

Office of the State Fire Marshal



PREVENT FIRES
IT'S YOUR JOB!



An Overview on Level “U”

Underground Fire Sprinkler Installation – Licensing Laws and Rules

Ed Borgatti, Deputy State Fire Marshal

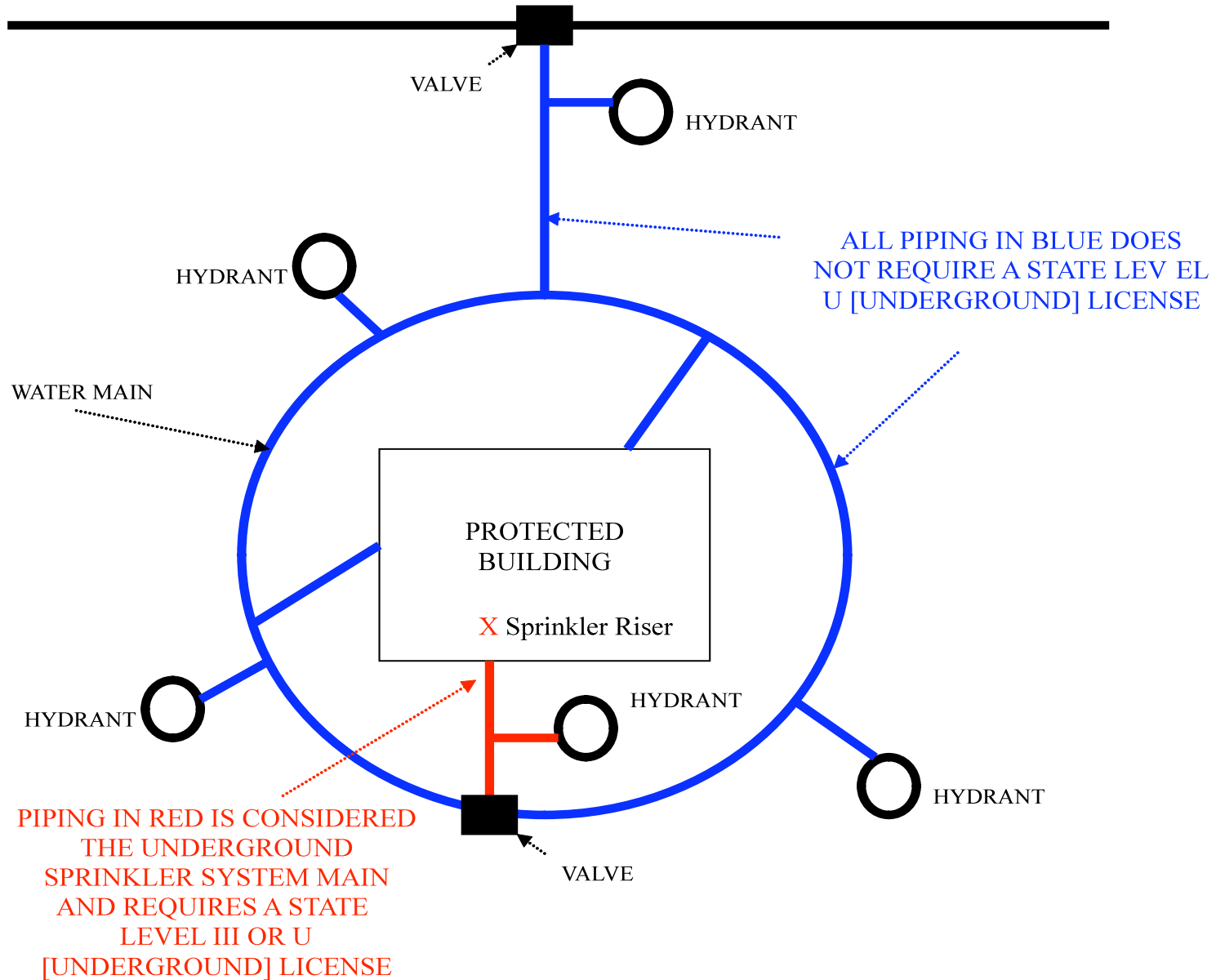
What Constitutes the Underground Portion?

