



Building Sprinkler Systems

Bill Moy: 3 Credit Hours Plan Review



AUTOMATIC SPRINKLER SYSTEMS; FIRE SUPPRESSION SYSTEMS

SECTION 1600 AUTOMATIC SPRINKLER SYSTEMS; FIRE SUPPRESSION SYSTEMS

1600.1 Scope. The provisions of this article provide the minimum requirements for the design and installation of automatic sprinkler systems in all occupancies, except for 1- and 2-family dwellings.

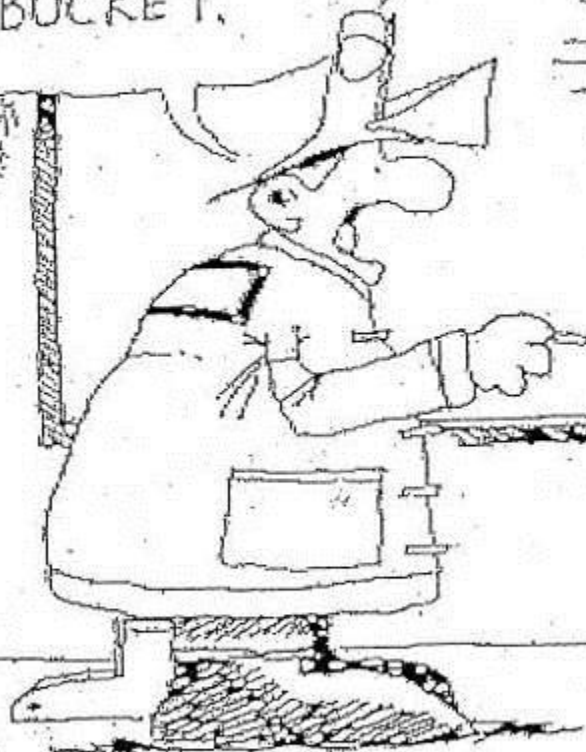
R 408.30995a

1600.2 Installations. Installations shall be in compliance with the provisions of the code. Fire suppression systems shall be in compliance with the provisions of the building code and shall be installed in accordance with the code and NFPA-13-2007, NFPA-13D-2007, NFPA-13R-2007, and NFPA-24-2007 installation of sprinkler systems, installation of sprinkler systems in 1- and 2-family dwellings and manufactured homes, and installation of sprinkler systems in residential occupancies up to 4 stories in height, standards of the national fire protection association listed in chapter 15.

R 408.30995a

O.K.... TRY
THE NEXT
BUCKET.

~~Gasoline~~
~~Fuel oil~~
Lighter Fluid
Kerosene
water



EARLY EXPERIMENTS IN FIRE SUPPRESSION

Chapter 22 Plans and Calculations

22.1* Working Plans.

22.1.1* Working plans shall be submitted for approval to the authority having jurisdiction before any equipment is installed or remodeled.

22.1.2 Deviation from approved plans shall require permission of the authority having jurisdiction.

22.1.3 Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system:

- (1) Name of owner and occupant.
- (2) Location, including street address.
- (3) Point of compass.
- (4) Full height cross section, or schematic diagram, including structural member information if required for clarity and including ceiling construction and method of protection for nonmetallic piping.
- (5) Location of partitions.
- (6) Location of fire walls.
- (7) Occupancy class of each area or room.
- (8) Location and size of concealed spaces, closets, attics, and bathrooms.
- (9) Any small enclosures in which no sprinklers are to be installed.
- (10) Size of city main in street and whether dead end or circulating; if dead end, direction and distance to nearest circulating main; and city main test results and system elevation relative to test hydrant (see A.23.1.8).
- (11) Other sources of water supply, with pressure or elevation.

- (12) Make, type, model, and nominal K-factor of sprinklers including sprinkler identification number.
- (13) Temperature rating and location of high-temperature sprinklers.
- (14) Total area protected by each system on each floor.
- (15) Number of sprinklers on each riser per floor.
- (16) Total number of sprinklers on each dry pipe system, preaction system, combined dry pipe-preaction system, or deluge system.
- (17) Approximate capacity in gallons of each dry pipe system.
- (18) Pipe type and schedule of wall thickness.
- (19) Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions). Where typical branch lines prevail, it shall be necessary to size only one typical line.
- (20) Location and size of riser nipples.
- (21) Type of fittings and joints and location of all welds and bends. The contractor shall specify on drawing any sections to be shop welded and the type of fittings or formations to be used.
- (22) Type and locations of hangers, sleeves, braces, and methods of securing sprinklers when applicable.
- (23) All control valves, check valves, drain pipes, and test connections.
- (24) Make, type, model, and size of alarm or dry pipe valve.
- (25) Make, type, model, and size of preaction or deluge valve.
- (26) Kind and location of alarm bells.
- (27) Size and location of standpipe risers, hose outlets, hand hose, monitor nozzles, and related equipment.
- (28) Private fire service main sizes, lengths, locations, weights, materials, point of connection to city main; the sizes, types and locations of valves, valve indicators, regulators, meters, and valve pits; and the depth that the top of the pipe is laid below grade.
- (29) Piping provisions for flushing.
- (30) Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.
- (31) For hydraulically designed systems, the information on the hydraulic data nameplate.
- (32) A graphic representation of the scale used on all plans.
- (33) Name and address of contractor.
- (34) Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
- (35) The minimum rate of water application (density or flow or discharge pressure), the design area of water application, in-rack sprinkler demand, and the water required for hose streams both inside and outside.
- (36) The total quantity of water and the pressure required noted at a common reference point for each system.
- (37) Relative elevations of sprinklers, junction points, and supply or reference points.
- (38) If room design method is used, all unprotected wall openings throughout the floor protected.
- (39) Calculation of loads for sizing and details of sway bracing.
- (40) The setting for pressure-reducing valves.
- (41) Information about backflow preventers (manufacturer, size, type).
- (42) Information about antifreeze solution used (type and amount).
- (43) Size and location of hydrants, showing size and number of outlets and if outlets are to be equipped with independent gate valves. Whether hose houses and equipment are to be provided, and by whom, shall be indicated. Static and residual hydrants that were used in flow tests shall be shown.

- (44) Size, location, and piping arrangement of fire department connections.
- (45) Ceiling/roof heights and slopes not shown in the full height cross section.
- (46) Edition year of NFPA 13 that the sprinkler system is designed to.

22.1.4* A signed copy of the owner's certificate and the working plan submittal shall include the manufacturer's installation instructions for any specially listed equipment, including descriptions, applications, and limitations for any sprinklers, devices, piping, or fittings.

22.1.5* Working Plans for Automatic Sprinkler Systems with Non-Fire Protection Connections. Special symbols shall be used and explained for auxiliary piping, pumps, heat exchangers, valves, strainers, and the like, clearly distinguishing these devices and piping runs from those of the sprinkler system. Model number, type, and manufacturer's name shall be identified for each piece of auxiliary equipment.

22.2 Water Supply Information.

22.2.1 Water Supply Capacity Information. The following information shall be included:

- (1) Location and elevation of static and residual test gauge with relation to the riser reference point
- (2) Flow location
- (3) Static pressure, psi (bar)
- (4) Residual pressure, psi (bar)
- (5) Flow, gpm (L/min)
- (6) Date
- (7) Time
- (8) Test conducted by or information supplied by
- (9) Other sources of water supply, with pressure or elevation

22.2.2 Water Supply Treatment Information. The following information shall be included where required by 23.1.5:

- (1) Type of condition that requires treatment
- (2) Type of treatment needed to address the problem
- (3) Details of treatment plan

22.3 Hydraulic Calculation Forms.

22.3.1 General. Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed worksheets, and a graph sheet. [See copies of typical forms in Figure A.22.3.2(a), Figure A.22.3.3, and Figure A.22.3.4.]

22.3.2* Summary Sheet. The summary sheet shall contain the following information, where applicable:

- (1) Date
- (2) Location
- (3) Name of owner and occupant
- (4) Building number or other identification
- (5) Description of hazard (for storage applications, the commodity classification, storage height, and rack configuration shall be included)
- (6) Name and address of contractor or designer
- (7) Name of approving agency
- (8) System design requirements, as follows:
 - (a) Design area of water application, ft² (m²)
 - (b) Minimum rate of water application (density), gpm/ft² (mm/min). Where sprinklers are listed with minimum water application in gpm (L/min) or pressure in psi (bar), the minimum rate of water application shall be indicated in gpm (L/min) or pressure, psi (bar).
 - (c) Area per sprinkler, ft² (m²)

- (9) Total water requirements as calculated, including allowance for inside hose, outside hydrants, and water curtain and exposure sprinklers
- (10) Allowance for in-rack sprinklers, gpm (L/min)
- (11) Limitations (dimension, flow, and pressure) on extended coverage or other listed special sprinklers

22.3.3* Detailed Worksheets. Detailed worksheets or computer printout sheets shall contain the following information:

- (1) Sheet number
- (2) Sprinkler description and discharge constant (*K*)
- (3) Hydraulic reference points
- (4) Flow in gpm (L/min)
- (5) Pipe size
- (6) Pipe lengths, center-to-center of fittings
- (7) Equivalent pipe lengths for fittings and devices
- (8) Friction loss in psi/ft (bar/m) of pipe
- (9) Total friction loss between reference points
- (10) In-rack sprinkler demand balanced to ceiling demand
- (11) Elevation head in psi (bar) between reference points
- (12) Required pressure in psi (bar) at each reference point
- (13) Velocity pressure and normal pressure if included in calculations
- (14) Notes to indicate starting points or reference to other sheets or to clarify data shown
- (15)*Diagram to accompany gridded system calculations to indicate flow quantities and directions for lines with sprinklers operating in the remote area
- (16) Combined K-factor calculations for sprinklers on drops, armovers, or sprigs where calculations do not begin at the sprinkler

22.3.4* Graph Sheet. A graphic representation of the complete hydraulic calculation shall be plotted on semilogarithmic graph paper (*Q*^{1.85}) and shall include the following:

- (1) Water supply curve
- (2) Sprinkler system demand
- (3) Hose allowance (where applicable)
- (4) In-rack sprinkler demand (where applicable)

22.3.5 Computer Generated Hydraulic Reports.

22.3.5.1* General. Hydraulic calculations shall be prepared on form sheets that include a summary sheet, a graph sheet, a water supply analysis, a node analysis and detailed worksheets. The data shall be presented in the order shown in Figure 22.3.5.1(a), Figure 22.3.5.1(b), Figure 22.3.5.1(c), and Figure 22.3.5.1(d). The requirement of 22.3.5 shall be effective starting January 1, 2008.

22.3.5.2 Summary Sheet. [See Figure 22.3.5.1(a).] The summary sheet shall contain the following information, where applicable:

- (1) Project name and date
- (2) Location (including street address)
- (3) Drawing number
- (4) Remote area number
- (5) Remote area location
- (6) Occupancy or commodity classification
- (7) System design requirements, as follows:
 - (a) Design area of water application, ft² (m²)
 - (b) Minimum rate of water application (density), gpm/ft² (mm/min)
 - (c) Area per sprinkler, ft² (m²)

1. Information required on shop drawings includes:

- Name of owner and occupant
- Location, including street address
- Point of compass
- Graphic indication of scale
- Ceiling construction
- Full-height cross section
- Location of fire walls
- Location of partitions
- Occupancy of each area or room
- Location and size of blind spaces and closets
- Any questionable small enclosures in which no sprinklers are to be installed
- Size of city main in street, pressure and whether dead end or circulation and, if dead end, direction and distance to nearest circulating main, city main test results
- Other source of water supply, with pressure or elevation
- Make, type and orifice size of sprinkler
- Temperature rating and location of high-temperature sprinklers
- Limitations on extended coverage sprinklers or other special sprinkler types
- Number of sprinklers on each riser and on each system by floors and total area by each system on each floor
- Make, type, model and size of alarm or dry pipe valve
- Make, type, model and size of preaction or deluge valve
- Type and location of alarm bells
- Backflow prevention method and details
- Total number of sprinklers on each dry pipe system or preaction deluge system
- Approximate capacity in gallons or each dry pipe system
- Setting for pressure-reducing valves
- Pipe size, type, and schedule of wall thickness
- Cutting lengths of pipe (or center-to-center dimensions)
- Type of fittings, riser nipples and size, and all welds and bends
- Type and location of hangers, inserts and sleeves
- Calculations of loads and details for sway bracing
- All control valves, checks, drain pipes, flushing, and test pipes
- Size and location of standpipe risers and hose outlets
- Small hand-hose equipment
- Underground pipe size, length, location, weight, material, point of connection to city main; the type of valves, meters and valve pits; and the depth that top of the pipe is laid below grade
- Size and location of hydrants along with hose-houses
- Size and location of fire department connections
- When the equipment is to be installed as an addition to an old group of sprinklers without additional feed from the yard system, enough of the old system shall be indicated on the plans to show the total number of sprinklers to be supplied and to make all connections clear
- Information to be provided on the hydraulic nameplate
- Name, address and phone number of contractor and sprinkler designer
- Hydraulic reference points shall be shown by a number and/or letter designation and shall correspond with comparable reference points shown on the hydraulic calculation sheets
- System design criteria showing the minimum rate of water application (density), the design area of water application and the water required for hose streams both inside and outside
- Actual calculated requirements showing the total quantity of water and the pressure required at a common reference point for each system
- Elevation data showing elevations of sprinklers, junction points and supply or reference points
- Protected wall openings if room design method is used

2. Information required on calculations includes:

- Location
- Name of owner and occupant
- Building identification
- Description of hazard
- Name and address of contractor and designer
- Name of approving agency

3. System design requirements include:

- Design area of water application
- Minimum rate of water application (density)
- Area of sprinkler coverage
- Hazard or commodity classification
- Building height
- Storage height
- Storage method
- Total water requirements, as calculated, including allowance for hose demand water supply information and allowance for in-rack sprinklers
- Location and elevation static and residual test gauge with relation to the riser reference point
- Size and location of hydrants used for flow test data
- Flow location
- Static pressure, psi
- Residual pressure, psi
- Flow, gpm
- Date
- Time
- Test conducted by whom
- Sketch to accompany gridded system calculations to indicate flow quantities and directions for lines with sprinklers operated in the remote area
















4. Additional information necessary for complete review includes:

- Sprinkler description and discharge constant (K value)
- Hydraulic reference points
- Flow, gpm
- Pipe diameter (actual internal diameter)
- Pipe length
- Equivalent pipe length for fittings and components
- Friction loss in psi per foot of pipe
- Total friction loss between reference points
- Elevation difference between reference points
- Required pressure in psi at each reference point
- Velocity pressures and normal pressure if included in calculations
- Notes to indicate starting points, reference to other sheets or classification of data
- Information on antifreeze solution (type and quantity)
- Water treatment system information including reason for treatment and program details

5. Included with the submittal must be a graph sheet showing water supply curves and system requirements including:

- Hose demand plotted on semilogarithmic graph paper so as to present a graphic summary of the complete hydraulic calculations
- Sprinkler system demand including in-rack sprinklers (if applicable)

Figure 903.3
SAMPLE SPRINKLER SYSTEM DRAWING AND DATA SUBMITTALS

MATERIAL SPECIFICATIONS						STANDARD DRAWING SYMBOLS			
Note: 1" Pipe is	GRID	GRID	MAIN	LINES	SUPPLY THE FOLLOWING	Yes/No			
Sch 40 A53 (uno)	MAIN	LINE			American Made (Domestic)	YES	[0-0]	DENOTES CENTERLINE OF PIPE ABOVE FINISH FLOOR	
Sch 40 A53 Black					Grv-Lock Fittings	NO	[0 Bls]	DENOTES CENTERLINE OF PIPE BELOW TOP OF STEEL	
Sch 10 Thinwall					Grv-Lock Couplings	NO	[0 BJC]	DENOTES CENTERLINE OF PIPE BELOW BOTTOM OF JOIST	
Sch 7			X	X	Firelock Fittings	YES	[0 BSC]	DENOTES CENTERLINE OF PIPE BELOW BOTTOM OF BEAM	
Sch 40 Galvanized					Firelock Couplings	YES	[0 CLOC]	DENOTES CENTERLINE OF PIPE BELOW THE CEILING	
Sch 10 Galvanized					Standard Vic/Central Ftgs	NO			
Weld-0-Lets Thrd				X	Head Wrenches	YES	✕	DENOTES HANGER	 FIRE HOSE VALVE
Weld-0-Lets Grv			X		Spare Head Cabinet	YES		DENOTES HANGER ROD LENGTH	 FIRE HYDRANT
Weld-0-Lets Buff					Top Beam Clamps	NO		DENOTES CEILING HEIGHT	 ELECTRIC BELL
Cast Iron Fittings					Concrete Inserts	NO		HYDRAULIC CALC. REF. POINT	 RISER
Galvanized Fittings					Sammy Screws	YES		GROOVE COUPLING	 FLOW SWITCH
Malleable Ftgs 150#					Strut/Angle Iron	NO		GROOVE CHECK VA.	 FIRE DEPT. CONN.
Malleable Ftgs 300#					Can Heads be any brand?	YES		FIRE HOSE VALVE CABINET	 AUXILIARY DRAIN
Cpvc					Fit Fittings	NO		HYDRAULIC DATA STICKER	 PRESSURE GAUGE
Number of Welds					Hangers Cut Length	NO			
Cut Lengths					Hangers Center to Center	YES			
Center to Center			X	X	FM Approved Material Only	YES			

FIRE SPRINKLER PIPING PLAN



FINISHED FLOOR = 0'-0"

ALL CEILINGS ARE STANDARD 2x4 OR 2x2 LAY-IN TILE TYPE,
AT 8'-0" ABOVE FINISHED FLOOR, UNLESS NOTED.
ALL ROOMS AND AREAS NOT NOTED ARE LIGHT HAZARD TYPE
OCCUPANCIES (OFFICES, TOILETS, LUNCHROOMS).

		⊙	(4)	HORIZ. SIDEWALL	WHITE	155°	1/2"	1/2"	5.6	GLOBE	JN
		⊙	(197)	RECESS PENDENT	WHITE	155°	1/2"	1/2"	5.6	GLOBE	JN
6-29-98	FOR APPROVAL	○	(7)	UPRIGHT	BRASS	165°	1/2"	1/2"	5.6	GLOBE	JN
DATE	DRAWING VERSION / REVISION	A.S.	QUAN	TYPE	FINISH	TEMP	THREAD	ORIFICE	K	SUPPLIER	MODEL

GENERAL NOTES

1. NEW INSTALLATION TO BE PER NFPA-13, USING U.L. LISTED MATERIALS AND COMPONENTS.
2. "AFF" = PIPE DISTANCE ABOVE FINISHED FLOOR.
3. "TOS" = PIPE DISTANCE BELOW TOP OF STEEL.
4. PIPE = ALLIED 'XL' WITH DUCTILE OR CAST IRON SCREWED FITTINGS FOR SIZES 2" AND SMALLER, THINWALL PER NFPA 13-1994 SECTION 2-3 WITH GROOVED FITTINGS AND MECHANICAL TEES OR WELDED OUTLETS FOR SIZES LARGER THAN 2".
5. ALL DIMENSIONS ARE TO CENTERLINES, AND PIPES' LENGTHS ARE CUT, UNLESS NOTED OTHERWISE.
6. ALL WIRING OF ELECTRICAL DEVICES BY OTHERS.
7. (X) DENOTES HYDRAULIC CALCULATION REFERENCE.
8. HANGERS = $\frac{3}{8}$ " ALL-THREAD ROD, UNIVERSAL BEAM CLAMP & ADJUSTABLE RING UNLESS NOTED; SPACING AND LOGGATIONS ARE SHOWN SCHEMATICALLY FOR CODE COMPLIANCE, ACTUAL LOCATIONS MAY VARY TO ACCOMMODATE FIELD CONDITIONS, BUT WILL BE IN COMPLIANCE WITH NFPA-13.
9. UNDERGROUND PIPE INSTALLATION, FLUSHING, AND TESTING PER ALL APPLICABLE CODES SHALL BE BY OTHERS, UNLESS SPECIFICALLY NOTED.
10. UNLESS SPECIFICALLY NOTED, SPRINKLERS DO NOT LINE UP AT THE CENTER OF CEILING TILES.
11. UNLESS SPECIFICALLY NOTED, CROSSMAINS HAVE REMOVABLE CAPS (AT ENDS) FOR FLUSHING.

