

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
A1 27	Overhead Sprinkler HEAD	4.9 Open	13 0.2	256 0.051	7 -13.9	7 12.8
A2 27	Overhead Sprinkler HEAD	4.9 Open	13.3 0.5	256 0.052	7.3 -13.9	7 12.8
02 27.33	Node NODE				7.6 -14	
TOR 17.33	Node NODE				20.1 -9.7	
CV1-O 16.69	Node NODE				20.4 -9.4	
CV1-I 16.52	Node NODE				20.8 -9.3	
GV3-O 15.01	Node NODE				21.6 -8.7	
GV3-I 14.85	Node NODE				21.6 -8.6	
BFP-O 14.36	Node NODE				21.9 -8.4	
BFP-I 12.96	Node NODE				26.8 -7.8	
MTR-O 12	Node NODE				27.4 -7.4	
MTR-I 12	Node NODE				27.6 -7.4	
GV2-O 4.08	Node NODE				31.4 -3.9	
GV2-I 3.92	Node NODE				31.5 -3.9	
GV1-O 3.08	Node NODE				31.9 -3.5	
GV1-I 2.92	Node NODE				31.9 -3.4	
W1 -5	Supply SUPPLY		-26.2		37 0	



PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

A1 02	27 27.33	4.9	13 13	1 1.101	1x(BM.Tee-Run)=1 2x(BM.90)=10	12.35 11 23.35	150 0.0304	7 -0.1 0.7	
02 TOR	27.33 17.33		13.3 26.2	1 1.101	1x(us.90)=3.82 2x(BM.90)=10 3x(BM.Tee-Run)=3 3x(BM.Tee-Br)=15	41.6 31.82 73.42	150 0.1119	7.6 4.3 8.2	
TOR CV1-O	17.33 16.69		0 26.2	1.5 1.481	1x(coupling)=1.01	0.56 1.01 1.57	150 0.0264	20.1 0.3 0.0	
CV1-O CV1-I	16.69 16.52		0 26.2	1.5 0		0.16 0 0.16	0 2.0635	20.4 0.1 0.3	SSCV ***
CV1-I GV3-O	16.52 15.01		0 26.2	1.5 1.481	1x(coupling)=1.01	1.51 1.01 2.52	150 0.0264	20.8 0.7 0.1	
GV3-O GV3-I	15.01 14.85		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	21.6 0.1 0	Gate A2360 ***
GV3-I BFP-O	14.85 14.36		0 26.2	1.5 1.481	1x(coupling)=1.01	0.57 1.01 1.58	150 0.0264	21.6 0.2 0.0	
BFP-O BFP-I	14.36 12.96		0 26.2	1.5 0		1.4 0 1.4	0 3.0664	21.9 0.6 4.3	Ames2000B ***
BFP-I MTR-O	12.96 12		0 26.2	1.5 1.481	1x(coupling)=1.01 1x(us.90)=4.02	0.99 5.03 6.02	150 0.0264	26.8 0.4 0.2	
MTR-O MTR-I	12 12		0 26.2	1.5 0		0.67 0 0.67	0 0.3844	27.4 0 0.3	EVO Q4 MTR ***
MTR-I GV2-O	12 4.08		0 26.2	1.5 1.481	1x(coupling)=1.01 1x(us.90)=4.02	8.53 5.03 13.56	150 0.0264	27.6 3.4 0.4	
GV2-O GV2-I	4.08 3.92		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	31.4 0.1 0	Gate A2360 ***
GV2-I GV1-O	3.92 3.08		0 26.2	1.5 1.481	1x(coupling)=1.01	0.84 1.01 1.84	150 0.0264	31.5 0.4 0.0	
GV1-O GV1-I	3.08 2.92		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	31.9 0.1 0	Gate A2360 ***
GV1-I W1	2.92 -5		0 26.2	1.5 1.481	1x(us.90)=4.02	57.5 4.02 61.52	150 0.0264	31.9 3.4 1.6	
W1								37	



MODULAR STEEL STRUCTURES - BIB HOUSES\18-320C - MOD STEEL -
APP014043 - WITTY.dwg

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

A2	27	4.9	13.3	1	1x(BM.Tee-Br)=5	2.35	150	7.3	
02	27.33		13.3	1.101	1x(BM.90)=5	10	0.0316	-0.1	
						12.35		0.4	
02								7.6	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

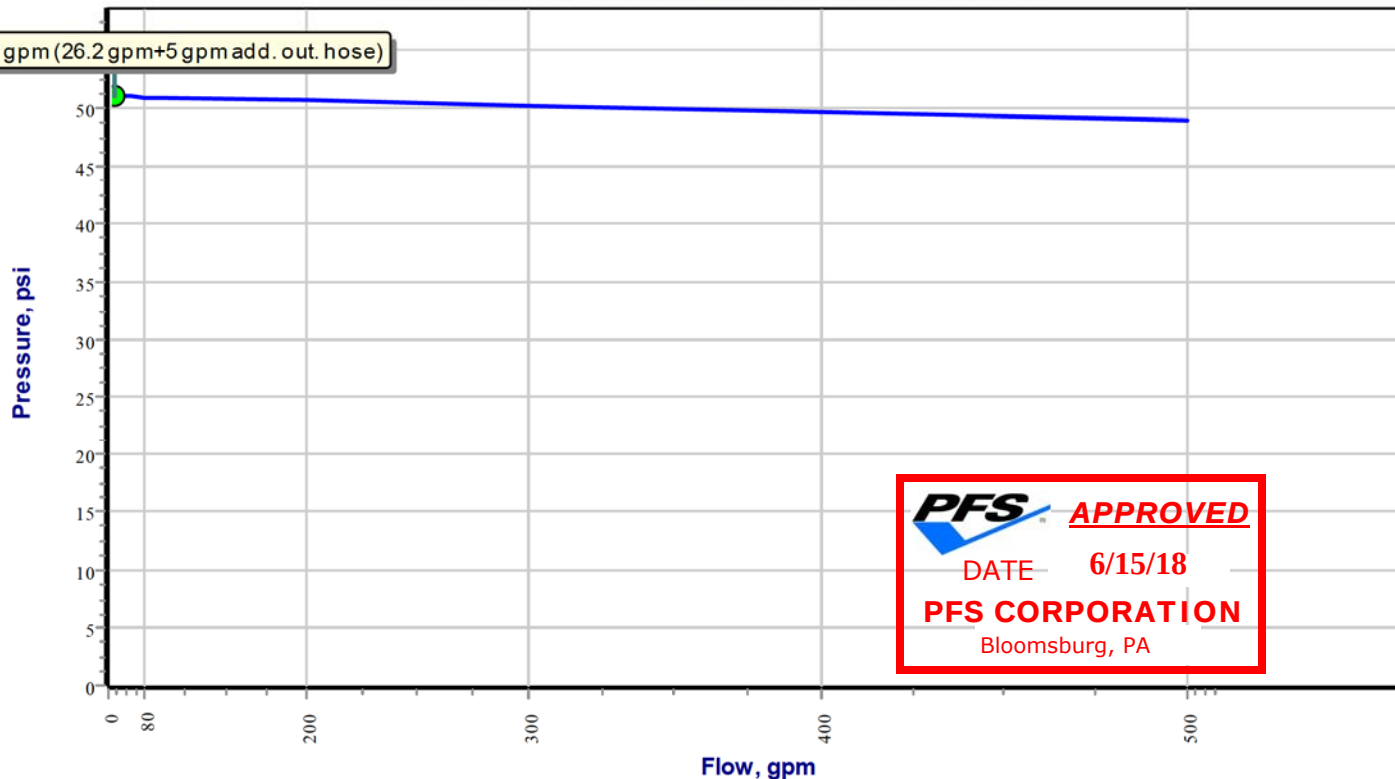
* Maximum Velocity of 8.84 ft/s occurs in the following pipe(s): (TOR-02)

*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

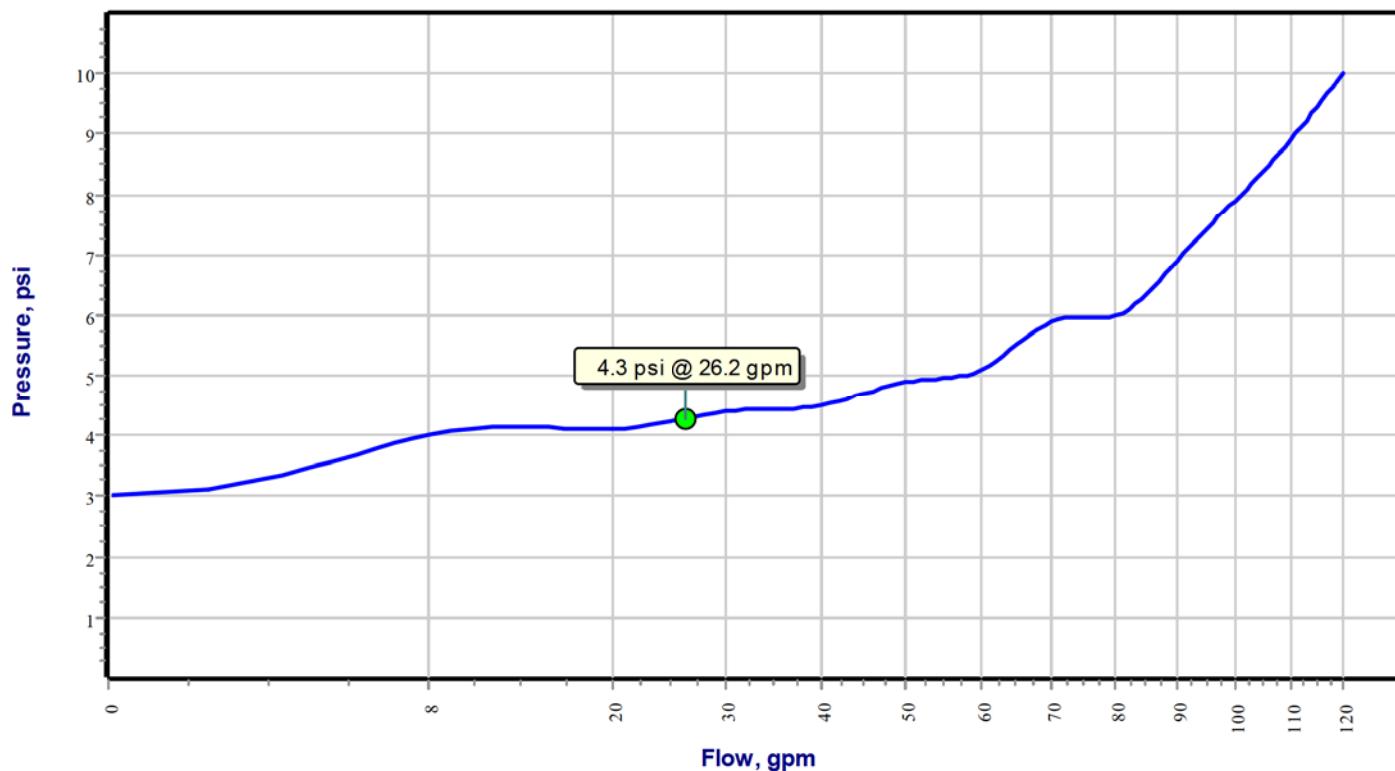


Pressure vs. Flow Function
Design Area: 1; Supply Ref.: W1; Supply Name:W1

51 psi @ 31.2 gpm (26.2 gpm+5 gpm add. out. hose)

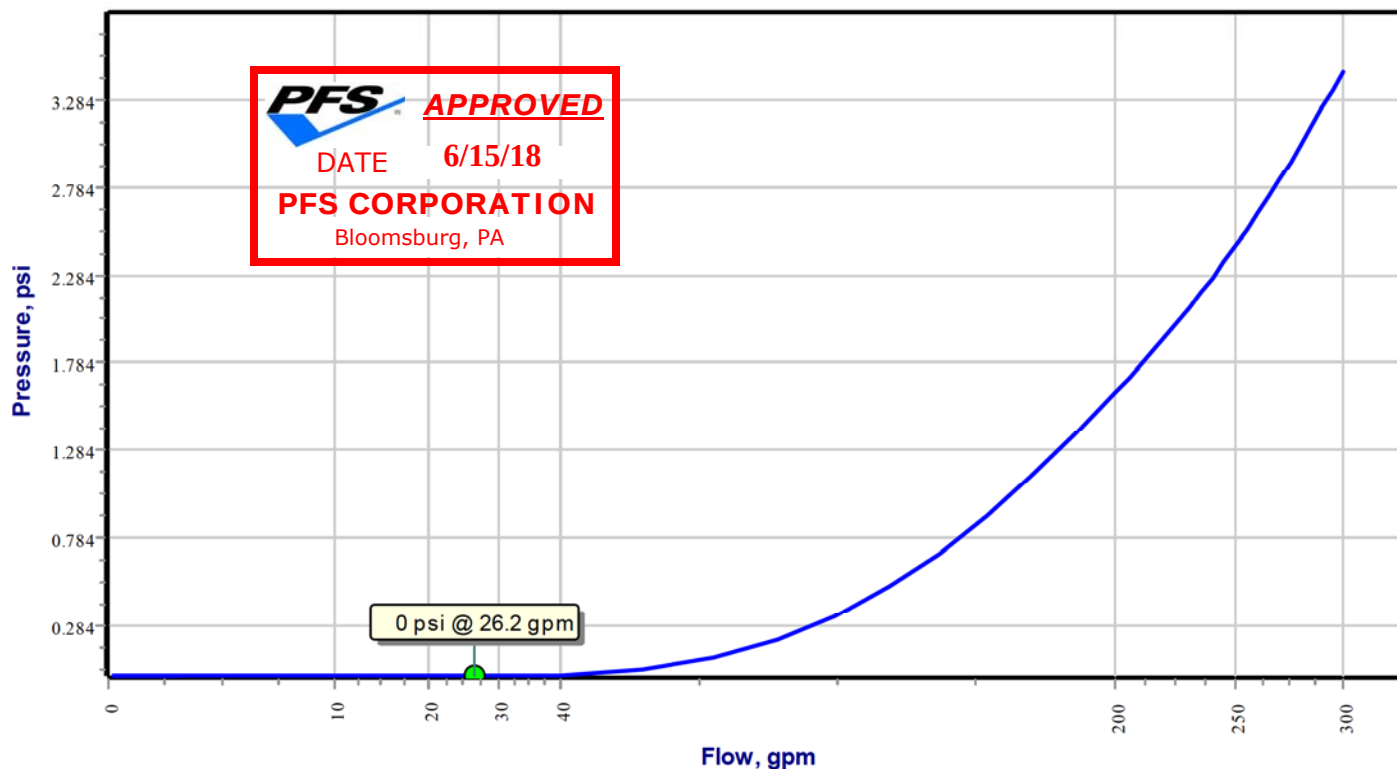


Pressure Loss Function
Design Area: 1; BFP Ref.: 90 (Ames2000B, Size = 1.5); Inlet Node: BFP-I; Outlet Node: BFP-O



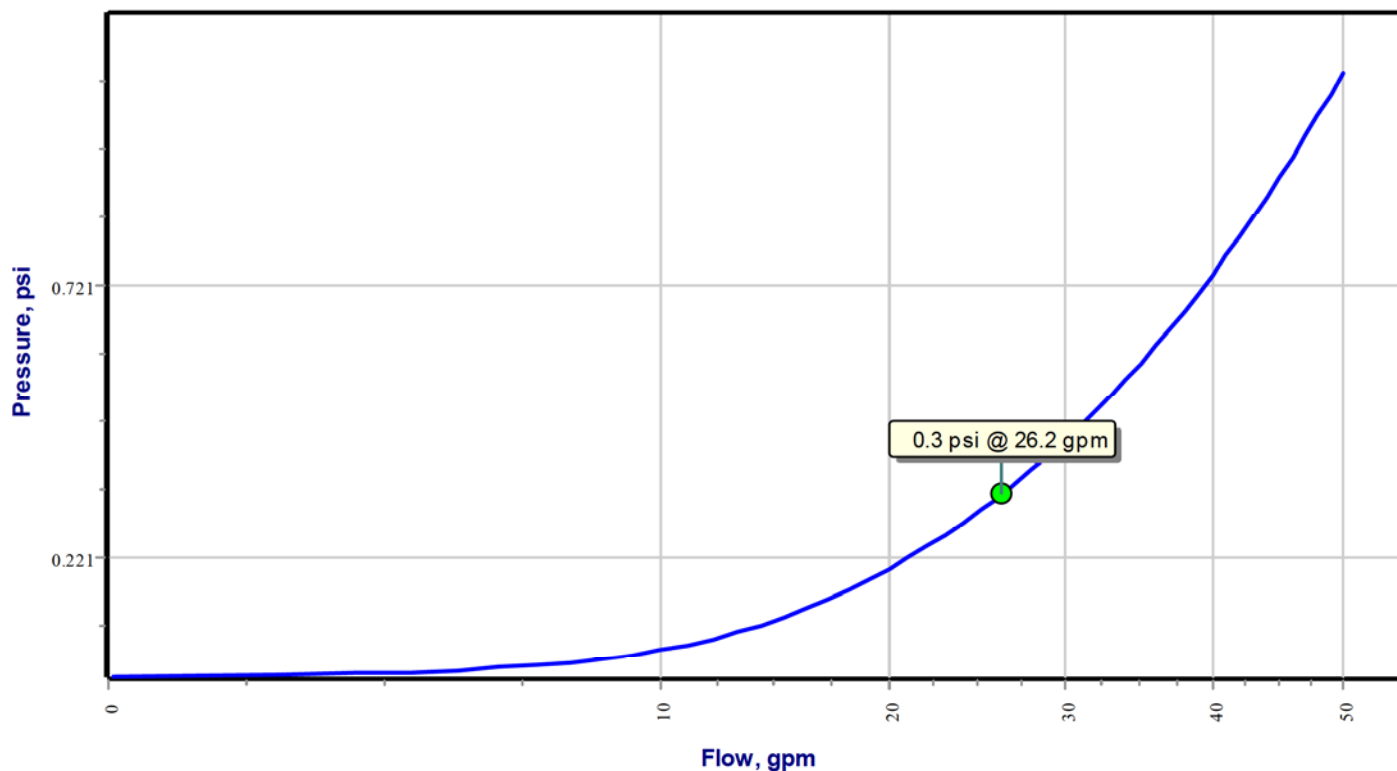
Pressure Loss Function

Design Area: 1; Valve Ref.: 91 (Gate A2360, Size = 1.5); Inlet Node: GV3-I; Outlet Node: GV3-O



