22-183102 DFS 01 RS

SPRINKIT
FIRE PROTECTION

9210 SW 25th Ave LOT 11

PORTLAND, OR 97219

HYDRAULIC CALCULATIONS AND SUBMITALS

BY: SprinkIt Fire Protection Inc.
PO 2227 Oregon City, OR 97045
PHONE: 503-272-6650
CCB# 211320

Portland Water Bureau

FROM: wbfireflow@portlandoregon.gov

Fire Service/ Sprinkler Design Flow Availability Estimate

This estimate is intended to assist fire service/ sprinkler system design. This is an estimated flow obtained using a hydraulic model.

SIM taken on 6" main in SW 25th Ave near irrigation serivce.

Simulation ID Number:	**5265**	
Simulation Date:	**1/18/2022**	
Assumed fire service location:	**2401 SW Taylors Ferry Rd**	
Map Number (quartersection):	**3927**	
Pressure Zone:	**BURLINGAME 643 TANK**	
Main size:	**6**	**inch**
Assumed fire service elevation:	**403**	**feet**
Maximum Static Hydraulic Grade Line:	**643**	**feet**
Maximum Static Pressure:	**104**	**psi**
STATIC PRESSURE to use for design: (80% of the nominal max static pressure)	**83**	**psi**
ESTIMATED FLOW:	**1300**	**gpm**
ESTIMATED RESIDUAL PRESSURE: (in the system, with the simulated flow)	**46**	**psi**

NOTE: The Water Bureau reserves the right to make future operational changes that may affect flow available at this location. The reported flow is available in the main before any service pipe, backflow prevention device, or meter. This is not an indication of fire flow available at the nearest hydrant.

CALCULATION SUMMARY

Project Name : HAB. FOR HUM.

Project Location: 2401 SW TAYLORS FERR RD UNIT 11

Drawing No. :

City: PORLTAND, OR 97219

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft²)	(gpm)	(psi)	(gpm/ft²)	(psi)	(gpm)	#	(gpm)	(psi)
1	Demand (HW)	RESIDENTIAL	144	13	Required 28.6	0.178	7	13	1	0	54.4
2	Demand (HW)	RESIDENTIAL	383	27.2	Required 35.6	0.068	7	13	2	0	47.4

HYDRAULIC CALCULATIONS
for

Job Information

Project Name : HAB. FOR HUM.

Contract No. :

City: PORLTAND, OR 97219

Project Location: 2401 SW TAYLORS FERR RD UNIT 11

Date: 7/4/2022

Contractor Information

Name of Contractor: SPRINKIT FIRE INC

Address: PO BOX 2227

City: OREGON CITY, OR 97045

Phone Number: 503-272-6650

E-mail:

Name of Designer: BHA

Authority Having Jurisdiction: CITY OF PORTLAND

Design

Remote Area Name	1
Remote Area Location	BEDROOM 3 2ND FLOOR
Occupancy Classification	RESIDENTIAL
Density (gpm/ft²)	0.178
Area of Application (ft²)	144
Coverage per Sprinkler (ft²)	73
Number of Calculated Sprinklers	1
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	0
Total Water Required (incl. Hose Streams) (gpm)	13
Required Pressure at Source (psi)	28.6
Type of System	Wet
Volume - Entire System (gal)	19.4 gal

