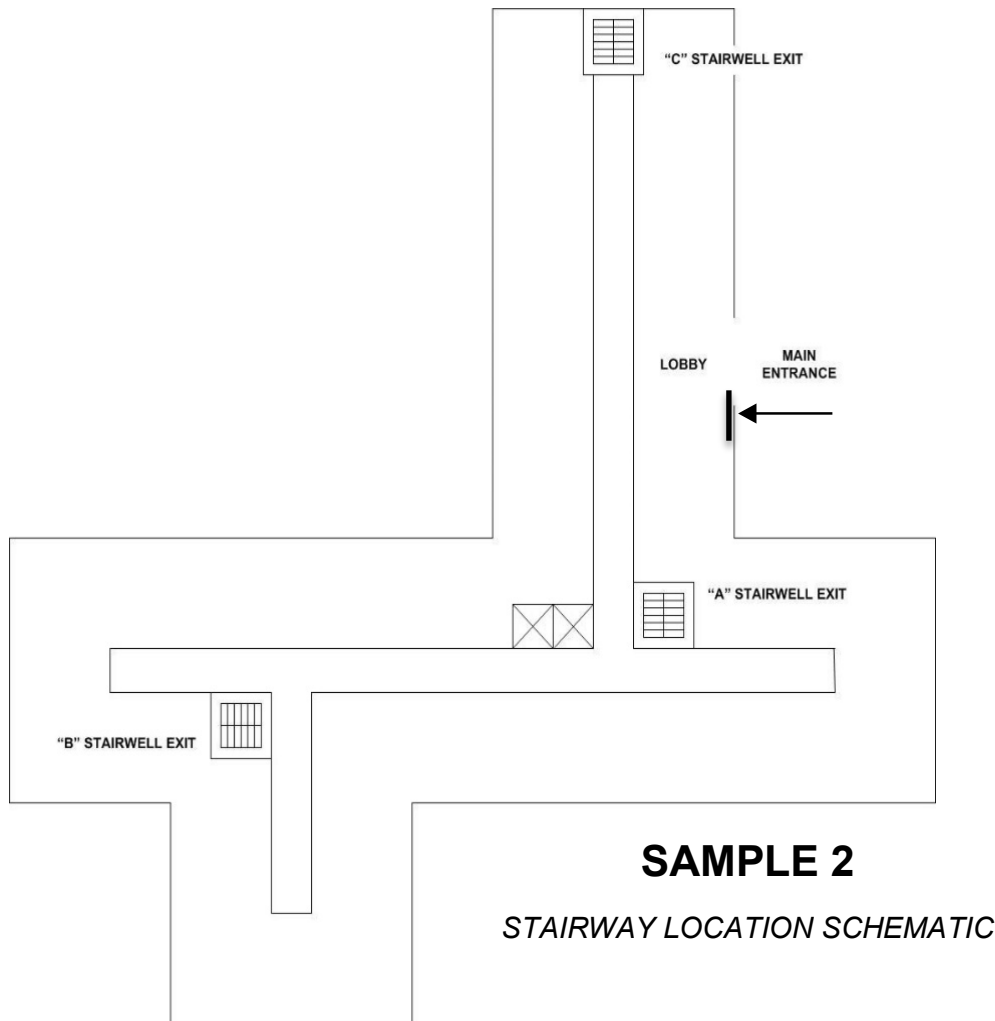
Thank you for your cooperation. If you have any questions about these requirements, please contact the Fire Inspections at 703-228-3800.

Stairway Sign Samples



SAMPLE 1

STAIRWAY IDENTIFICATION SIGN



FIRE DEPARTMENT KEY BOXES

- A. Access to Structures.** In accordance with Section 506.1 of the Fire Prevention Code, where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for lifesaving or fire-fighting purposes, the fire code official is authorized to require a key box to be installed in an approved location. The key box shall be of an approved type listed in accordance with UL 1037 and shall contain keys to gain necessary access as required by the fire code official. The only exception to the key box listing requirement applies to existing key boxes which are not required to be listed in accordance with UL 1037 unless replaced.
- B. Structures Requiring Key Boxes.** In Arlington County, all buildings except for single-family dwellings shall provide a fire department building access system (i.e., key box with the proper inventory of building entry keys) as approved by the Inspection Service Office. The types of boxes typically installed include surface-mounted and recessed key boxes, as well as MSDS repository cabinets when required.