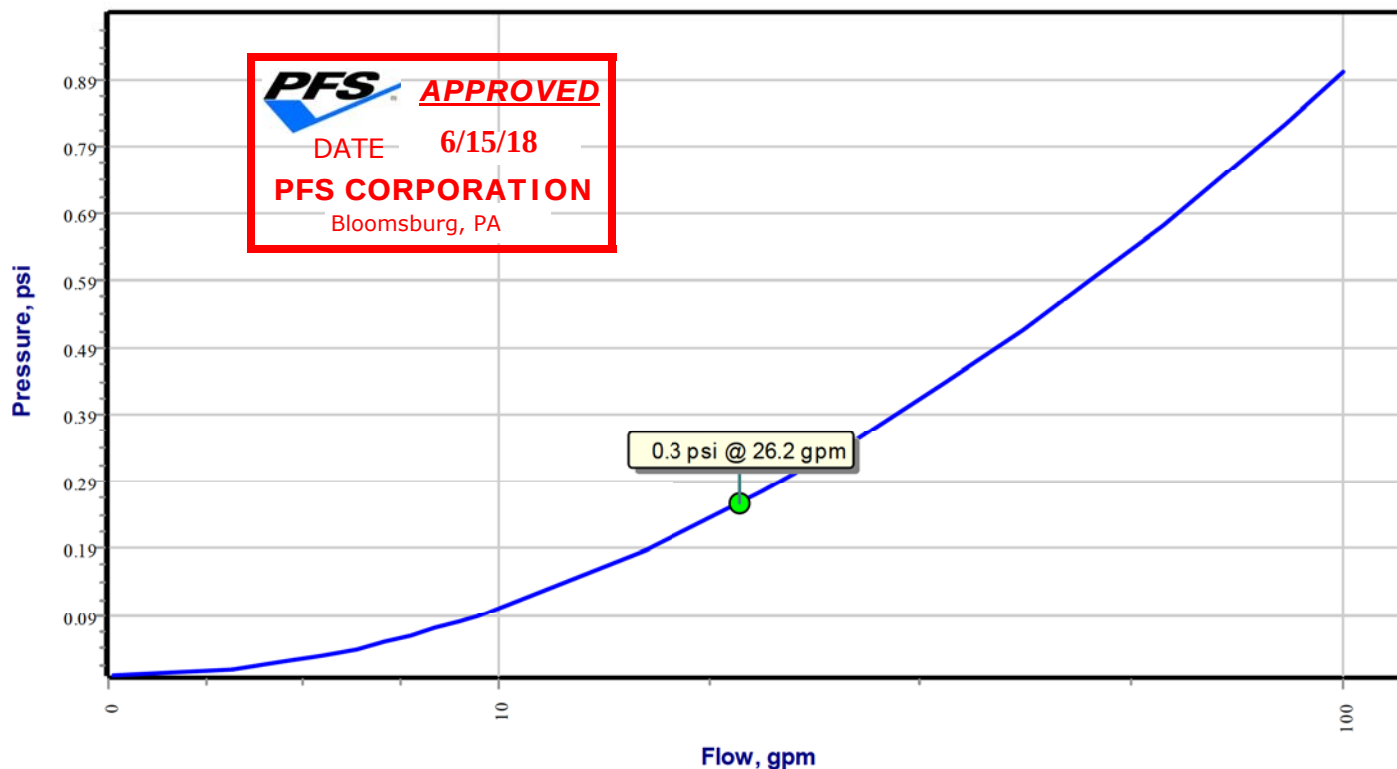
Pressure Loss Function

Design Area: 1; Valve Ref.: 92 (SSCV, Size = 1.5); Inlet Node: CV1-I; Outlet Node: CV1-O



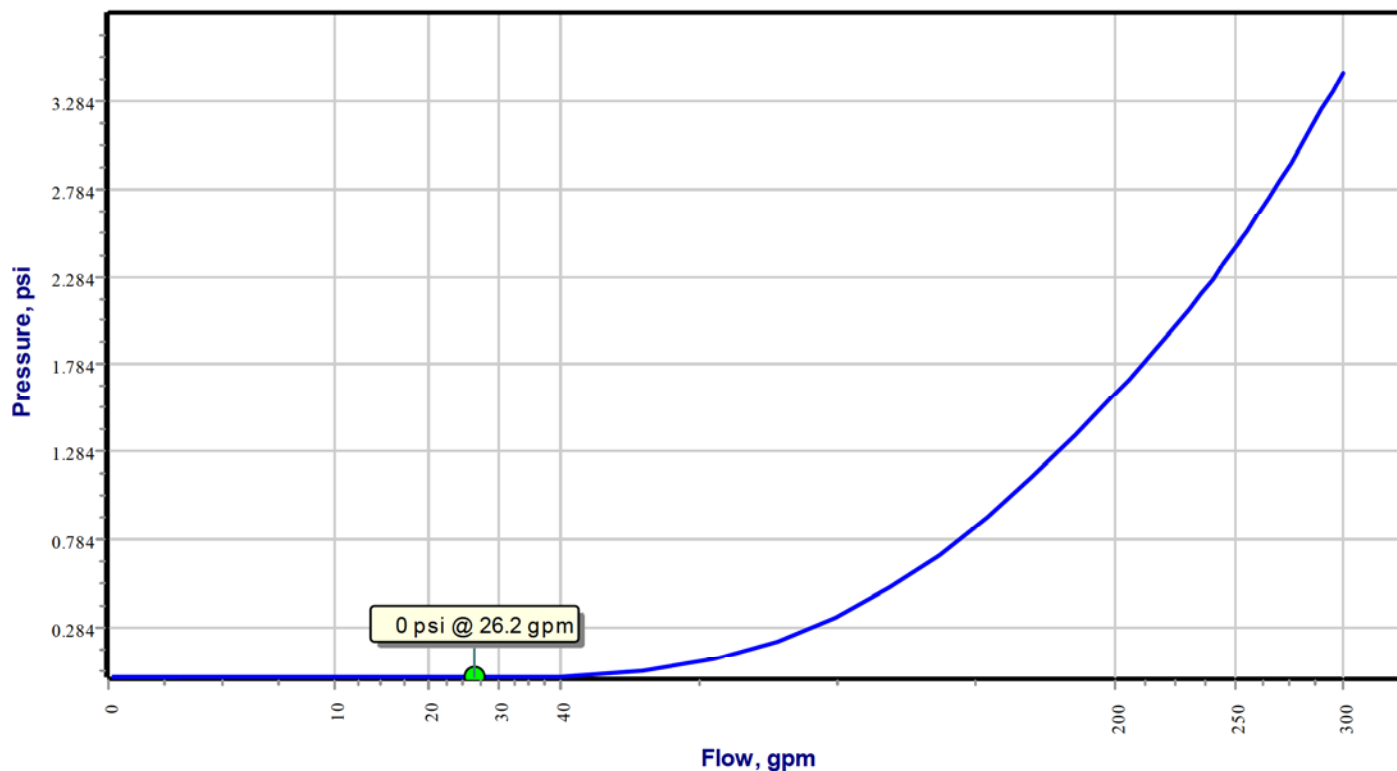
Pressure Loss Function

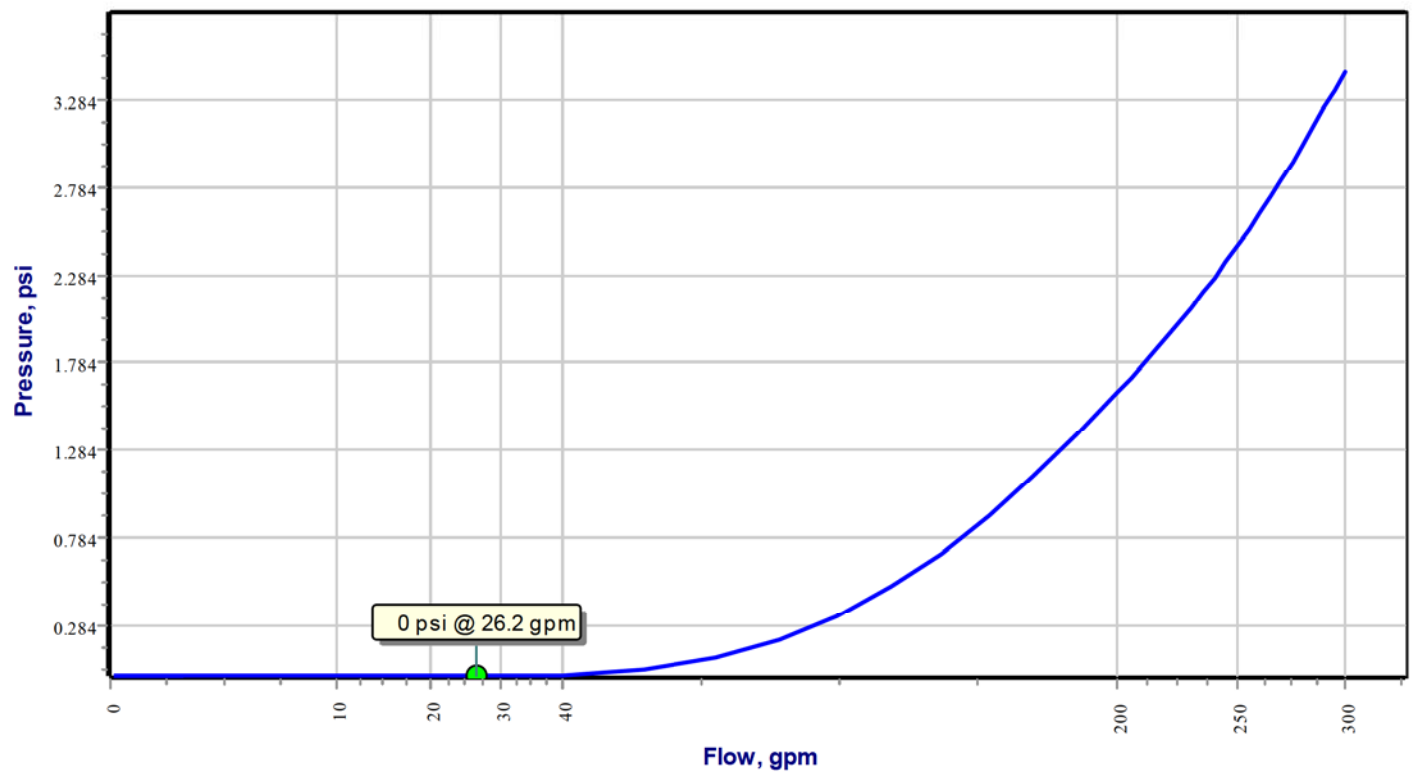
Design Area: 1; Valve Ref.: 93 (EVO Q4 MTR, Size = 1.5); Inlet Node: MTR-I; Outlet Node: MTR-O



Pressure Loss Function

Design Area: 1; Valve Ref.: 94 (Gate A2360, Size = 1.5); Inlet Node: GV1-I; Outlet Node: GV1-O



Pressure Loss Function**Design Area: 1; Valve Ref.: 95 (Gate A2360, Size = 1.5); Inlet Node: GV2-I; Outlet Node: GV2-O**

HYDRAULIC CALCULATIONS for

Job Information

Project Name : MOD STEEL - APP014043 - WITTY

Contract No. : 18-320C

City: QUEENS, NY 11692

Project Location: 315 BEACH 67

Date: 5/23/2018

Contractor Information

Name of Contractor: PENN FIRE PROTECTION, INC.

Address: 1768 ROUTE 522

City: SELINGSGROVE, PA 17870

Phone Number: 570-374-4508

E-mail: ADAM@PENNFIRE.COM

Name of Designer: A HEIMBACH

Authority Having Jurisdiction: PFS/NYDOS/LOCAL

Design

Remote Area Name	2
Remote Area Location	KIT/LR
Occupancy Classification	RES13D
Density (gpm/ft ²)	0.051
Area of Application (ft ²)	512
Coverage per Sprinkler (ft ²)	256
Number of Calculated Sprinklers	2
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	5
Total Water Required (incl. Hose Streams) (gpm)	31.2
Required Pressure at Source (psi)	41.8
Type of System	Wet
Volume - Entire System (gal)	10.5 gal

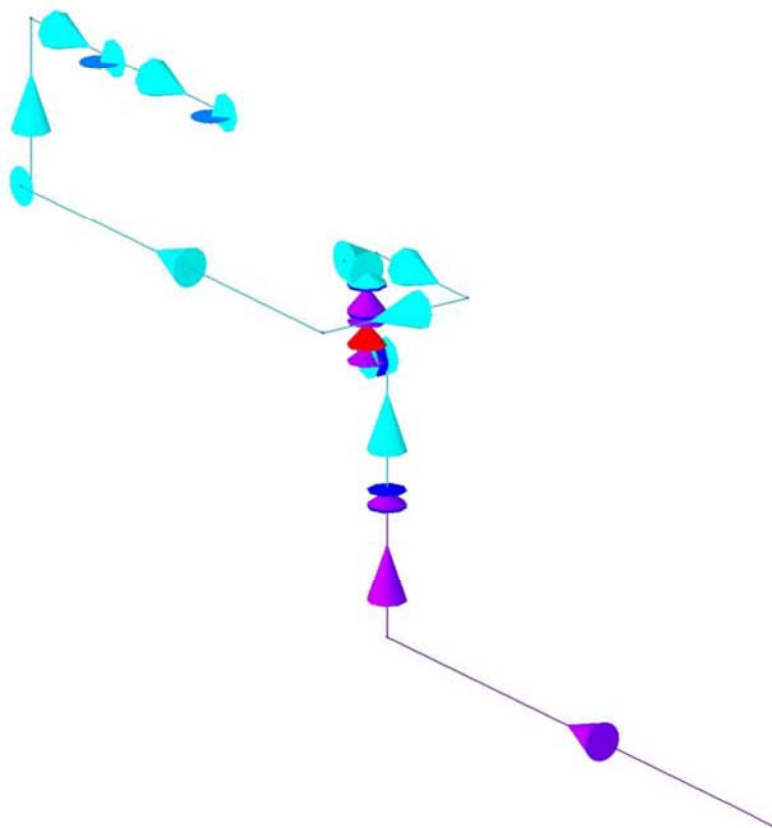
Water Supply Information

Date	07/17/15
Location	BEACH 67
Source	W1

Notes



Diagram for Design Area : 2
(Optimized Hvdraulic Simplified)



Hydraulic Analysis for : 2**Calculation Info**

Calculation Mode
 Hydraulic Model
 Fluid Name
 Fluid Weight, (lb/ft³)
 Fluid Dynamic Viscosity, (lb·s/ft²)

Demand
 Hazen-Williams
 Water @ 60F (15.6C)
 N/A for Hazen-Williams calculation.
 N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	51
500	49

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	51	49	500	51	31.2	41.8

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm)

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm)**Sprinklers**

Ovehead Sprinkler Flow (gpm) 26.2

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 26.2**Other**

Required Margin of Safety (psi) 0

W1 - Pressure (psi) 41.8

W1 - Flow (gpm) 26.2

Demand w/o System Pump(s) N/A



Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
33 27.33	Node NODE				7.6 -14	
B1 27	Overhead Sprinkler HEAD	4.9 Open	13.3 0.5	256 0.052	7.3 -13.9	7 12.8
B2 27	Overhead Sprinkler HEAD	4.9 Open	13 0.2	256 0.051	7 -13.9	7 12.8
BFP-I 12.96	Node NODE				31.5 -7.8	
BFP-O 14.36	Node NODE				26.7 -8.4	
CV1-I 16.52	Node NODE				25.6 -9.3	
CV1-O 16.69	Node NODE				25.2 -9.4	
GV1-I 2.92	Node NODE				36.7 -3.4	
GV1-O 3.08	Node NODE				36.6 -3.5	
GV2-I 3.92	Node NODE				36.2 -3.9	
GV2-O 4.08	Node NODE				36.2 -3.9	
GV3-I 14.85	Node NODE				26.4 -8.6	
GV3-O 15.01	Node NODE				26.3 -8.7	
MTR-I 12	Node NODE				32.4 -7.4	
MTR-O 12	Node NODE				32.1 -7.4	
TOR 17.33	Node NODE				24.9 -9.7	
W1 -5	Supply SUPPLY		-26.2		41.8 0	



PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

B2 33	27 27.33	4.9	13 13	1 1.101	1x(BM.Tee-Run)=1 2x(BM.90)=10	12.33 11 23.33	150 0.0304	7 -0.1 0.7	
33 TOR	27.33 17.33		13.3 26.2	1 1.101	1x(us.90)=3.82 2x(BM.90)=10 5x(BM.Tee-Run)=5 5x(BM.Tee-Br)=25	71.94 43.82 115.76	150 0.1121	7.6 4.3 13	
TOR CV1-O	17.33 16.69		0 26.2	1.5 1.481	1x(coupling)=1.01	0.56 1.01 1.57	150 0.0265	24.9 0.3 0.0	
CV1-O CV1-I	16.69 16.52		0 26.2	1.5 0		0.16 0 0.16	0 2.0676	25.2 0.1 0.3	SSCV ***
CV1-I GV3-O	16.52 15.01		0 26.2	1.5 1.481	1x(coupling)=1.01	1.51 1.01 2.52	150 0.0265	25.6 0.7 0.1	
GV3-O GV3-I	15.01 14.85		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	26.3 0.1 0	Gate A2360 ***
GV3-I BFP-O	14.85 14.36		0 26.2	1.5 1.481	1x(coupling)=1.01	0.57 1.01 1.58	150 0.0265	26.4 0.2 0.0	
BFP-O BFP-I	14.36 12.96		0 26.2	1.5 0		1.4 0 1.4	0 3.0671	26.7 0.6 4.3	Ames2000B ***
BFP-I MTR-O	12.96 12		0 26.2	1.5 1.481	1x(coupling)=1.01 1x(us.90)=4.02	0.99 5.03 6.02	150 0.0265	31.5 0.4 0.2	
MTR-O MTR-I	12 12		0 26.2	1.5 0		0.67 0 0.67	0 0.3848	32.1 0 0.3	EVO Q4 MTR ***
MTR-I GV2-O	12 4.08		0 26.2	1.5 1.481	1x(coupling)=1.01 1x(us.90)=4.02	8.53 5.03 13.56	150 0.0265	32.4 3.4 0.4	
GV2-O GV2-I	4.08 3.92		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	36.2 0.1 0	Gate A2360 ***
GV2-I GV1-O	3.92 3.08		0 26.2	1.5 1.481	1x(coupling)=1.01	0.84 1.01 1.84	150 0.0265	36.2 0.4 0.0	
GV1-O GV1-I	3.08 2.92		0 26.2	1.5 0		0.16 0 0.16	0 0.0014	36.6 0.1 0	Gate A2360 ***
GV1-I W1	2.92 -5		0 26.2	1.5 1.481	1x(us.90)=4.02	57.5 4.02 61.52	150 0.0265	36.7 3.4 1.6	
W1								41.8	



8\18-320 - MODULAR STEEL STRUCTURES - BIB HOUSES\18-320C - MOD STEEL -
APP014043 - WITTY.dwg

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

B1	27	4.9	13.3	1	1x(BM.Tee-Br)=5	1.33	150	7.3	
33	27.33		13.3	1.101	1x(BM.90)=5	10	0.0318	-0.1	
						11.33		0.4	
33								7.6	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

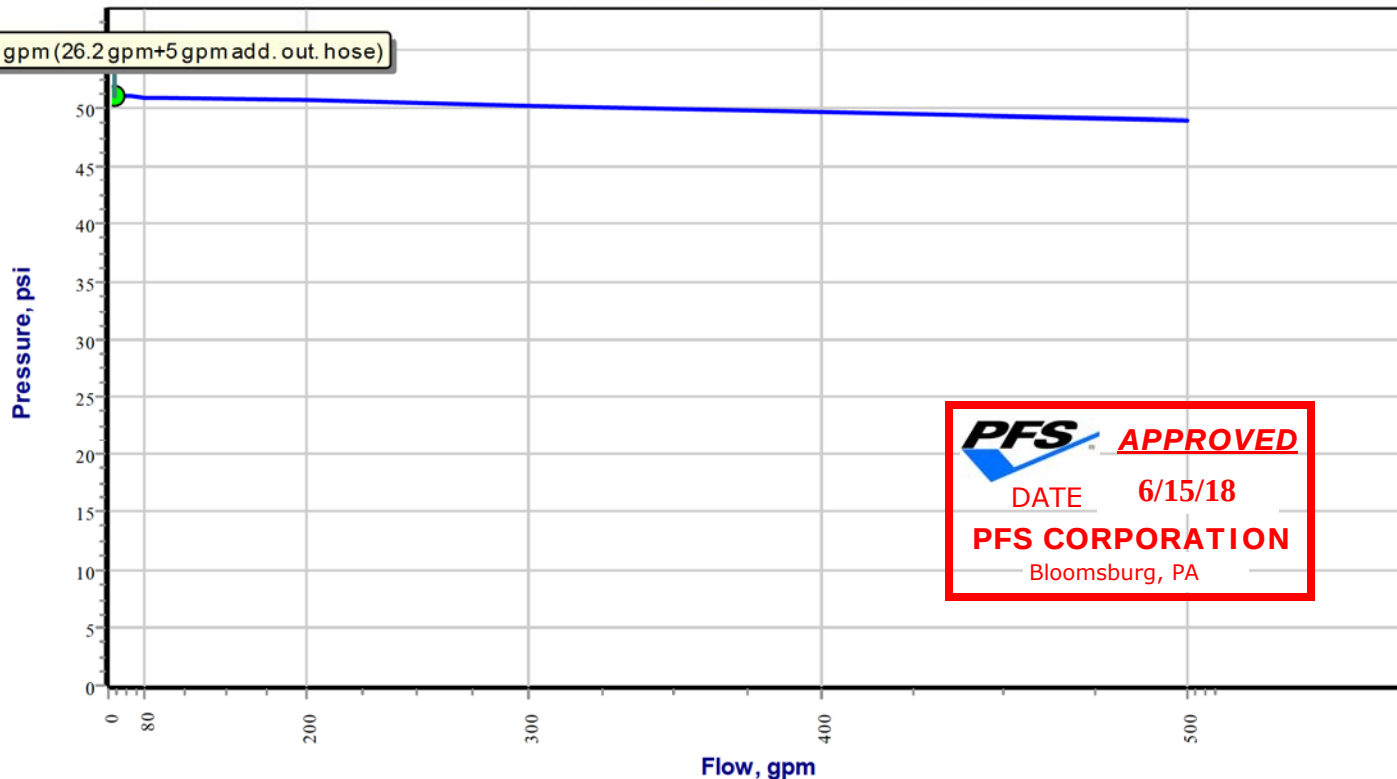
* Maximum Velocity of 8.85 ft/s occurs in the following pipe(s): (TOR-33)

*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

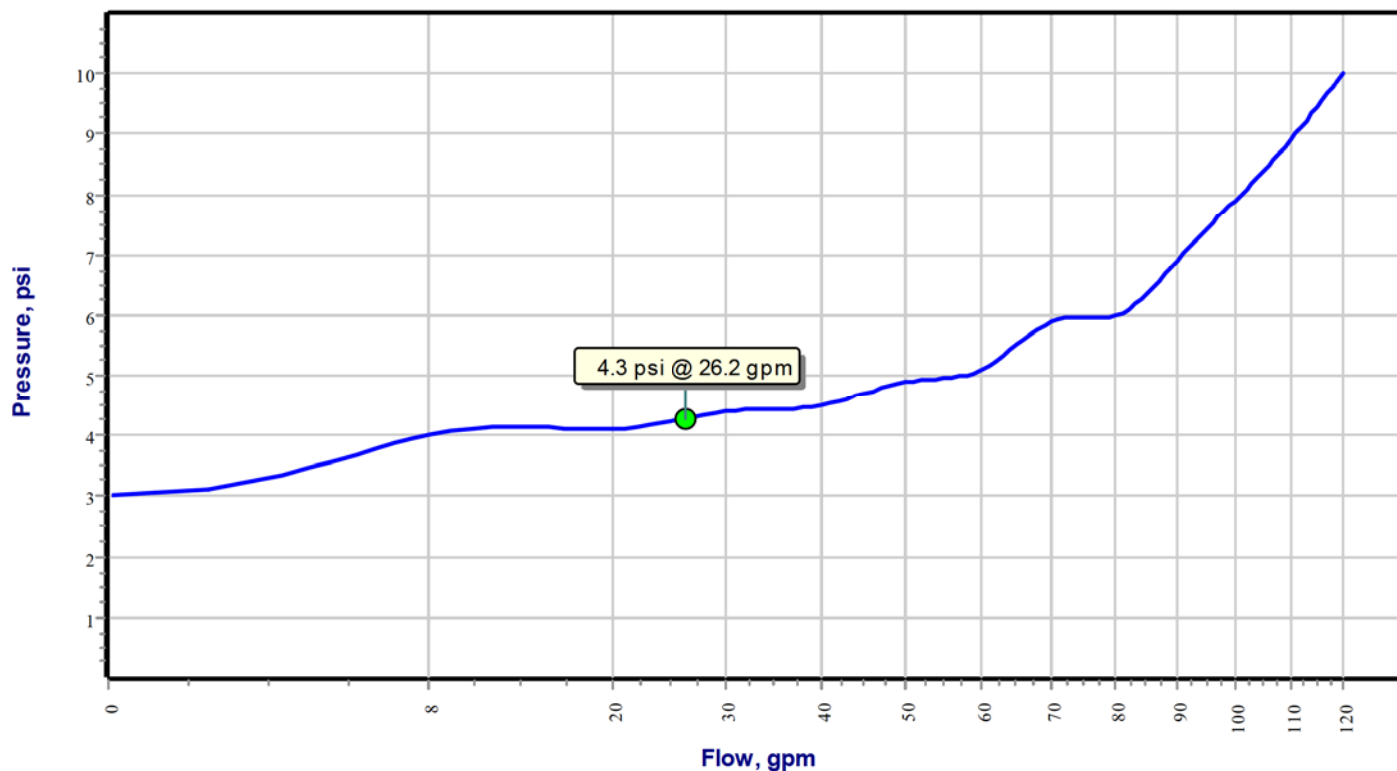


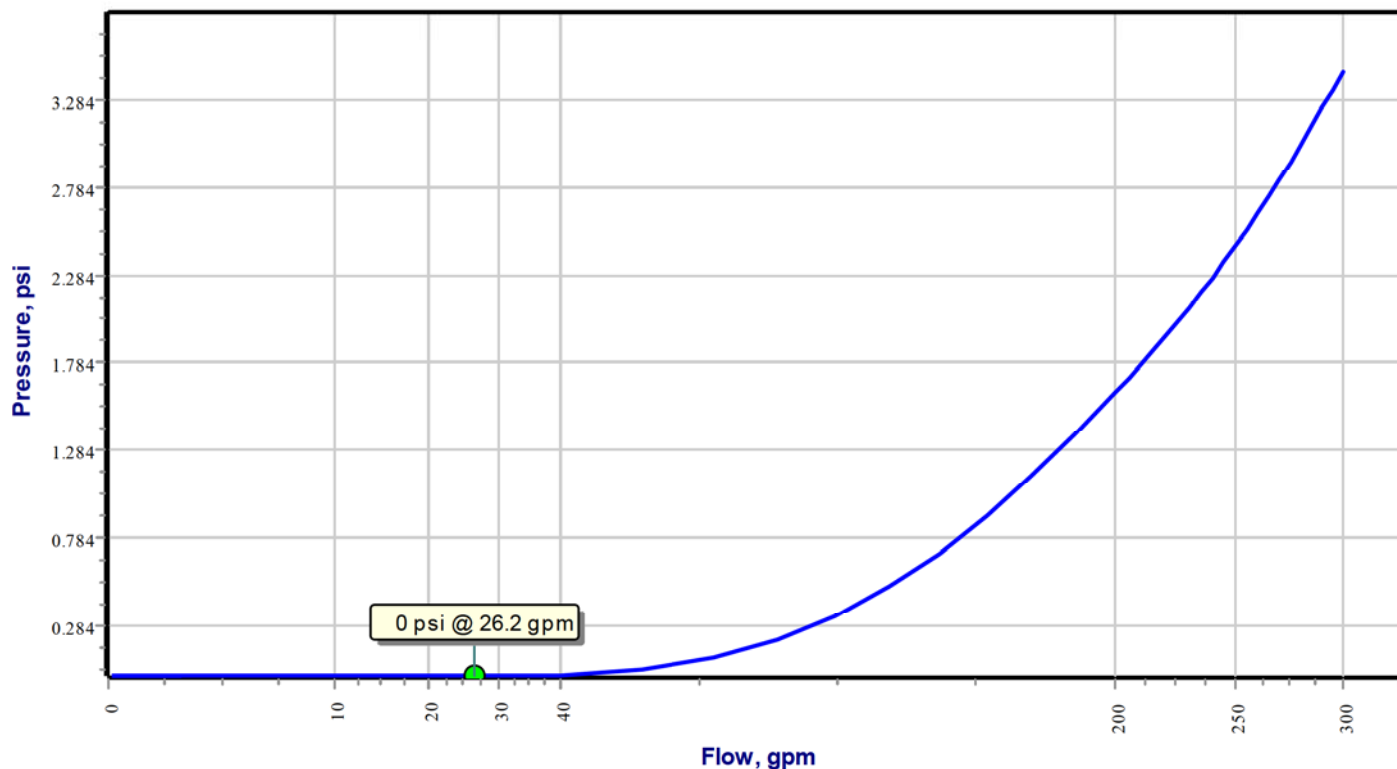
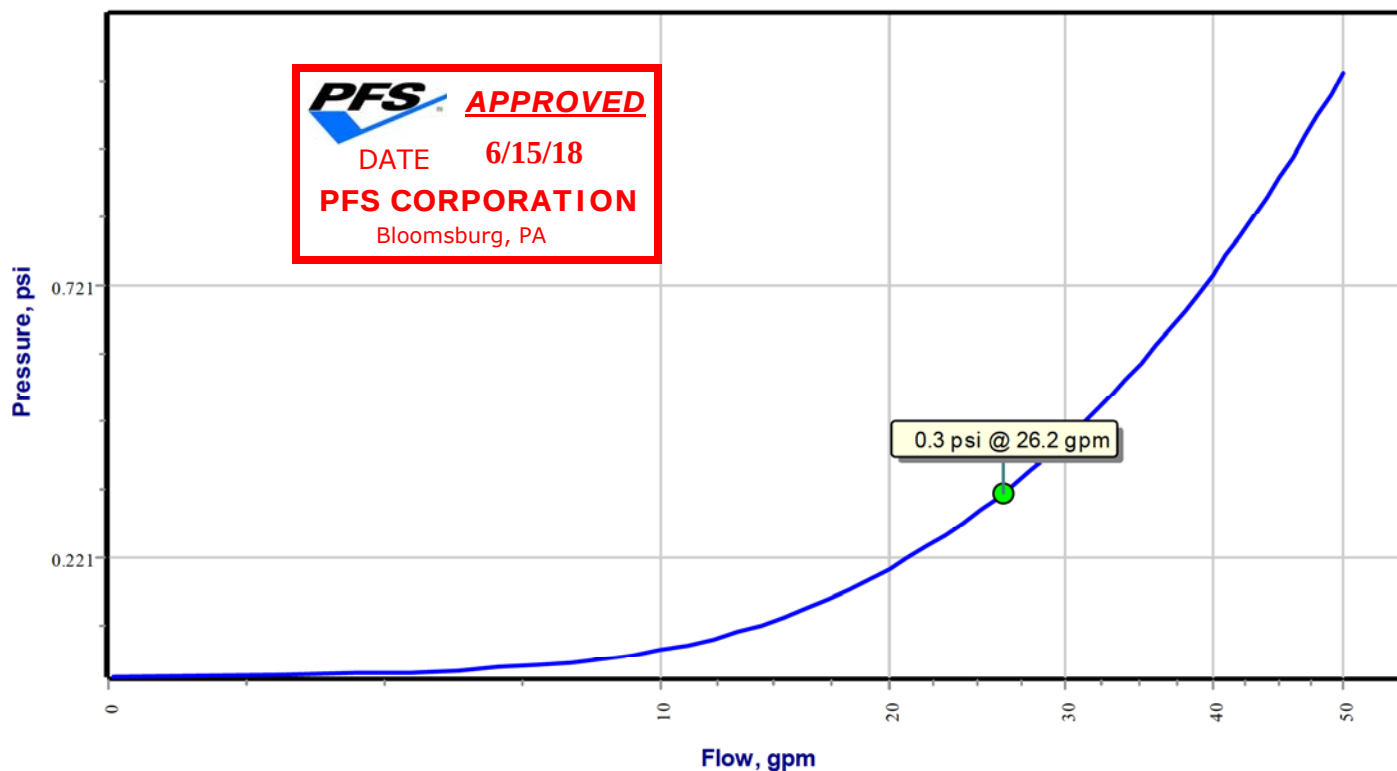
Pressure vs. Flow Function
Design Area: 2; Supply Ref.: W1; Supply Name:W1

51 psi @ 31.2 gpm (26.2 gpm+5 gpm add. out. hose)