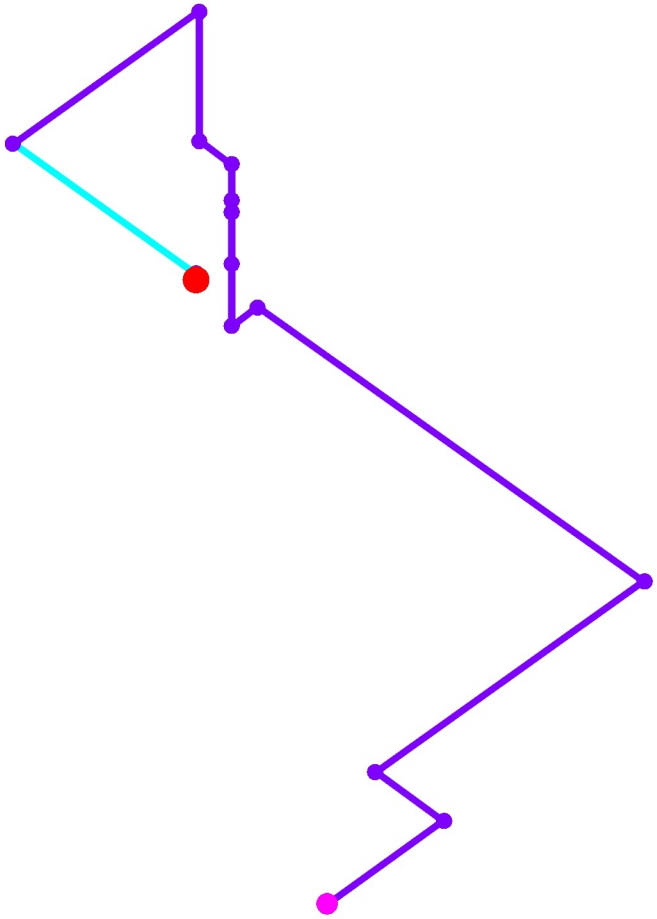
Water Supply Information

Date	1/18/22
Location	2401 SW TAYLORS FERRY RD
Source	W1

Notes

Node Labels: Off
Pipe Labels: Off

Diagram for Design Area : 1
(Optimized Hydraulic Simplified)



Hydraulic Analysis for : 1

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	83
1300	46

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	83	46	1300	83	13	28.6

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)	