Knox-Box® Rapid Entry System by Knox Company

Literature on the key boxes can be obtained from the manufacturer website.

- C. Installation - Buildings & Structures.** Fire department key boxes shall be installed in an approved manner in accordance with the following requirements:
- Key boxes must be installed at the primary fire department entrance (main entrance or entrance nearest to the fire control room).
 - Key boxes must be visible and accessible.
 - Key boxes must be installed 42" – 54" above finished grade.
 - For new or renovated buildings, fire department key boxes must be installed prior to occupancy.

- D. Installation - Gates & Barricades.** In accordance with Section 503.5 of the Fire Prevention Code (as amended by Arlington County), gates and barricades that are installed across a fire apparatus access road that is normally intended for vehicular traffic should be installed with a fire department access system which has an emergency override fire department master key switch. This will improve fire department response time. This may require that an approved fire department key box be installed at gates or similar barriers that impede fire department apparatus access.

- E. Number and Types of Keys Required.** In accordance with Section 506 of the Fire Prevention Code, the following number and types of keys shall be provided:
- In buildings with Fire Command Centers (Fire Control Rooms), shall be provided with 15 sets of common keys for access to building services and systems regulated by Chapter 6 of the Fire Prevention Code, and to all storage, trash and utility rooms, roof access doors, and doors to other secured areas.
 - In all other buildings required to provide fire department access, 15 sets for high rise and 7 sets of common keys for low rise shall be provided.
 - Individual keys shall be clearly labeled as to function and each set of keys shall be tagged.
 - All electronic keys (if any) shall be non-expiring type

WET CHEMICAL EXTINGUISHING SYSTEMS

PLAN SUBMITTAL REQUIREMENTS

A. General (All submissions shall include, but are not limited to, the following):

1. A minimum set of drawings (in PDF format) - a key plan showing the location of the building, kitchen equipment layout, hood, tank and pull station locations. The manufacturer's technical design manual and complete submittal data product sheets for all cooking appliances shall be provided with permit application permitting evaluation of the system prior to installation. Provide all necessary calculations for the installation, rehabilitation, or modification of any fire protection system. Construction documents for fire protection systems shall be submitted for review and approval prior to system installation. The permit application shall clearly designate the system as being required for compliance with VCC.
2. Provide the name, address, email, and telephone/fax numbers of designer of fire suppression/detection system. NFPA 17A, Section 6.3