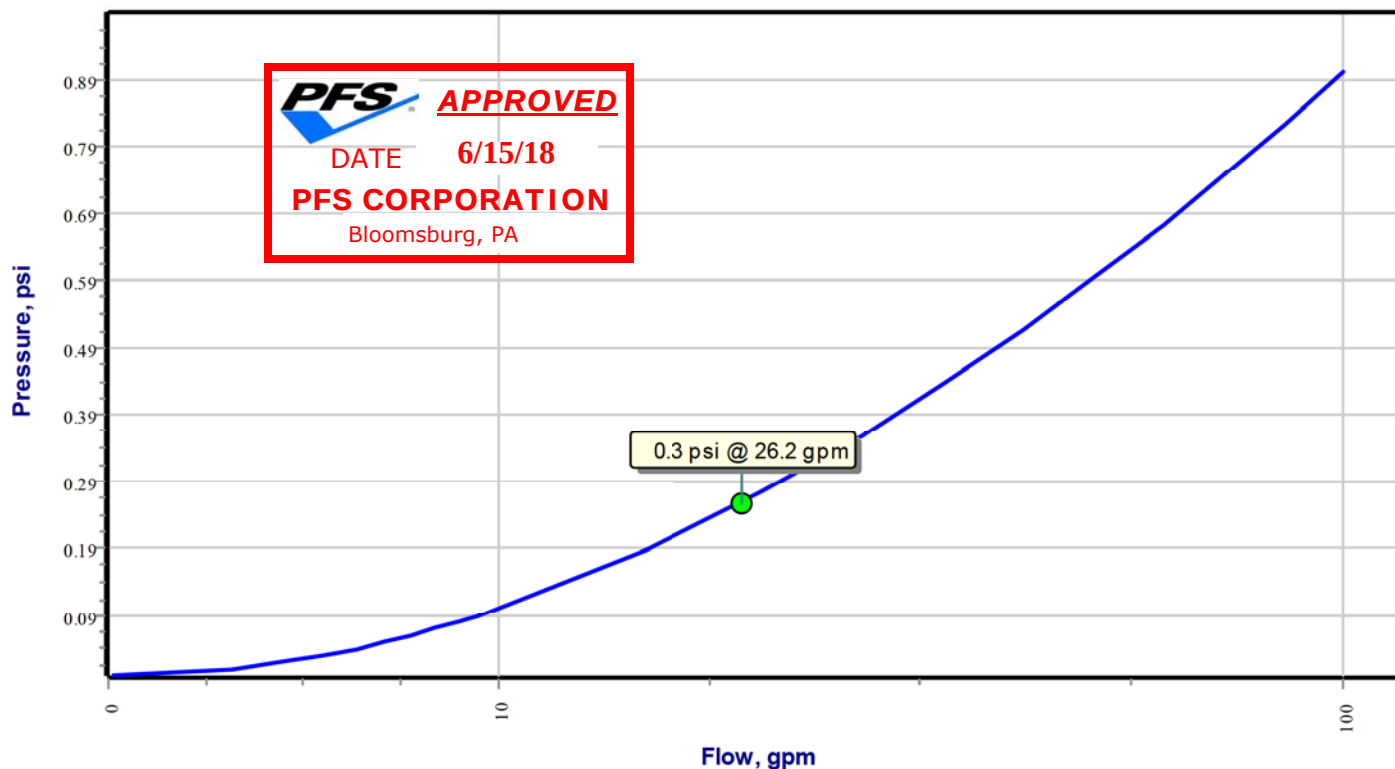
Pressure Loss Function
Design Area: 2; BFP Ref.: 90 (Ames2000B, Size = 1.5); Inlet Node: BFP-I; Outlet Node: BFP-O



Pressure Loss Function**Design Area: 2; Valve Ref.: 91 (Gate A2360, Size = 1.5); Inlet Node: GV3-I; Outlet Node: GV3-O****Pressure Loss Function****Design Area: 2; Valve Ref.: 92 (SSCV, Size = 1.5); Inlet Node: CV1-I; Outlet Node: CV1-O**

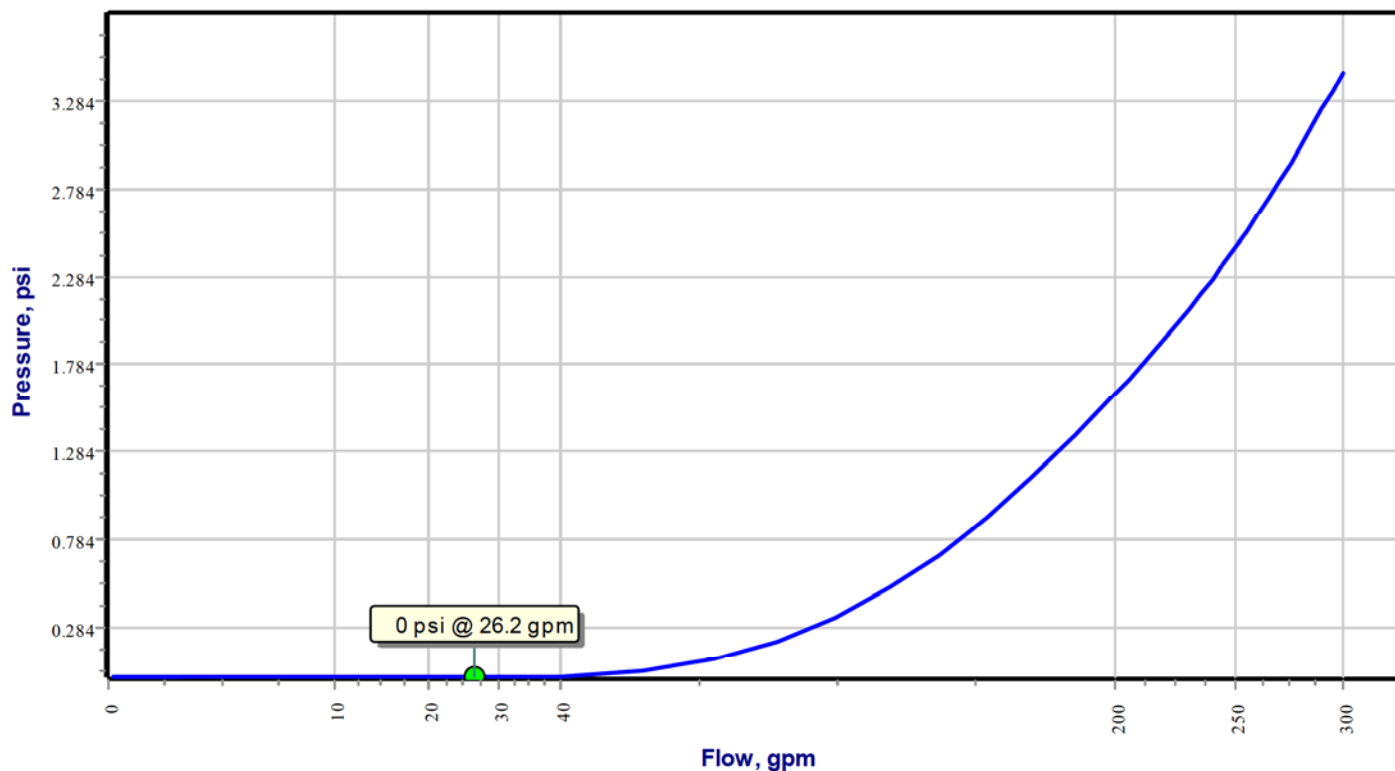
Pressure Loss Function

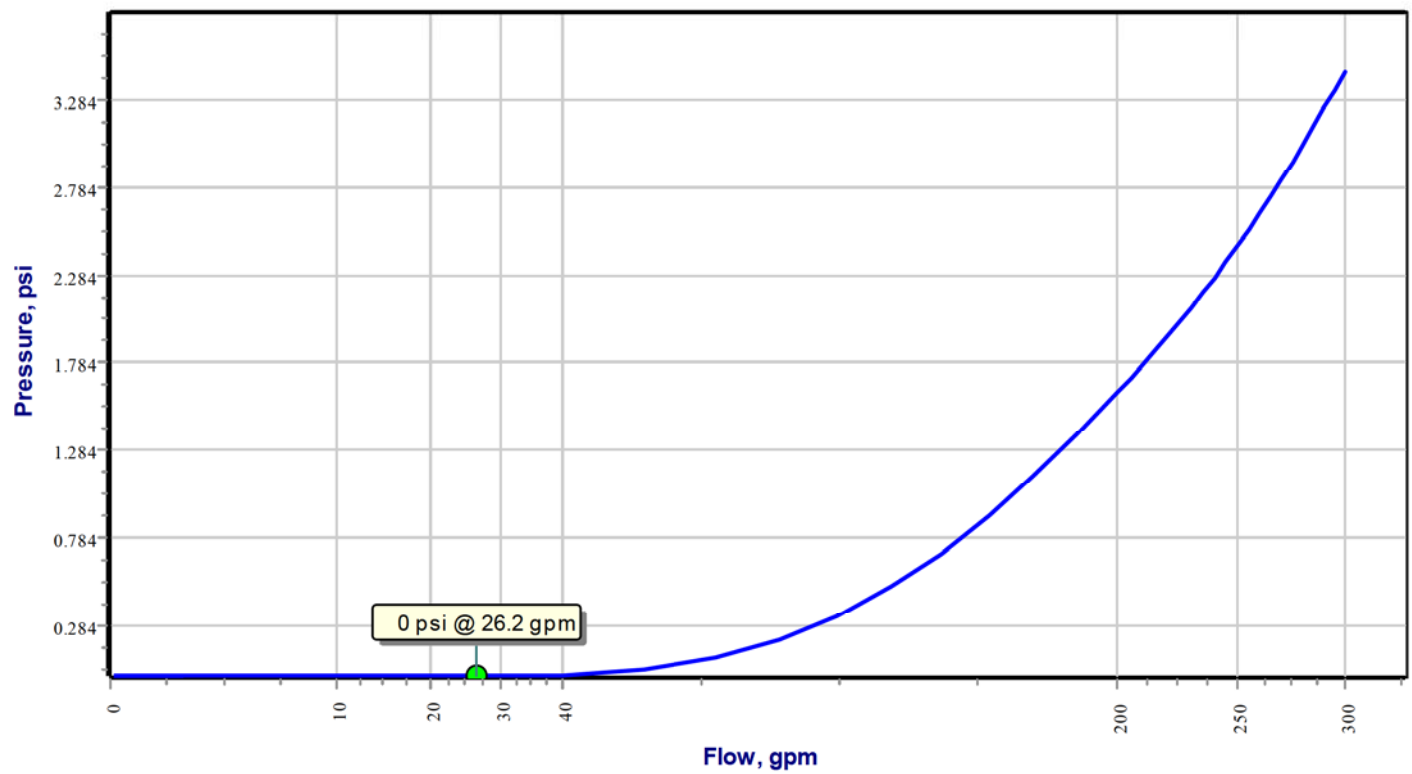
Design Area: 2; Valve Ref.: 93 (EVO Q4 MTR, Size = 1.5); Inlet Node: MTR-I; Outlet Node: MTR-O



Pressure Loss Function

Design Area: 2; Valve Ref.: 94 (Gate A2360, Size = 1.5); Inlet Node: GV1-I; Outlet Node: GV1-O



Pressure Loss Function**Design Area: 2; Valve Ref.: 95 (Gate A2360, Size = 1.5); Inlet Node: GV2-I; Outlet Node: GV2-O**

- NFPA 13D - 2013 - 8.2.5.7 SHADOW AREAS - SHADOW AREAS SHALL BE PERMITTED IN THE PROTECTION AREA OF A SPRINKLER AS LONG AS THE CUMULATIVE DRY AREAS DO NOT EXCEED 15FT² PER SPRINKLER
- NFPA 13D - 2013 8.3.1 SPRINKLERS SHALL BE INSTALLED IN ALL AREAS EXCEPT WHERE OMISSION IS PERMITTED BY 8.3.2 THROUGH 8.3.8
- NFPA 13D - 2013 8.3.2 SPRINKLERS SHALL NOT BE REQUIRED IN BATHROOMS 55 FT² OR LESS
- NFPA 13D - 2013 8.3.3 SPRINKLERS SHALL NOT BE REQUIRED IN CLOTHES CLOSETS, LINEN CLOSETS, AND PANTRIES THAT MEET ALL OF THE FOLLOWING CONDITIONS:
 - THE AREA OF THE SPACE DOES NOT EXCEED 24 FT²
 - THE LEAST DIMENSION DOES NOT EXCEED 3 FT
 - THE WALLS AND CEILINGS ARE SURFACED WITH NONCOMBUSTIBLE OR LIMITED-COMBUSTIBLE MATERIALS AS DEFINED IN NFPA 220.
- NFPA 13D - 2013 - 8.3.4 SPRINKLERS SHALL NOT BE REQUIRED IN GARAGES, OPEN ATTACHED PORCHES, CARPORTS AND SIMILAR STRUCTURES
- NFPA 13D - 2013 - 8.3.5 SPRINKLERS SHALL NOT BE REQUIRED IN ATTICS WITH OR WITHOUT STORAGE, PENTHOUSE EQUIPMENT ROOMS, ELEVATOR MACHINE ROOMS, CONCEALED SPACES DEDICATED EXCLUSIVELY TO AND CONTAINING ONLY DWELLING UNIT VENTILATION EQUIPMENT, FLOOR CEILING SPACES, ELEVATOR SHAFTS, CRAWL SPACES, AND OTHER CONCEALED SPACES THAT ARE NOT INTENDED FOR LIVING PURPOSES, AND DO NOT CONTAIN FUEL FIRED EQUIPMENT.
- NFPA 13D - 2013 - 8.3.5.1 SUCH SPACES THAT CONTAIN FUEL FIRED EQUIPMENT SHALL ALSO COMPLY WITH 8.3.5.1.1 OR 8.3.5.1.2
- NFPA 13D - 2013 - 8.3.5.1.1 WHERE FUEL FIRED EQUIPMENT IS ABOVE ALL OF THE OCCUPIED AREAS OF THE DWELLING UNIT, NO SPRINKLER PROTECTION SHALL BE REQUIRED IN THE CONCEALED SPACE.
- NFPA 13D - 2013 - 8.3.5.1.2 WHERE FUEL FIRED EQUIPMENT IS BELOW OR ON THE SAME LEVEL AT LEAST ONE QUICK RESPONSE, INTERMEDIATE TEMPERATURE SPRINKLER SHALL BE INSTALLED ABOVE THE EQUIPMENT OR AT THE WALL SEPARATING THE SPACE WITH THE FUEL FIRED EQUIPMENT FROM THE OCCUPIED SPACE.
- NFPA 13D 8.3.6 SPRINKLERS SHALL NOT BE REQUIRED IN COVERED UNHEATED PROJECTIONS OF THE BUILDING AT THE ENTRANCES/EXITS AS LONG AS THE DWELLING UNIT HAS ANOTHER MEANS OF EGRESS
- NFPA 13D - 2010 8.3.7 SPRINKLERS SHALL NOT BE REQUIRED FOR CEILING POCKETS THAT MEET THE FOLLOWING CONDITIONS:
 - THE TOTAL VOLUME OF UNPROTECTED CEILING POCKET DOES NOT EXCEED 100 FT³ (2.83 M³).
 - THE ENTIRE FLOOR UNDER THE UNPROTECTED CEILING POCKET IS PROTECTED BY THE SPRINKLERS AT THE LOWER CEILING ELEVATION.
 - EACH UNPROTECTED CEILING POCKET IS SEPARATED FROM ANY ADJACENT UNPROTECTED CEILING POCKET BY A MINIMUM 10 FT (3.05 M) HORIZONTAL DISTANCE.
 - THE INTERIOR FINISH OF THE UNPROTECTED CEILING POCKET IS NONCOMBUSTIBLE OR LIMITED-COMBUSTIBLE MATERIAL.
 - SKYLIGHTS NOT EXCEEDING 32 FT² (2.97 M²) SHALL BE PERMITTED TO HAVE A PLASTIC COVER.