**FOR
APPROVAL**

SCALE <u>AS NOTED</u> DRAWN BY _____ ENGINEER <u>JRI</u> CHECKED _____ APPROVAL _____	<h3 style="margin: 0;">Haggerty Road</h3> <h3 style="margin: 0;">Canton, Mi.</h3>	JOB NO. <u>98-04-C</u> SHEET NO. <div style="font-size: 2em; font-weight: bold; margin-top: 20px;">FP-1</div>
<h2 style="margin: 0;">FIRE SPRINKLER PIPING PLAN</h2>		

3.6.1* Sprinkler Characteristics, General. The following are characteristics of a sprinkler that define its ability to control or extinguish a fire. (a) Thermal sensitivity. A measure of the rapidity with which the thermal element operates as installed in a specific sprinkler or sprinkler assembly. One measure of thermal sensitivity is the response time index (RTI) as measured under standardized test conditions. (1) Sprinklers defined as fast response have a thermal element with an RTI of 50 (meters-seconds)^{1/2} or less. (2) Sprinklers defined as standard response have a thermal element with an RTI of 80 (meters-seconds)^{1/2} or more. (b) Temperature rating. (c) Orifice size (*see Chapter 6*). (d) Installation orientation (*see 3.6.3*). (e) Water distribution characteristics (i.e., application rate, wall wetting). (f) Special service conditions (*see 3.6.4*).

3.6.2 Sprinkler Types. The following sprinklers are defined according to design and performance characteristics.

3.6.2.1* Early Suppression Fast-Response (ESFR) Sprinkler. A type of fast-response sprinkler that meets the criteria of 3.6.1(a)(1) and is listed for its capability to provide fire suppression of specific high-challenge fire hazards.

3.6.2.2 Extended Coverage Sprinkler. A type of spray sprinkler with maximum coverage areas as specified in Sections 8.8 and 8.9 of this standard.

3.6.2.3 Large Drop Sprinkler. A type of specific application control mode sprinkler that is capable of producing characteristic large water droplets and that is listed for its capability to provide fire control of specific high-challenge fire hazards.

3.6.2.4 Nozzles. A device for use in applications requiring special water discharge patterns, directional spray, or other unusual discharge characteristics.

3.6.2.5 Old-Style/Conventional Sprinkler. A sprinkler that directs from 40 percent to 60 percent of the total water initially in a downward direction and that is designed to be installed with the deflector either upright or pendent.

3.6.2.6 Open Sprinkler. A sprinkler that does not have actuators or heat-responsive elements.

3.6.2.7* Quick-Response Early Suppression (QRES) Sprinkler. A type of quick-response sprinkler that meets the criteria of 3.6.1(a)(1) and is listed for its capability to provide fire suppression of specific fire hazards.

3.6.2.8 Quick-Response Extended Coverage Sprinkler. A type of quick-response sprinkler that meets the criteria of 3.6.1(a)(1) and complies with the extended protection areas defined in Chapter 8.

3.6.2.9* Quick-Response (QR) Sprinkler. A type of spray sprinkler that meets the fast response criteria of 3.6.1(a)(1) and is listed as a quick-response sprinkler for its intended use.

3.6.2.10 Residential Sprinkler. A type of fast-response sprinkler that meets the criteria of 3.6.1(a)(1) that has been specifically investigated for its ability to enhance survivability in the room of fire origin and is listed for use in the protection of dwelling units.

3.6.2.11 Special Sprinkler. A sprinkler that has been tested and listed as prescribed in 8.4.8.

3.6.3 Installation Orientation. The following sprinklers are defined according to orientation.

3.6.3.1 Concealed Sprinkler. A recessed sprinkler with cover plates.

3.6.3.2 Flush Sprinkler. A sprinkler in which all or part of the body, including the shank thread, is mounted above the lower plane of the ceiling.

3.6.3.3 Pendent Sprinkler. A sprinkler designed to be installed in such a way that the water stream is directed downward against the deflector.

3.6.3.4 Recessed Sprinkler. A sprinkler in which all or part of the body, other than the shank thread, is mounted within a recessed housing.

3.6.3.5 Sidewall Sprinkler. A sprinkler having special deflectors that are designed to discharge most of the water away from the nearby wall in a pattern resembling one-quarter of a sphere, with a small portion of the discharge directed at the wall behind the sprinkler.

3.6.3.6 Upright Sprinkler. A sprinkler designed to be installed in such a way that the water spray is directed upwards against the deflector.

3.6.4 Special Service Conditions. The following sprinklers are defined according to special application or environment.

3.6.4.1 Corrosion-Resistant Sprinkler. A sprinkler fabricated with corrosion-resistant material, or with special coatings or platings, to be used in an atmosphere that would normally corrode sprinklers.

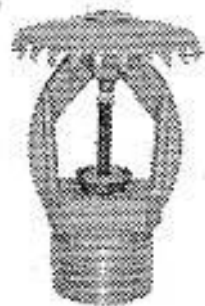
3.6.4.2* Dry Sprinkler. A sprinkler secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates.

3.6.4.3 Institutional Sprinkler. A sprinkler specially designed for resistance to load-bearing purposes and with components not readily converted for use as weapons.

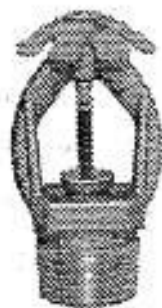
3.6.4.4 Intermediate Level Sprinkler/Rack Storage Sprinkler. A sprinkler equipped with integral shields to protect its operating elements from the discharge of sprinklers installed at higher elevations.

3.6.4.5 Ornamental/Decorative Sprinkler. A sprinkler that has been painted or plated by the manufacturer.

3.6.4.6 Pilot Line Detector. A standard spray sprinkler or thermostatic fixed-temperature release device used as a detector to pneumatically or hydraulically release the main valve, controlling the flow of water into a fire protection system.



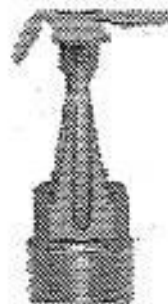
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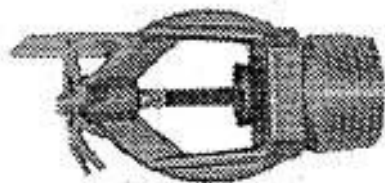
CONVENTIONAL



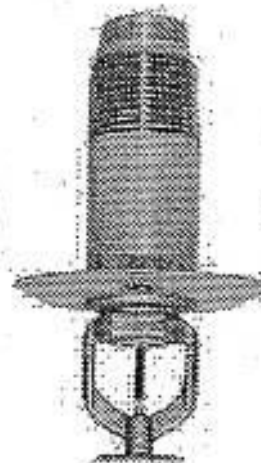
PENDENT



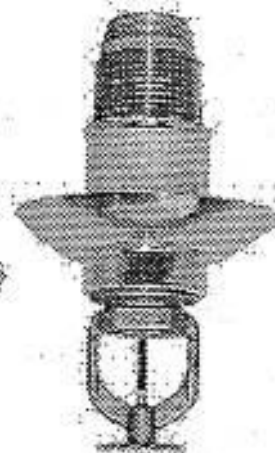
VERTICAL
SIDEWALL



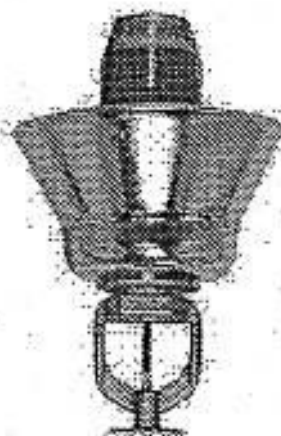
HORIZONTAL SIDEWALL



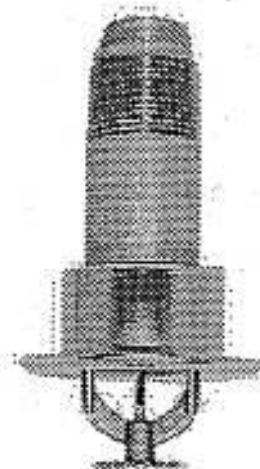
SURFACE
MOUNT



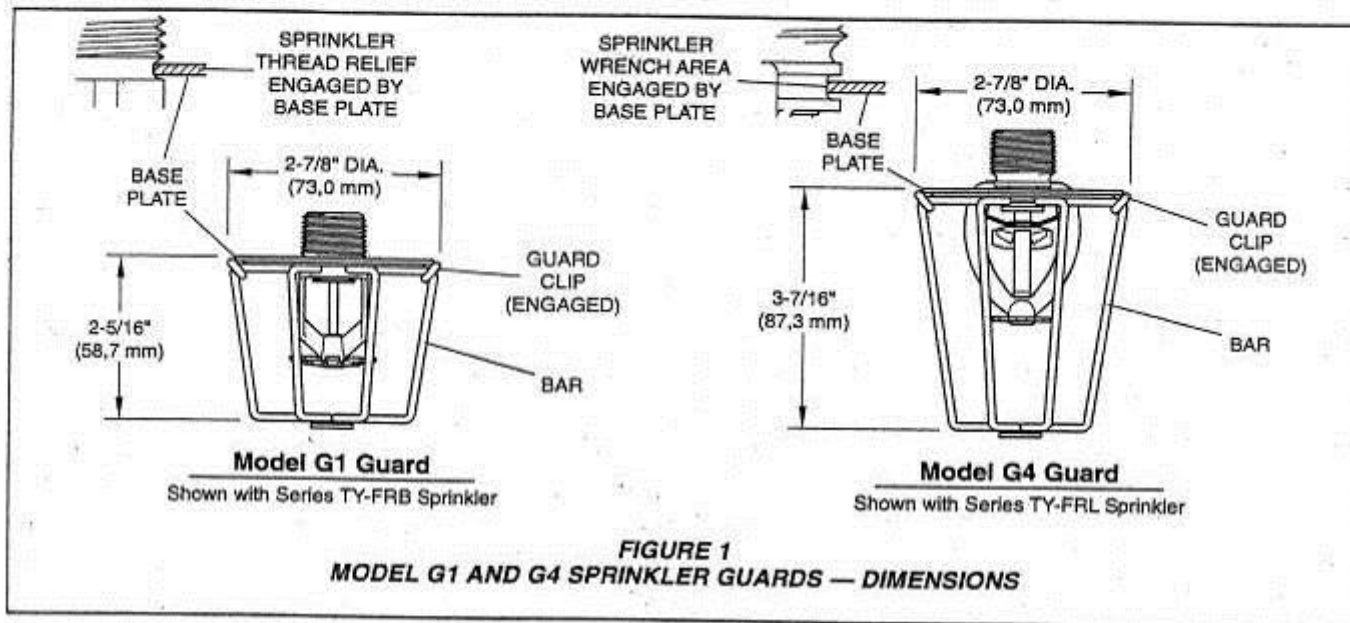
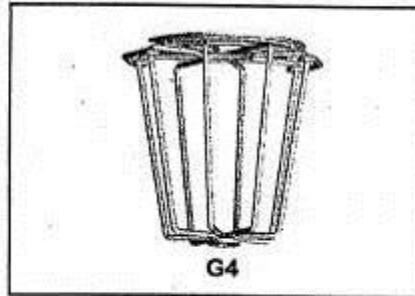
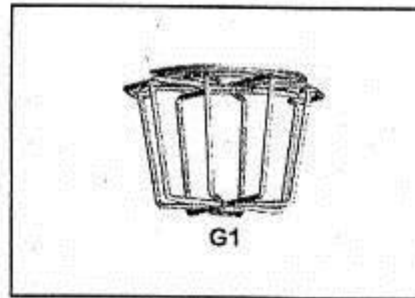
SLEEVE
& SKIRT

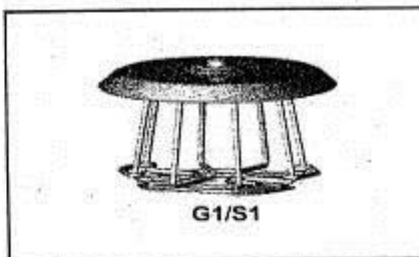


EXTENDED

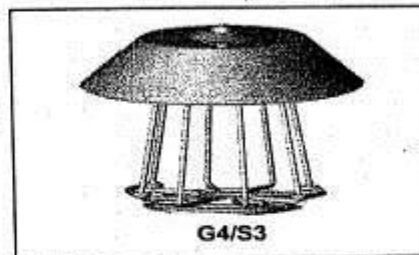


RECESSED

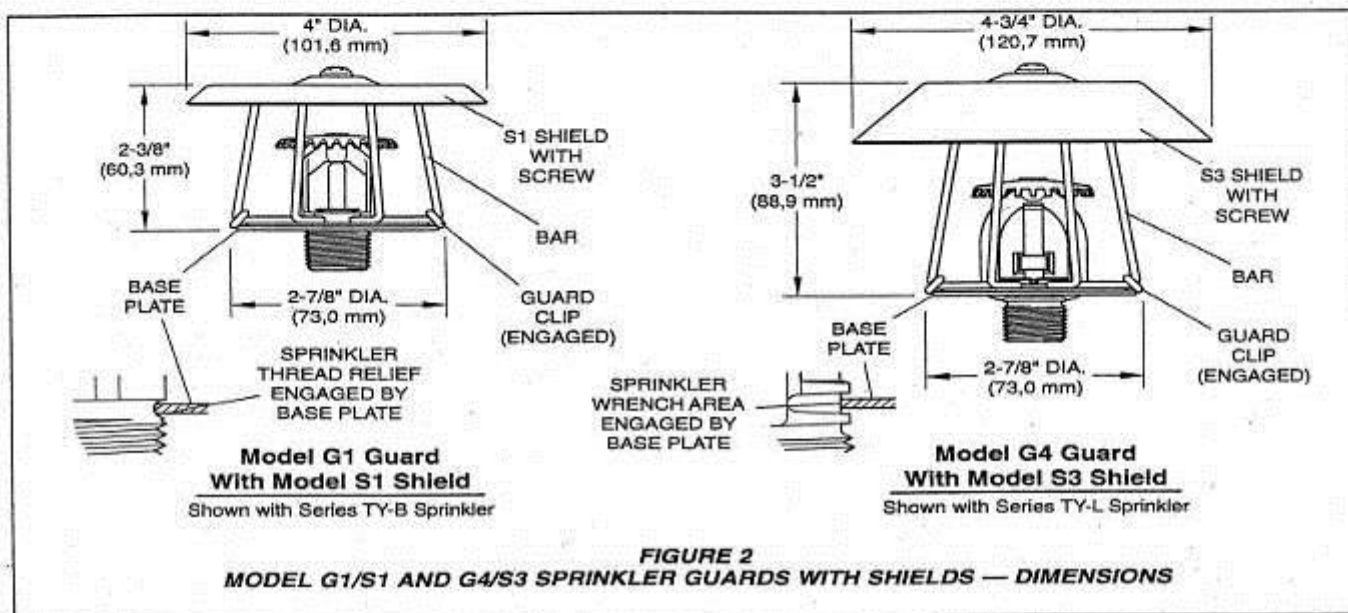


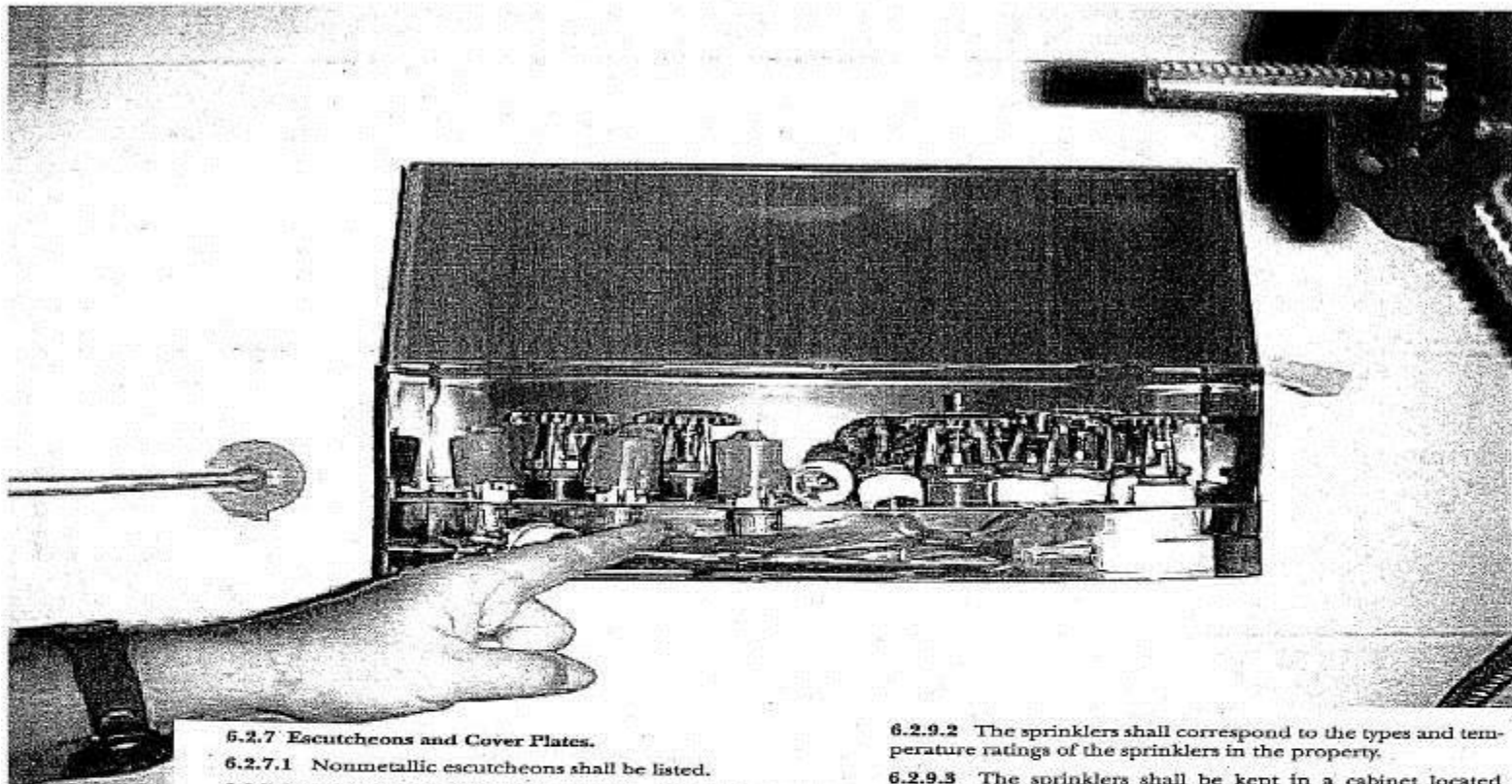


G1/S1



G4/S3





6.2.7 Escutcheons and Cover Plates.

6.2.7.1 Nonmetallic escutcheons shall be listed.

6.2.7.2* Escutcheons used with recessed, flush-type, or concealed sprinklers shall be part of a listed sprinkler assembly.