3. Provide the building name, and address on all drawings. NFPA 17A, Section 6.3
 4. The submitted plans are to be of uniform size and drawn to a recognized scale or fully dimensioned. NFPA 17A, Section 6.3.1
 - a. A scaled front elevation and isometric view shall be included.
 5. The submitted plans shall contain sufficient detail to evaluate the protection of the hazard, provide manufactures data sheet for all cooking appliances. NFPA 17A, Section 6.1.1
 6. The submitted plans shall contain sufficient detail to evaluate the protection of the hazard(s), provide a floor plan and elevation views indicating the location of the hood(s), all appliances that will be or are required to be under the hood(s), the location of the pull station and the location of all appliances with nozzle location, including required height above the hazard surface.
 7. The submitted plans shall show a detail of the hood and associated ductwork and dimensions of the hood and associated duct work. NFPA 17A, Section 6.3.2
 8. The submitted plans shall show the location of all appliances indicating which each appliance require protection, their arrangement under the hood and the hazard area of each appliance. NFPA 17A, Section 6.3.2
 9. The submitted plans shall include the size, type, brand, length and arrangement of all connected piping. Indicate maximum flow points available for the system, the flow point(s) of each nozzle type, the number of each nozzle type utilized, and the total flow points utilized. NFPA 17A, Section 6.3.3
 - a. Tank size and flow point count must be noted on the plans.
 10. The submitted details of the system shall include the location and function of detection devices, operating devices, auxiliary equipment, and electrical circuitry. NFPA 17A, Section 6.3.4
 11. The submitted plans shall indicate that systems protecting two or more hoods or plenums, or both, that meet the requirements of 5.1.5 shall be installed to ensure the simultaneous operation of all systems. NFPA 17A, Section 5.6
 12. Fusible links or heat detector shall be provided within each exhaust duct opening and above each protected cooking appliance in accordance with the manufacturer's listing. The Submitted plans shall indicate the specific temperature rating of the fusible link or heat detector utilized. NFPA 17A
 13. At least 1 manual system actuator, pull station, shall be provided for each system, and be located not more than 4 feet and not less than 42 inches above the finished floor. NFPA 17A
 14. The manual system actuating device shall be a minimum of 10 ft. and a maximum of 20 feet from the kitchen exhaust system, be conveniently and easily accessible at all times, including at the time of a fire.
 15. An automatic means shall be provided to ensure the shutoff of fuel or power sources to the protected appliances that are located under ventilating equipment protected by the extinguishing system, upon system actuation. NFPA 17A, Section 4.4.3.1; IFC Section 904.11.2
 16. An audible or visual alarm shall be provided to show that the system has operated, and that the system is in need of a recharge. NFPA 17A
 17. If a fire alarm system is provided in the building, the extinguishing system shall be connected to the fire alarm panel in accordance with the requirements of NFPA 72 "The National Fire Alarm Code". The actuation of the extinguishing system will sound the building fire alarm as well as provide the function of the extinguishing system. NFPA 17A
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18. Automatic fire suppression shall be provided for all portions of a common exhaust duct. NFPA 17A
19. A specifically listed "K" type fire extinguisher shall be provided in accordance with International Fire Code. The portable extinguisher shall be compatible with the extinguishing agent utilized for the fire suppression system and shall be within 30' of the cooking equipment.
20. Where movable cooking equipment is to be installed, a means shall be provided to ensure the cooking equipment is properly repositioned, after movement for cleaning or servicing, in relation to the appliance discharge nozzle. Permanent floor rails or guides, permanent floor markings or other suitable means of marking the correct cooking equipment location, as acceptable to the Authority Having Jurisdiction, shall be provided. NFPA 17A, Section 5.6.4
21. Provide sequence of operations, including actuation of building fire alarm system or hood suppression fire alarm, and/or simultaneous operations of multiple hazards, if applicable.
22. All revisions shall be clearly denoted on the plans with appropriate delta change designation, revision cloud and revision date.
23. A pamphlet (owner's guide) containing the manufacturer's recommendations for the proper inspection and operation of the extinguishing system. NFPA 17A
24. Design and installation of systems shall be performed only by persons properly trained and qualified to design and/or install the specific system being provided. The installer shall provide certification to the authority having jurisdiction that the installation is in complete agreement with the terms of the listing and the manufacturer's instructions and/or approved design. NFPA 17A
25. Where plans are required, the responsibility for their preparation shall be entrusted only to trained persons. NFPA 17A

DRY CHEMICAL EXTINGUISHING SYSTEMS

PLAN SUBMITTAL REQUIREMENTS

This following information is provided to assist the contractor, owner, developer/builder with the review and installation process. This checklist contains the **minimum** standard information required for a project submitted for the plan review of Dry Chemical Extinguishing Systems. Plan sets submitted without the minimum information listed below cannot be reviewed for compliance. This publication does not replace, nor supersede, any provisions of the Virginia Fire Prevention Code or other codes and/or ordinances adopted by Arlington County.

A. General (All submissions shall include the following but not limited to):

1. A set of complete drawings in PDF format, a key plan showing the location of the space in the building, chemical extinguishing equipment layout, two manufacture's technical design manual and complete submittal data product sheets for all listed equipment shall be provided with permit application permitting evaluation of the system prior to installation. Provide all necessary calculations for the installation, rehabilitation or modification of any fire protection system. Construction documents for fire protection systems shall be submitted for review and approval prior to system installation. The permit application shall clearly designate the system as being required for compliance with the VCC.
2. Provide the building name, and address on all drawings.
3. Provide the name, address, and telephone number of designer of fire suppression/detection system on all drawings.