- NFPA 13D - 2013 - 8.3.8 SPRINKLERS SHALL NOT BE REQUIRED IN CLOSETS IN GARAGES AND EXTERIOR CLOSETS (REGARDLESS OF SIZE) LOCATED ON EXTERIOR BALCONIES, EXTERIOR BREEZEWAYS/CORRIDORS OR ACCESSED FROM OUTDOORS WHERE THE CLOSET DOES NOT HAVE DOORS OR UNPROTECTED PENETRATIONS DIRECTLY INTO THE DWELLING UNIT.
- NFPA 13D - 2013 - 8.3.9 SPRINKLERS SHALL BE INSTALLED IN ANY CLOSET USED FOR HEATING AND/OR AIR CONDITIONING EQUIPMENT, WASHERS AND/OR DRYERS, WATER HEATERS EXCEPT AS ALLOWED IN 8.3.8

FIRE PROTECTION GENERAL NOTES:

- THE ENTIRE DWELLING(S) SHALL BE PROTECTED BY ONE WET PIPE SPRINKLER SYSTEM, THAT IS COMPLETELY NEW, HYDRAULICALLY CALCULATED, SUPERVISED AND SUPPLIED BY A PUBLIC WATER SUPPLY OR PUMP & TANK THIS SPRINKLER SYSTEM SHALL BE INSTALLED, TESTED AND PLACED IN SERVICE IN ACCORDANCE WITH NFPA 13D - 2013
- ALL NEW SPRINKLER PIPING SHALL HYDROSTATICALLY TESTED IN ACCORDANCE WITH NFPA 13D - 2013 - 11.2.1 HYDROSTATIC TESTS
- PIPE HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13D - 2013 - 7.4 - PIPING SUPPORT
- ALL PIPE AND FITTINGS SHALL BE BLAZEMASTER OR FLAMEGUARD CPVC IN ACCORDANCE WITH NFPA 13D - 2013 5.2 ABOVE GROUND PIPE & EQUIPMENT, ALL PIPING IN BASEMENT CPVC IN ACCORDANCE WITH PIPING MANUFACTURERS LISTING FOR EXPOSED INSTALLATION.
- INSPECTORS TESTING CONNECTIONS/DRAINS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13D - 2013 7.2 DRAINS & TEST CONNECTIONS
- APPROVED IDENTIFICATION SIGNS FOR ALL SYSTEM COMPONENTS SHALL BE FURNISHED AND INSTALLED BY OTHERS
- ALL ELECTRICAL WIRING SHALL BE FURNISHED AND INSTALLED BY OTHERS, IE LICENSED ELECTRICIAN

OWNER/BUILDER/DEVELOPER NOTES:

- IT IS THE RESPONSIBILITY OF THE BUILDING OWNER TO MAINTAIN SUFFICIENT HEAT THROUGHOUT THE ENTIRE STRUCTURE TO PREVENT ALL FIRE PROTECTION DEVICES FROM FREEZING CONDITIONS
- DO NOT USE BLOWN IN INSULATION AROUND SPRINKLER PIPE. TENT "ROLLED" INSULATION AROUND SPRINKLER PIPING TO CREATE A POCKET OF HEATED AIR BETWEEN HEATED SPACES AND FREEZING AREAS
- OWNER SHALL BE RESPONSIBLE FOR ALL MAINTENANCE, AND INSPECTIONS AS DESCRIBED IN NFPA 13, 13D, & 25

FIRE PROTECTION SEQUENCE OF OPERATION:

- SPRINKLER HEAD ACTIVATES
- WATER DELIVERY - IMMEDIATE

PLOT PLAN
1"=10'

- FIRE PROTECTION GENERAL NOTES - FOR MANUFACTURED HOMES NFPA 13D-2013:
- NFPA 13D - 2013 6.4 MANUFACTURED HOMEWATER SUPPLY. FOR SPRINKLERED BUILDINGS MANUFACTURED OFF-SITE, THE MINIMUM PRESSURE NEEDED TO SATISFY THE SYSTEM DESIGN CRITERIA ON THE SYSTEM SIZE OF THE METER SHALL BE SPECIFIED ON A DATA PLATE BY THE MANUFACTURER.
 - NFPA 13D - 2013 6.5.1 WHERE COMMON SUPPLY PIPES SERVE BOTH FIRE SPRINKLER AND DOMESTIC USE, THEY SHALL COMPLY WITH 6.5.2 THROUGH 6.5.4.
 - NFPA 13D - 2013 6.5.2 IN COMMON WATER SUPPLY CONNECTIONS SERVING MORE THAN ONE DWELLING UNIT, 5 GPM (19 L/MIN) SHALL BE ADDED TO THE SPRINKLER SYSTEM DEMAND TO DETERMINE THE SIZE OF COMMON PIPING AND THE SIZE OF THE TOTAL WATER SUPPLY REQUIREMENTS WHERE NO PROVISION IS MADE TO PREVENT FLOW INTO THE DOMESTIC WATER SYSTEM UPON OPERATION OF A SPRINKLER.
 - NFPA 13D - 2013 6.5.4 WHERE WATER TREATMENT AND FILTRATION ARE INSTALLED, ONE OF THE FOLLOWING CONDITIONS SHALL BE MET:
 - THE FLOW RESTRICTION AND PRESSURE LOSS THROUGH THE WATER TREATMENT EQUIPMENT SHALL BE TAKEN INTO ACCOUNT IN THE HYDRAULIC CALCULATIONS.
 - AN AUTOMATIC BYPASS SHALL BE INSTALLED AROUND THE WATER TREATMENT EQUIPMENT THAT DIRECTS ALL WATER DIRECTLY TO THE SYSTEM.

FIRE PROTECTION MATERIALS (HEADS, PIPE, FITTINGS, ETC.):

- ALL SPRINKLER HEADS SHALL BE IN ACCORDANCE WITH NFPA 13D 2013 - 5.1.1, AND 7.5.1 LISTED RESIDENTIAL SPRINKLERS SHALL BE USED UNLESS ANOTHER TYPE IS PERMITTED BY 7.5.3 OR 7.5.4.
- ALL DEVICES AND MATERIALS USED IN SPRINKLER SYSTEM SHALL BE LISTED UNLESS PERMITTED NOT TO BE BY NFPA 13D - 2013 5.1.3.
- NFPA 13D - 2013 5.1.3 TANKS, EXPANSION TANKS, PUMPS, HANGERS, WATERFLOW DETECTION DEVICES, AND WATERFLOW VALVES SHALL NOT BE REQUIRED TO BE LISTED
- ALL CPVC SPRINKLER PIPING SHALL BE IN ACCORDANCE WITH NFPA 13 D 2013 - 5.2.2 - CPVC PIPE SHALL COMPLY WITH THE PORTIONS OF THE ASTM STANDARDS SPECIFIED IN TABLE 5.2.3.2 THAT APPLY TO FIRE PROTECTION SERVICE.
- ALL CPVC SPRINKLER FITTINGS SHALL BE IN ACCORDANCE WITH NFPA 13D 2013 - 5.2.9.2 CPVC PIPE SHALL COMPLY WITH THE PORTIONS OF THE ASTM STANDARDS SPECIFIED IN TABLE 5.2.2.2 THAT APPLY TO FIRE PROTECTION SERVICE.
- PRESSURE GAUGES SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13D 2013 - 5.2.1.13 GAUGES
- DRAIN AND TEST VALVES SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13D 2013 - 7.2 DRAINS AND TEST CONNECTIONS.
- PIPING SUPPORT SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13D 2013 - 7.4

SYSTEM RISER
F&I ONSITE BY OTHERS
N.T.S. (REFERENCE ONLY)

Calculation results for Design Area 1 - BEDROOM 2	
This system as shown on PENN FIRE PROTECTION, INC. for MOD STEEL - APP014043 - WITTY - at 315 BEACH 67 contract no. 18-320C is designed to discharge at a rate of 0.05 gpm/ft ² (L/min/m ²) of floor area over a maximum area of 512 ft ² when supplied with water at a rate of 26.2 gpm at 37 psi at the base of the riser. Hose stream allowance of _____ is included in the above.	company print no. dated 5/23/18
Occupancy classification: RES13D	Number of heads flowing: 2
Commodity classification: _____	System Type: Wet
Maximum storage height: _____	Maximum velocity: 8.84 f/s
Storage arrangement: _____	

Flow from In-Rack sprinklers: 0 gpm	Pressure Required at Source: 37 psi
Flow from Overhead sprinklers: 26.2 gpm	Pressure Available at Source: 51 psi
Flow from Inside Hoses: 0 gpm	Surplus Pressure at Source: 14 psi
Flow from Outside Hoses: 0 gpm	
Other fixed flows: 0 gpm	
Total flow in system piping: 26.2 gpm	
Additional flow at/beyond source: 5 gpm	
Total of all flows: 31.2 gpm	

Calculation results for Design Area 2 - KITCHEN	
This system as shown on PENN FIRE PROTECTION, INC. for MOD STEEL - APP014043 - WITTY - at 315 BEACH 67 contract no. 18-320C is designed to discharge at a rate of 0.05 gpm/ft ² (L/min/m ²) of floor area over a maximum area of 512 ft ² when supplied with water at a rate of 26.2 gpm at 41.8 psi at the base of the riser. Hose stream allowance of _____ is included in the above.	company print no. dated 5/23/18
Occupancy classification: RES13D	Number of heads flowing: 2
Commodity classification: _____	System Type: Wet
Maximum storage height: _____	Maximum velocity: 8.85 f/s
Storage arrangement: _____	

Flow from In-Rack sprinklers: 0 gpm	Pressure Required at Source: 41.8 psi
Flow from Overhead sprinklers: 26.2 gpm	Pressure Available at Source: 51 psi
Flow from Inside Hoses: 0 gpm	Surplus Pressure at Source: 9.2 psi
Flow from Outside Hoses: 0 gpm	
Other fixed flows: 0 gpm	
Total flow in system piping: 26.2 gpm	
Additional flow at/beyond source: 5 gpm	
Total of all flows: 31.2 gpm	

NYC
Department of
Environmental
Protection

Emily Lloyd
Commissioner

James J. Roberts
Deputy Commissioner
Bureau of Water &
Street Operations

59-17 Junction Blvd.
Flushing, NY 11373

NYC Dept. of Housing Preservation & Development
100 Gold Street, 9th Fl.
New York, New York 10038
Attn: Tiffany Pryce
Deputy Director, Build it Back Rebuild Program

To Whom It May Concern:

The hydrant flow test you requested at Beach 67th Street between Rockaway Freeway and Beach Channel Drive, Queens was performed on 7/17/2015 at 11:05 AM with the following results:

The static pressure taken on an 8 inch water main which is fed from two directions on the west side of Beach 67th Street 2nd hydrant north of Rockaway Freeway was 51 pounds per square inch. The residual pressure at this point was 49 pounds per square inch when 500 gallons of water per minute were flowing from the west side of Beach 67th Street 1st hydrant north of Rockaway Freeway.

This Department cannot guarantee that this pressure will be maintained in the future because a change may be needed in conformity with good engineering practices.

If you have any questions regarding engineering, and application status, please call (718) 595-3958.

Very truly yours,
Jose A. Cortes, P.E.
Jose A. Cortes, P.E.
Water Distribution Engineer
City Wide Hydraulic Testing Unit

File: FT2015-5036-416532
All hydrant flow test requests are to be addressed to: NYCDEP-BWSO/59-17 Junction Blvd., 1275 Fl., Flushing, NY 11375-5108, Attn: Citywide Hydraulic Flow Test Unit.
Enclose payment for \$500 payable to NYC Water Board for each test. Indicate the test street, cross streets and borough for each test. All requests are to be made by US or overnight mail, no hand deliveries accepted.

	LEGEND	STATUS	PURPOSE
A	1 1/2" COMBINED DOMESTIC & FIRE SPRINKLER SERVICE		
B	1 1/2" OS&Y VALVE	NEW	HOUSE CONTROL
C	1 1/2" SPRINKLER/DOM SUPPLY LINE - LETTERED EVERY 5' "FEED TO BACKFLOW PREVENTER - DO NOT TAP OR	NEW	SUPPLY
D	1 1/2" OS&Y VALVE	NEW	MICV
E	1 1/2" NYC APPROVED SINGLE JET METER	NEW	METER
F	1 1/2" AMES LF2000B DCV		DCV
G	1 1/2" TEE WITH NIPPLE & CAP	NEW	TEST TEE
H	1 1/2" OS&Y VALVE	NEW	MOCV
I	1 1/2" X 1 1/2 X 1 TEE FOR DOMESTIC	NEW	DOM SUPPLY
J	1 1/2" NYC APPROVED SOFT SEAT SINGLE CHECK VALVE		CHECK
K	SPRINKLER DRAIN CONNECTION	NEW	SPRINKLER DRAIN
L	FLOW SWITCH - NOTE 1	NEW	
M	1" GATE VALVE	NEW	DOMESTIC
N	ASCO SOLENOID VALVE 8210-G14 "NORMALLY OPEN" WIRED TO FLOW SWITCH BY LICENSED ELECTRICIAN TO SHUT OFF DOMESTIC DURING SPRINKLER OPERATION	NEW	

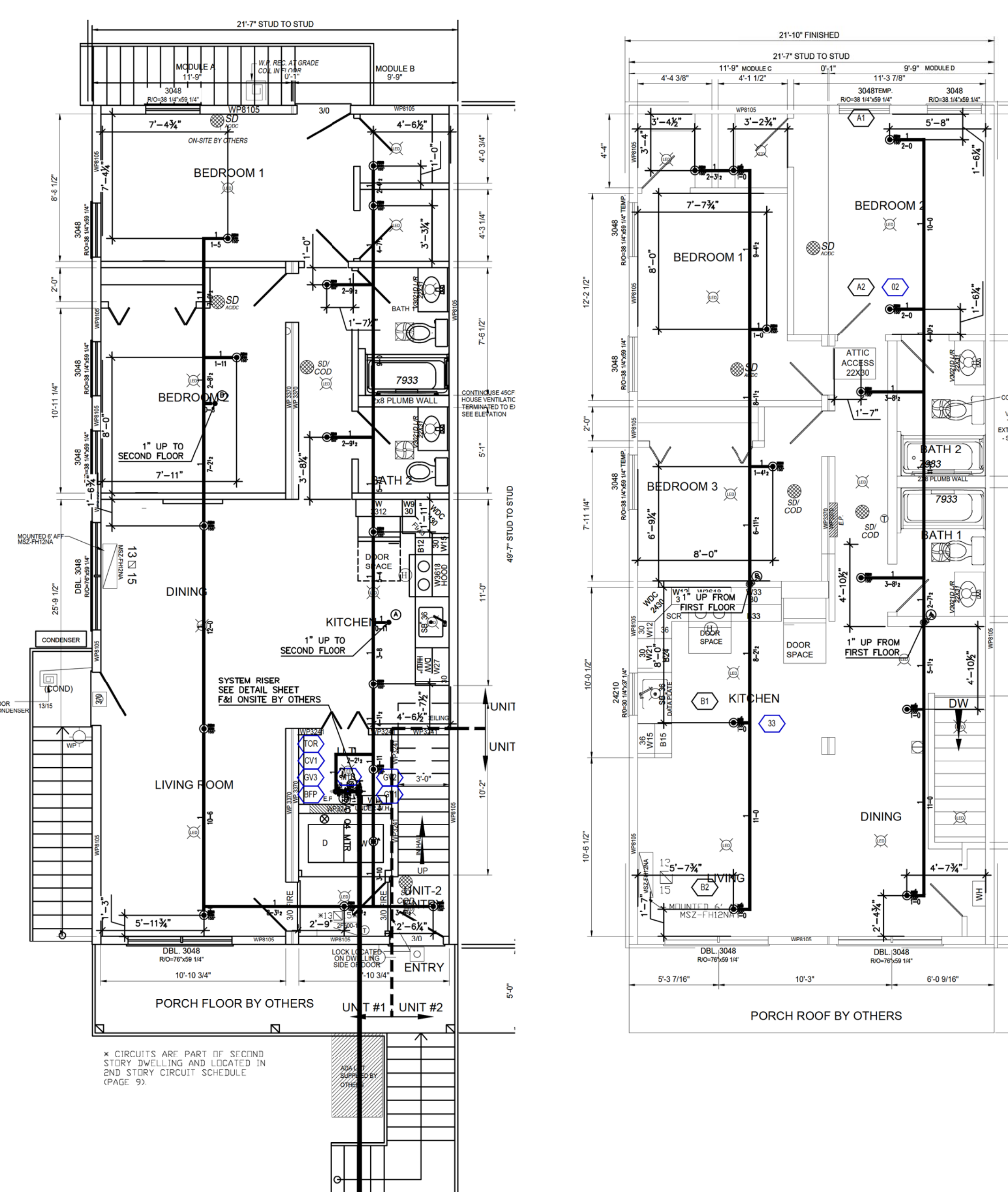
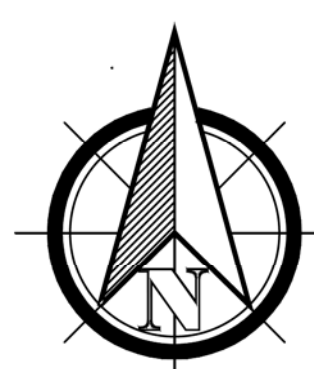
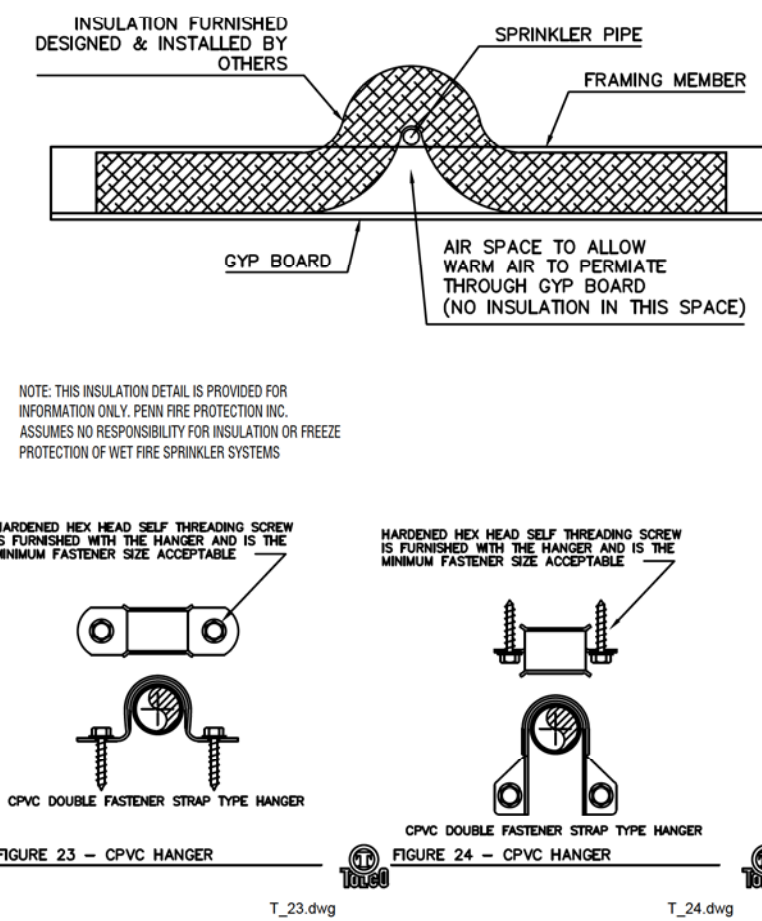
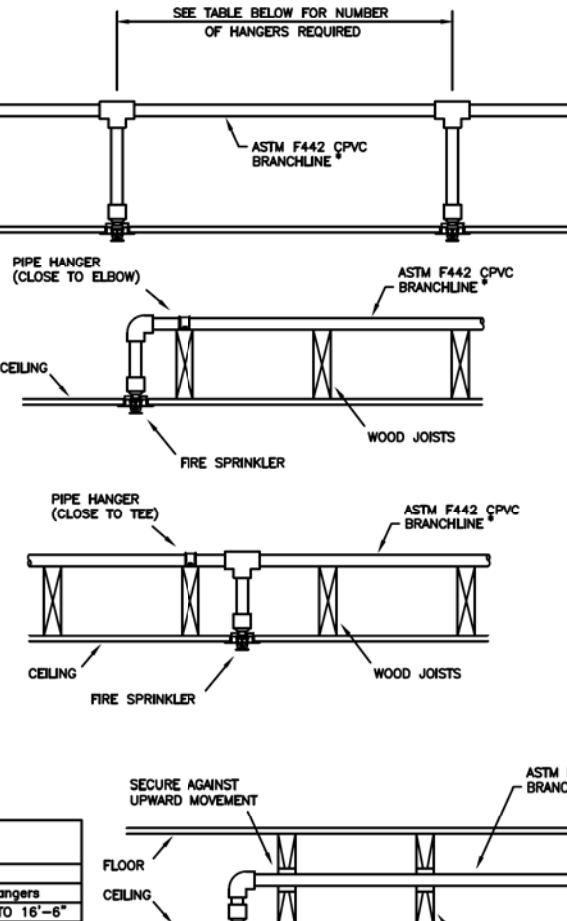
BLAZEMASTER PIPE DIMENSIONS FOR 1/2" (NOM. P442) INCHES (MILLIMETERS)				
NOMINAL SIZE	AVERAGE ID	AVERAGE OD	POUNDS/FT.	WGT./M.
3/4"	(20.0)	1.000	(25.4)	25.4
1"	(25.0)	1.315	(33.4)	1.101
1 1/4"	(38.0)	1.660	(42.3)	1.394
1 3/4"	(44.0)	1.960	(49.3)	1.568
2"	(50.0)	2.275	(57.3)	2.001
2 1/2"	(63.0)	2.875	(73.0)	2.423
3"	(76.0)	3.500	(88.9)	2.951