6.2.7.3 Cover plates used with concealed sprinklers shall be part of the listed sprinkler assembly.

6.2.8 Guards. Sprinklers subject to mechanical injury shall be protected with listed guards.

6.2.9 Stock of Spare Sprinklers.

6.2.9.1* A supply of at least six spare sprinklers (never fewer than six) shall be maintained on the premises so that any sprinklers that have operated or been damaged in any way can be promptly replaced.

6.2.9.2 The sprinklers shall correspond to the types and temperature ratings of the sprinklers in the property.

6.2.9.3 The sprinklers shall be kept in a cabinet located where the temperature to which they are subjected will at no time exceed 100°F (38°C).

6.2.9.4 Where dry sprinklers of different lengths are installed, spare dry sprinklers shall not be required, provided that a means of returning the system to service is furnished.

6.2.9.5 The stock of spare sprinklers shall include all types and ratings installed and shall be as follows:

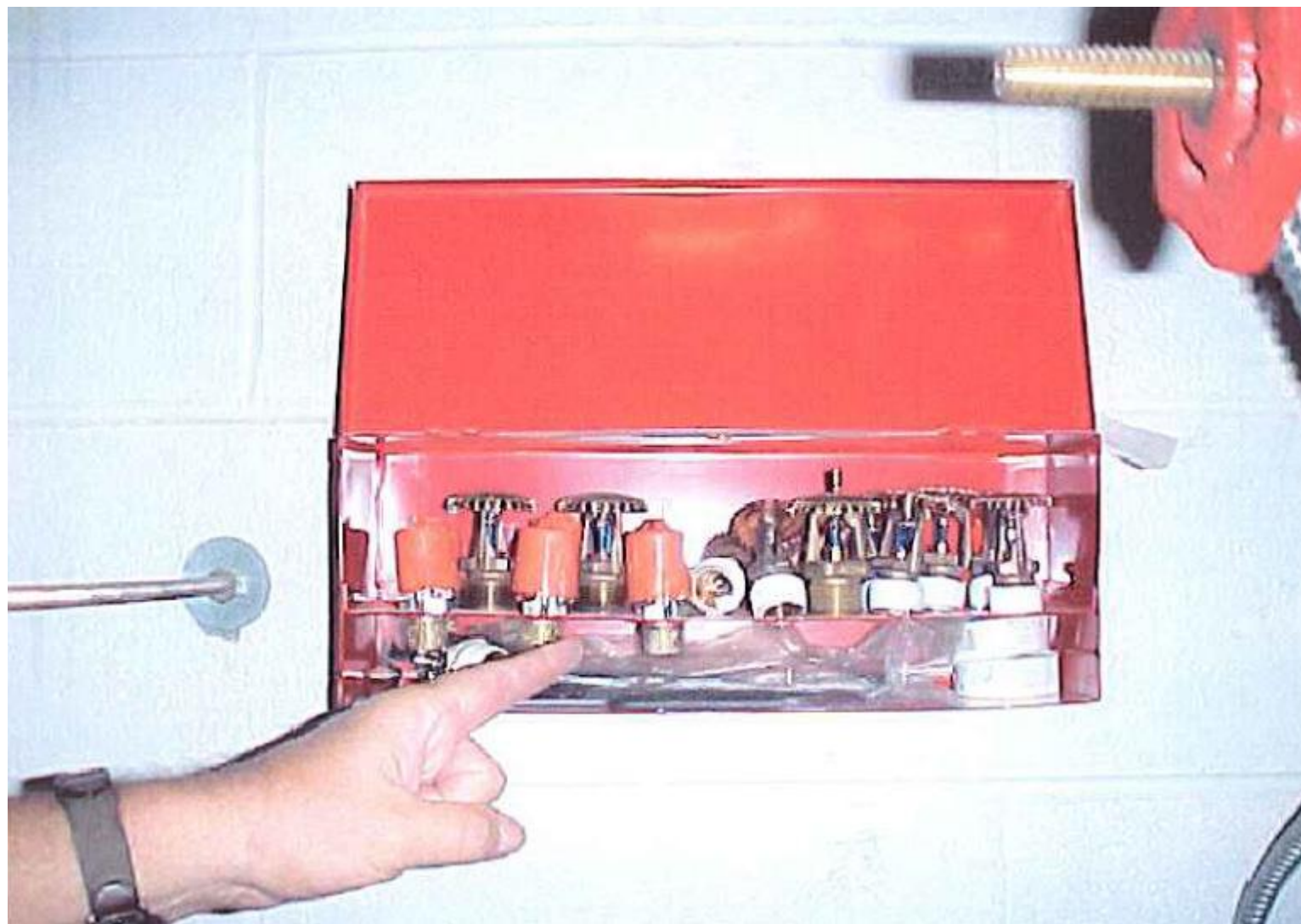
- (1) For protected facilities having under 300 sprinklers — no fewer than six sprinklers
- (2) For protected facilities having 300 to 1000 sprinklers — no fewer than 12 sprinklers
- (3) For protected facilities having over 1000 sprinklers — no fewer than 24 sprinklers

6.2.9.6 A special sprinkler wrench shall be provided and kept in the cabinet to be used in the removal and installation of sprinklers. One sprinkler wrench shall be provided for each type of sprinkler installed.

6.2.9.7 A list of the sprinklers installed in the property shall be posted in the sprinkler cabinet.

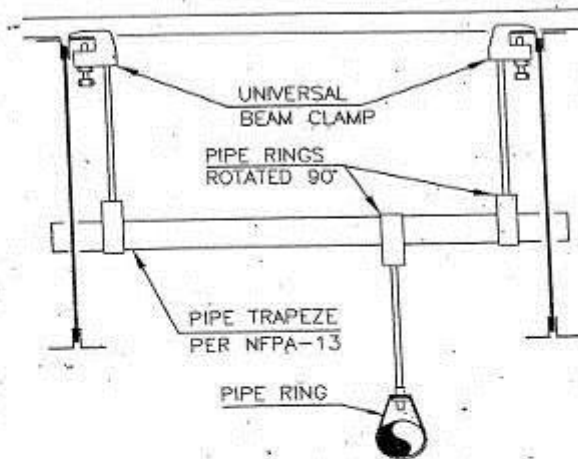
6.2.9.7.1* The list shall include the following:

- (1) Sprinkler Identification Number (SIN) if equipped; or the manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure rating
- (2) General description
- (3) Quantity of each type to be contained in the cabinet
- (4) Issue or revision date of the list



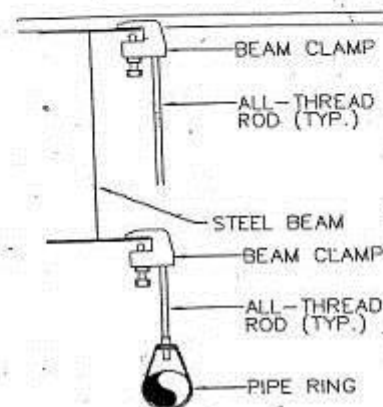
TYPICAL HANGERS

NO SCALE



TYPICAL TRAPEZE HANGER

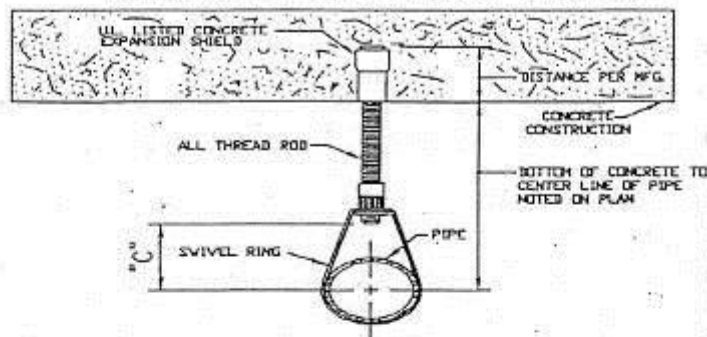
NO SCALE



TYPICAL HANGERS

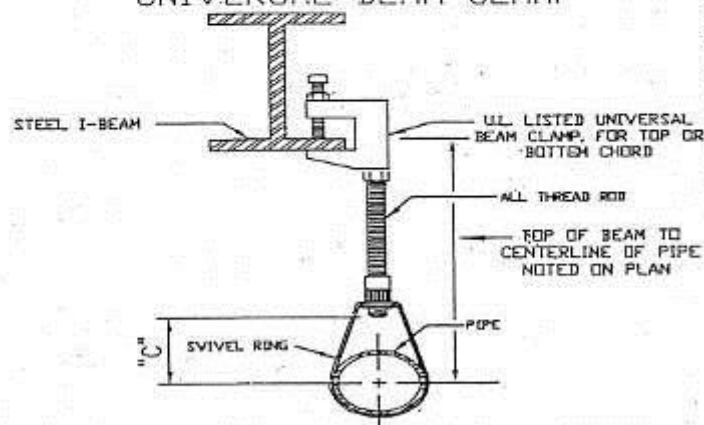
NO SCALE

HANGER No. 11 CONCRETE EXPANSION SHIELD



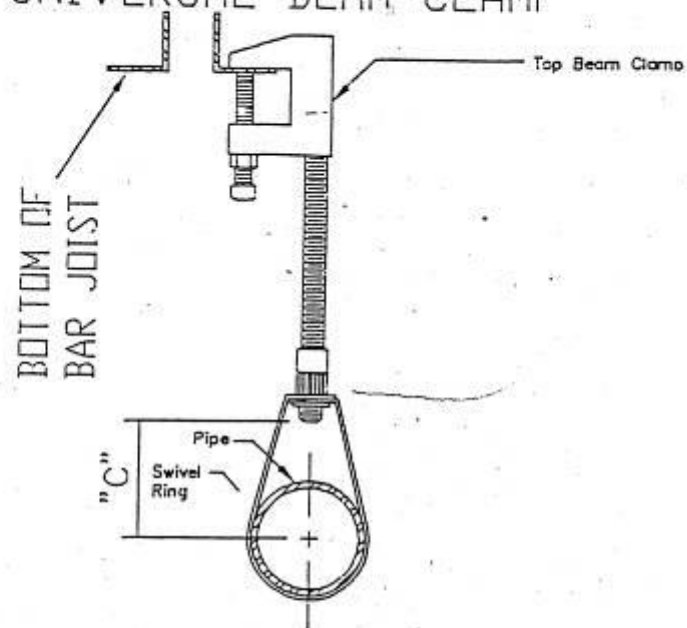
PIPE SIZE	ROD SIZE	MAXIMUM DISTANCE BETWEEN HANGERS	SWIVEL RING TAKE - OUT
1"	3/8"	12'-0"	1 1/4"
1 1/4"			1 1/4"
1 1/2"			1 1/2"
2"			1 3/4"
2 1/2"			2"
3"			2 1/2"
3 1/2"	1/2"	15'-0"	2 1/2"
4"			3"
5"			4"
6"			5 1/4"
8"			6-3/4"

HANGER No. 6s UNIVERSAL BEAM CLAMP



PIPE SIZE	ROD SIZE	MAXIMUM DISTANCE BETWEEN HANGERS	SWIVEL RING TAKE - OUT
1"	3/8"	12'-0"	1 1/4"
1 1/4"			1 1/4"
1 1/2"			1 1/2"
2"			1 3/4"
2 1/2"			2"
3"			2 1/2"
3 1/2"	1/2"	15'-0"	2 1/2"
4"			3"
5"			4"
6"			5 1/4"
8"			6-3/4"

HANGER # 41 UNIVERSAL BEAM CLAMP



PIPE SIZE	ROD SIZE	MAXIMUM DISTANCE BETWEEN HANGERS	SWIVEL RING TAKE - OUT
1'	3/8"	12'-0"	1 1/4"
1 1/4'			1 1/4"
1 1/2"			1 1/2"
2"			1 3/4"
2 1/2'			2"
3'	3/8"	15'-0"	2 1/2"
3 1/2'			2 1/2"
4'			3"
5'			4"
6'			5 1/4"
8'	1/2"	15'-0"	6 3/4"

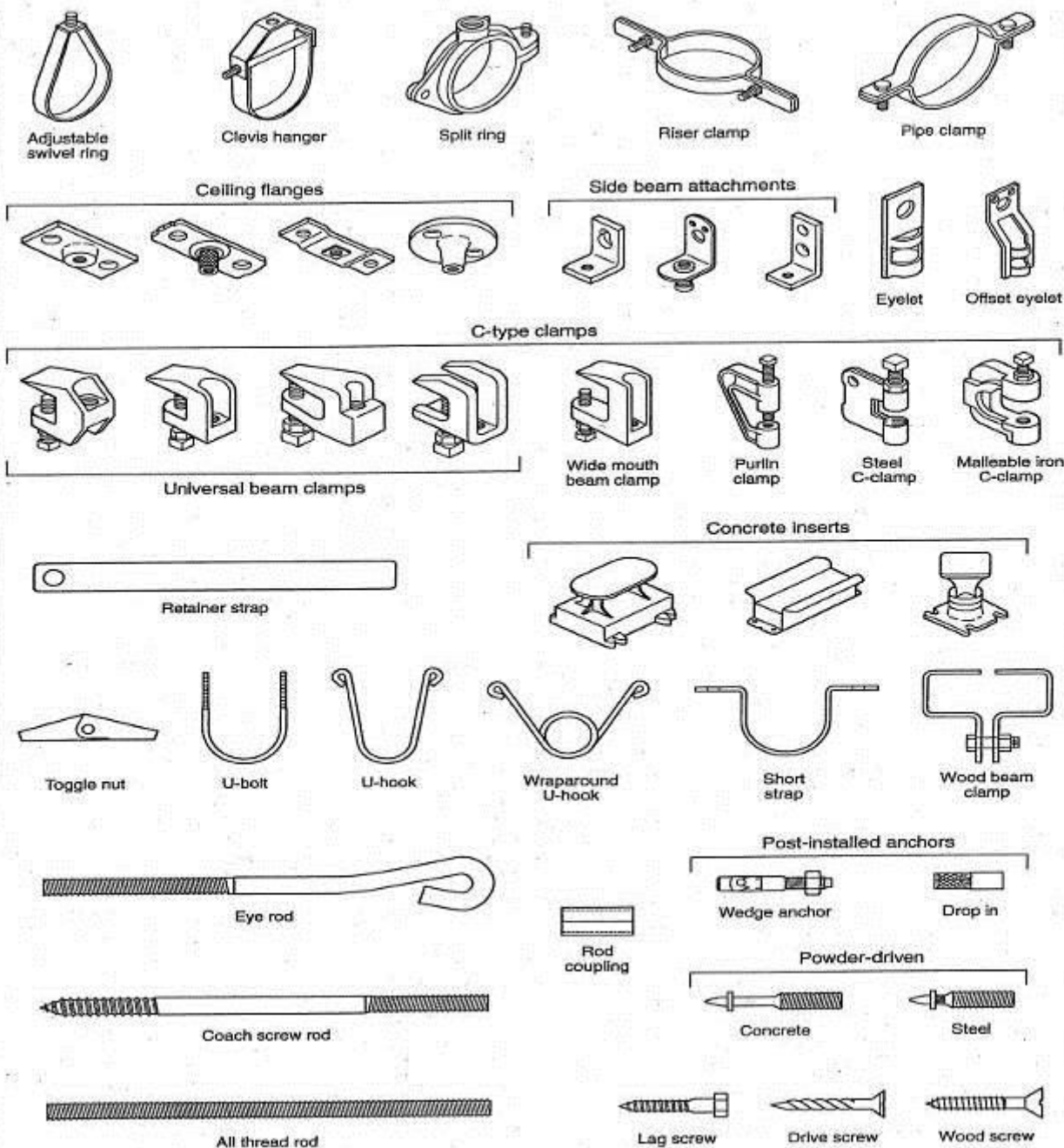
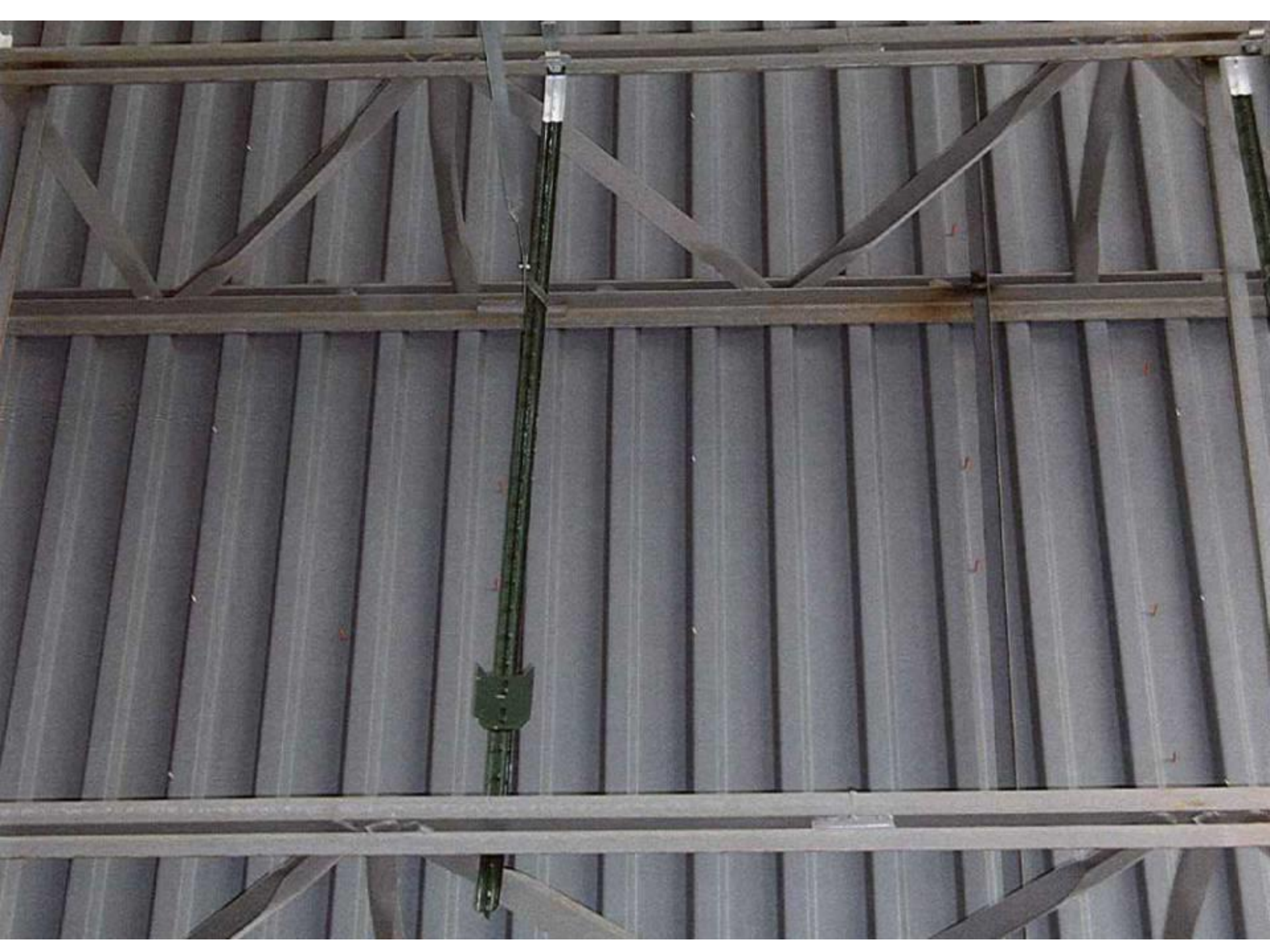
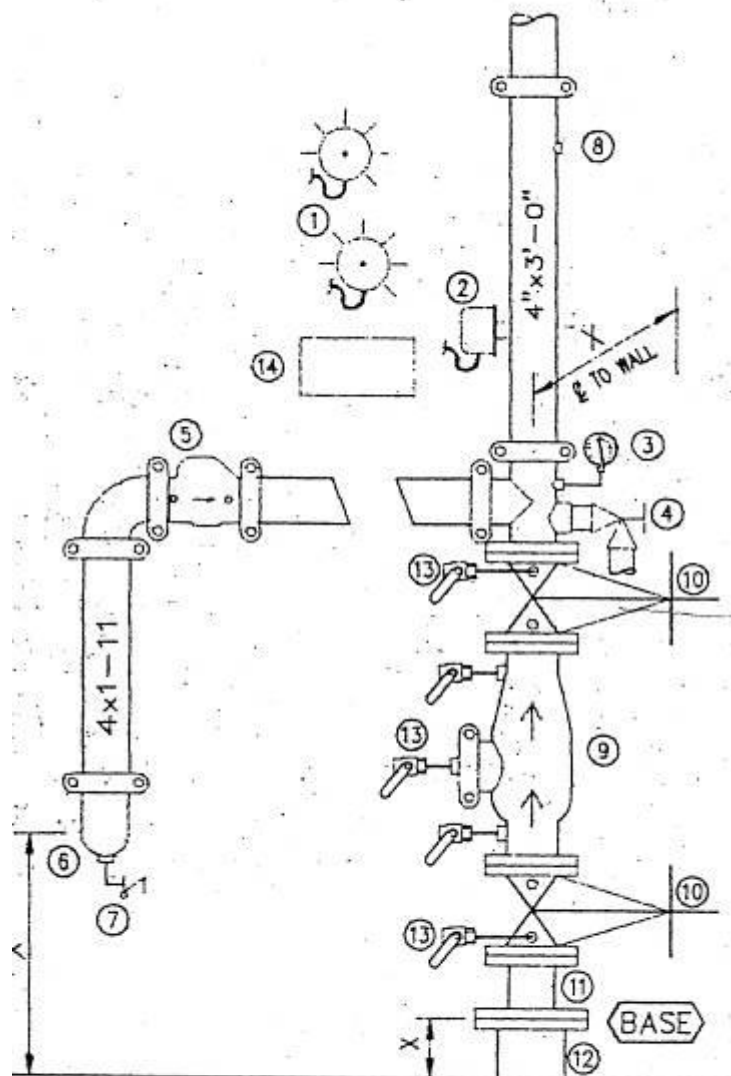