WAC 212-80-010

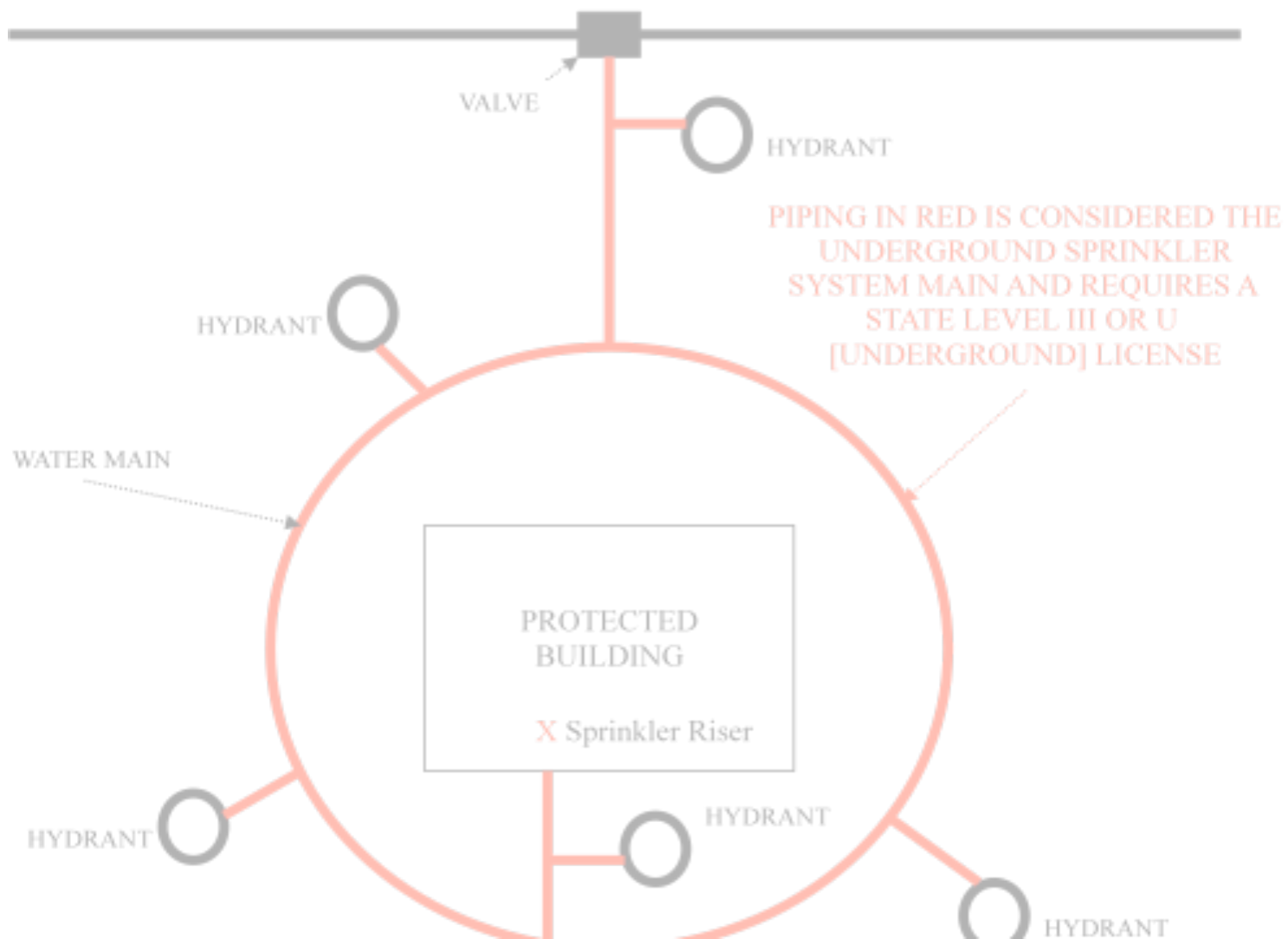
Definition simply means:

... The underground portion starts at the valve furthest upstream from the system that if shut off would shut off ONLY the sprinkler system.

STREET WATER MAIN



STREET WATER MAIN



State Level U Licenses and CoC Holders are Qualified For . . .

WAC 212-80-043:

(2) Level U Licensed Contractors can *execute contracts* for the installation . . . of all underground portions

(6) Level U Certificate of Competency (CoC) holders *supervise and/or certify the installation* of underground supplies to fire protection sprinkler systems. . . .