4. Plans shall be prepared by qualified persons trained in the design and application of these systems.
5. Plans submitted for approval shall be working plans for the system installation, drawn to scale. The scale for floor plans shall not be less than $\frac{1}{8}'' = 1'$.
6. Provide a legend showing all symbols, device descriptions, size, and type of pipe on all plans.
7. Note NFPA Standard (including edition) that the installation will comply with on all plans.
8. For pre-engineered local application or total flooding systems, submit a manufacturer's installation manual.
9. For engineered systems, a statement reading "There Shall Be No Deviations from the Plans without Approval from the Authority Having Jurisdiction." Shall be provided on all plans.
10. Provide on the plan a sequence of operations, including actuation of building fire alarm system or dry system suppression fire alarm, and/or simultaneous operations of multiple hazards if applicable.
11. Three-dimensional representation of hazard to be protected, including volume of enclosure if applicable, shall be provided. Permanently mounted equipment, structural or architectural features or structures that materially reduce the volume, shall be identified, and computed.
12. The submitted plans shall be drawn to scale, include a plan view of the protected area showing the enclosure partitions, full and partial height; the agent distribution piping system including the location of the agent storage containers and amount of agent, piping, and nozzle types; types of pipe hangers and rigid pipe supports; and the detection system, the alarm device locations and mounting height. The plans shall also indicate the control system including all devices and schematic drawings of the wiring interconnection between the devices; the end of line resistors and their location; location of the controlled devices such as dampers and shutters; and the location of the instructional signage. NFPA 17
13. The submitted plans shall indicate the flow rates of the nozzles for engineered systems.
14. Automatic equipment interlocks with fuel shutoffs, ventilation controls, door closers, window shutters, conveyor openings, smoke and heat vents, and other features necessary for proper operation of the fire-extinguishing system shall be provided as required by the design and installation standard utilized for the hazard.
15. Documentation shall be provided to show/note all emergency shut-off systems are fail-safe and require manual reset. The shut-off systems shall not reset without the dry chemical fire suppression system being restored to service.
16. If common exhaust ducts are utilized, the plans shall show fire protection of the common ducts in accordance with NFPA 17
17. Alarms and warning signs. Where alarms are required to indicate the operation of automatic fire-extinguishing systems, distinctive audible and visible alarms and warning signs shall be provided to warn of impending agent discharge. Where exposure to automatic-extinguishing agents poses a hazard to persons and a delay is required to ensure the evacuation of occupants before agent discharge, a separate warning signal shall be provided to alert occupants once agent discharge has begun.

18. Ventilation systems, within the spray area, room, or booth, shall be shut down upon system activation and/or additional dry chemical agent shall be provided and calculated for the unenclosed opening(s) based on the percentage of the unenclosed opening. NFPA 17
19. The submitted plans and data shall provide details of the electrical/mechanical equipment that is interfaced with the fire suppression system to initiate performance of control function(s) in accordance with the fire suppression system manufacturer's requirements.
20. The submitted plans shall indicate the location, the mounting height and the method for manual activation of fire suppression system.

CLEAN AGENT FIRE EXTINGUISHING SYSTEMS

The following information for the plan review of Clean Agent Fire Extinguishing Systems per NFPA 2001, 2015 edition. Plans sets submitted without the minimum information listed below cannot be accepted for review.

This publication does not replace, nor supersede, any provisions of the Fire Prevention Code or other codes and/or ordinances adopted by Arlington County.