FIGURE A.9.1.1 Common Types of Acceptable Hangers.



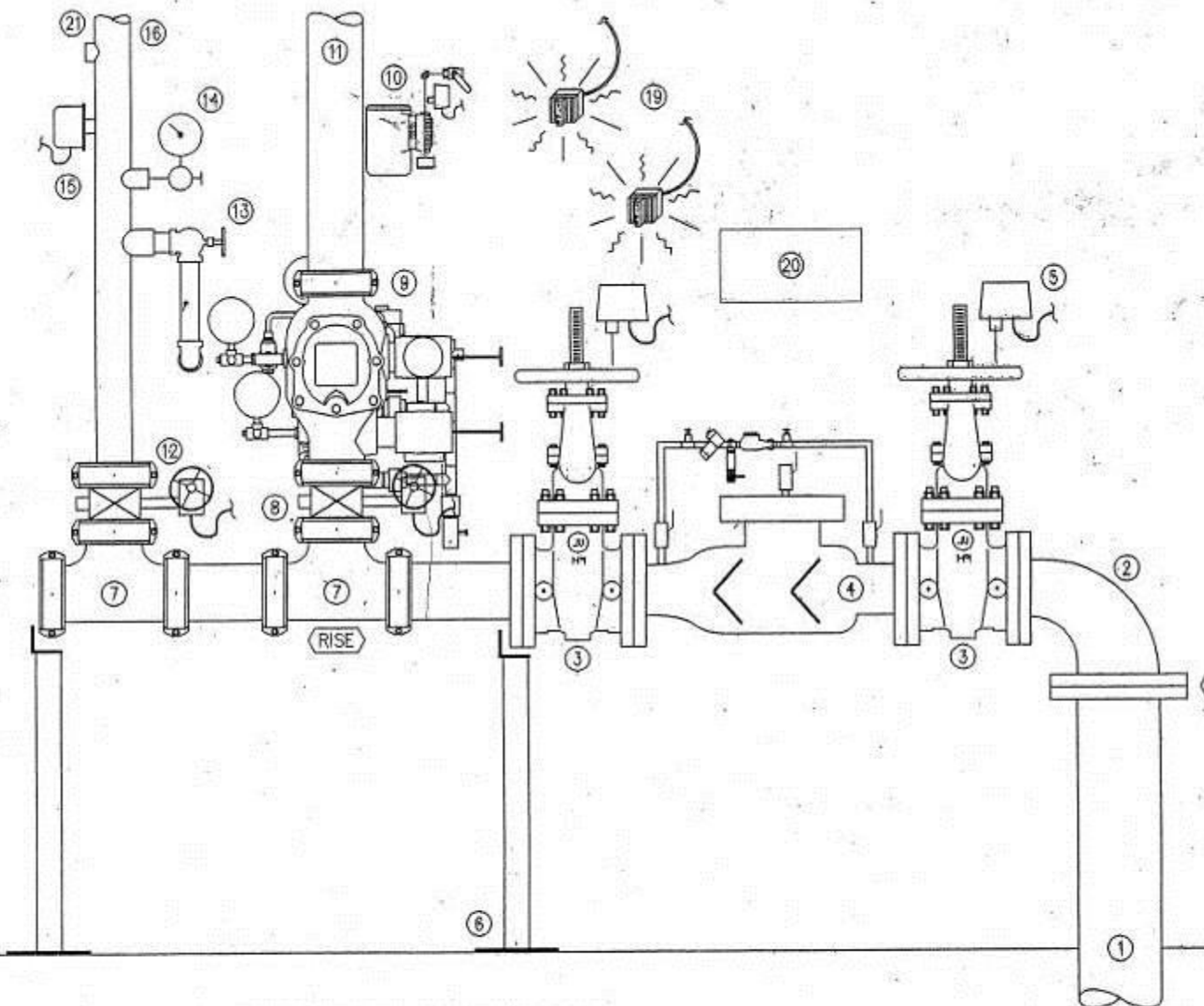


- ① INSIDE AND OUTSIDE ELECTRIC HORN AND STROBE UNITS, WIRED BY OTHERS.
- ② FLOWSWITCH, WIRED (BY OTHERS) TO BELLS AND/OR OTHER ALARMS.
- ③ GAUGE, WITH TEST PORT; $\frac{1}{4}$ " 175# RELIEF VALVE ON GRIDED SYSTEMS.
- ④ MAIN DRAIN, PIPED THRU EXTERIOR WALL (WHEN POSSIBLE) OR TO FLOOR DRAIN.
- ⑤ 4" GROOVED CHECK VALVE.
- ⑥ 4" x $\frac{1}{2}$ " THRU WALL TO FIRE DEPT. CONNECTION, $\frac{1}{2}$ " BALL DRIP.
- ⑦ 1" TEST OUTLET FOR FLOWSWITCH.
- ⑧ 4" AMES 4000SS BACKFLOW PREVENTOR WITH METERED BYPASS WHERE REQUIRE
- ⑩ 4" OS&Y VALVE WITH SUPERVISION (CHAINED OPEN, UNLESS NOTED).
- ⑪ 4" x 0'-6" T-G GALVANIZED ADAPTER SPOOL PIECE.
- ⑫ UNDERGROUND SUPPLY - INSTALLED, TESTED, FLUSHED (PER NFPA-13), AND CHLORINATED BY OTHERS.
- ⑬ TEST COCK (TYPICAL).
- ⑭ SPARE HEADS AND WRENCH.

RISER DETAIL

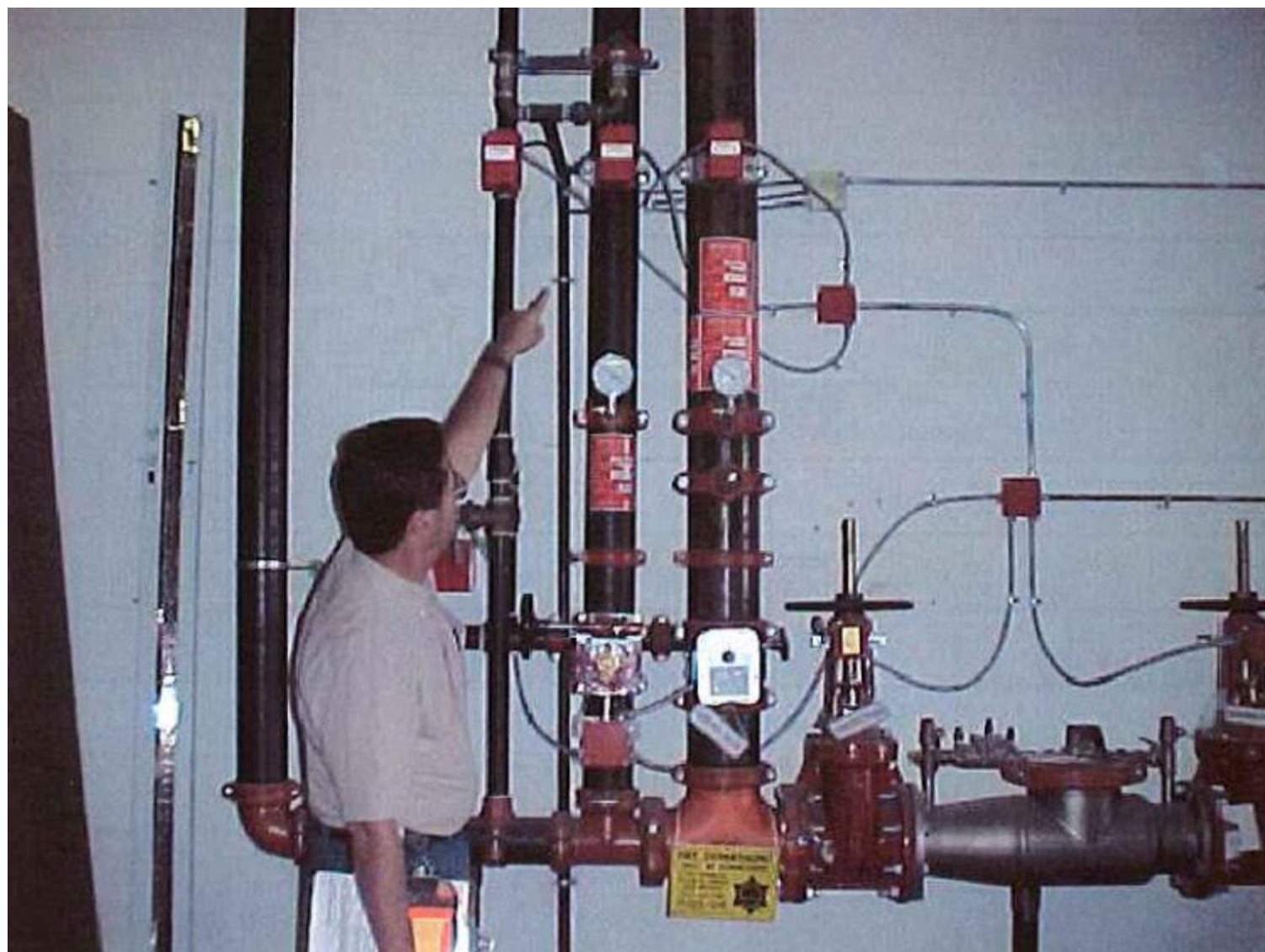
0 1 2 3 LOOKING SOUTH WEST

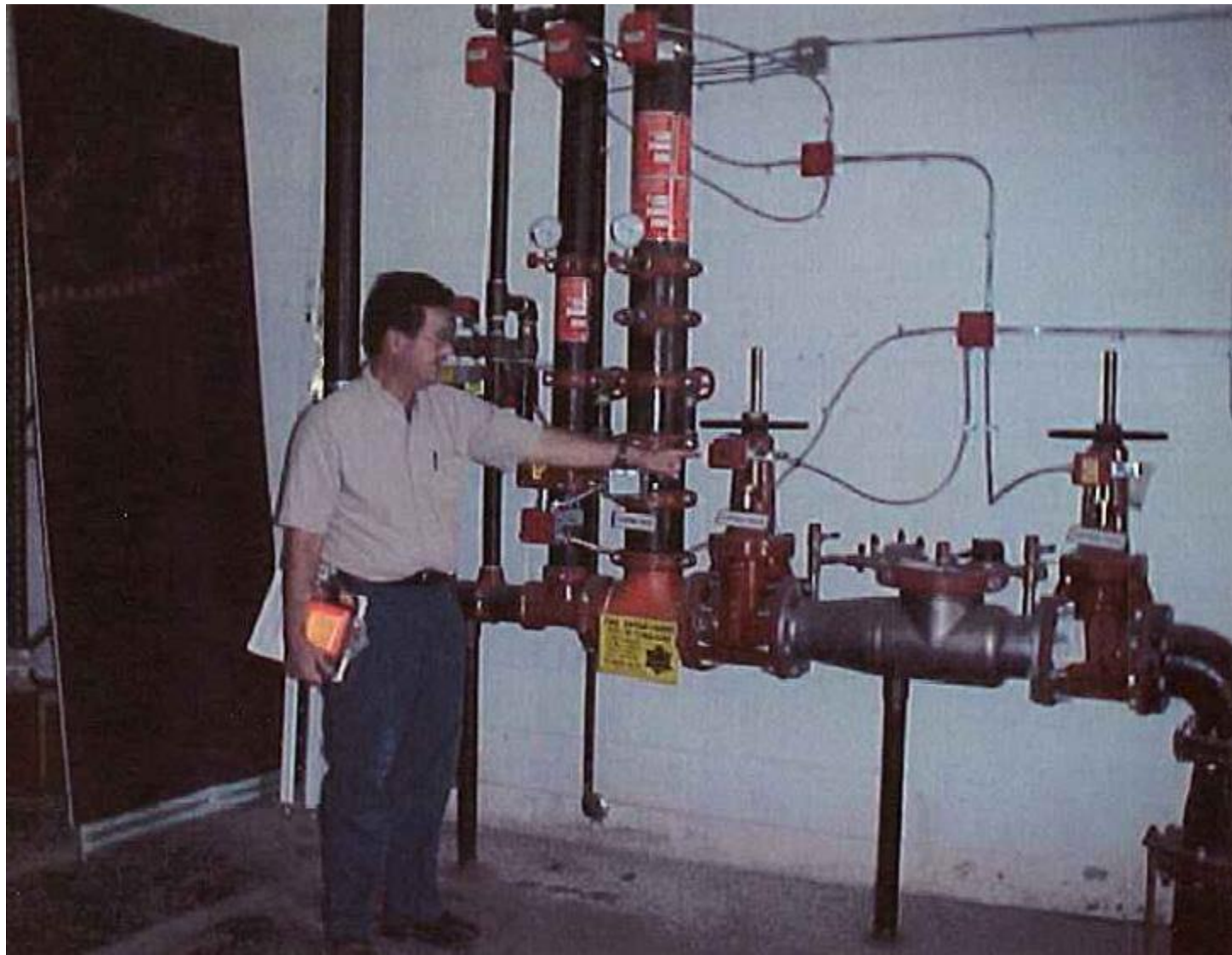
- ① 6" UNDERGROUND SUPPLY - INSTALLED, TESTED, FLUSHED (PER NFPA 13), AND CHLORINATED BY OTHERS.
- ② 6" FLANGED 90 ELL.
- ③ 6" OS&Y VALVE WITH SUPERVISION (CHAINED OPEN, UNLESS NOTED).
- ④ 6" AMES 3000SS BACKFLOW PREVENTOR WITH METERED BYPASS WHERE REQUIRED.
- ⑤ OS&Y TAMPER SWITCH.
- ⑥ PIPESTAND (TYPICAL)
- ⑦ 6" GROOVED TEE.
- ⑧ 4" GROOVED BUTTERFLY VALVE WITH BUILT-IN TAMPER SWITCH (TYPICAL).
- ⑨ 4" GLOBE MODEL G-3 DRY PIPE CHECK VALVE FLANGE x GROOVE W/ CONVENTIONAL TRIM AND QUICK OPENING DEVICE.
- ⑩ PIPE MOUNTED AIR COMPRESSOR.
- ⑪ 4" "DYNAFLOW" TO 2ND FLOOR DRY SYS.
- ⑫ 4" GROOVED BUTTERFLY VALVE WITH BUILT-IN TAMPER SWITCH (TYPICAL).
- ⑬ 2" MAIN DRAIN, PIPED THRU EXTERIOR WALL (WHEN POSSIBLE) OR TO FLOOR DRAIN.
- ⑭ GAUGE, WITH TEST PORT; 1/4" 175# RELIEF VALVE ON GRIDDED SYSTEMS.
- ⑮ FLOWSWITCH, WIRED (BY OTHERS) TO BELLS AND/OR OTHER ALARMS.
- ⑯ 4" "DYNAFLOW" TO WET SYS.
- ⑰ NOT USED.
- ⑱ NOT USED.
- ⑲ INSIDE AND OUTSIDE ELECTRIC HORN AND STROBE UNITS, WIRED BY OTHERS.
- ⑳ SPARE HEADS AND WRENCH.
- ㉑ 1" OUTLET FOR INSP. TEST CONN.