Authority/Responsibility of the State

RCW 18.160.030: State director of fire protection (a.k.a. State Fire Marshal)

Has the authority to:

(1) Issue *administrative regulations*

(2) Adopt rules for contractors who install *underground systems* that service fire protection sprinkler systems

(3) Conduct *investigations* of complaints

(4) Issue Licenses and Certificate of Competency

Local Government

Local Government Permit Options

(RCW 18.160.020)

Municipalities or Counties *may require* a fire protection sprinkler system contractor to *obtain a permit* and *pay a fee* for the installation of a fire protection sprinkler system.

1. The *installation* has to *conform with the building code and local construction requirements*
2. The contractor must have a *valid fire sprinkler contractor license*.

Local Government

- Why issue permits?
 - Funding Source
 - Provide Guidance
 - AHJ's need to check for:
 - Level U License
 - Certificate of Competency
 - Working Plans (NFPA 24 Chapter 4)
 - Allows AHJ's issue a receipt for the "Contractor's Material and Test Certificate"
 - Upon completion of work, signed by contractor's representative and witnessed by owner's representative
 - Right to inspect the installed sprinkler system

Designs and Working Plans Shall:

- Indicate pipe sizing and type.
- Show the placement of any and all hydrants for the building.
- Start from the source of water – be it the city main, a water tank, or other NFPA 24 approved source – and show the system connection point.
- Obtain the approval of the local fire authority **BEFORE** installation.

Designs and Working Plans Shall:

- Be designed by a state certified Certificate of Competency Holder of the appropriate level (or a professional engineer).
- Be in the possession of and installed by a state licensed Fire Protection Sprinkler System Contractor.
- Contain details for all thrust blocks, restraints, and fittings such as the type used and their location.

Designs and Working Plans Shall:

- Possess an equipment symbol legend.
- Have a current water flow test summary sheet.
- List the details for the size, type, and location of all system shut-off and isolation valves.
- Include a detailed listing of ALL system components.

Site Inspection Items

(NFPA 24, 2002 Edition)

- Thrust Blocks (Sections 10.8.1.1 & 10.8.2)
- Depth of Cover (Section 10.4)
- Backfilling Trenches (Section 10.9)

Thrust Blocks

- *All tees, plugs, caps, bends, reducers, valves, and hydrant branches SHALL be restrained against movement by using thrust blocks.*
- *Shall be placed between undisturbed earth and the fitting to be restrained.*
- *Capable of such bearing to ensure adequate resistance to the thrust to be encountered.*
- *Placed so that the joints are accessible for repair.*
- *All thrust blocks and/or joint restraining systems must be listed and comply with NFPA 24.*

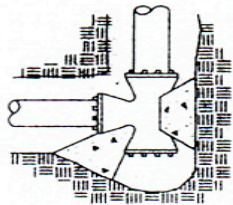
(HORIZONTAL)
BEARING AREA OF THRUST BLOCKS IN SQ. FT.

FITTING SIZE	TEE WYE AND HYDRANT	STRADDLE BLOCK	90 BEND PLUGGED CROSS, TEE PLUGGED ON RUN	45 BEND	22 1/2 BEND	11 1/4 BEND
4	1.3	1.6	1.8	1.0		
6	2.8	3.7	4.0	2.2	1.1	
8	5.0	6.5	7.1	3.8	2.0	1.0
10	7.9	10.2	11.1	6.0	3.1	1.5

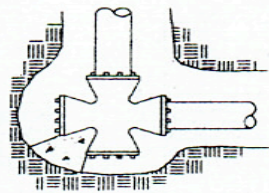
VOLUME OF THRUST BLOCK
IN CU. YDS. (VERTICAL)

FITTING SIZE	BEND ANGLE		
	45	22.5	11.25
4	1.1	0.4	0.2
6	2.7	1.0	0.4
8	4.0	1.5	0.6
10	6.0	2.3	0.9

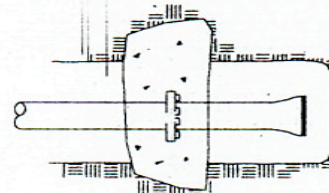
VALUES BASED ON 100 PSI WATER PRESSURE AND 1000 PSF SOIL BEARING CAPACITY.