BLAZEMASTER PIPE SIZES FOR 1/2" (NOM. P442) HANGER SPACING				
NOMINAL SIZE	MAX SPACING	MAX SPACING	MAX SPACING	MAX SPACING
3/4"	(20.0)	6.0	(1.5)	
1"	(25.0)	8.0	(2.0)	
1 1/4"	(38.0)	10.0	(2.5)	
1 3/4"	(44.0)	12.0	(3.0)	
2"	(50.0)	14.0	(3.5)	
2 1/2"	(63.0)	16.0	(4.0)	
3"	(76.0)	18.0	(4.5)	

TABLE 1 MAXIMUM SUPPORT SPACING DISTANCE BASE LINE SPRINKLER HEAD DROP ELBOW			
PIPE SIZE	INCHES	SYSTEM PRESSURE	MAX SPACING
3/4"	12"	< 100 psi	> 100 psi
1"	12"	< 100 psi	> 100 psi
1 1/4"	12"	< 100 psi	> 100 psi
1 3/4"	12"	< 100 psi	> 100 psi
2"	12"	< 100 psi	> 100 psi
2 1/2"	12"	< 100 psi	> 100 psi
3"	12"	< 100 psi	> 100 psi

TABLE 2 MAXIMUM SUPPORT SPACING DISTANCE BASE LINE SPRINKLER HEAD DROP TEE			
PIPE SIZE	INCHES	SYSTEM PRESSURE	MAX SPACING
3/4"	12"	< 100 psi	> 100 psi
1"	12"	< 100 psi	> 100 psi
1 1/4"	12"	< 100 psi	> 100 psi
1 3/4"	12"	< 100 psi	> 100 psi
2"	12"	< 100 psi	> 100 psi
2 1/2"	12"	< 100 psi	> 100 psi
3"	12"	< 100 psi	> 100 psi

MINIMUM ALLOWABLE HANGERS PER LENGTH OF PIPE			
PIPE SIZE	INCHES	MAX HANGER	MAX HANGER
3/4"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
1"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
1 1/4"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
1 3/4"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
2"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
2 1/2"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"
3"	0'-0" TO 5'-0"	0'-0" TO 11'-0"	11'-0" TO 15'-0"



THESE PLANS AND ASSOCIATED CALCULATIONS ARE ISSUED FOR THE MANUFACTURED (MODULAR) PORTION OF THE CONSTRUCTION ONLY. ALL REFERENCES TO SITE BUILT INSTALLATION, ARE TO BE DESIGNED, FURNISHED, AND INSTALLED ON-SITE BY THE ONSITE SPRINKLER CONTRACTOR.

NOTE: ALL PIPING TO BE INSTALLED WITHIN THE HEATED ENVELOPE OF THE HOME. ALL FREEZE PROTECTION IS BY OTHERS.

ALL FREEZE PROTECTION OF SPRINKLER PIPING IS THE RESPONSIBILITY OF THE HOME MANUFACTURER AND/OR THE BUILDER. PENN FIRE PROTECTION INC IS NOT RESPONSIBLE FOR THE DESIGN AND/OR INSTALLATION OF ANY AND ALL FREEZE PROTECTION. IT IS YOUR RESPONSIBILITY TO MAINTAIN SUFFICIENT HEAT THROUGHOUT THE ENTIRE WET SPRINKLER SYSTEM.

THESE PLANS ARE ISSUED FOR APPROVAL ONLY, AND CONVEY THE GENERAL DESIGN CONCEPT. THERE MAY BE CHANGES TO THESE PLANS, THAT OCCUR DUE TO COORDINATION OF TRADES, CONSTRUCTION METHODS, OR CHANGES TO COMPONENTS, OR METHODS OF CONSTRUCTION.

MANUFACTURER NOTE:
DO NOT ALLOW ANY COMPOUNDS, SPRAYS, FOAMS, ELECTRICAL WIRES, ETC., COME INTO CONTACT WITH OR BE APPLIED TO ANY BLAZEMASTER SPRINKLER PIPE OR FITTINGS, UNLESS THE COMPOUND IS SPECIFICALLY BRANDED WITH THE FBC SYSTEM COMPATIBLE LOGO OR ARE LISTED ON THE FBC™ SYSTEM COMPATIBLE PRODUCT FINDER AT <https://www.lubrizol.com/CPVC/BlazeMaster/>



KURT A STENBERG, P.E.



KURT A STENBERG, P.E.
2 COOKE ST.
PROVIDENCE, RI 02906
NY LIC.#076737

SPACE RESERVED FOR THE NEW YORK STATE STAMP OF APPROVAL

PFS
Approval Limited to Factory-Built Portion Only
State: New York
Signature: Penn Fire
Title: Staff Plan Reviewer
Date: 06/15/2018

IT IS A VIOLATION OF ARTICLE 145 OF THE NEW YORK EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECT SUPERVISION OF A LICENSED ENGINEER TO ALTER THE DRAWINGS IN ANY WAY. IF A DRAWING BEARING THE SEAL OF AN ENGINEER IS ALTERED THE ALTERING ENGINEER SHALL AFFIX HIS SEAL TO THE DRAWING WITH A NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE, THE DATE OF SUCH ALTERATION, AND SPECIFIC DESCRIPTION OF THE ALTERATION

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IN LOCALITIES SUBJECT TO FREEZING CONDITIONS IT SHALL BE THE OWNERS RESPONSIBILITY TO PROVIDE ADEQUATE HEAT THROUGHOUT THE WET SYSTEM, AND IN ENCLOSURES HOUSING DRY PIPE, PREACTION, DELUGE VALVES, AND ALL VALVE CONTROLLING WATER SUPPLIES TO SPRINKLER SYSTEMS

SPRINKLER SYMBOLS									
SYMBOL	QUANTITY	NAME	FINISH	TEMP °F	K-FACTOR	THREAD SIZE	ORIFICE	MANUFACTURER	MODEL
	25	PENDENT	WHITE	155	4.9	1/2	3/8	VIKING	FREEDOM
	1	PENDENT	WHITE	175	4.9	1/2	3/8	VIKING	FREEDOM

HYDRAULIC DATA									
DESIGN AREA #	HAZARD CLASS. AREA	DENSITY GPM/FT ²	DESIGN AREA FT ²	SYSTEM TYPE	INSIDE HOSE	OUTSIDE HOSE	# OF FLOWING	TOTAL DEMAND	TOTAL PSI
1	RES13D	0.05	512 ft ²	Wet	0 gpm	0 gpm	2	26.2 gpm	37 psi
2	RES13D	0.05	512 ft ²	Wet	0 gpm	0 gpm	2	26.2 gpm	41.8 psi
3	----	----	----	----	----	----	----	----	----
4	----	----	----	----	----	----	----	----	----
5	----	----	----	----	----	----	----	----	----

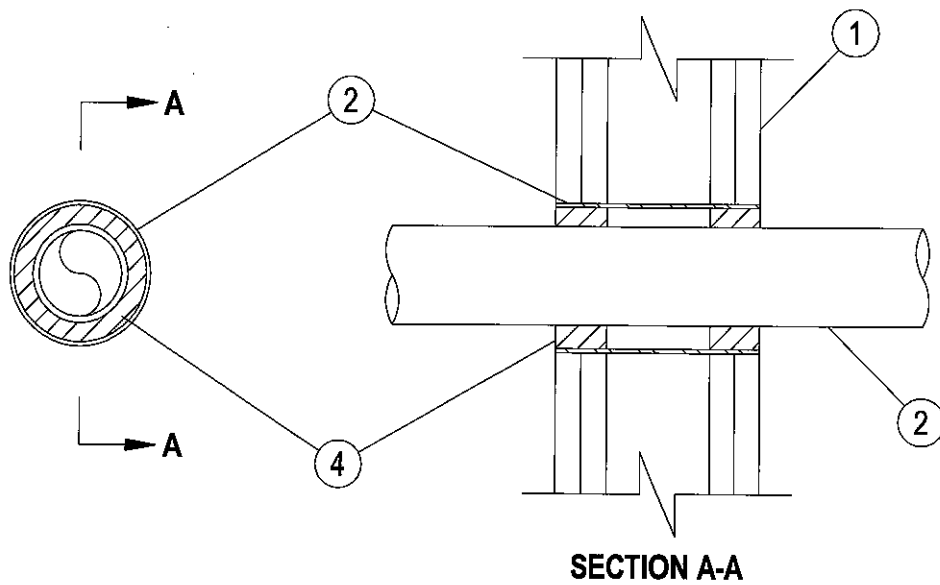
CONTRACT WITH:
MODULAR STEEL SYSTEMS INC
11 EDWARDS DR
BLOOMSBURG, PA 17815

FLOW TEST INFORMATION:
DATE OF TEST: 07/17/2015
STATIC PRESSURE: 51 PSI
RESIDUAL PRESSURE: 49 PSI
FLOW: 500 GPM
LOCATION OF TEST: BEACH 67
TEST BY: NYC

SCALE:		PENN FIRE PROTECTION, INC.	
AS NOTED		1768 ROUTE 522 - SELINGSGROVE, PA 17870	
JOB NUMBER: 18-320C		PHONE: 570-374-4508 FAX 570-374-5087	
DATE: 5/23/18		EMAIL: ADAM@PENNFIRE.COM	
REV1 - 04/19/2018		MOD STEEL - APP014043 - WITTY	
DRAWN BY: A HEIMBACH		315 BEACH 67	
PLOT DATE: 23-May-18		QUEENS, NY 11692	
TOTAL SPRINKLERS THIS SHEET: 26		DWG NO: FP-001.00	

SEE ATTACHED FIRE ASSEMBLY DETAILS FOR
SPECIFIC REQUIREMENTS, WHEN CONFLICTS ARISE
TESTED ASSEMBLY DETAIL SHALL GOVERN





1. Wall Assembly —The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs —Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
 B. Gypsum Board* —5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 3-1/2 in.

2. Metallic Sleeve Optional —Nom 3-1/2 in. (or smaller) cylindrical sleeve fabricated from min 0.016 in. thick (28 gauge) galv sheet steel and having a min 1-1/4 in. lap along longitudinal seam. Length of sleeve to be installed flush with wall surfaces.

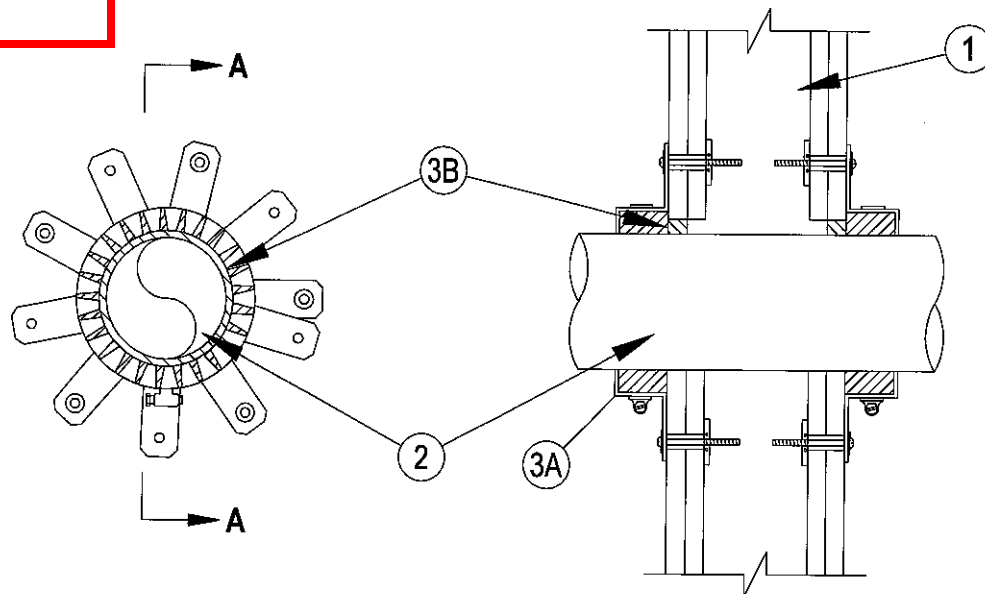
3. Through Penetrants —One nonmetallic pipe installed within the firestop system. Pipe may be installed at an angle not greater than 45 degrees from perpendicular. Pipe to be rigidly supported on both sides of wall assembly. The space between pipe and periphery of opening shall be min 1/4 in. to max 11/16 in. The following types and sizes of nonmetallic pipes may be used:

A. Polyvinyl Chloride (PVC) Pipe —Nom 2 in. diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 B. Chlorinated Polyvinyl Chloride (CPVC) Pipe —Nom 2 in. diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.

4. Fill, Void or Cavity Materials* —Sealant —For 1 hr F Rating, min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. For 2 hr F Rating, min 1-1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC —FS-ONE Sealant

*Bearing the UL Classification Mark



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

- A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
- B. Gypsum Board* — The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 5 in.

The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through-Penetrant — One nonmetallic pipe installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min of 0 in. (point contact) to a max 1/2 in. Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used.

- A. Polyvinyl Chloride (PVC) Pipe — Nom 4 in. diam (or smaller) solid or cellular core Schedule 40 (or heavier) polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
- B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 4 in. diam (or smaller) SDR 13.5 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping system.

3. Firestop System — The firestop system shall consist of the following:

- A. Steel Collar — Collar fabricated from coils of precut min 0.017 in. thick (No. 28 MSG) galv steel available from the sealant manufacturer. Collar shall be nom 1-3/4 in. deep with 1 in. wide by 2 in. long anchors tabs on 2 in. centers for securement to wall assembly. The anchor tabs shall be bent 90 degree outward for securement to the wall assembly. The opposite side incorporates retainer tabs, 1/2 in. wide by 3/16 in. long, prebent toward the pipe surface. Collar shall be wrapped around pipe maintaining a 1 in. distance between pipe and collar, and overlapping min 2 in at seam. Steel collar is slid along the pipe until it butts the surface of the wall. The collar shall be attached to the gypsum board with 1/4 in. toggler bolts on every other tab. After sealant (Item 3B) is installed, the collar shall be compressed around the pipe using a 1/2 in wide by 0.028 in. thick stainless steel band clamp fastened at the collar mid-height. Collars are installed on each side of wall.
- B. Fill, Void or Cavity Material* — Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall. Additionally, the steel collars shall be completely filled with sealant, maintaining a 1 in. space between collar and pipe.