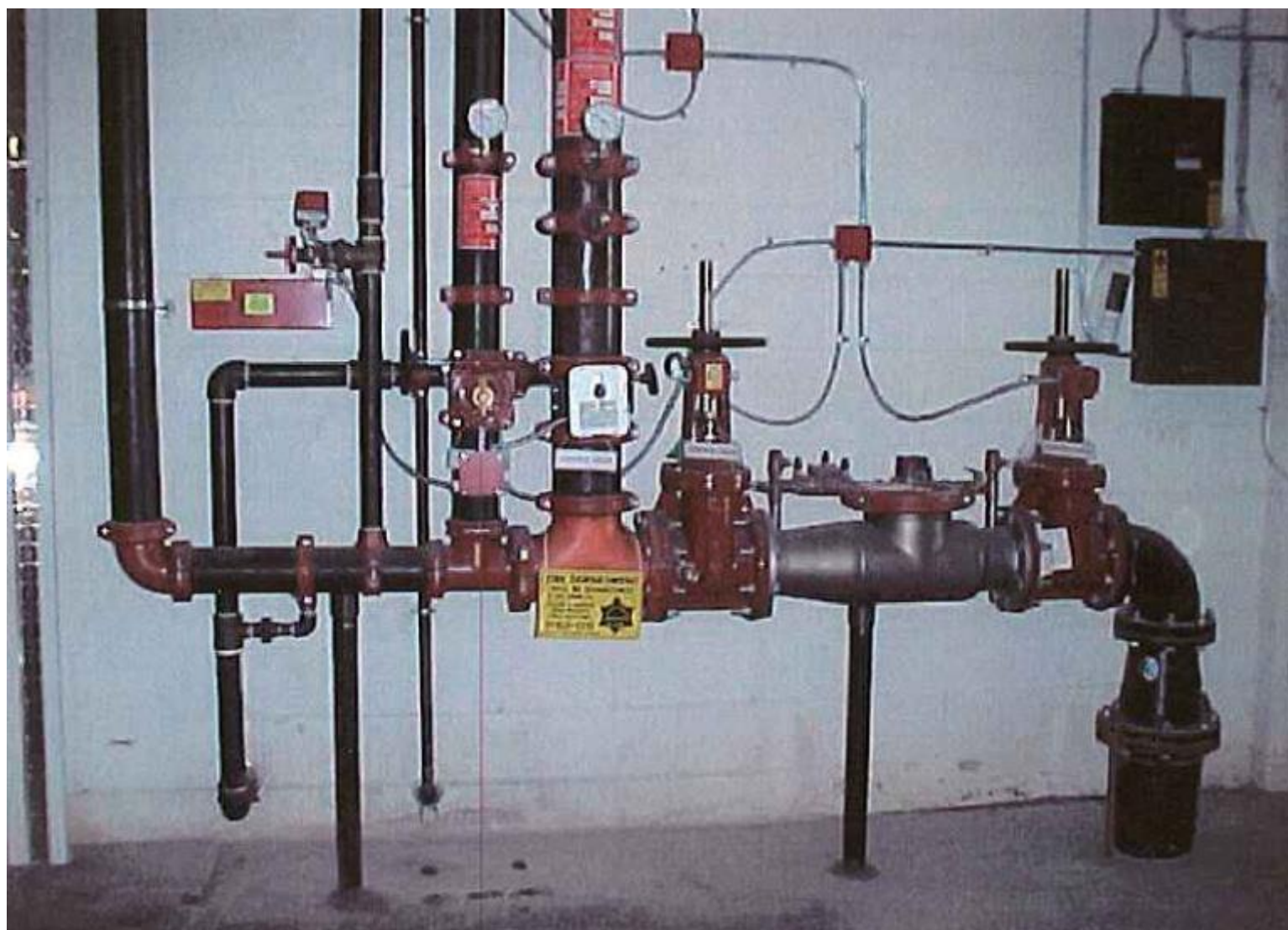


RISER DETAIL

0 1 2 3







Series 3000SS

Double Check Detector Assemblies

Sizes: 2 1/2" – 12" (65 – 300mm)



Features

- Patented Cam-Check Assembly valve provides low head loss
- Short lay length is ideally suited for retrofit installations
- Stainless Steel body is half the weight of competitive designs reducing installation and shipping cost
- Stainless steel construction provides long term corrosion protection and maximum strength
- Single top access cover with two-bolt grooved style coupling for ease of maintenance
- No special tools required for servicing
- Compact construction allows for smaller vaults and enclosures
- Furnished with 3/8" x 3/4" bronze meter (gpm or cfm)
- Detects underground leaks and unauthorized water use
- Maybe installed horizontal or vertical "flow up" position

Available Models

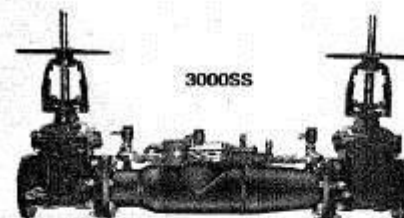
Suffix:

- LG – less shutoff valves
 OSY – UL/FM outside stem and yoke resilient seated gate valves
 *OSY FxG – flanged inlet gate connection and grooved outlet gate connection
 *OSY GxG – grooved inlet gate connection and flanged outlet gate connection
 *OSY GxG – grooved inlet gate connection and grooved outlet gate connection
 CFM – cubic feet per minute
 GPM – gallons per minute meter

Available with grooved NRS gate valves – consult factory*

Post indicator plate and operating nut available – consult factory*

*Consult factory for dimensions



Series 3000SS Double Check Detector Assemblies are designed for use in accordance with water utility non-health hazard containment requirements. It is mandatory to prevent the reverse flow of fire protection system substances, i.e., glycerin wetting agents, stagnant water and water of non-potable quality from being pumped or siphoned into the potable water supply.

Specifications

A Double Check Detector Assembly shall be installed on fire protection systems when connected to a potable water supply. Degree of hazard present is determined by the local authority having jurisdiction. The main valve body shall be manufactured from 300 Series stainless steel to provide corrosion resistance, 100% lead free through the waterway. The double check detector assembly consists of two independently operating, spring loaded check valves, two UL, FM, OSY resilient seated gate valves, and bypass assembly. The bypass assembly consists of a meter (cubic ft. or gallons), a double check including shutoff valves and required test cocks. Each cam-check shall be internally loaded and provide a positive drip tight closure against reverse flow. Cam-check includes a stainless steel cam arm and spring, rubber faced disc and a replaceable seat. There shall be no brass or bronze parts used within the cam-check valve assembly. The check valve seats shall be of molded thermoplastic construction. The use of seat screws as a retention method is prohibited. All internal parts shall be accessible through a single cover on the valve assembly. The valve cover shall be held in place through the use of a single grooved style two-bolt coupling. The bypass line shall be hydraulically sized to accurately measure low flow. The bypass line shall consist of a meter, a small diameter double check assembly with test cocks and isolation valves. The bypass line double check valve shall have a single access cover, two independently operating modular poppet check valves, and top mounted test cocks. The assembly shall be an Ames 3000SS.

Materials

All internal metal parts: 300 Series stainless steel, Main valve body: 300 Series stainless steel, Check assembly: Noryl® Flange dimension in accordance with AWWA Class D. Noryl® is a registered trademark of General Electric Company.

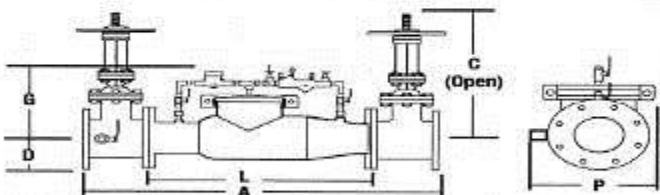
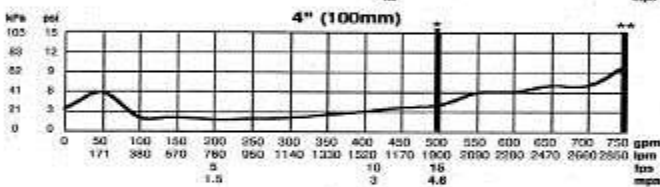
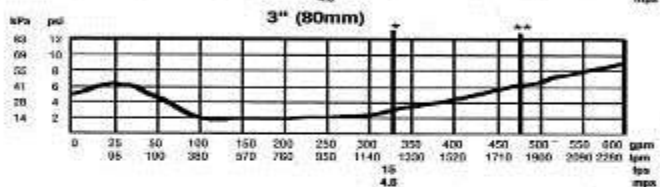
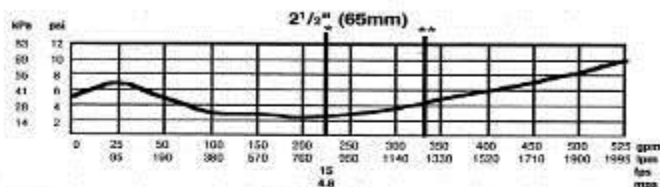
Job Name _____	Contractor _____
Job Location _____	Approval _____
Engineer _____	Contractor's P.O. No. _____
Approval _____	Representative _____

Pressure — Temperature

Temperature Range: 33°F ± 110°F (5°C — 43°C)
Maximum Working Pressure: 175psi (12.06 bar)

Capacity

Flow curves as tested by Underwriters Laboratory per UL 1469, 1996. * Rated flow **UL Tested

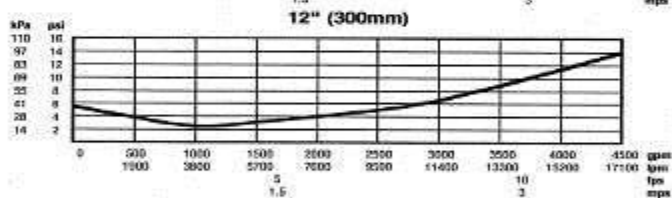
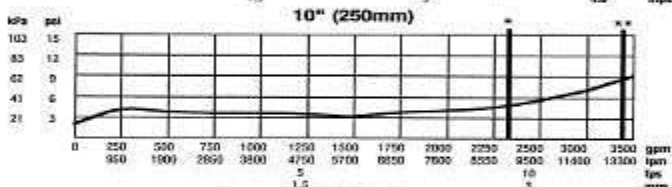
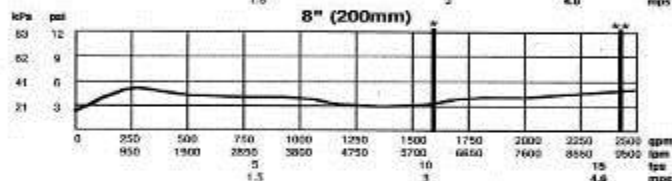
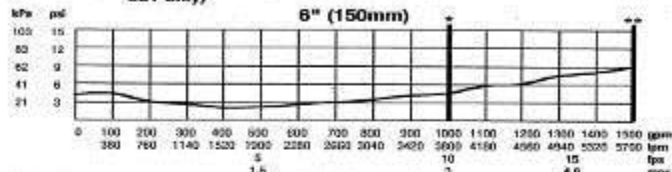


Standards

AWWA C510-92, UL 1469

Approvals

For 12" approvals consult factory.



SIZE (DN)				DIMENSIONS								NET WEIGHT		NET WEIGHT			
		A		C (DSY)		D		G		L		P		w/Gates		w/o Gates	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lb.	kg.	lb.	kg.
2 1/2	65	37	965	16 3/8	416	3 1/2	89	10	250	22	559	12 1/2	318	155	70	68	31
3	80	38	965	18 7/8	479	3 3/4	95	10	250	22	559	13	330	230	104	70	32
4	100	40	1016	22 3/4	578	4 1/2	114	10	250	22	559	14 1/2	368	240	109	73	33
6	150	48 1/2	1232	30 1/8	765	5 1/2	140	15	381	27 1/2	699	15 1/2	394	390	177	120	54
8	200	52 1/2	1334	37 3/4	959	6 3/4	171	15	381	29 1/2	749	18 1/2	464	572	259	180	82
10	250	55 1/2	1410	45 3/4	1162	8	200	15	381	29 1/2	749	19 1/2	495	774	351	190	86
12	300	57 1/2	1461	53 1/8	1349	9 1/2	241	15	381	29 1/2	749	21	533	1044	474	220	100



A Division of Watts Regulator Company

IMPORTANT: Inquire with governing authorities for local installation requirements.

www.amesfirewater.com



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ES-A-3000SS 0513

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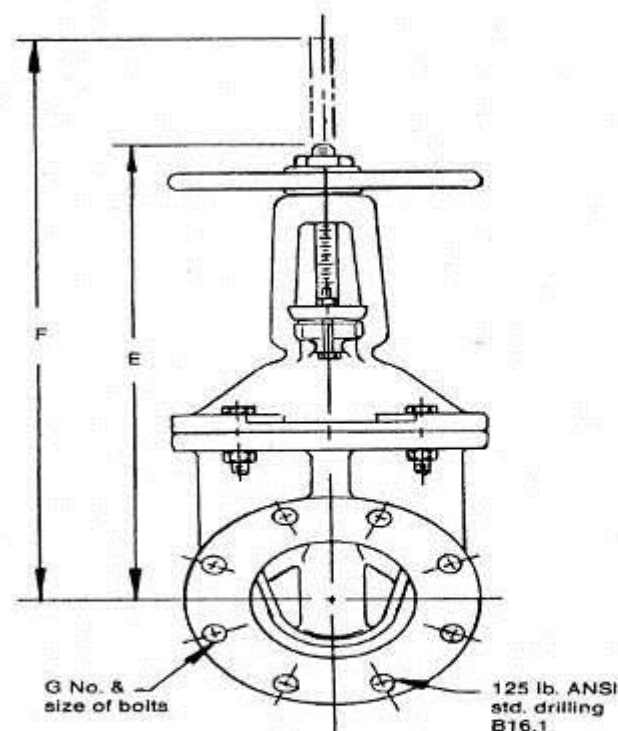
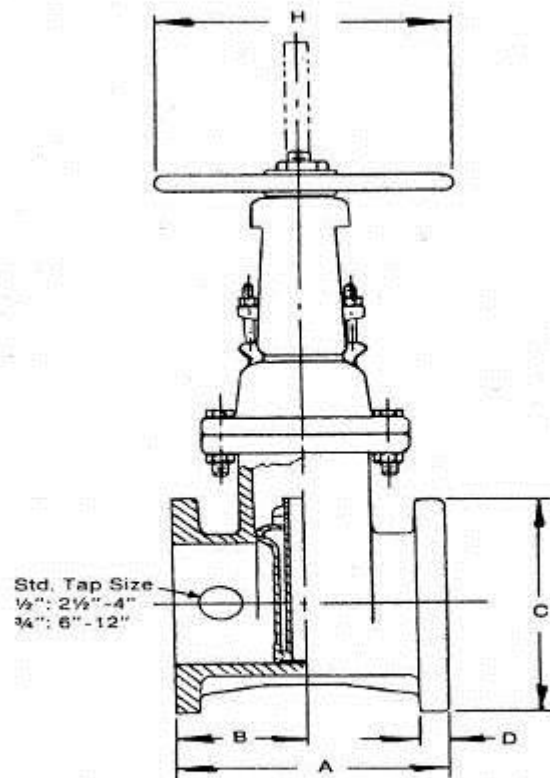


A.W.W.A Standard C509

2-1/2" - 12" KENSEAL II R/W
VALVE - OS & Y - FLANGED END
GENERAL DIMENSION LAYOUT

KENNEDY VALVE

4068



VALVE SIZE	A	B	C	D	E	F	G	H	Weight
2-1/2	7-1/2	3-3/4	7	11-1/8	13-7/8	16-3/8	4-5/8	7-1/4	55
3	8	4	7-1/2	3/4	15-5/8	18-7/8	4-5/8	10	70
4	9	4-1/2	9	15/16	18-1/4	22-3/4	8-5/8	10	100
6	10-1/2	5-1/4	11	1	23-3/4	30-1/8	8-3/4	12	150
8	11-1/2	5-3/4	13-1/2	1-1/8	29-1/4	37-3/4	8-3/4	14	250
10	13	6-1/2	16	1-3/16	35-3/8	45-3/4	12-7/8	18	400
12	14	7	19	1-1/4	40-5/8	53-1/8	12-7/8	18	580

4068A-Tapped & Plugged Upon Request @ Position "A"
1/2": 2 1/2"-4"; 3/4": 6"-12"

**4" - 12" KENSEAL II R/W
VALVE UL/FM
PERFORMANCE INFORMATION**

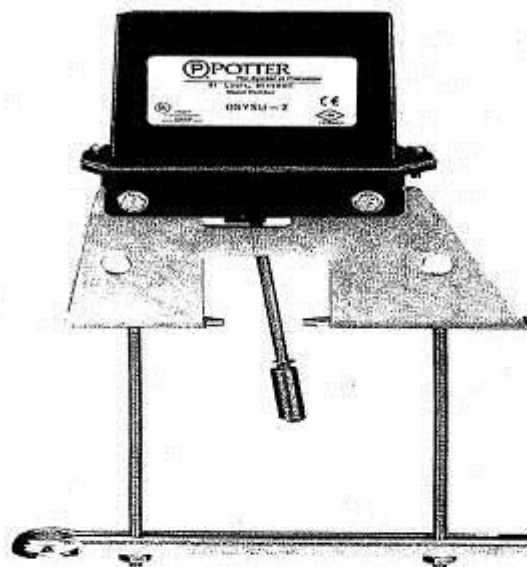
KENNEDY VALVE

Page 16

1. Valve complies with AWWA specs where applicable.
2. Valve complies with Underwriters Laboratory standard UL 262.
3. Valve is rated at 250 psi working pressure, for AWWA
4. Valve is bubble-tight at all pressures up to full rated pressure (250 psi).
5. Valve is capable of a bubble tight seal.
6. 2" thru 6" valve sizes have been hydrostatically shell tested to 1000 psi.
7. 8", 10" and 12" valve sizes have been hydrostatically shell tested to 800 psi.
8. Valve has been subjected to torques 150 percent of the designated minimum required torques.
9. Valve has been cycle tested 5,000 times without loss of bubble-tight seal.
10. Rubber to iron bond on wedge is inspected for strength as per ATM D429 specification.

For complete data on the tests
Underwriters Laboratories performed
reference UL File EX 783

OSYSU-1, -2 OUTSIDE SCREW AND YOKE VALVE SUPERVISORY SWITCH



OSYSU-1 Stock No. 1010106

OSYSU-2 Stock No. 1010206

GENERAL INFORMATION

The OSYSU is used to monitor the open position of an OS & Y (outside screw and yoke) type gate valve. This device is available in two models; the OSYSU-1, containing one set of SPDT (Form C) contacts and the OSYSU-2, containing two sets of SPDT (Form C) contacts. These switches mount conveniently to most OS & Y valves ranging in size from 2" to 12" (50mm to 300mm). They will mount on some valves as small as 1/2" (12.5mm).

The cover is held in place by two tamper resistant screws that require a special tool to remove. The tool is furnished with each device and should be left with the building owner or responsible party. Replacement or additional cover

UL and CSFM Listed, FM Approved, NYMEA Accepted, CE Marked

Dimensions: 6.19"L X 2.25"W X 5.88"H
15,7cm L X 5,7cm W X 14,6cm H

Weight: 2 lbs. (0,9 kg.)

Enclosure: Cover - Die-Cast
Finish - Red Spatter Enamel
Base - Die Cast Zinc
All parts have corrosion resistant finishes.

Cover Tamper: Tamper resistant screws,
Optional cover tamper kit available.