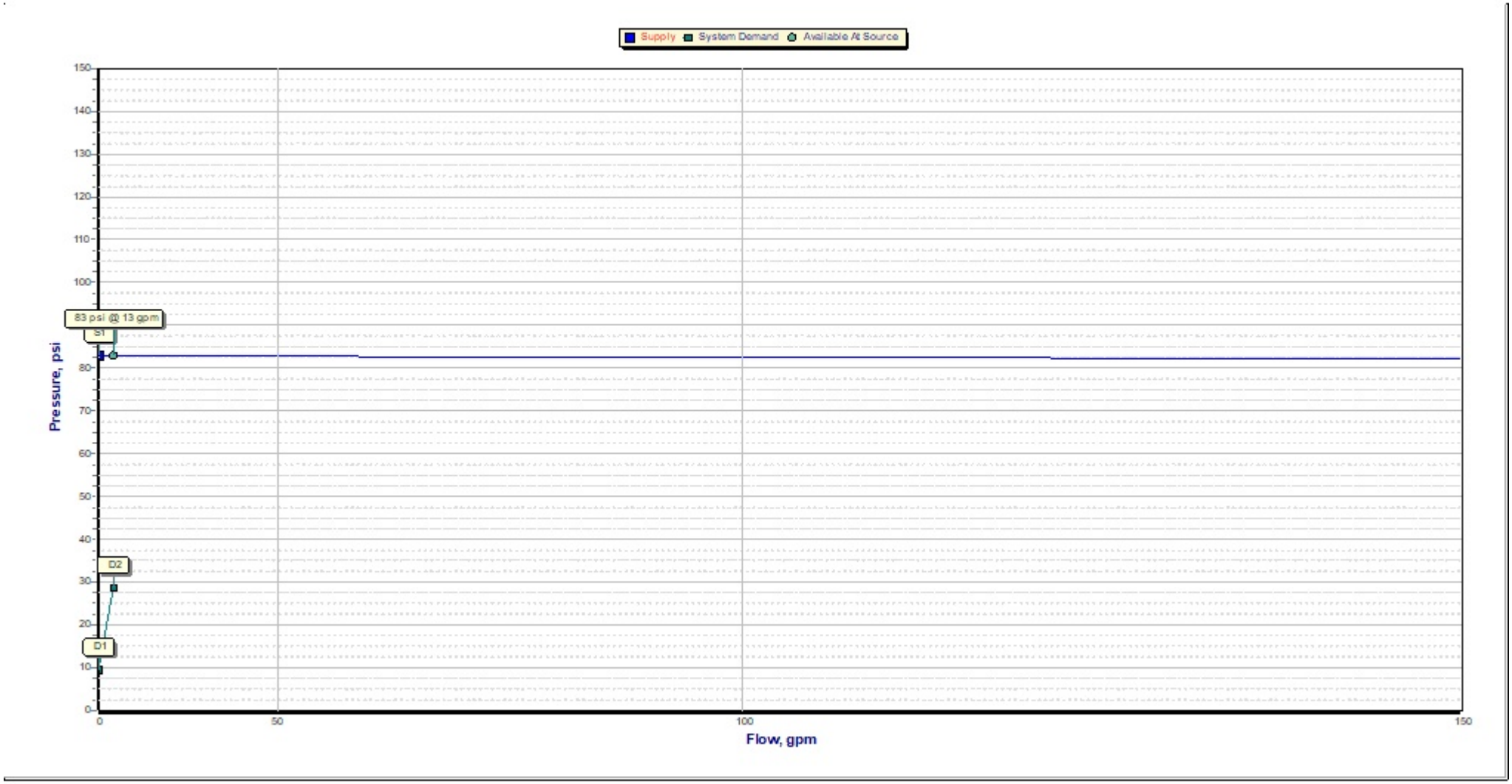
Sprinklers

Ovehead Sprinkler Flow (gpm)	13
InRack Sprinkler Flow (gpm)	0
Other (custom defined) Sprinkler Flow (gpm)	0
Total Sprinkler Flow (gpm)	13

Other

Required Margin of Safety (psi)	0
W1 - Pressure (psi)	28.6
W1 - Flow (gpm)	13
Demand w/o System Pump(s)	N/A

Hydraulic Analysis for : 1



Hydraulic Analysis for : 1

Graph Labels

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	83
S2	Supply point #2 - Residual	1300	46
D1	Elevation Pressure	0	9.5
D2	System Demand	13	28.6

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	83	26.9	54.4	13

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S0	Overhead Sprinkler	73	4.9	0.05	3.7	7	0.178	13	7

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft			gpm gpm	ft² gpm/ft²	psi psi	psi gpm
19-I 5.78	Node NODE				23.4 -3.8	
19-O 6.71	Node NODE				18.5 -4.2	
20 1.79	Node NODE				25.5 -2.1	
S0 19	Overhead Sprinkler HEAD	5 Open	13 9.3	73 0.178	7 -9.5	7 3.7
W1 -3	Supply SUPPLY		-13		28.6 0	

Pipe Data

Path # Pipe Ref.	Type Hgroup	Schedule Size	HWC Rough.	Fittings Eq.Len.	Length Total Len.	Flow Velocity	Fr.Resist. Loss Frict.	Vel.Pres. Loss Elev.	Start End
			in	ft	ft ft	gpm ft/s	psi/ft psi	psi psi	
1 18	Cmain PIPE	CPVC .75	150 0.000084	3(BM.Tee-Run);4(BM.Tee-Br);1(BM .90); 22	44.38 66.38	13 6.93	0.0935 6.2	0.3 5.3	19-O S0
1 54	BFP BFP	Ames2000B .75	0 0		0.93	13 0	4.7818 4.4	0 0.4	19-I 19-O
1 19	Cmain PIPE	CPVC .75	150 0.000084		3.99	13 6.93	0.0935 0.4	0.3 1.7	20 19-I
1 25	Cmain PIPE	CPVC 1.5	150 0.000084	5(BM.90); 45	171.79 216.79	13 2.07	0.0049 1.1	0.0 2.1	W1 20

Pipe Data

Start Disch. End Disch.	Start Tot.Pres. End Tot.Pres.
gpm gpm	psi psi
13	18.5 7
	23.4 18.5
	25.5 23.4
-13	28.6 25.5

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/psi½)	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	
S0	19	4.9	13	.75	3x(BM.Tee-Run)=3	44.38	150	7	
19-O	6.71		13	0.874	4x(BM.Tee-Br)=12	22	0.0935	5.3	
					1x(BM.90)=7	66.38		6.2	
19-O	6.71		0	.75		0.93		18.5	Ames2000B
19-I	5.78		13	0		0	4.7818	0.4	***
						0.93		4.4	
19-I	5.78		0	.75		3.99	150	23.4	
20	1.79		13	0.874		0	0.0935	1.7	
						3.99		0.4	
20	1.79		0	1.5	5x(BM.90)=45	171.79	150	25.5	
W1	-3		13	1.598		45	0.0049	2.1	
						216.79		1.1	