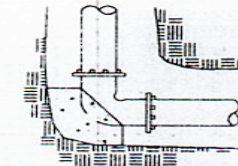
TEE



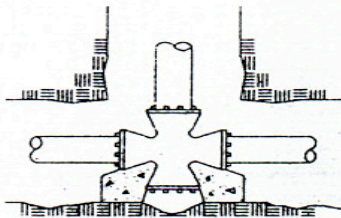
CROSS



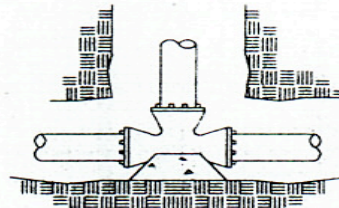
STRADDLE BLOCK



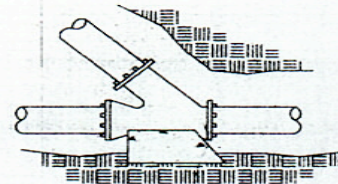
BEND



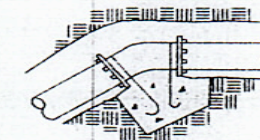
CROSS



TEE



WYE



VERTICAL BEND

NOTES:

- 1) CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
- 2) ALL CONCRETE TO BE F'c- 2500 PSI
- 3) INSTALL ISOLATION MATERIAL BETWEEN PIPE AND/OR FITTINGS BEFORE POURING BLOCKING.

- 4) CONCRETE SHALL BE KEPT CLEAR OF ALL JOINTS AND ACCESSORIES.
- 5) SEE TYPICAL HYDRANT SETTING DETAILS FOR BLOCKING LOCATIONS.

FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	•6	30'

THRUST BLOCK SIZING

NOT TO SCALE



Depth of Cover

- When *frost is not a factor* (consult NFPA 24) the *minimum depth* shall be *2 1/2 feet*, *3 feet* when located *underneath vehicular traffic areas*, and *4 feet* when located *under railroad tracks*.
- When *subject to freezing* any *above ground pipe* shall be *protected* by a means capable of maintaining at least a *temperature of 40 F*. *Top of the pipe* shall be buried *not less than 1 foot below the frost line* for the locality (Figure A.10.4.1).
- *Depth of cover* measured from *top of pipe* to finished grade.

Back Filling Trenches

- *Tamped in layers per NFPA 24.*
- *Rocks shall be removed from the backfill and removed from the trench BEFORE piping is placed inside.*
- *Frozen earth shall not be used for backfilling.*
- *Joints SHALL be left exposed for final NFPA 24 tests and inspections.*

Acceptance Requirements

- Flushing (Section 10.10.2.1):
 - Flow the required rate until the water is clear
 - No collection of foreign material in burlap bags at outlets

- Hydrostatic Test (Section 10.10.2.2)
 - Made at not less than 200 psi for 2 hours or 50 psi static pressure in excess of 150 psi system working pressure for 2 hours
 - Pressure loss determined by drop in gauge pressure or visual leakage

- Leakage (Section 10.10.2.2.4) (Pertains only to fire main)
 - Leakage shall be distributed over all joints
 - Leakage at the joints shall not exceed 2 quarts/hour per 100 gaskets or joints
 - If such leakage occurs at a few joints, the installation shall be considered unsatisfactory and necessary repairs made.

Contractor's Material and Test Certificate for Underground Piping

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name		Date	
Property address			
Plans	Accepted by approving authorities (names)		
	Address		
	Installation conforms to accepted plans		<input type="checkbox"/> Yes <input type="checkbox"/> No
Equipment used is approved		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If no, state deviations			
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain		<input type="checkbox"/> Yes <input type="checkbox"/> No
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain		<input type="checkbox"/> Yes <input type="checkbox"/> No
Location	Supplies buildings		
Underground pipes and joints	Pipe types and class		Type joint
	Pipe conforms to Fittings _____ standard		<input type="checkbox"/> Yes <input type="checkbox"/> No
	conforms to _____ standard		<input type="checkbox"/> Yes <input type="checkbox"/> No
If no, explain			
Joints needed anchorage clamped, strapped, or blocked in accordance with _____ standard		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If no, explain			
Test description	<p>Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 gpm (1476 L/min) for 4-in. pipe, 880 gpm (3331 L/min) for 6-in. pipe, 1560 gpm (5905 L/min) for 8-in. pipe, 2440 gpm (9235 L/min) for 10-in. pipe, and 3520 gpm (13,323 L/min) for 12-in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available.</p> <p>Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.8 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.3 bar) for 2 hours.</p> <p>Leakage: New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints. The amount of leakage at the joints shall not exceed 2 quarts per hour (1.89 L/hr) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints. If such leakage occurs at a few joints, the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above can be increased by 1 fluid ounce per inch valve diameter per hr. (30 mL/25 mm/hr) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open so the hydrants are under pressure, an additional 5 ounces per minute (150 mL/min) leakage is permitted for each hydrant.</p>		
Flushing tests	New underground piping flushed according to _____ standard by (company)		<input type="checkbox"/> Yes <input type="checkbox"/> No
	If no, explain		
	How flushing flow was obtained		Through what type opening
	<input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump	<input type="checkbox"/> Hydrant butt <input type="checkbox"/> Open pipe	
Lead-ins flushed according to _____ standard by (company)		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If no, explain			
How flushing flow was obtained		Through what type opening	
<input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump	<input type="checkbox"/> Y connection to flange <input type="checkbox"/> Open pipe and spigot		