A. General (All submissions shall include the following):

1. A set of complete copies of drawings in PDF format with all supporting data shall be provided with permit application permitting evaluation of the system prior to installation. Properly assembled and labeled. If they are not, they cannot be reviewed.
2. Provide the name and address of the project or tenant where system will be installed on all drawings.
3. The plans shall be drawn to a uniform size and to a recognized scale.
4. The applicant must provide two copies of the manufactures design, installation, operation, and maintenance manual with the submission. A copy will be returned with the approved package for use by field inspectors.
5. Protected enclosure location within the building must be shown with a key plan or floor plan.
6. Indicate the location and the construction of the protected enclosure walls and partitions. Identify fire walls.
7. Provide an enclosure cross section, full height, or schematic diagram, including the location and the construction of building floor/ceiling assemblies above and below, the raised access floor and the suspended ceiling. The location of all equipment, furniture, cabinets, etc. within the protected closure must be shown on the floor plan with finished top dimensions noted.
8. Indicate the type of clean agent being used by its brand name and its chemical nomenclature.
9. Provide a description of the occupancies and the hazards being protected, designating whether or not the enclosure is normally occupied.
10. Provide a description of the adjacent exposures and occupancies surrounding the enclosure.
11. Provide the description of the agent storage containers used including the internal volume, the recommended storage pressure, and the nominal capacity expressed in units of agent mass, or volume at standard conditions of temperature and pressure.
12. Provide a description of nozzle(s) being used including the size, the orifice port configuration, and the equivalent orifice area.
13. Provide a description of the pipe and fittings used including the material specifications, the grade, and the pressure rating.

14. Provide a detail of the method of the detector mounting. NFPA 2001
15. Submitted plans shall provide a plan view of protected area showing the enclosure partitions, full and partial height, the agent distribution system including the agent storage containers, piping, and nozzles; the type of pipe hangers and rigid pipe supports; the detection, alarm, and control system including all devices and a schematic of the wiring interconnection between them; the end-of-line device locations; the location of controlled devices such as dampers and shutters and location of instructional signage.
16. Provide an isometric view of agent distribution system showing the length and the diameter of each pipe segment; the node reference numbers relating to the flow calculations; the fittings including reducers and strainers; the orientation of tees and nozzles including the size, the orifice port configuration, the flow rate and the equivalent orifice area. NFPA 2001,
17. Scaled drawings shall be provided showing the layout of the annunciator panel graphics.
18. Provide details of each unique rigid pipe support configuration showing the method for securement to the pipe to the building structure.
19. Provide details of the method for the container securement showing the method of securement to the container and to the building structure.
20. Provide a complete set of calculations to verify the enclosure volume and to determine the quantity of clean agent required.
21. Provide a complete step-by-step description of the system sequence of operations including the function of abort and the maintenance switches, the delay timers, and the emergency power shutdown.
22. The submitted plans shall include a point-to-point wiring schematic diagram(s) in a plan view and a system riser diagram showing all the circuit connections to the system control panel and the graphic annunciator panel. This is to include any external or add-on relays.
23. Indicate the method used to determine the number and location of audible and visual indicating devices, and the number and location of the detectors
24. Provide a complete set of back up battery calculations and voltage drop calculations for the detection system
25. The submitted plans shall include the flow calculations for the system. The version of the flow calculation program shall be identified on the computer calculation printout. NFPA 2001
26. The system flow calculations shall be performed using a calculation method listed or approved for the agent by the authority having jurisdiction. The system design shall be within the manufacturer's listed limitations.
27. Warning and instruction signs shall be noted on the plans. Warning and instruction signs at entrances to and inside protected areas shall be provided. Warning and safety instruction signs shall be located outside each entrance to clean agent cylinder storage rooms. The safety sign format and color and the letter style of the signal words shall be in accordance with ANSI Z535.
28. Provide manufacturer's data sheets for the following: Agent Cylinder and Valve Assemblies Agent Cylinder Data, Agent Valve Outlet Adapters, Agent Discharge Nozzles, Agent Release Control Heads, Agent System Release Control Panels Suppression System, Abort Devices, Agent Manual Release Stations, Initiating Devices Notification, Appliances Conductor Wire, Relays, Interface Modules.