* Discharge shown for flowing nodes only

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/psi½)	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	
Path No: 1									
S0	19	4.9	13	.75	3x(BM.Tee-Run)=3	44.38	150	7	
19-O	6.71		13	0.874	4x(BM.Tee-Br)=12	22	0.0935	5.3	
					1x(BM.90)=7	66.38		6.2	
19-O	6.71		0	.75		0.93		18.5	Ames2000B
19-I	5.78		13	0		0	4.7818	0.4	***
						0.93		4.4	
19-I	5.78		0	.75		3.99	150	23.4	
20	1.79		13	0.874		0	0.0935	1.7	
						3.99		0.4	
20	1.79		0	1.5	5x(BM.90)=45	171.79	150	25.5	
W1	-3		13	1.598		45	0.0049	2.1	
						216.79		1.1	
W1								**28.6**	

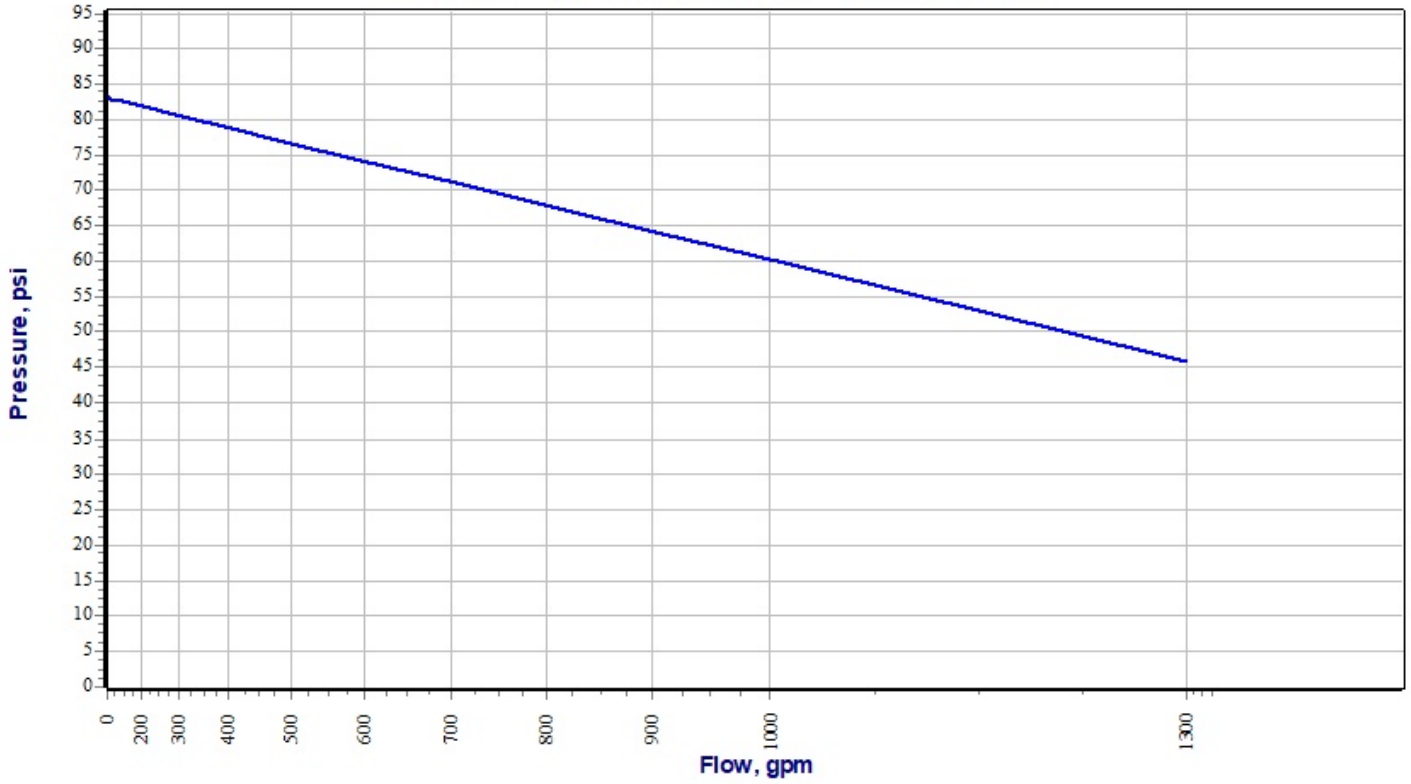
* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