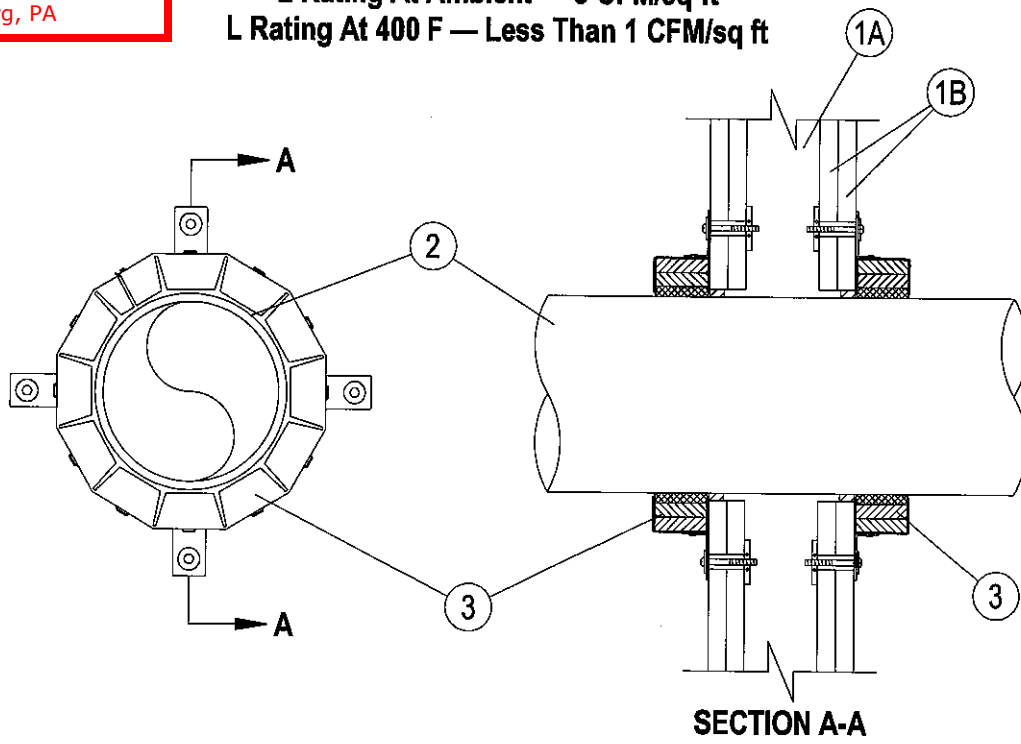
HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC — FS-ONE Sealant

*Bearing the UL Classification Mark

System No. W-L-2078

F Ratings — 1 and 2 Hr (See Item 1)
 T Ratings — 0, 1 and 2 Hr (See Items 2 and 3)
 L Rating At Ambient — 3 CFM/sq ft
 L Rating At 400 F — Less Than 1 CFM/sq ft

WL 2078



1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:
 - A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced max 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
 - B. Gypsum Board* — Nom 5/8 in. thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 11-1/2 in. The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrants — One nonmetallic pipe, conduit or tubing to be installed within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes may be used:
 - A. Polyvinyl Chloride (PVC) Pipe — Nom 10 in. diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
 - B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 10 in. diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
 - C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
 - E. Polyvinylidene Fluoride (PVDF) Pipe — Nom 4 in. diam (or smaller) PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
- When max 6 in. diam pipe is used, T Rating is equal to the hourly fire rating of the wall. When nom 8 in. or 10 in. diam pipe is used, T Rating is 0 hr.
3. Firestop Device* — Firestop Collar — Firestop collar shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to both sides of the wall using the anchor hooks provided with the collar. (Minimum two anchor hooks for 1-1/2 and 2 in. diam pipes, three anchor hooks for 3 and 4 in. diam pipes, four anchor hooks for 6 in. diam pipes, ten anchor hooks for 8 in. diam pipes and twelve anchor hooks for 10 in. diam pipes). The anchor hooks are to be secured to the surface of wall with 3/16 in. diam by 2-1/2 in. long steel toggle bolts along with washers. As an alternate for pipe sizes of nom 4 in. diam or less, min No. 10 by 1-1/2 in. long drywall or laminate screws with min 3/4 in. steel washers may be used. When the drywall or laminate screw is used, T Rating shall not exceed 1 hr.
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50/1.5"N, CP 643 63/2"N, CP 643 90/3"N, CP 643 110/4"N, CP 643 160/6"N, CP 644 200/8" and CP 644 250/10" Firestop Collars
4. Fill, Void or Cavity Material* — Sealant — (Not Shown) — Min 1/2 in. thickness of sealant applied within the annular space for nom 8 in. and 10 in. diam pipes, flush with each side of wall. Sealant in annular space is optional for max 6 in. diam pipes. A min 1/4 in. thickness of sealant is required within the annular space, flush with each side of wall, to attain the L Ratings for max 6 in. diam pipes.
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS—One Sealant

*Bearing the UL Classification Mark

HILTI
 Hilti Firestop Systems

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 November 29, 2005





System No. W-L-2474

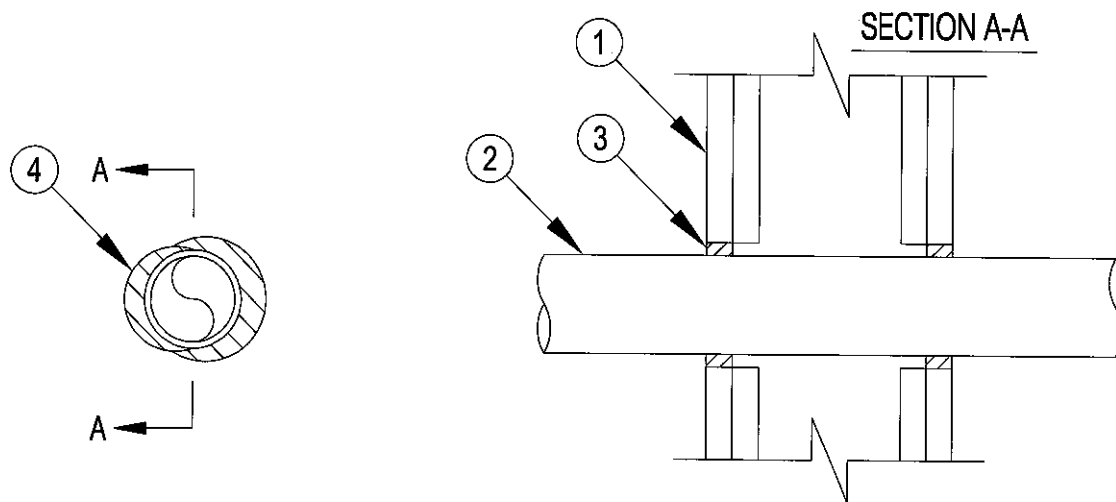
F Ratings - 1 and 2 Hr (See Item 1)

T Rating - 0 Hr

L Rating At Ambient - Less Than 1 CFM/Sq Ft

L Rating at 400 F - 4 CFM/Sq Ft

WL 2474



1. Wall Assembly —The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:

A. Studs —Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.

B. Gypsum Board* —Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 3 in. (76 mm).

The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrants —One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and the periphery of the opening shall be min 0 in. (point contact) to a max 1/2 in. (13 mm). The following types and sizes of nonmetallic pipes may be used:

A. Polyvinyl Chloride (PVC) Pipe —Nom 2 in. (51 mm) diam (or smaller) cellular or solid core Schedule 40 (or heavier) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

B. Chlorinated Polyvinyl Chloride (CPVC) Pipe —Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

C. Crosslinked Polyethylene (PEX) Tubing —Nom 2 in. (51 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.

D. Rigid Nonmetallic Conduit (RNC)+ —Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).

3. Fill, Void or Cavity Material* — Sealant —Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location, a min 1/2 in. (13 mm) diam bead of fill material shall be applied to the wall/penetrant interface on both surfaces of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF

HILTI INC —FS—ONE Sealant

*Bearing the UL Classification Mark

+ Bearing the UL Listing Mark



Hilti Firestop Systems

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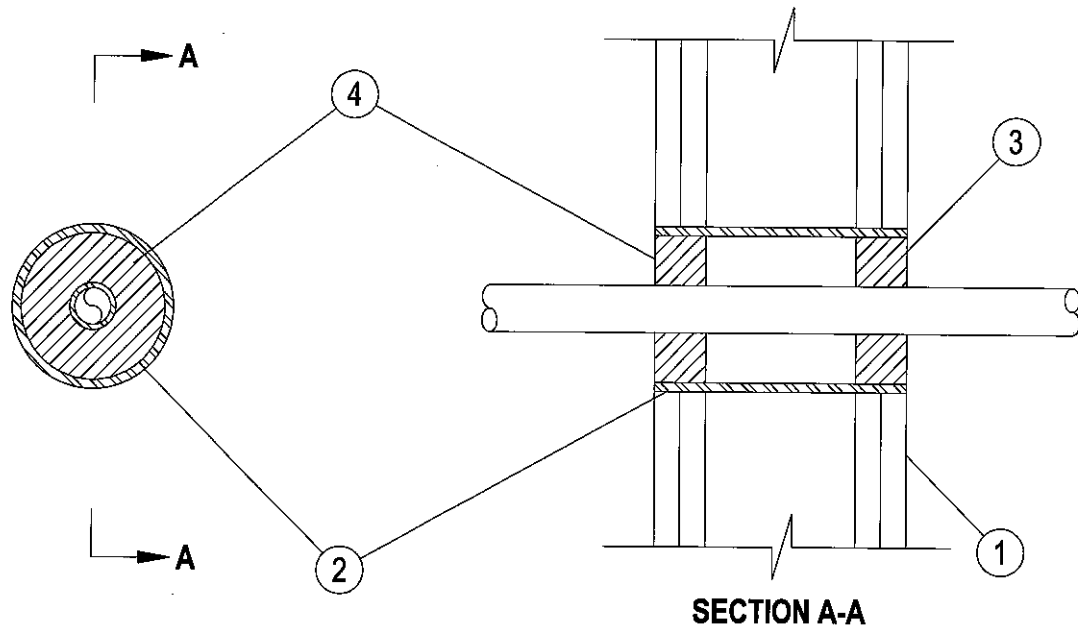
May 22, 2006



System No. W-L-2186

F Ratings -- 1 and 2 Hr (See Items 1 and 4)
 T Ratings -- 1/2 and 1 Hr (See Items 3 and 4)
 L Rating at Ambient - Less Than 1 CFM/sq ft
 L Rating at 400 F - 2 CFM/sq ft

WL 2186



1. Wall Assembly -- The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs -- Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm). Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.

B. Gypsum Board* -- For 1 hr assembly, one layer of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. For 2 hr assembly, two layers of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. Max diam of opening is 3 in. (76 mm).

The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. Steel Sleeve -- Max 3 in. (76 mm) diam Schedule 40 (or heavier) steel pipe sleeve friction-fit into circular opening core drilled through wall. Length of steel sleeve to be equal to thickness of wall.

3. Through Penetrant -- One nom 1 in. (25 mm) diam (or smaller) SDR 9 cross-linked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. The tubing installed concentrically or eccentrically within the steel sleeve. The annular space between the tube and the steel sleeve shall be min 1/2 in. (13 mm) to max 1-3/8 in. (35 mm). Tube to be rigidly supported on both sides of wall assembly.

The hourly T Rating is 1/2 Hr and 1 Hr for 1 Hr and 2 Hr fire rated wall assemblies, respectively.

4. Fill, Void or Cavity Material--Sealant -- Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 and 2 hr rated walls, respectively. When a steel sleeve (Item 2) is provided for assemblies with L Ratings, sealant shall be applied around periphery of opening to cover the exposed ends of the sleeve and to lap min 1/4 in. (6 mm) onto gypsum board on each side of wall.

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 HILTI INC -- FS-ONE Sealant

*Bearing the UL Classification Mark

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 May 22, 2006



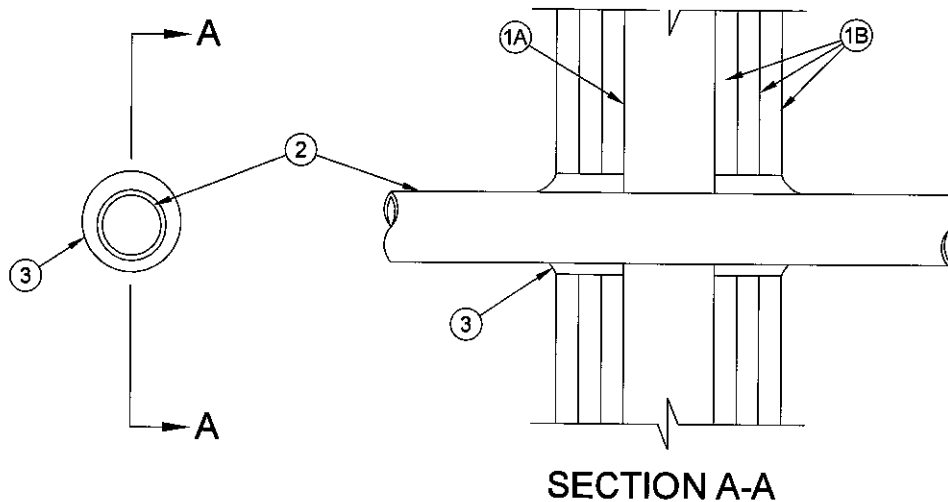
System No. W-L-1156

F Ratings - 1, 2 and 3 Hr (See Item 1)

T Rating - 0 Hr

L Rating at Ambient - Less Than 1 CFM/sq ft

L Rating at 400F - Less Than 1 CFM/sq ft



1. Wall Assembly - The 1, 2 or 3 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
 - A. Studs - Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced 24 in. OC.
 - B. Gypsum Board* - 1/2 or 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Designs in the UL Fire Resistance Directory. Max diam of opening is 1-1/2 in.The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants - One metallic pipe or conduit installed concentrically or eccentrically within the firestop system. The annular space within the firestop system shall be min 1/4 in. to max 1/2 in. Pipe or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipe or conduit may be used:
 - A. Steel Pipe - Nom 3/4 in. diam (or smaller) Schedule 5 (or heavier) steel pipe.
 - B. Conduit - Nom 3/4 in. diam (or smaller) rigid steel conduit, steel electrical metallic tubing (EMT) or flexible steel conduit.
3. Fill, Void or Cavity Materials* - Sealant - Fill material installed to completely fill annular space between pipe or conduit and gypsum wallboard with a min 1/4 in. diam bead of caulk applied to perimeter of pipe or conduit at its egress from both sides of the wall.

SPECIFIED TECHNOLOGIES INC

- SpecSeal 100, 101, 102 or 105 Sealant

*Bearing the UL Classification Marking



Specified Technologies Inc. 200 Evans Way Somerville, NJ 08876

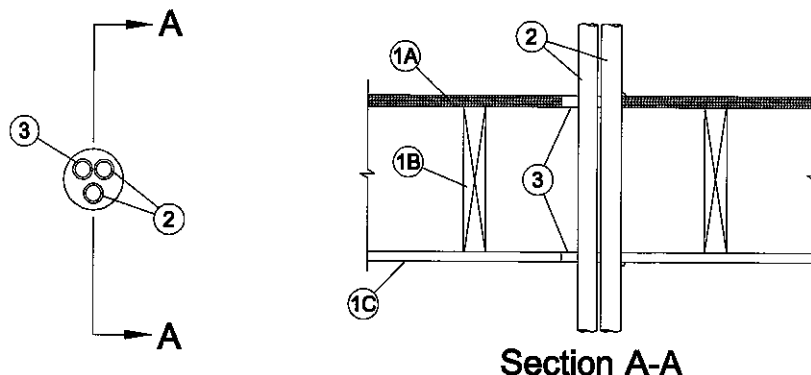
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System No. F-C-2252

F Rating - 1 Hr
T Rating - 1 Hr



Section A-A

1. Floor-Ceiling Assembly - The 1 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Designs in the UL Fire Resistance Directory, as summarized below:
 - A. Flooring System - Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture * as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in.
 - B. Wood Joists - Nom 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members * with bridging as required and with ends firestopped.
 - C. Gypsum Board * - Thickness, type, number of layers and fasteners as required in the individual Floor-Ceiling Design. Max diam of opening is 3 in.
 - 1A. Chase Wall - (Optional, Not Shown) - The through penetrant (Item 2) may be routed through a 1 hr fire rated single, double or staggered wood stud/gypsum board chase wall. Depth of chase wall stud cavity to be min 1/2 in. greater than diameter of opening cut in sole and top plates to accommodate the through penetrant (item 2). The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
 - A. Studs - Nom 2 by 4 in., 2 by 6 in. or double nom 2 by 4 in. lumber studs.
 - B. Sole Plate - Nom 2 by 4 in., 2 by 6 in. or parallel 2 by 4 in. lumber plates, tightly butted. Max diam of opening is 3 in.
 - C. Top Plate - The double top plate shall consist of two nom 2 by 4 in., two nom 2 by 6 in. or two sets of parallel 2 by 4 in. lumber plates, tightly butted. Max diam of opening is 3 in.
 - D. Gypsum Board * - Thickness, type, number of layers and fasteners shall be as specified in the individual Wall and Partition Design.
2. Through Penetrants - One or more nonmetallic pipes, conduits or tubing to be installed either concentrically or eccentrically within the opening. Min space between pipes, conduits or tubes to be 0 in. Annular space between the pipes, conduits or tubing and the periphery of the opening shall be min 0 in. (point contact) to max 1 in. Penetrants to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipe, conduits or tubing may be used:
 - A. Polyvinyl Chloride (PVC) Pipe - Nom 1 in. diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) piping systems.
 - B. Chlorinated Polyvinyl Chloride (CPVC) Pipe - Nom 1 in. diam (or smaller) SDR11 CPVC pipe for use in closed (process or supply) piping systems.
 - C. Rigid Nonmetallic Conduit (RNC)+ - Nom 1 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA 70).
 - D. Cross Linked Polyethylene (PEX) Tubing - Nom 1 in. diam (or smaller) SDR9 PEX tubing for use in closed (process or supply) piping systems.
 - E. Electrical Nonmetallic Tubing (ENT)+ - Nom 1 in. diam (or smaller) PVC tubing installed in accordance with Article 331 of the National Electrical Code (NFPA 70).
3. Fill, Void or Cavity Material * - Sealant - Min 3/4 in. thickness of fill material applied within the annulus, flush with the top surface of the floor or chase wall sole plate. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of gypsum board ceiling or chase wall top plate. Min 1/4 in. diam bead of fill material applied at point contact location on the top surface of floor or sole plate and at the penetrant/ceiling or penetrant/chase wall top plate interface.