FLAMMABLE AND COMBUSTIBLE LIQUID STORAGE TANKS (ABOVE AND UNDERGROUND)

INSTALLATION, ABANDONMENT, REMOVAL AND TESTING PROCEDURES

The VCC section on flammable and combustible liquids indicates that regulations governing the installation, repair, upgrade, and closure of underground and aboveground storage tanks under the Virginia State Water Control Board (SWCB) regulation(s) 9 VAC 25-580-10 et seq. and 9 VAC 25-91-10 et seq. are adopted and incorporated by reference to be an enforceable part of this code. For quick reference see the Virginia and Fire Code Related Regulations at <https://codes.iccsafe.org/codes/virginia> . Follow charts A-Underground Storage tanks (USTs), B-Aboveground Storage tanks (ASTs) and C-Partial List of Key Differences ICC Codes vs SWCB Regulations as applicable.

The underground storage tank installation, removal, closure, and testing shall be performed in accordance with the Virginia Uniform Statewide Building Code (USBC).

See the Fire Prevention Office's website at <https://www.arlingtonva.us/Government/Departments/Fire/Permits-Reports> for information regarding Fire Prevention Permits for fuel tank installation removal, or abandonment.

WARNING: NO PRODUCT SHALL BE INTRODUCED INTO TANKS OR PRODUCT LINES UNTIL A REPRESENTATIVE FROM ARLINGTON COUNTY INSPECTION SERVICES DIVISION HAS WITNESSED THE REQUIRED TEST(S) OR INSPECTION(S) AND GRANTED WRITTEN APPROVAL.

A. Pre-Installation Requirements of New Aboveground or Underground Storage Tanks shall be in accordance with the following procedures. Submit a Mechanical permit application and plans to the Inspection Services Division of the County:

1. A set of the completed site plan in PDF format for review and approval, showing the location of the tank(s), distances from the tank(s) to all above or underground structures, monitor well locations, and location and layout of all piping and dispensing units associated with the tank(s).
2. A set of complete elevation plans in PDF format of the tank(s) shall also be submitted, showing depth of burial, fill material, overtop slab if present, ballast slab if present, fill and vent piping, and vapor recovery. Tank specifications including manufacturer's cut sheets shall also be included. Information on spill and overflow protection shall be shown. For aboveground tanks, complete plans of tank and supporting structure shall be provided. Include details and cut sheets for leak detection where required.
3. A set of buoyancy calculations from the tank manufacturer or submitter (for underground tanks). Petroleum storage tank and distribution piping system plans review fee are per the published fee schedule. <https://www.arlingtonva.us/Government/Programs/Building/Permits/Fee-Schedules>

B. Installation Requirements of New Aboveground or Underground Storage Tanks. Only after the above plans have been reviewed and approved can the installation of tanks, product lines and equipment begin. Prior to pit closure and covering of product lines, the following steps shall be taken by the installer.

1. A strength test (by manufacturer) – a label on the tank to verify ASME, UL, API, or ULC. An air test (before placing in pit for underground tanks, or for aboveground tanks, before any product is introduced) at 3 psig.
2. A visual inspection witnessed by the Inspection Services Inspector of the hold down pad or deadman anchors, bedding, and straps is required prior to backfilling the pit.

3. An air test of the tank(s) after placing in pit or after mounting on its foundation, prior to introduction of product – 10 inches by mercury gauge or 5 psig for a minimum of 60 minutes. The gauge shall have a maximum reading of 15 psi and be graduated in 0.1 psi increments. If applicable, the interstitial space on double-walled tanks shall be tested per the manufacturer's instructions for a minimum of 60 minutes. An Inspection Services Division inspector shall witness these tests.
4. A hydrostatic test – when static head on bottom of tank is over 10 psig.
5. An air test of the product lines (suction system) – shall be done when the tank is air tested. Product lines shall be installed to the tank and capped off at connection to the device.
6. An air test of the product lines (with day tank) – 5 psig every 10 feet of elevation for a minimum of 10 minutes witnessed by the Inspection Services Inspector.
7. An air test of the product lines (submersible systems) – 50 psig for a minimum of 20 minutes witnessed by the Inspection Services Inspector.
8. An air test of secondary containment piping – 5 psig for a minimum of 10 minutes witnessed by the Inspection Services Division inspector.
9. A visual inspection, witnessed by the Inspection Services Division inspector, of the product line trenches is required when the backfill is even with the top of the product lines.