Hydrostatic test	All new underground piping hydrostatically tested at _____ psi for _____ hours		Joints covered <input type="checkbox"/> Yes <input type="checkbox"/> No
Leakage test	Total amount of leakage measured _____ gallons _____ hours		
	Allowable leakage _____ gallons _____ hours		
Hydrants	Number installed	Type and make	All operate satisfactorily <input type="checkbox"/> Yes <input type="checkbox"/> No
	Water control valves left wide open If no, state reason		<input type="checkbox"/> Yes <input type="checkbox"/> No
Control valves	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm		<input type="checkbox"/> Yes <input type="checkbox"/> No
	Date left in service		
Remarks			
Signatures	Name of installing contractor		
	Tests witnessed by		
	For property owner (signed)	Title	Date
	For installing contractor (signed)	Title	Date
Additional explanation and notes			
(NFPA 24, 2 of 2)			

Installation at the Job Site

- What Contractor Levels are permitted to install underground piping on a *commercial structure*?
 - Level 3: permits the installation of all 13D, 13R, and 13 sprinkler systems. It incorporates a level U ability.
 - Level U: normally hired by a general contractor or a Level 3 Fire Sprinkler contractor.

Installation at the Job Site

- Does everyone at the job site need to possess a level U Certificate of Competency to install underground piping?
 - No; Only a CofC Holder for design at the appropriate level for the work being done or a Level “U”.

What Problems Have We Seen?

- Lack of supervision by Certificate of Competency Holders
- Unlicensed Underground Installations

Supervision by a C of C

- Certificate of Competency Holders (CofC) for Level I, II, III, and U are responsible to:
 - Be on site during the installation, **OR**
 - Supervise the installation by overseeing the work being performed through periodic visits.
 - The CofC shall be present for the final inspection (flush, hydro, leak), **AND**
 - The CofC shall sign and affix the CofC stamp to the Contractor's material & Test Certificate.

Unlicensed Underground Installations

- All dedicated underground fire service mains must be installed by a licensed fire sprinkler contractor (Levels 1, 2, 3, and/or U).
- A licensed contractor who connects the above ground system to the illegal underground system is also violating both the RCW and the WAC.

Unlicensed Underground Installations

- The responsibility for ensuring the installation meets the International Fire Code falls to the
 - local Authority Having Jurisdiction (AHJ)

Unlicensed Underground Installations

- AHJ steps when finding an illegal underground installation:
 - Issue stop order to prevent connection to the above ground portion
 - Require the general contractor to use a licensed sprinkler contractor to reinstall the underground fire service main per NFPA 24.
 - File a State Fire Marshal's complaint form against both contractors for work performed in violation of the RCW and the WAC.

Unlicensed Underground Installations

- If the aboveground is already connected:
 - AHJ cannot accept either portion of the sprinkler system.
 - Both above and underground contractors are in violation.
 - File a complaint with our office.

Note: AHJ's CANNOT approve any unlicensed installation of fire sprinkler systems.

Undocumented Underground Installations

- For licensed contractors that do not contact the jurisdiction:
 - Uncover ALL joints for review and hydrostatic test.
 - Accept the system after requiring all NFPA 24 tests and inspections to be performed.
 - Note:** *the AHJ who uses this approach is accepting liability for the installation and any subsequent failures of the system.*
 - File a State Fire Marshal's complaint form against the contractor for work performed in violation of the RCW and the WAC.

Violations and Penalties

■ RCW 18.160.100: Unlicensed operations — Penalty.

Any fire protection sprinkler system contractor who *constructs, installs, or maintains* a fire protection sprinkler system ... *without* first obtaining a *fire sprinkler contractor's license* . . . is guilty of a gross misdemeanor.

■ RCW 18.160.120: Infractions — Failure to obtain certificate of competency — Fines.