Contact Ratings:

OSYSU-1: One set of SPDT (Form C)
OSYSU-2: Two sets of SPDT (Form C)
15.00 Amps at 125/250VAC
2.50 Amps at 30VDC resistive

Environmental Limitations:

- NEMA 4 and NEMA 6P Enclosure (IP67) when used with appropriate watertight conduit fittings.
- Indoor or Outdoor use (Not for use in hazardous locations. See bulletin no. 5400705 OSYS-U-EX for hazardous locations.)
- Temperature Range: -40°F to 140°F (-40°C to 60°C)

Conduit Entrances:

2 knockouts for 1/2" conduit provided

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

screws and hex keys are available. See ordering information on page 4.

OPTIONAL COVER TAMPER SWITCH

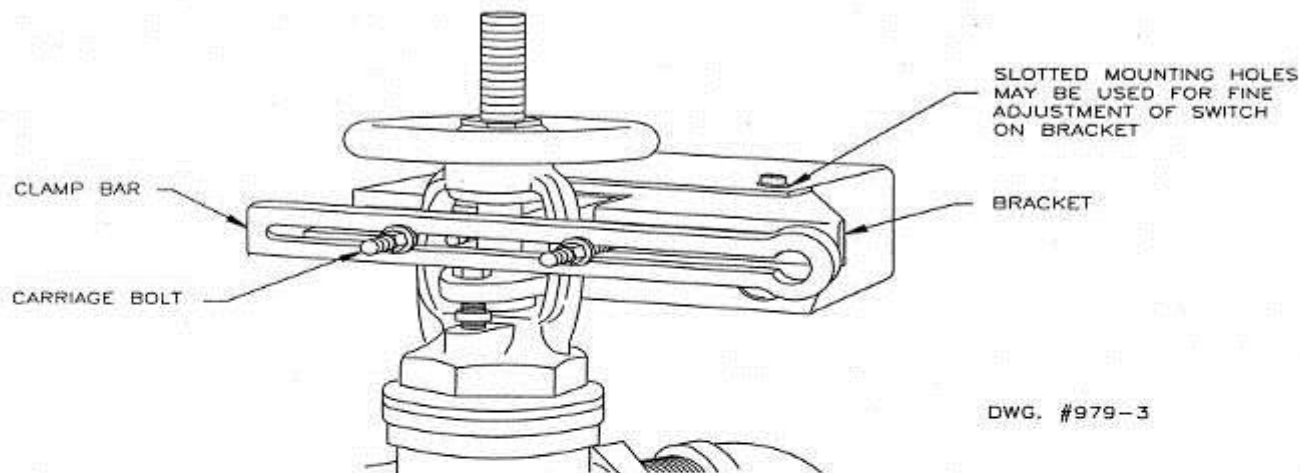
A field installable cover tamper switch is available as an option which may be used to indicate removal of the cover. See ordering information on page 4.

TESTING

The OSYSU and its associated protective monitoring system should be inspected and tested in accordance with applicable NFPA codes and standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

FIG. 1 SMALL VALVE INSTALLATION - 1/2" THRU 2 1/2" (12,5mm THRU 63,5mm) SIZES

THESE SWITCHES MOUNT CONVENIENTLY TO MOST 2" TO 12" OS & Y VALVES. THEY WILL MOUNT ON SOME VALVES AS SMALL AS 1/2" (12,5MM). J-HOOKS MAY BE REQUIRED ON VALVES WITH LIMITED CLEARANCE.

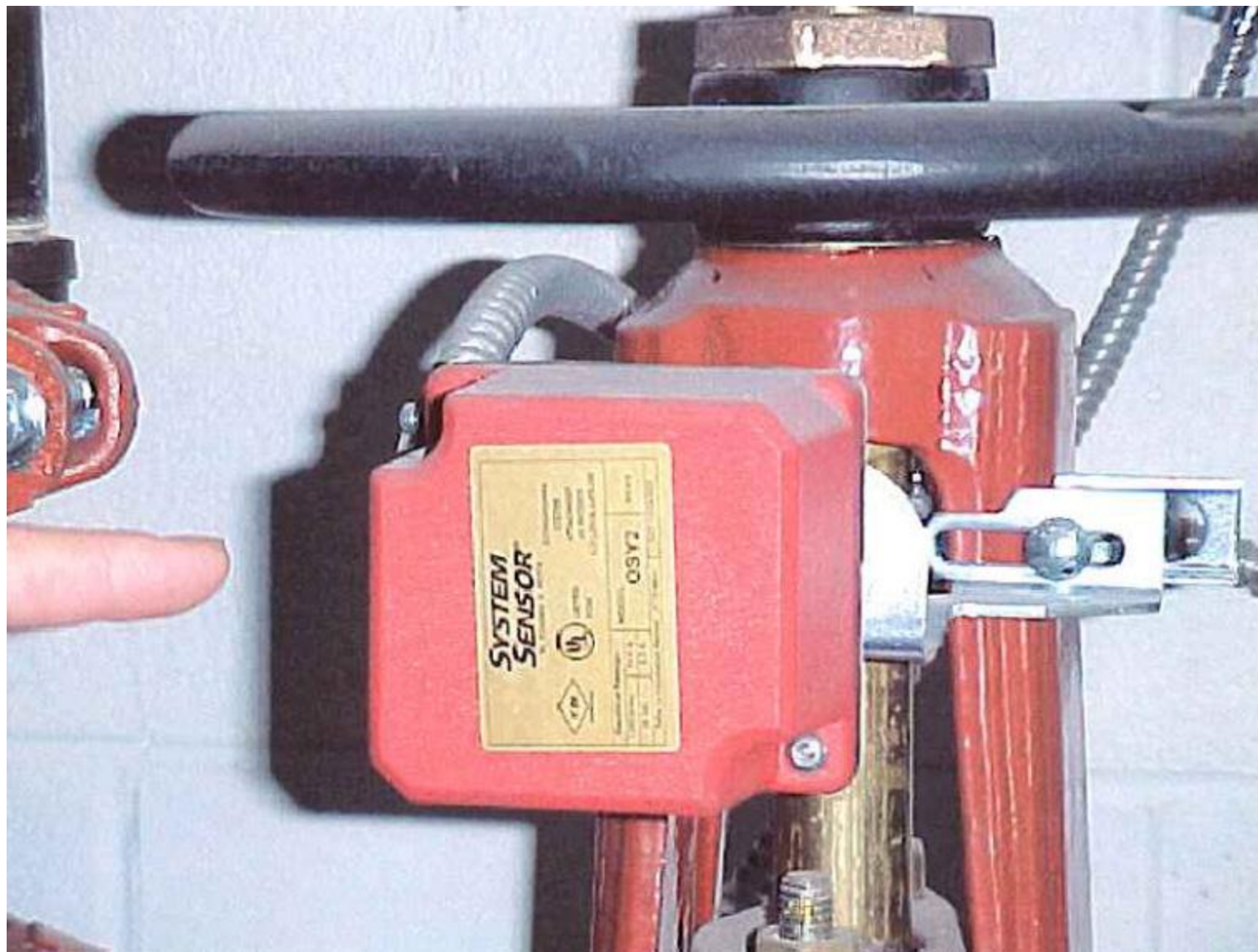


SMALL VALVE INSTALLATION

1. Remove and discard "C" washer and roller from the trip rod.
2. With the valve in the FULL OPEN position, locate the OSYSU across the valve yoke as far as possible from the valve gland, so that the trip rod lays against the non-threaded portion of the valve stem.
3. Loosen the locking screw that holds the trip rod in place and adjust the rod length (see Fig. 4). When adjusted properly, the rod should extend past the valve screw, but not so far that it contacts the clamp bar. Tighten the locking screw to hold the trip rod in place.
NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the 1" (25mm) long notched section (see Fig. 5). Reinstall trip rod and repeat Step 3 procedure.
4. Mount the OSYSU loosely with the carriage bolts and clamp bar supplied. On valves with limited clearance use J-hooks supplied instead of the carriage bolts and clamp bar to mount the OSYSU.
5. Mark the valve stem at the center of the trip rod.

6. Remove the OSYSU. File a 1/8" (3,2mm) deep groove centered on the mark on the valve stem utilizing a 3/16" (4,8mm) round, non-tapered file. Round and smooth the edges of the groove to prevent damage to the valve packing and to allow the trip rod to move easily in and out of the groove as the valve is operated.
7. Mount the OSYSU with the trip rod centered in groove.
8. Final adjustment is made by loosening 2 screws (see Fig. 1) and sliding the OSYSU on the bracket. Adjustment is correct when switches are not activated with the trip rod seated in the valve stem groove and that the switches activate when the trip rod moves out of the groove.
9. Tighten the adjustment screws and all mounting hardware. Check to insure that the rod moves out of the groove easily and that the switches activate within one turn when the valve is operated from the FULL OPEN towards the CLOSED position.

NOTE: CLOSE THE VALVE FULLY TO DETERMINE THAT THE STEM THREADS DO NOT ACTIVATE THE SWITCH. THE SWITCH BEING ACTIVATED BY THE STEM THREADS COULD RESULT IN A FALSE VALVE OPEN INDICATION.





U.S. Pat. No. 3921989
Canadian Pat. No. 1009680
Other Patents Pending
Potter Electric, Rd., 1990

GENERAL INFORMATION

The Model VSR-F is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50mm thru 200mm).

LPC approved sizes are 2" thru 8" (50mm thru 200mm).

The unit may also be used as a sectional waterflow detector on large systems.

The unit contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 gallons per minute (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

ENCLOSURE: The unit is enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin no. 5400775 for installation instructions of this switch.

UL, UL C and CSF M Listed, FM and LPC B Approved, NYMEA Accepted, CE Marked

Service Pressure: Up to 450 PSI (31 BAR)

Minimum Flow Rate for Alarm: 10 GPM (38 LPM)

Maximum Surge: 18 FPS (5.5 m/s)

Contact Ratings: Two sets of SPDT (Form C)
15.0 Amps at 125/250VAC
2.0 Amps at 30VDC Resistive

Conduit Entrances: Two knockouts provided for 1/2" conduit

Environmental Specifications:

- Suitable for indoor or outdoor use with factory installed gasket and die-cast housing.
- NEMA 4/IP54 Rated Enclosure - use with appropriate conduit fitting.
- Temperature Range: 40°F/120°F, 4.5°C/49°C
- Non-corrosive sleeve factory installed in saddle.

Caution: This device is not intended for applications in explosive environments.

Sizes Available: Steel Pipe schedules 10 thru 40, sizes 2" thru 8" BS 1387 pipe 50mm thru 200mm

Note: For copper or plastic pipe use Model VSR-CF.

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

Optional: Cover Tamper Switch Kit, Stock No. 0090018

INSTALLATION: See Fig.2

These devices may be mounted on horizontal or vertical pipe. On horizontal pipe they should be installed on the top side of the pipe where they will be accessible. The units should not be installed within 6" (15cm) of a fitting which changes the direction of the waterflow or within 24" (60 cm) of a valve or drain.

Drain the system and drill a hole in the pipe using a circular saw in a slow speed drill. The 2" (50mm) and 2 1/2" (65mm) devices require a hole with a diameter of 1 1/4" + 1/8" - 1/16" (33mm ±2mm). All other sizes require a hole with a diameter of 2" ±1/8" (50mm ±2mm).

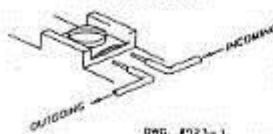
Clean the inside pipe of all growth or other material for a distance equal to the pipe diameter on either side of the hole.

Roll the vane so that it may be inserted into the hole; do not bend or crease it. Insert the vane so that the arrow on the saddle points in the direction of the waterflow. Install the saddle strap and tighten nuts alternately to an eventual 50 ft-lbs. (68 n-m) of torque (see Fig. 2). The vane must not rub the inside of the pipe or bind in any way.

Specifications subject to change without notice.

FIG. 1

SWITCH TERMINAL CONNECTIONS CLAMPING PLATE TERMINAL



CAUTION:

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

FIG. 2

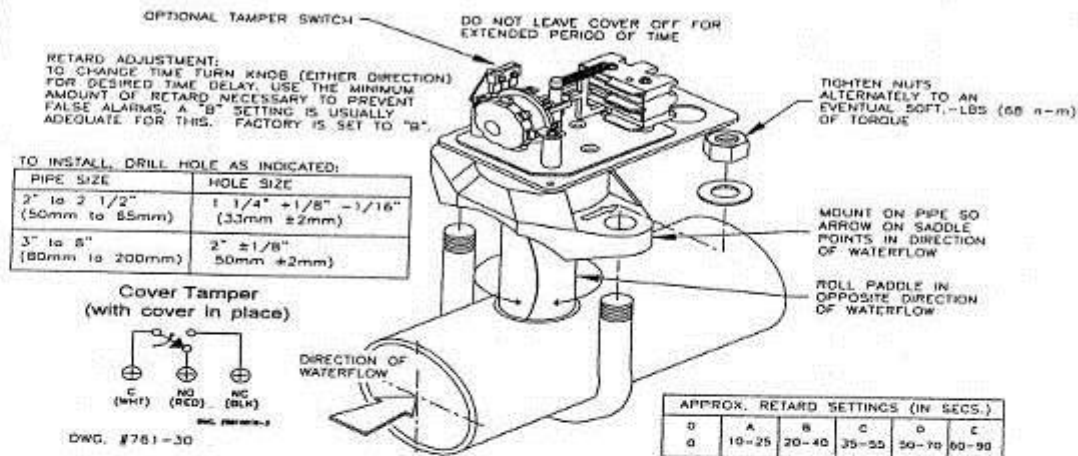
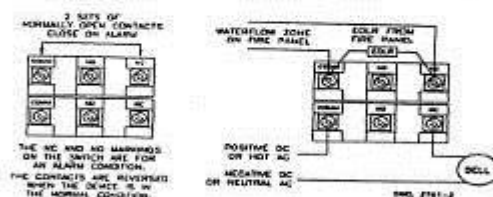


FIG. 3 TYPICAL ELECTRICAL CONNECTIONS

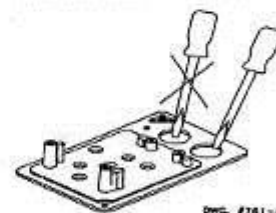


NOTES:

1. The Model VSR-F has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.
2. A condition of LPC Approval of this product is that the electrical entry must be sealed to exclude moisture.
3. For supervised circuits see "Switch Terminal Connections" drawing and caution note (Fig. 1).

FIG. 4

To remove knockouts: Place screwdriver at edge of knockouts, not in the center.



APPLICATION WARNING!

Due to the possibility of unintended discharges caused by pressure surges, trapped air, or short retard times, waterflow switches that are monitoring wet pipe sprinkler systems should not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems.

TESTING

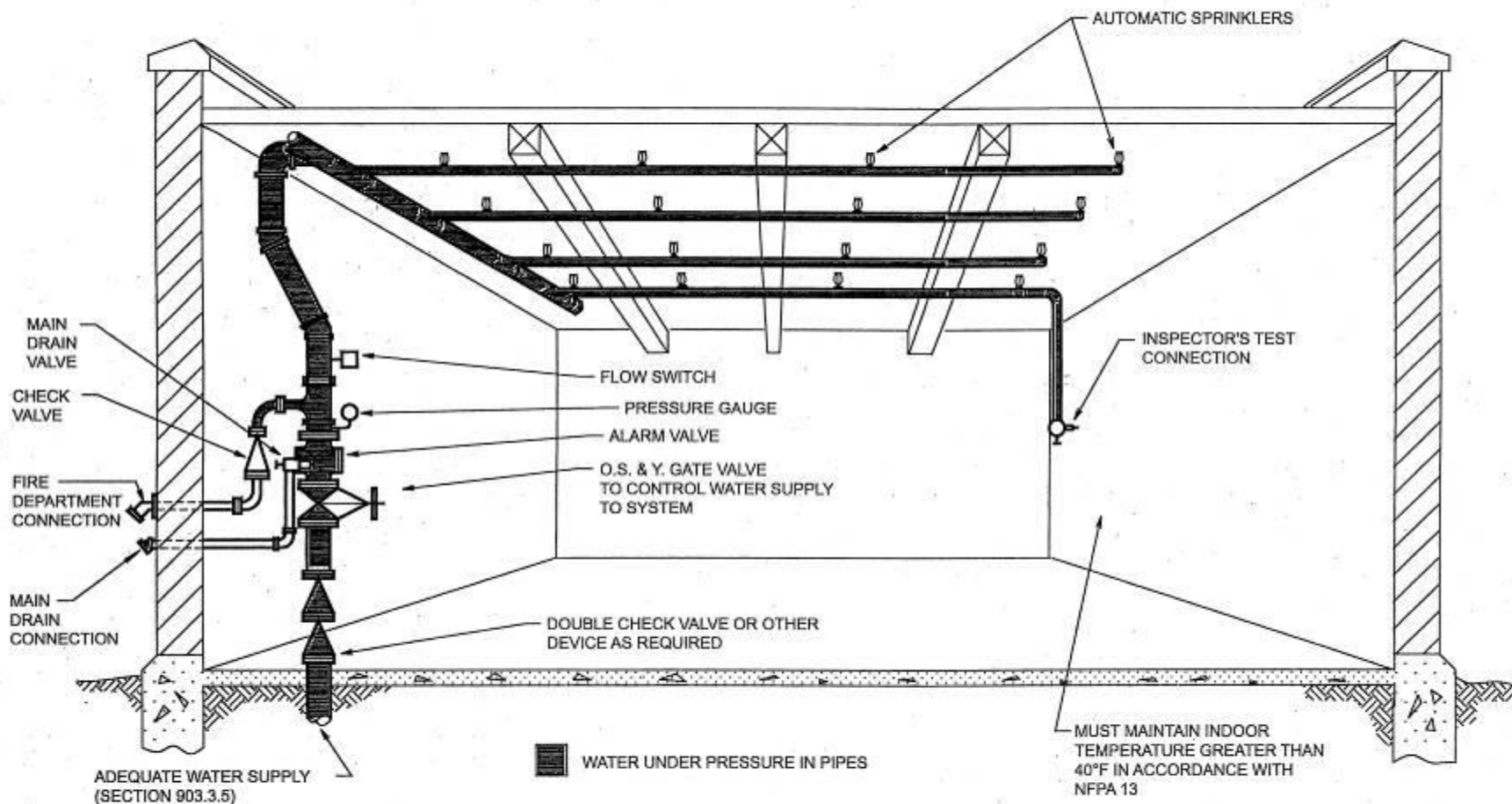
The frequency of inspection and testing for the model VSR-F and its associated protective monitoring system should be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

If provided, the inspector's test valve, that is usually located at the end of the most remote branch line, should always be used for test purposes. If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR-F is not recommended or advisable.

A minimum flow of 10 gpm (38 Lpm) is required to activate this device.