* Maximum Velocity of 6.93 ft/s occurs in the following pipe(s): (19-O-S0), (20-19-I)

*** 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.

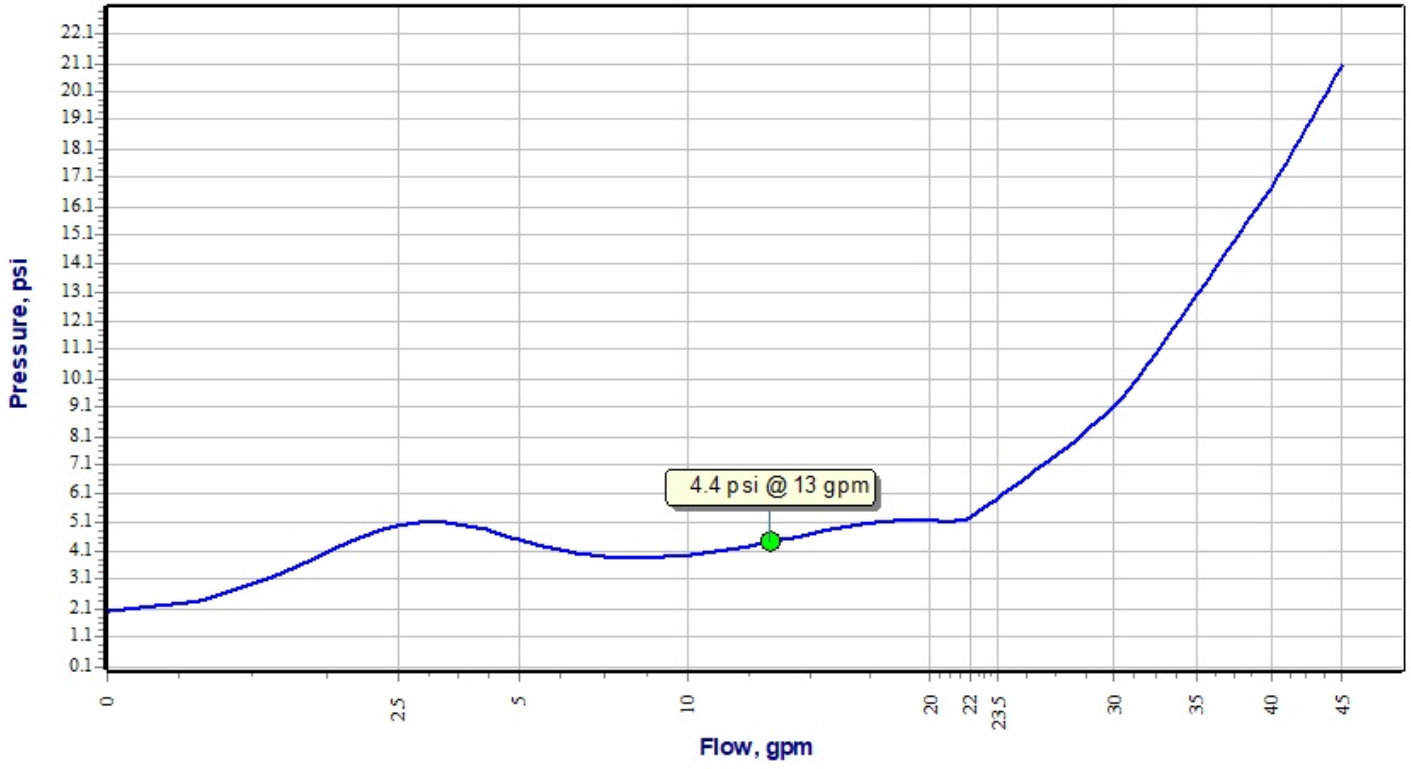
Pressure vs. Flow Function

Design Area: 1; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function

Design Area: 1; BFP Ref.: 54 (Ames2000B, Size = .75); Inlet Node: 19-I; Outlet Node: 19-O



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HYDRAULIC CALCULATIONS
for

Job Information

Project Name : HAB. FOR HUM.