Specified Technologies Inc. - SpecSeal LCI Sealant

* Bearing the UL Classification Marking



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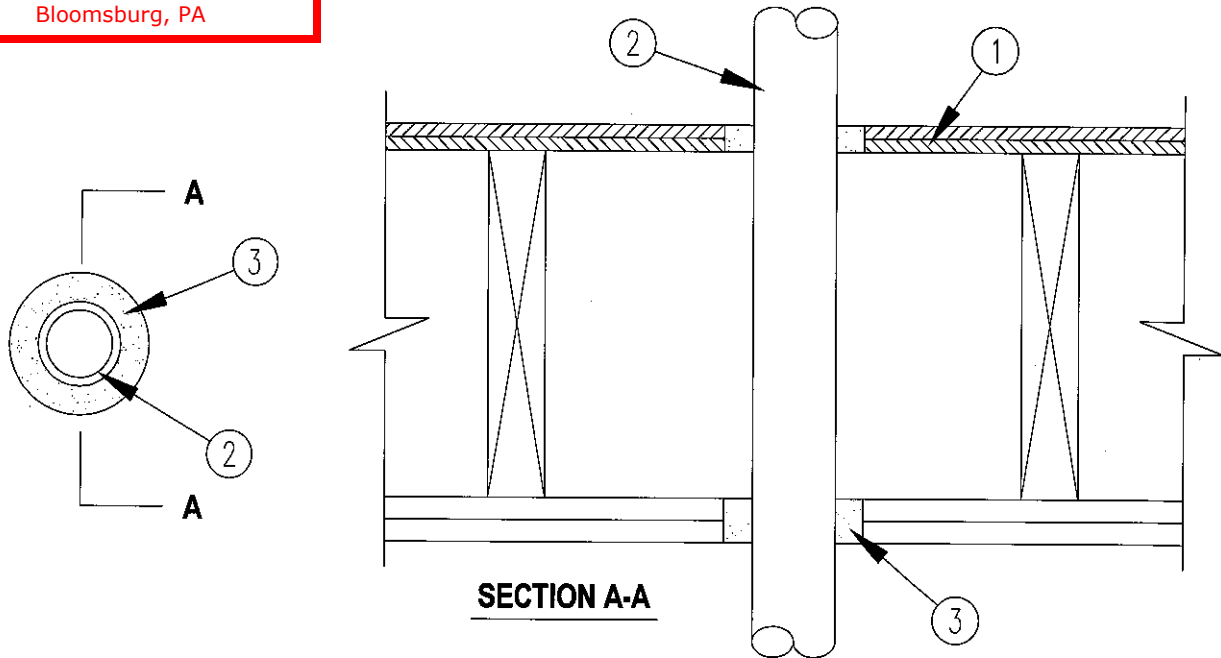


System No. F-C-2160

F Rating - 1 and 2 Hr

T Rating - 1 and 2 Hr

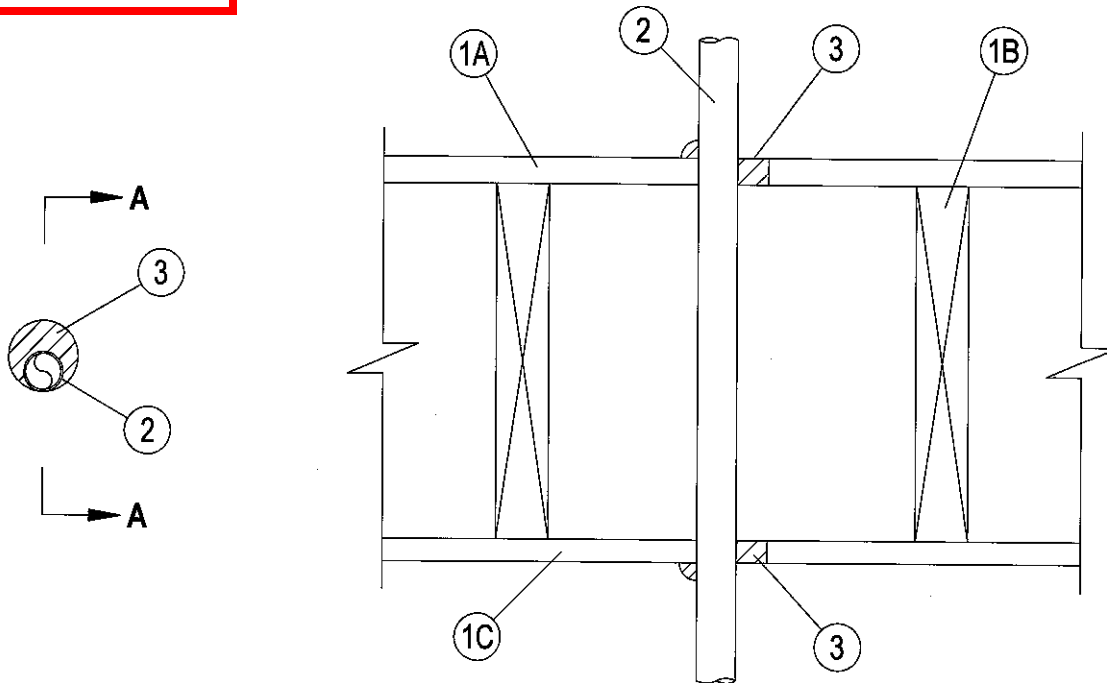
FC 2160



1. Floor-Ceiling Assembly The 1 and 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
 - A. Flooring System Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diameter of opening shall be 4 in.
 - B. Wood Joists* Nom 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
 - C. Furring Channels (Not Shown) Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard (Item 1D). Furring channels spaced max 24 in.
 - D. Gypsum Board* Nom 4 ft wide by 5/8 in. thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw-attached to furring channels. Max diam of ceiling opening is 4 in.
2. Through Penetrants One nonmetallic pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 1/2 in. and max 1-1/8 in. Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
 - A. Polyvinyl Chloride (PVC) Pipe Nom 2 in. diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - B. Chlorinated Polyvinyl Chloride (CPVC) Pipe Nom 2 in. diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
3. Fill, Void or Cavity Materials*—Sealant Fill Material forced into annular space to fill space to max extent possible. Sealant shall be installed flush with both surfaces of floor-ceiling assembly.

HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC — FS-ONE Sealant.

*Bearing the UL Classification Mark

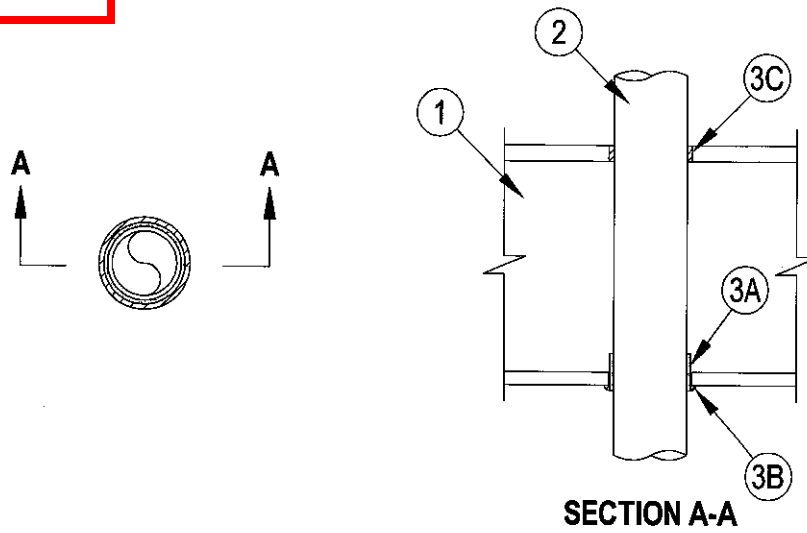


SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Designs in the UL Fire Resistance Directory, as summarized below:
 - A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 2 in. (51mm).
 - B. Wood Joists — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
 - C. Gypsum Board* — Nom 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board secured to joists as specified in the individual Floor-Ceiling Design. Max diam of opening is 2 in. (51 mm).
 2. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space within the firestop system shall be min 0 in. (point contact) to max 7/8 in. (22 mm). Pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:
 - A. Crosslinked Polyethylene (PEX) Tubing — Nom 1 in. (25 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 3. Firestop System — The firestop system shall consist of the following:
 - A. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within annulus, flush with top surface of subfloor. Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with bottom surface of ceiling. At point contact locations, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the penetrant/gypsum board and penetrant/flooring interface.
- HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant
 *Bearing the UL Classification Mark

System No. F-C-2335
F Rating — 1 Hr
T Ratings — 0 and 1/2 Hr (See item 2)

FC 2335



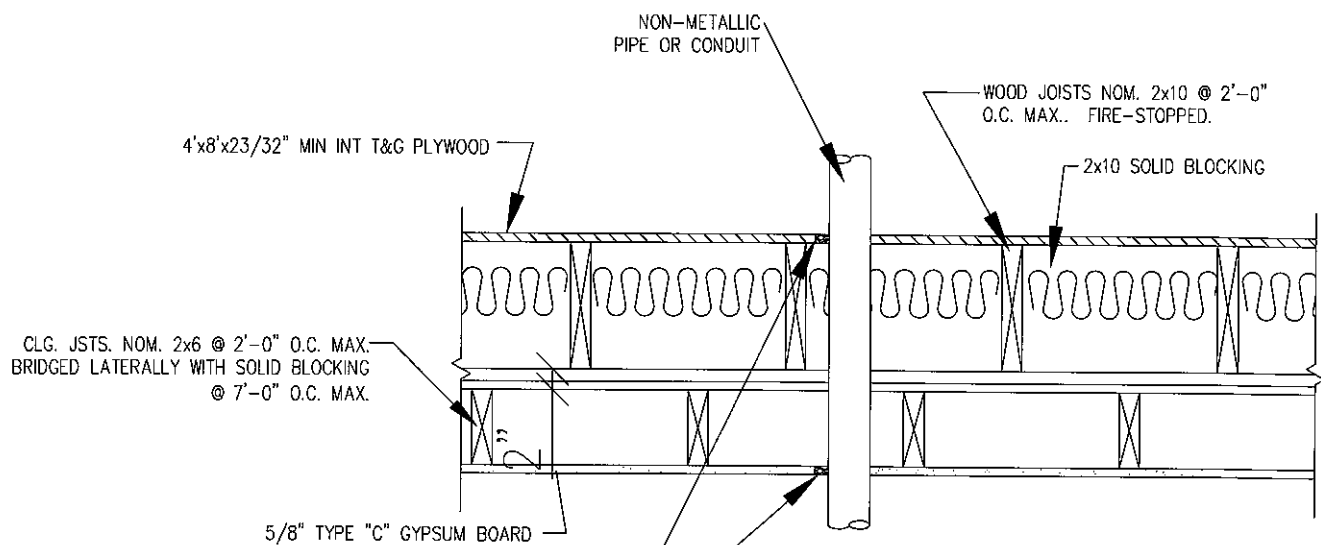
1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
 - A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 4 in. (102 mm).
 - B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
 - C. Gypsum Board* — Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board secured to wood joists or furring channels as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 4 in. (102 mm).
2. Through Penetrants — One non-metallic pipe or conduit to be installed concentrically or eccentrically within the opening. The annular space between the pipe, conduit or tubing and the periphery of opening shall be min 3/16 in. (4.8 mm). to max 5/16 in. (8 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of non-metallic pipes or conduit may be used:
 - A. Polyvinyl Chloride (PVC) Pipe — Nom 3 in. (76 mm) diam (or smaller) Schedule 40 cellular core or solid core PVC pipe for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
 - B. Chlorinated Polyvinyl (CPVC) Pipe — Nom 3 in. (76 mm) diam (or smaller) SDR13.5 CPVC pipe for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
 - C. Rigid Nonmetallic Conduit+ — Nom 3 in. (76 mm) diam (or smaller) PVC conduit installed in accordance with the National Electrical Code (NFPA 70).
 - D. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 3 in. (76 mm) diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

The T Rating is 1/2 Hr for penetrants with a nom diam of 2 in (51 mm) or smaller. The T Rating is 0 Hr for penetrants with a nom diam greater than 2 in. (51 mm).
3. Firestop System — The firestop system shall consist of the following:
 - A. Fill, Void or Cavity Material* — Wrap Strip — One layer of wrap wrapped around pipe with ends tightly butted and held in place with supplied tape. Wrap strip slid into the annular space such that the bottom edge of the wrap strip extends 1/4 in. (6 mm) from the bottom surface of ceiling board.
 HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC — CP 648S — 1.5" (38 mm) US, CP 648S — 2" (51 mm) US, CP 648S — 3" (76 mm).
 - B. Fill, Void or Cavity Material* — Sealant — Min 1/4 in. (6 mm) bead applied around periphery of wrap strip, at the wrap strip gypsum board interface.
 HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC — FS-One Sealant
 - C. Fill, Void or Cavity Material* — Sealant — Min 3/4 in (19 mm) depth applied within the annulus, flush with the top surface of the floor.
 HILTI CONSTRUCTION CHEMICALS, DIV OF
 HILTI INC — FS-One Sealant

*Bearing the UL Classification Mark

+Bearing the UL Listing Mark.

PENETRATIONS THROUGH FLOOR/CEILING ASSEMBLY



SEALANT MIN. 3/4" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF THE FLOOR. MIN 5/8" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTTOM SURFACE OF CEILING. MIN 1/2" DIAMETER DEAD OF FILL MATERIAL APPLIED AT THE PENETRANT/ FLOOR AND PENETRANT/ CEILING INTERFACES AT POINT OF CONTACT LOCATIONS ON BOTH SIDES OF ASSEMBLY. SEALANT TO BE FIRETEMP(TM) CI OR FIRETEMP(TM) CE

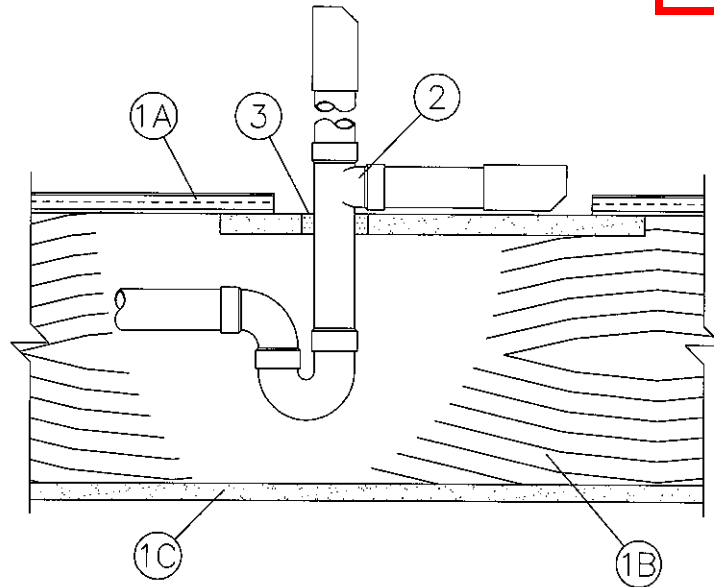
DESIGN NO. F-C-2137
ASSEMBLY RATING 1-HOUR

PFS **APPROVED**
DATE 6/15/18
PFS CORPORATION
Bloomsburg, PA

System No. F-C-2320

F Rating - 1 Hr

T Rating - 1 Hr



1. Floor-Ceiling Assembly – The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:

A. Flooring System – Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Rectangular cutout in flooring to accommodate the bathtub drain piping (Item 2) to be max 8 by 12 in. (203 by 305 mm). Cutout to be patched on underside of subfloor using one layer of min 3/4 in. (19 mm) thick plywood or min 5/8 in. (16 mm) thick gypsum wallboard (Item 1C) sized to lap min 2 in. (51 mm) beyond each edge of rectangular cutout. Diam of opening hole-sawed through patch to accommodate drain piping (Item 2) to be 1 in. (25 mm) larger than outside diam of drain piping and positioned such that drain piping is centered in opening. Patch split into two pieces at opening hole-sawed for bathtub drain piping. Two pieces positioned around drain piping, with cut edges tightly butted, and screw-attached to underside of subfloor with 1-1/4 in. (32 mm) long Type S steel screws spaced max 6 in. (152 mm) OC.

B. Wood Joists* – Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.

C. Gypsum Board* – Nom 4 ft (1.22 m) wide by 5/8 in. (16 mm) thick, attached as described in the individual Floor-Ceiling Design.

2. Drain Piping – Nom 1-1/2 in. (38 mm) diam (or smaller) Schedule 40 cellular or solid core polyvinyl chloride (PVC) or acrylonitrile butadiene styrene (ABS) pipe and drain fittings cemented together and provided with PVC or ABS bathtub waste/overflow fittings. The annular space shall be a min 3/8 in. (10 mm) to max 5/8 in. (16 mm).

3. Fill, Void or Cavity Material* – Sealant – Min 5/8 in. (16 mm) depth of fill material applied within annular space, flush with both surfaces of plywood or gypsum wallboard patch.

SPECIFIED TECHNOLOGIES INC – Type WF300 Caulk

*Bearing the UL Classification Marking



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