(1) A fire protection sprinkler system contractor found to have committed *an infraction* . . . shall be assessed a fine of not less than two hundred dollars and not more than five thousand dollars.

(2) A fire protection sprinkler system contractor who *fails to obtain a certificate of competency* . . . shall be assessed a fine of not less than one thousand dollars and not more than five thousand dollars.

Violations and Penalties

■ WAC 212-80-220: General rules of citations and penalties.

(3) Each *separate instance* of noncompliance . . . shall be considered a *separate violation*.

(4) *Each day* the violation continues may be considered a *separate violation*.

(5) . . . the chief of the Washington state patrol, . . . *may also revoke, suspend, and/or deny the renewal* of any license or certificate . . . to person(s) and/or company(ies) who *fails to pay any penalties* assessed under these rules.

Such action does not preclude . . . assessing further violations for *unlicensed and/or uncertified operations*.

(6) The penalty for each violation shall range from \$0.00 to \$5,000.00 per day per violation per occurrence.

Violations and Penalties

- **WAC 212-80-200: Suspension or revocation of licenses.**

(1) The chief of the Washington state patrol, . . . may refuse to issue or renew or may suspend or revoke the privilege of a licensed fire protection sprinkler system contractor . . . to engage in the fire protection sprinkler system business or may establish penalties . . . for any of the *following reasons*:

(a) Gross incompetency or gross negligence

(b) Conviction of a felony

(c) Fraudulent or dishonest practices

(d) False evidence or misrepresentation

(e) Permitting license to be used in connection with the installation . . . not under his or her supervision

(f) Knowingly violating any provisions of this regulation

Sprinkler Contractor Web Site

- To check the credentials of the Sprinkler Contractors:
 - Go to the State Fire Marshal Web Site at:
www.wsp.wa.gov/fire/licreports.htm
 - For “Licensed Fire Sprinkler Contractors”:
click on the appropriate Level
 - For “Certificate of Competency Holders”
click on the appropriate level

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Sprinkler Program - Licensing & Certification Reports

To assist local jurisdictions, officials, clients, the industry, and the general public in complying with state law and rule all information regarding licenses and certifications issued by this office have been compiled in a report format sorted by level. These reports are available below and are updated on a monthly basis.

If you have any questions regarding the Fire Sprinkler Program, please see our [contact information](#).

Licensed Fire Sprinkler Contractors:

- [All Levels - Licensed Fire Sprinkler Contractors](#) PDF
 - [Level 1 - Licensed Fire Sprinkler Contractors](#) PDF
 - [Level 2 - Licensed Fire Sprinkler Contractors](#) PDF
 - [Level 3 - Licensed Fire Sprinkler Contractors](#) PDF
- [Level U - Licensed Fire Sprinkler Contractors](#) PDF
- [Level I&T - Licensed Fire Sprinkler Contractors](#) PDF

Certificate of Competency Holders:

- [All Levels - Certificate of Competency Holders](#) PDF
 - [Level 1 - Certificate of Competency Holders](#) PDF
 - [Level 2 - Certificate of Competency Holders](#) PDF
 - [Level 3 - Certificate of Competency Holders](#) PDF
 - [Level T3 - Certificate of Competency Holders](#) PDF
- [Level U - Certificate of Competency Holders](#) PDF
- [Level I&T - Certificate of Competency Holders](#) PDF

Certificate of Competency Holders – Sprinkler Fitter:

- [All Levels - Sprinkler Fitter Certificate of Competency Holders](#) PDF
 - [Journey-Level – Certificate of Competency Holders](#) PDF
 - [Residential-Level – Certificate of Competency Holders](#) PDF
 - [Trainee-Level – Certificate of Competency Holders](#) PDF



*"Saving Lives
through Prevention
and Preparedness"*

Quick Links

- [Contact Information](#)
- [COC: Certificate of Competency Holder](#)
- [Contractor Licensing](#)
- [Levels of Licensing](#)
- [Program Forms Page](#)
- [Sprinkler Inspection & Testing Technician](#)
- [Sprinkler Fitter](#)
- [Temporary COC Holder](#)
- [RCW Chapter 18.160](#)
- [WAC Chapter 212-80](#)



How To Reach Us

■ Complaint Form:

- www.wsp.wa.gov/fire/licforms.htm
 - Look under “Other Sprinkler Licensing Forms”
 - Select “Contractor Complaint Form”

■ Investigation/ Questions:

- Ed Borgatti
 - Phone: 253-536-4269
 - Email: Ed.Borgatti@wsp.wa.gov