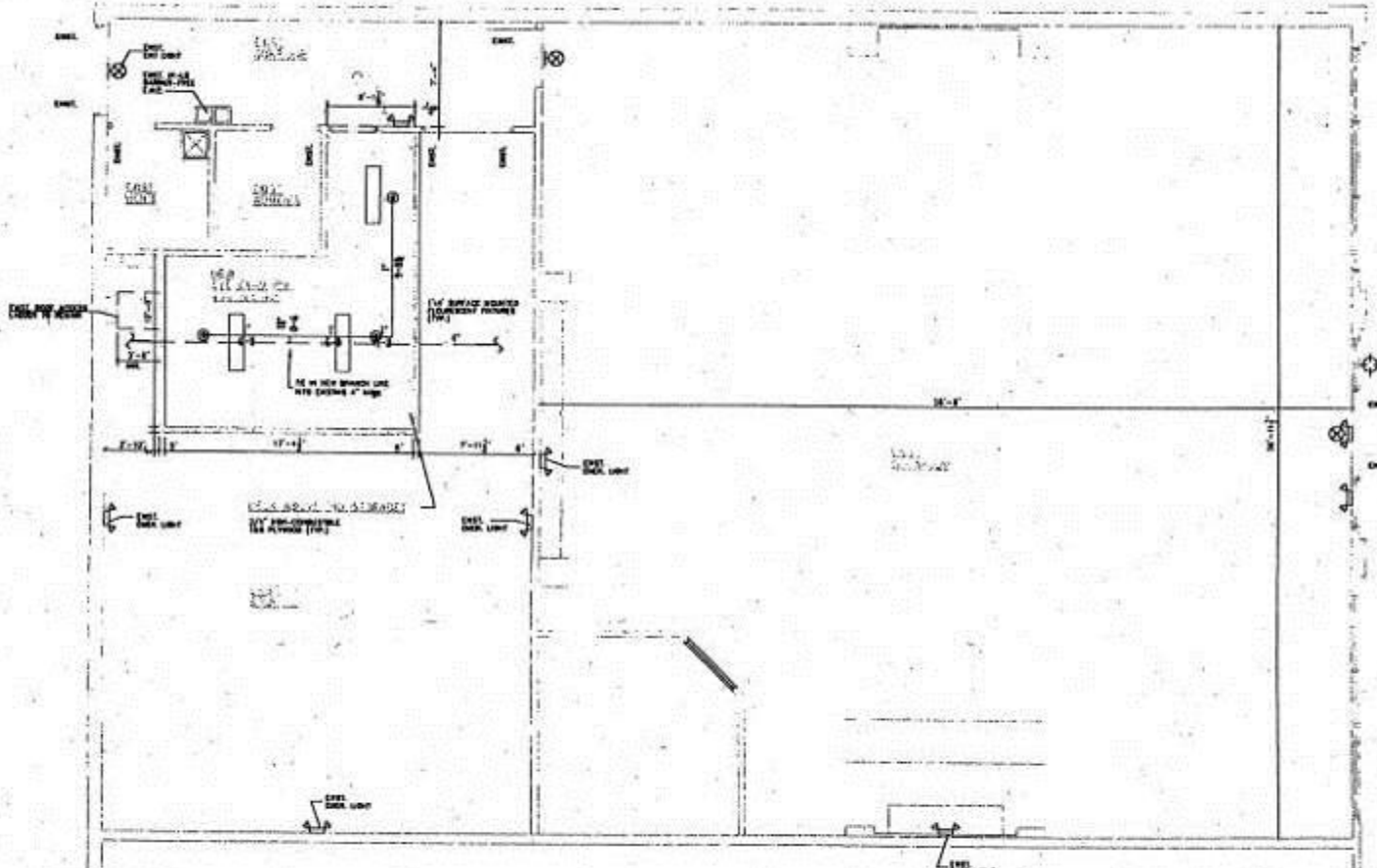
IMPORTANT NOTICE: Please advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions.





For SI: °C = [(°F) - 32]/1.8.

Figure 903.3.1.1
TYPICAL WET PIPE SYSTEM



PLAN VIEW
SCALE 1/8" = 1'-0" NORTH

- GENERAL NOTES -

- IT IS THE BUILDING OWNERS RESPONSIBILITY TO PROVIDE ADEQUATE HEAT FOR ALL AREAS IN THE BUILDING PROTECTED BY WET SPRINKLER SYSTEMS AND FOR ALL WATER FILLED SUPPLY PIPES, VALVES AND SYSTEM RISERS.
- DESIGN/INSTALLATION AND FABRICATION PER NFPA.
- SHOWS HANGER LOCATION.
- ALL MATERIAL TO BE UL LISTED.



CANTON, Michigan 48187

FIRE SPRINKLER RELOCATION

Contract Number:
384022

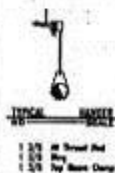
Scale 1" = 1'-0"

Phone Number:

PP-1 OF 1

TOTAL 3 (1/2" X 3/8" RELIABLE (180) FIFTH SEMI-REC. CHROME PENDENT

SNP 13613





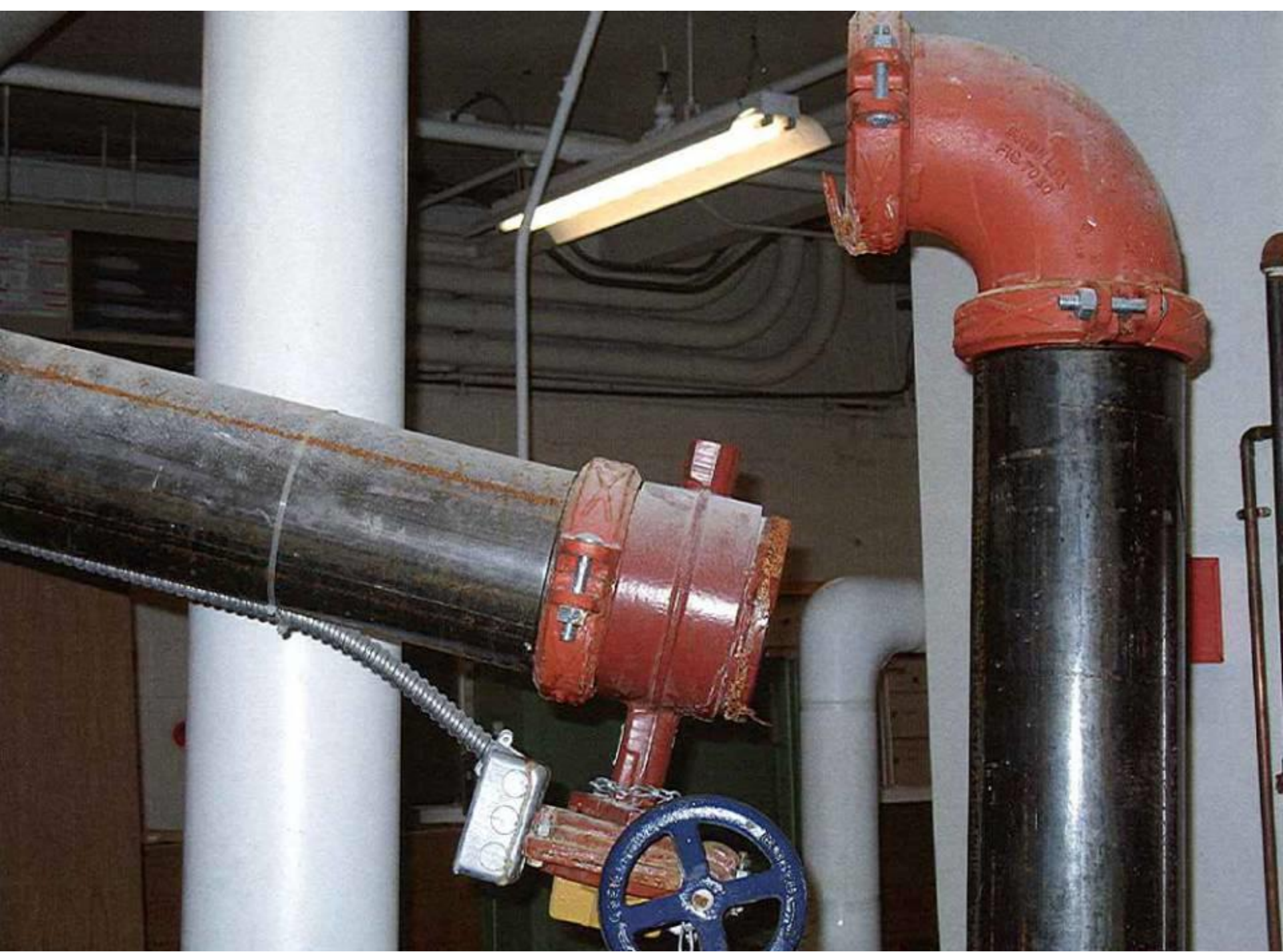


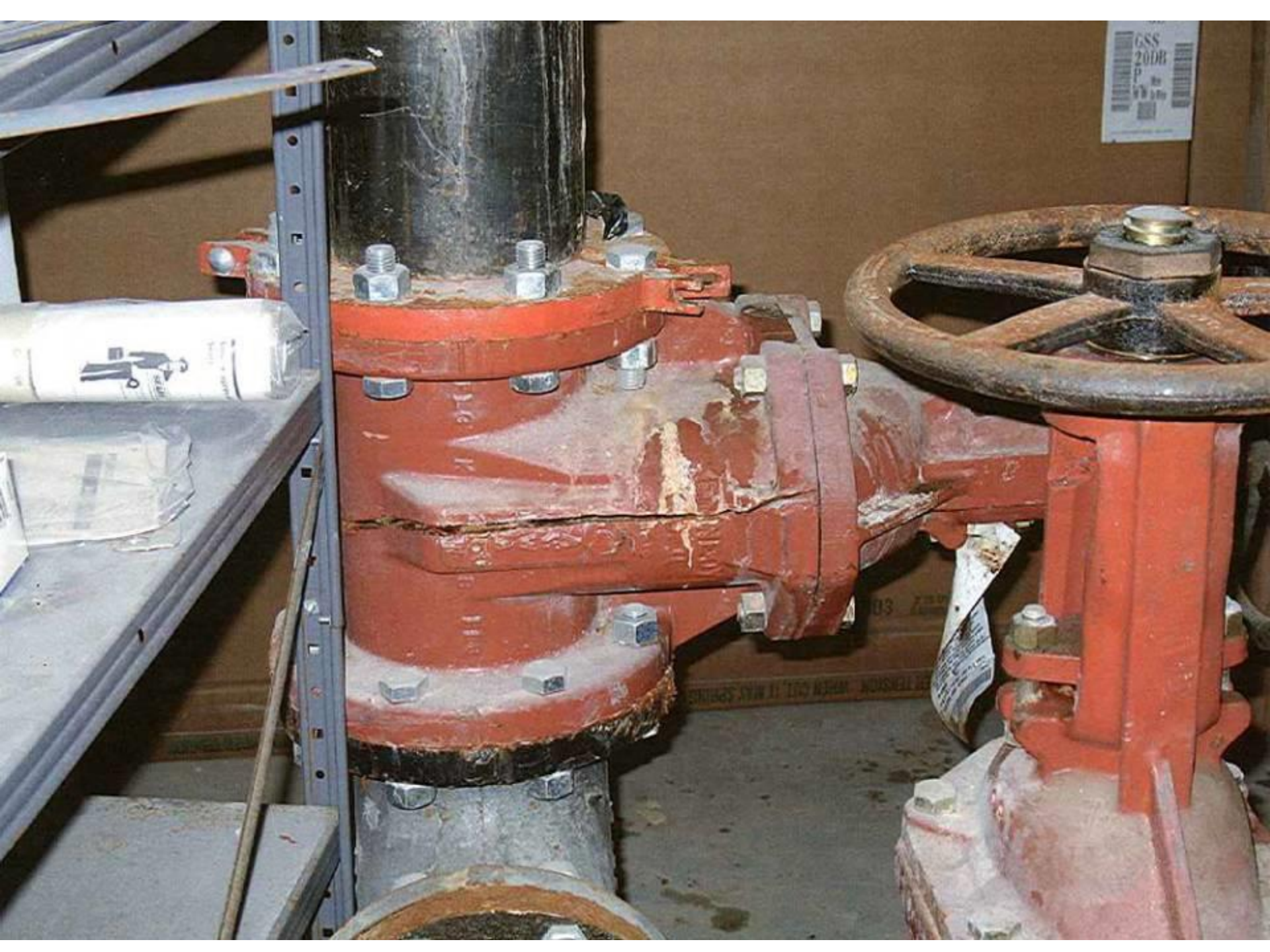


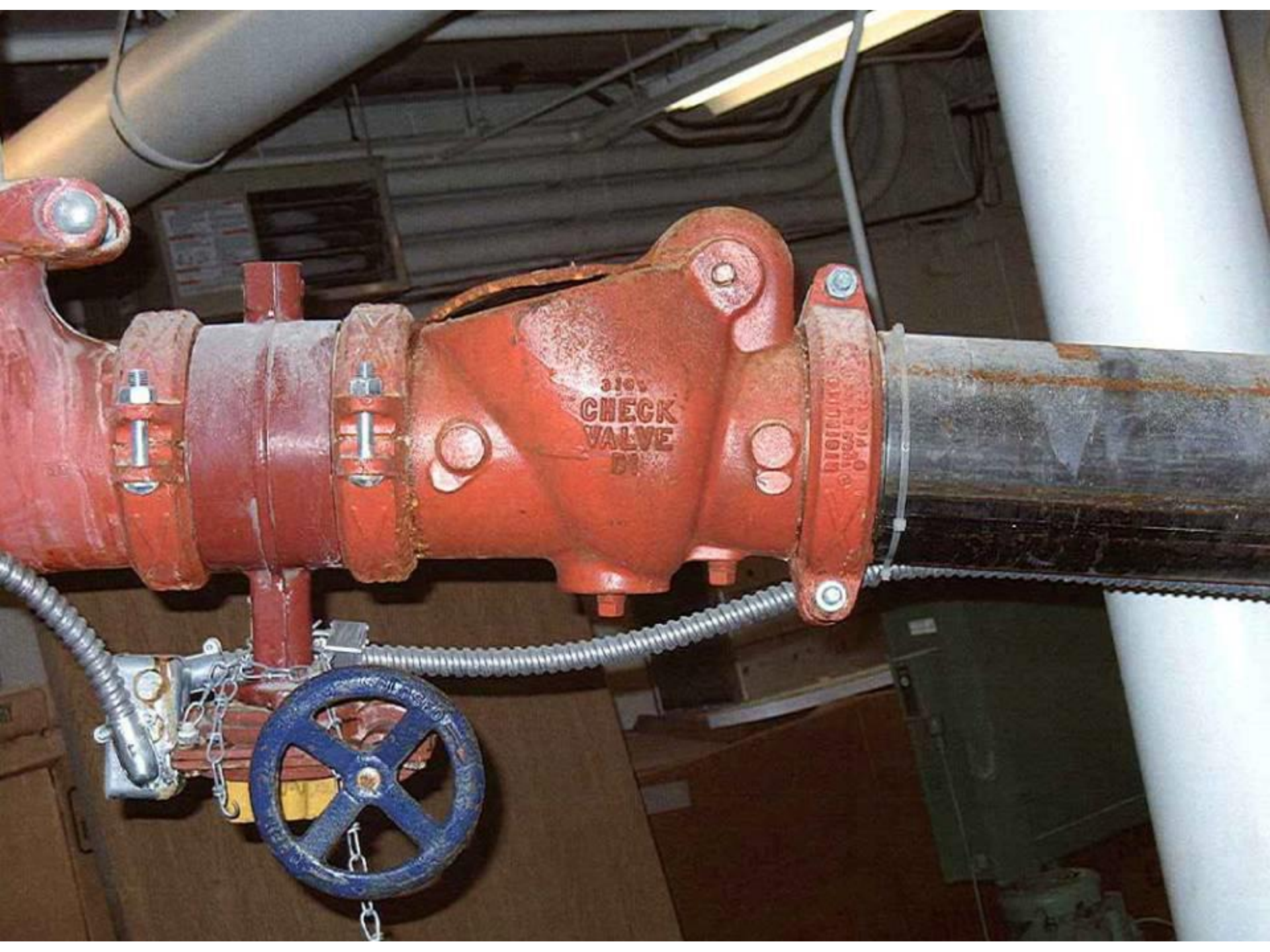


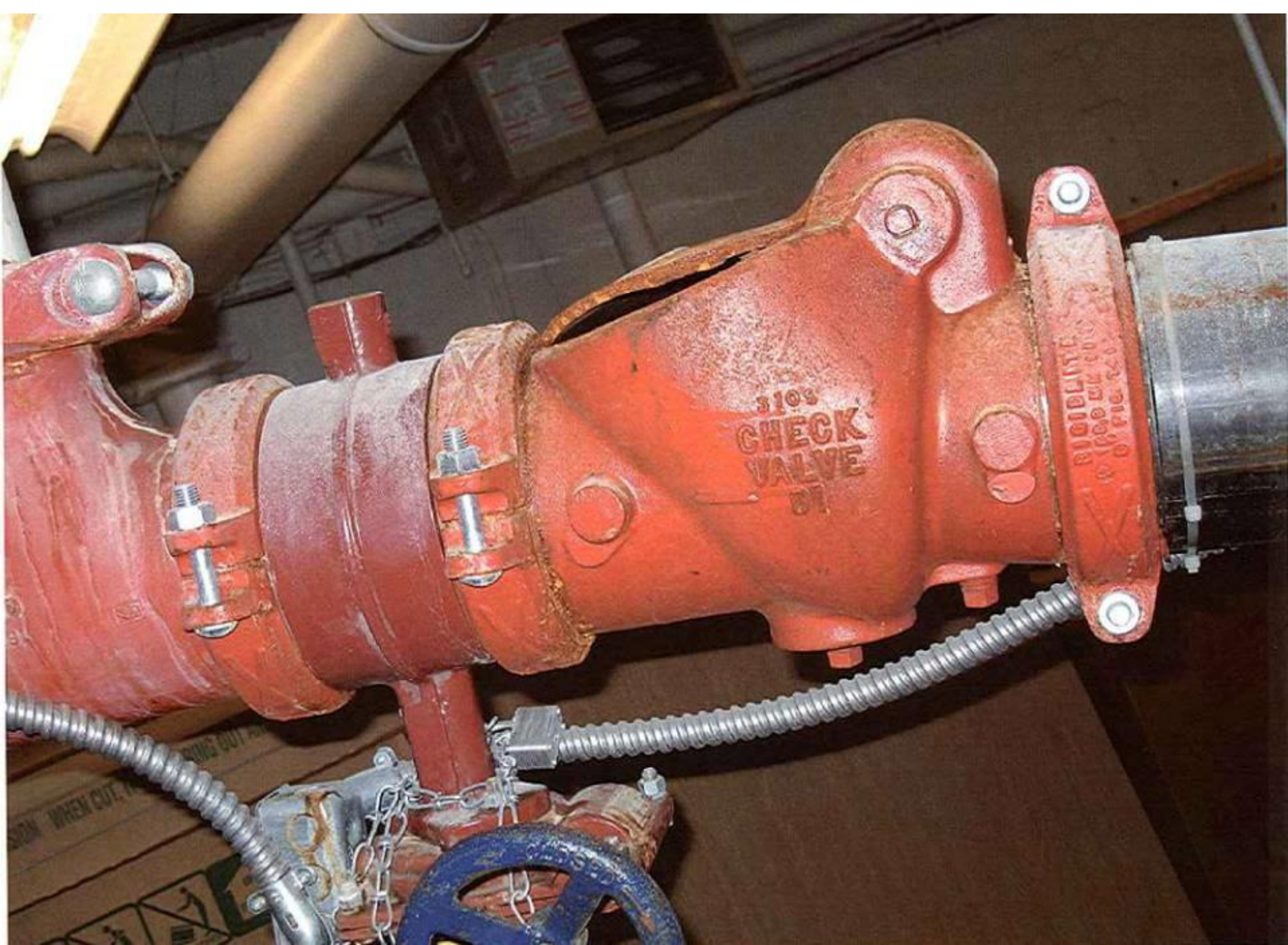














FIRE SPRINKLER VALVE
DO NOT CLOSE





FIRE HYDRANT DETAILS

Do's

- Installation should be made only by a qualified installer or contractor in accordance with all applicable codes and requirements.
- Read and follow the installation instructions.
- Follow recommended safe work practices.
- Make certain that thread sealants, gasket lubricants, or firestop materials are compatible with CPVC.
- Keep pipe and fittings in original packaging until needed.
- Cover pipe and fittings with an opaque tarp if stored outdoors.
- Follow proper handling procedures.
- Use tools specifically designed for use with plastic pipe and fittings.
- Use the proper solvent cement and follow application instructions.
- Use a drop cloth to protect interior finishes.
- Cut the pipe ends square.
- Deburr and bevel the pipe end with a chamfering tool.
- Rotate the pipe 1/4 turn when bottoming pipe in fitting socket.
- Make certain no solvent cement is on sprinkler head and adapter threads.
- Make certain that solvent cement does not run and plug the sprinkler head orifice.
- Follow the manufacturer's recommended cure times prior to pressure testing.
- Fill lines slowly and only at a proper pressure.
- Bleed the air from the system prior to pressure testing.
- Support sprinkler head properly to prevent lift up of the head through the ceiling when activated.
- Keep threaded rod within 1/16" of the pipe or use a surge arrestor.
- Install Viking Plastics CPVC fire sprinkler products in wet systems only.
- Use only compatible insulation and/or glycerin and water solutions for freeze protection.
- Allow for movement due to expansion and contraction.
- Renew your Viking Plastics BlazeMaster® CPVC fire sprinkler products installation training every two years.