New petroleum storage tank inspection fee(s) per visit per tank and piping distribution system are per the published fee schedule.

<https://www.arlingtonva.us/Government/Programs/Building/Permits/Fee-Schedules>

(Note: Multiple tank installations located on the same site which can be tested simultaneously will be counted as one tank for fee charge purposes.)

The installer shall schedule an inspection at the Permit Arlington site <https://aca-prod.accela.com/ARLINGTONCO/Default.aspx> for a Mechanical inspection.

C. Pre-Installation/Replacement Requirements for New Product Lines Only shall be in accordance with the following procedures. Submit a Mechanical permit application to Inspection Service Office:

1. Two copies of the completed site plan for our review and approval, showing the location of the tank(s), distances from the tank(s) to all above or underground structures, and location and layout of all piping and dispensing units associated with the tank(s); and including manufacturer's cut sheets for non-metallic piping.
2. Two copies of complete elevation plan showing depth of burial and fill material.

D. Installation/Replacement Requirements for New Product Lines. Only after the above procedures have been reviewed and approved can the installation of product lines begin. Prior to covering the lines, the following steps shall be taken by the installer.

1. Suction Systems – Air test of 5 psig for a minimum of 10 minutes shall be witnessed by the Inspection Service Division inspector.
2. Submersible Systems – Air test of 50 psig for a minimum of 20 minutes shall be witnessed by the Inspection Service Division inspector.
3. Secondary Containment Piping – Air test of 5 psig for a minimum of 10 minutes witnessed by the Inspection Service Division inspector.

New product lines inspection fee(s) per visit are per the published fee schedule.

(Note: Multiple line installations located on the same site which can be tested simultaneously will be counted as one tank for fee charge purposes.)

The installer shall schedule an inspection at the Permit Arlington site <https://aca-prod.accela.com/ARLINGTONCO/Default.aspx> for a Mechanical inspection.

E. Removal or Closure of Underground Storage Tanks shall be in accordance with the following:

1. Compliance with Chapter 7 of DEQ's requirement – see document 9VAC25-580-320
2. Permit request for Mechanical and Fire Prevention permits for abandonment in place need to include a site diagram. A site inspection will be conducted before approval of abandonment.
3. A Fire Prevention Permit shall be obtained from the Fire Prevention Office for Virginia SFPC Section 5704.2.13 – Abandonment, and status of tanks.
4. A check made payable to the "Arlington County" shall be presented at the time of application. Site drawings shall be submitted showing the location of the tank(s) in relationship to buildings, lot lines and underground utilities.

All tanks and tank pits shall be inspected by the Inspection Services Division inspector after tank removal or permanent closure. The installer shall schedule an inspection at the Permit Arlington site <https://aca-prod.accela.com/ARLINGTONCO/Default.aspx> for a Mechanical inspection.

5. A minimum of two soil samples shall be taken from each tank pit for analysis by a certified laboratory. The results of the analysis, along with the tank closure form, shall be mailed to the Virginia Department of Environmental Quality (DEQ).
6. The pit(s) may be backfilled for safety reasons with the understanding that the DEQ may order the pit(s) to be reopened and cleaned out if tests show gross contamination of the soil. Soil remediation shall comply with the Department of Environmental Quality, Department of Waste Management, and Department of Air Pollution Control regulations.
7. Tanks permanently closed in ground shall comply with the following:
 - a. All liquids shall be removed from the tank lines.
 - b. Tanks shall be thoroughly cleaned to remove any vapors or sludge.
 - c. Suction, inlet, gauge, and vent lines disconnected.
 - d. Fill pipe removed.
 - e. Tank shall be filled with a solid inert material.
8. The tank(s) and contaminated soil shall be disposed of at a site for such waste.

Testing and recordkeeping of underground and aboveground storage tanks shall be in accordance with regulations adopted by the Department of Environmental Quality and Article 57 of the SFPC and the Arlington County Fire Prevention Code, as amended.

Should you have any questions or need assistance, please contact the Inspection Services Division, Monday through Friday during the hours of 8:00 a.m. to 4:30 p.m. at 703- 228-3800.