Don'ts

- Do not use edible oils such as Crisco® as a gasket lubricant.
- Do not use petroleum or solvent-based sealants, lubricants, or fire stop materials.
- Do not use any glycol-based solutions as an anti-freeze.
- Do not mix glycerin and water solutions in contaminated containers.
- Do not use solvent cement that exceeds its shelf life or has become discolored or jellied.
- Do not allow solvent cement to plug the sprinkler head orifice.
- Do not connect rigid metal couplers to CPVC grooved adapters.
- Do not thread or groove CPVC pipe.
- Do not use solvent cement near sources of heat, open flame, or when smoking.
- Do not pressure test with air.
- Do not pressure test until recommended cure times are met.
- Do not exceed proper pressure for testing.
- Do not use ratchet cutters below 50°F.
- Do not use CPVC pipe that has been stored outdoors, unprotected and is faded in color.
- Do not allow threaded rod to come in contact with the pipe.
- Do not install BlazeMaster® CPVC Fire Sprinkler Products in cold weather without allowing for expansion.
- Do not install BlazeMaster® CPVC Fire Sprinkler Products in dry systems.
- Do not allow puddling of cement in fittings and pipe.
- Do not use dull or broken cutting tool blades when cutting pipe.

Light Hazard Occupancies

Viking Plastics CPVC fire sprinkler products are UL and C-UL Listed for use in: Light Hazard Occupancies as defined in the National Fire Protection Association Standard for the Installation of Sprinkler Systems, NFPA 13. In accordance with NFPA 13, section 6.3.6.2 (2002, 2007) and section 3-3.5 (1999), Pipe or tube listed for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 square feet. NOTICE: Local jurisdictions must approve of this application.

Residential Occupancies

Viking Plastics CPVC fire sprinkler products are UL and C-UL Listed for use in: Residential occupancies as defined in the National Fire Protection Association Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height, NFPA 13R, and residential occupancies as defined in the National Fire Protection Association Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, NFPA 13D.

Concealed Installations

In concealed installations, the minimum protection shall be one layer of 3/8 inch (9.5 mm) gypsum wallboard, 1/2 inch (12.7 mm) plywood soffits, or a suspended membrane ceiling with lay-in panels or tiles having a minimum weight of not less than 0.35 lbs/ft² (1.7 kg/m²) when installed with metal support grids. The minimum protection for residential occupancies, defined in NFPA 13D and 13R, may consist of one layer of 1/2 inch (12.7 mm) plywood.

In accordance with the C-UL Listing, the effectiveness of this protection can be impaired if penetrated by large openings such as ventilation grills, except where exhaust fans are connected to metal ducts serving washrooms. Where such penetration is present, individual openings exceeding 0.03 m² but not exceeding 0.71 m² in area must be located so that the distance from the edge of the opening to the nearest sprinkler does not exceed 300 mm. Viking Plastics CPVC products shall not be used where such openings exceed 0.71 m² in area. The effect of the presence of non-rated recessed lighting fixtures, public address speakers and other interruptions of the protective membrane has not been investigated and may cause damage to the products and may result in property damage, personal injury and/or death.

Viking Plastics CPVC fire sprinkler products must be used in sprinkler systems employing standard response, or quick response sprinklers rated at 225°F (107°C) or lower.

Combustible Concealed Installations

Viking Plastics CPVC fire sprinkler products CANNOT be installed exposed in spaces defined by NFPA 13 as combustible concealed areas requiring sprinklers. NFPA 13D and NFPA 13R

permit the omission of sprinklers in combustible concealed spaces and Viking Plastics CPVC Sprinkler Products can be installed in these areas when sprinkling residential occupancies in accordance with these standards.

Exception: In accordance with the UL Listing, specially Listed sprinklers exist that have been tested and are Listed for use with Viking Plastics products in combustible concealed spaces requiring sprinklers. When using Viking Plastics products in these applications always follow the sprinkler manufacturers' installation guidelines.

Exposed Installations

Viking Plastics CPVC fire sprinkler products are UL and C-UL Listed for installation by a qualified installer or contractor without protection (exposed) with the following restrictions:

Standard Coverage Sprinklers

These installations shall be below a smooth, flat, horizontal ceiling construction and require the use of Viking Plastics approved one-step cement. The use of listed hangers for thermoplastic sprinkler piping mounted directly to the ceiling (or wall) is permitted. The resulting clearance between the pipe and ceiling (or wall) resulting from the use of the listed hanger is acceptable.

Light Hazard Pendent Sprinklers

Listed quick response, 170°F (77°C) maximum temperature rated, pendent sprinklers having deflectors installed within 8 inches (203 mm) from the ceiling. The maximum distance between sprinklers not to exceed 15 feet (4.57 m). The piping shall be mounted directly to the ceiling.

Light Hazard Horizontal Sidewall Sprinklers

Listed quick response, 200°F (93°C) maximum temperature rated, horizontal sidewall sprinklers having deflectors installed within 12 inches (304 mm) from the ceiling and within 6 inches (152 mm) from the sidewall. The maximum distance between sprinklers shall not exceed 14 feet (4.27 m). The piping shall be mounted directly to the sidewall.

Light Hazard Upright Sprinklers

Listed quick response, 155°F (68°C) maximum temperature rated, upright sprinklers having deflectors installed within 4 inches (101 mm) from the ceiling and a maximum distance between sprinklers not to exceed 15 feet (4.57 m). The maximum distance from the ceiling to the centerline of the main run of pipe shall not to exceed 7-1/2 inches (190 mm) and the distance from the centerline of a sprinkler to the closest hanger shall be 3 inches (76 mm).

Return Air Plenum

BlazeMaster® CPVC fire sprinkler products manufactured by Viking Plastics meet the combustibility requirements for thermoplastic sprinkler pipe, as described in the Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A. In accordance with the UL and C-UL Listing, Viking Plastics CPVC fire sprinkler products may be installed in the plenum adjacent to, but not over, openings in the ceiling such as ventilation grills and require the use of Schedule 80 fittings in the 1-1/2 inch (40 mm) and larger size.

Garage Installations

Viking Plastics CPVC fire sprinkler products are UL Listed for installation by a qualified installer or contractor in garages requiring sprinklers, as defined in NFPA 13R, with the following requirements:

1. Minimum protection consisting of either one layer of 3/8 inch (9.5 mm) thick gypsum or 1/2 inch (12.7 mm) thick plywood shall be provided.
2. Listed pendent or sidewall sprinklers with a maximum temperature rating of 225°F (107°C) shall be used.
3. All sprinklers shall be installed per the manufacturer's published installation instructions.
4. The system must be installed per the requirements of NFPA 13R and these installation instructions.

Ambient Temperature Limitations

Viking Plastics CPVC fire sprinkler products are suitable for use in areas where ambient temperatures are within the range of 35°F (2°C) to 150°F (65°C).

High Temperature Areas

Viking Plastics CPVC fire sprinkler products can be installed in areas, such as an attic, where the ambient temperature exceeds 150°F (65°C) if ventilation is provided or if insulation is used around the product to maintain a cooler environment.

NOTICE

NOTICE: Do not install Viking Plastics CPVC fire sprinkler products in areas where the ambient temperature exceeds 150°F (65°C) without adequate ventilation or compatible insulation around the product to maintain a cooler environment. Installation in areas where the ambient temperature exceeds 150°F (65°C)

can cause damage to the cpvc sprinkler system and may result in property damage.

Heat Sources & Open Ceiling Areas

Piping systems using Viking Plastics CPVC fire sprinkler products must be laid out so that the piping is not closely exposed to heat producing sources, such as light fixtures, ballasts, and steam lines. Pipe shall not be positioned directly over open ventilation grills. During remodeling or ceiling repair, appropriate precautions shall be implemented to properly protect the piping.

Cold Temperature Areas

Viking Plastics CPVC fire sprinkler products can be used in areas where the ambient temperature remains above 35° F (2° C). These products can also be used in an area subject to freezing temperatures if the sprinkler system installation is protected from freezing. Many standard cold weather piping design and installation practices can be used to protect the system from freezing, including, but not limited to, the use of glycerin, insulation installation techniques, and pipe insulation. Contact the manufacturers for compatibility of their products with Viking Plastics CPVC Fire Sprinkler products.

Attention must be given to local insulating techniques and codes that require a particular method. Since very cold weather will make Viking Plastics CPVC fire sprinkler Products more susceptible to damage, extra care should be taken to avoid rough handling or impact to these products.



WARNING

WARNING: DO NOT ALLOW A SPRINKLER SYSTEM TO FREEZE. A FROZEN SYSTEM WILL DEACTIVATE AND THE PRESSURES BUILT UP CAN CAUSE THE SPRINKLER HEADS TO OPEN OR DAMAGE THE PIPE AND FITTINGS. ANTIFREEZE SOLUTIONS OF WATER AND USP OR CP GRADE GLYCERIN ARE ACCEPTABLE FOR USE WITH VIKING PLASTICS CPVC FIRE SPRINKLER PRODUCTS. REFER TO NFPA 13, NFPA 13R, NFPA 13D AND CONSULT THE LOCAL AUTHORITY HAVING JURISDICTION BEFORE USING GLYCERIN SOLUTIONS IN FIRE SPRINKLER APPLICATIONS. AN INACTIVE FIRE SPRINKLER SYSTEM CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

NOTICE

NOTICE: Do not use glycol-based antifreeze solutions. Glycol solutions are not chemically compatible with the cpvc material and can cause damage to the cpvc fire sprinkler system and may result in property damage.

Allowance for Friction Loss in Fittings (SDR 13.5 Equivalent Pipe)							
	3/4" (20 mm)	1" (25 mm)	1-1/4" (32 mm)	1-1/2" (40 mm)	2" (50 mm)	2-1/2" (65 mm)	3" (80 mm)
Tee Branch	3' (0.91 m)	5' (1.52 m)	6' (1.83 m)	8' (2.44 m)	10' (3.05 m)	12' (3.66 m)	15' (4.57 m)
Elbow 90	7' (2.13 m)	7' (2.13 m)	8' (2.44 m)	9' (2.74 m)	11' (3.35 m)	12' (3.66 m)	13' (3.96 m)
Elbow 45	1' (0.31 m)	1' (0.31 m)	2' (0.61 m)	2' (0.61 m)	2' (0.61 m)	3' (0.91 m)	4' (1.22 m)
Coupling	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	2' (0.61 m)	2' (0.61 m)
Tee Run	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	1' (0.31 m)	2' (0.61 m)	2' (0.61 m)

Hangers & Supports

Since CPVC fire sprinkler pipe is rigid, it requires fewer supports than flexible, plastic systems. Viking Plastics recommends use of hangers that are designed and listed for supporting the CPVC Fire Sprinkler pipe. However, some hangers designed for steel pipe may be used if their suitability is clearly established.

NOTICE

NOTICE: These hangers must have a minimum 1/2 inch (13 mm), load-bearing surface, and they must be selected to accommodate the specific pipe size. In addition, they cannot contain rough or sharp edges that contact the pipe, and they must not bind the pipe from axial movement. Vertical runs must be supported so that the weight of the run is not on a fitting or a joint.

Horizontal runs must be braced so that the stress loads (caused by bending or snaking pipe) will not be placed on a fitting or a joint. Support spacing is shown in the following table. See "Pipe Deflection" in this manual for information regarding bending or snaking CPVC Fire Sprinkler Pipe.

NFPA 13D permits "support methods comparable to those required by local plumbing codes." These hanger support requirements must also be followed on NFPA 13D systems.

Table A - Standard Support Spacing

Nominal Size, Inches/(mm)	Max. Support Spacing, Feet/(Meters)
3/4 (20.0)	5-1/2 (1.67)
1 (25.0)	6 (1.82)
1-1/4 (32.0)	6-1/2 (1.98)
1-1/2 (40.0)	7 (2.13)
2 (50.0)	8 (2.43)
2-1/2 (65.0)	9 (2.74)
3 (80.0)	10 (3.04)

NOTICE

NOTICE: DO NOT use hanger items such as plumber's tape or "nail-on" devices. Pipe hanger must comply with NFPA 13, 13D and 13R.

NOTICE

NOTICE: When a sprinkler head activates, a significant reactive force can be exerted on the pipe. With a pendent head, this reactive force can cause the pipe to lift vertically if it is not secured properly, especially if the sprinkler drop is from small diameter pipe. The pipe must be braced against the vertical lift-up with the closest hanger. Refer to the following illustration and Table B & C.

Table B - Maximum Support Spacing Distance
In Line Sprinkler Head Drop Tee

Nominal Pipe Size (Inches/mm)	Less than 100 psi (690 kPa)	More than 100 psi (690 kPa)
3/4" (20 mm)	4' (1.22 m)	3' (0.91 m)
1" (25 mm)	5' (1.52 m)	4' (1.22 m)
1-1/4" (32 mm)	6' (1.83 m)	5' (1.52 m)
1-1/2" - 3" (40 - 80 mm)	7' (2.13 m)	7' (2.13 m)



*"Never Lost a Well
or a Basement"*

*"We Service All
50 States"*

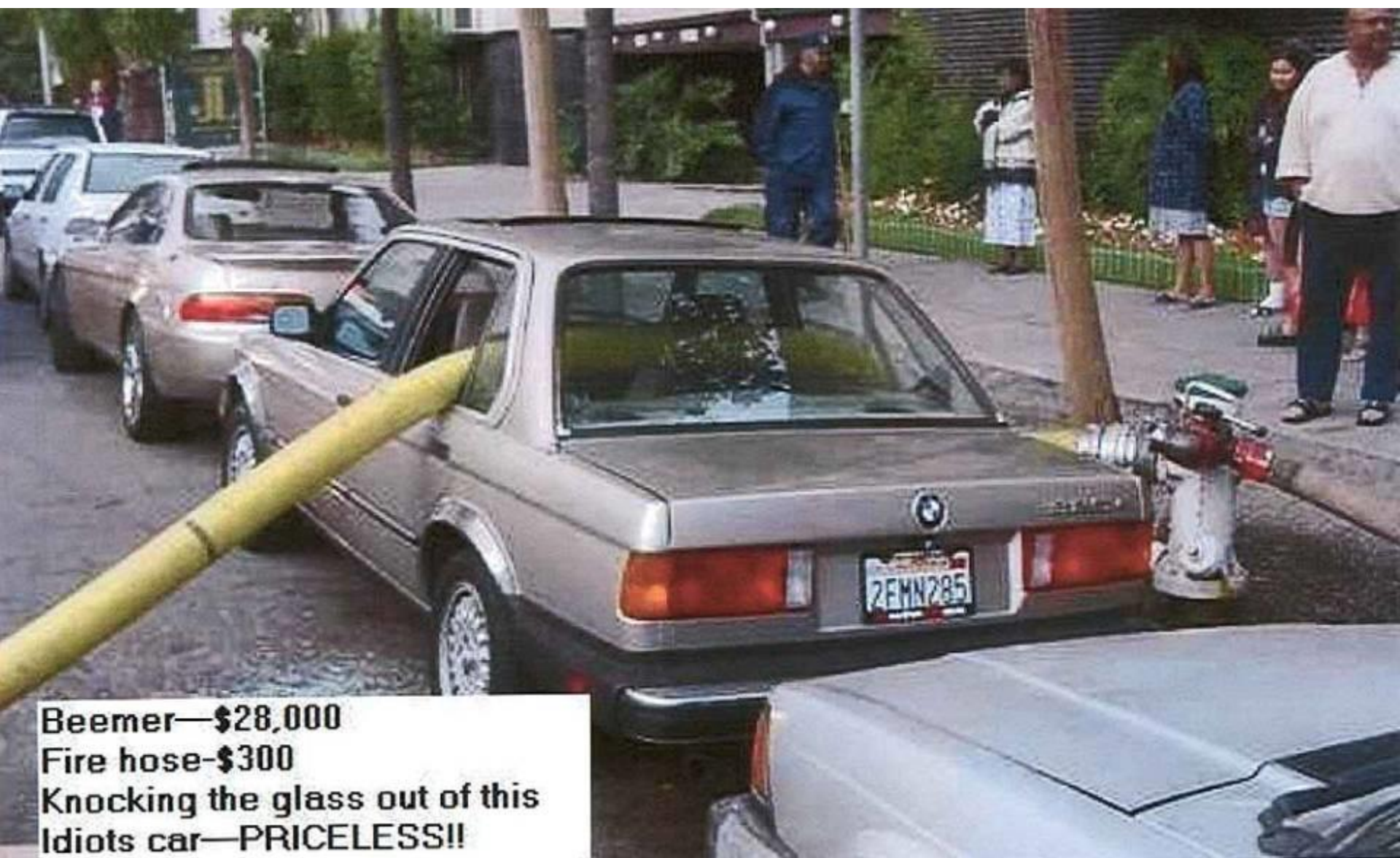


In Case of Fire YELL-FIRE!



*"We Use Only
Fresh Spring Water"*

*"House Calls by Appointment —
Wednesdays & Saturdays"*



Beemer—\$28,000
Fire hose—\$300
Knocking the glass out of this
Idiots car—PRICELESS!!



QUESTIONS?