Contract No. :

City: PORLTAND, OR 97219

Project Location: 2401 SW TAYLORS FERR RD UNIT 11

Date: 7/4/2022

Contractor Information

Name of Contractor: SPRINKIT FIRE INC

Address: PO BOX 2227

City: OREGON CITY, OR 97045

Phone Number: 503-272-6650

E-mail:

Name of Designer: BHA

Authority Having Jurisdiction: CITY OF PORTLAND

Design

Remote Area Name	2
Remote Area Location	DINING/LIVING
Occupancy Classification	RESIDENTIAL
Density (gpm/ft²)	0.068
Area of Application (ft²)	383
Coverage per Sprinkler (ft²)	192
Number of Calculated Sprinklers	2
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	0
Total Water Required (incl. Hose Streams) (gpm)	27.2
Required Pressure at Source (psi)	35.6
Type of System	Wet
Volume - Entire System (gal)	19.2 gal

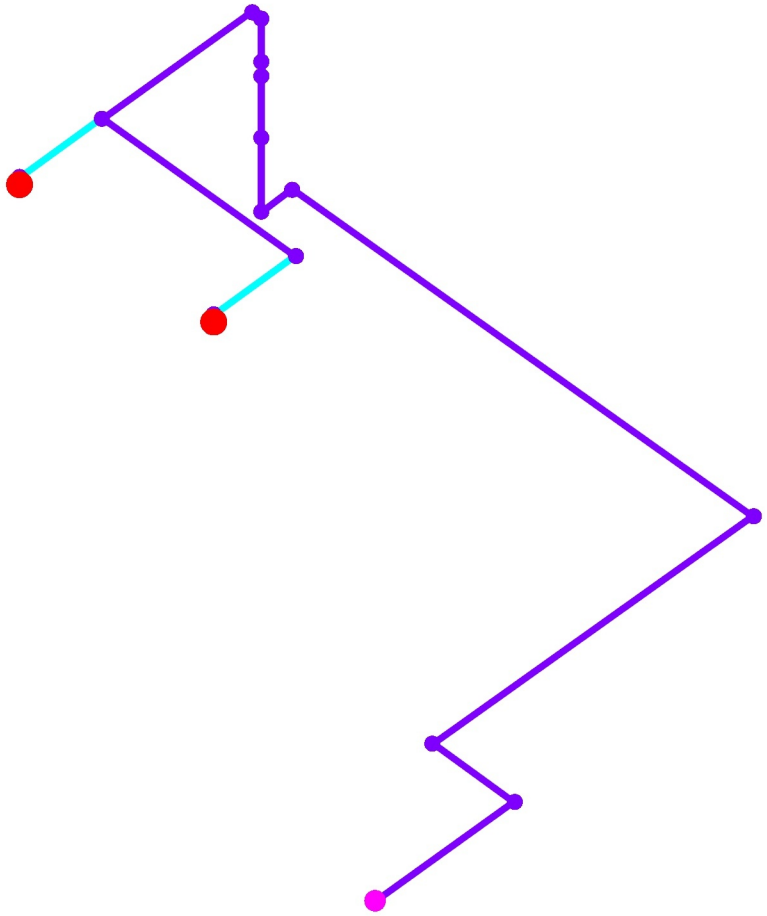
Water Supply Information

Date	1/18/22
Location	2401 SW TAYLORS FERRY RD
Source	W1

Notes

Node Labels: Off
Pipe Labels: Off

Diagram for Design Area : 2
(Optimized Hydraulic Simplified)



Hydraulic Analysis for : 2

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	83
1300	46

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	83	46	1300	83	27.2	35.6

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)	

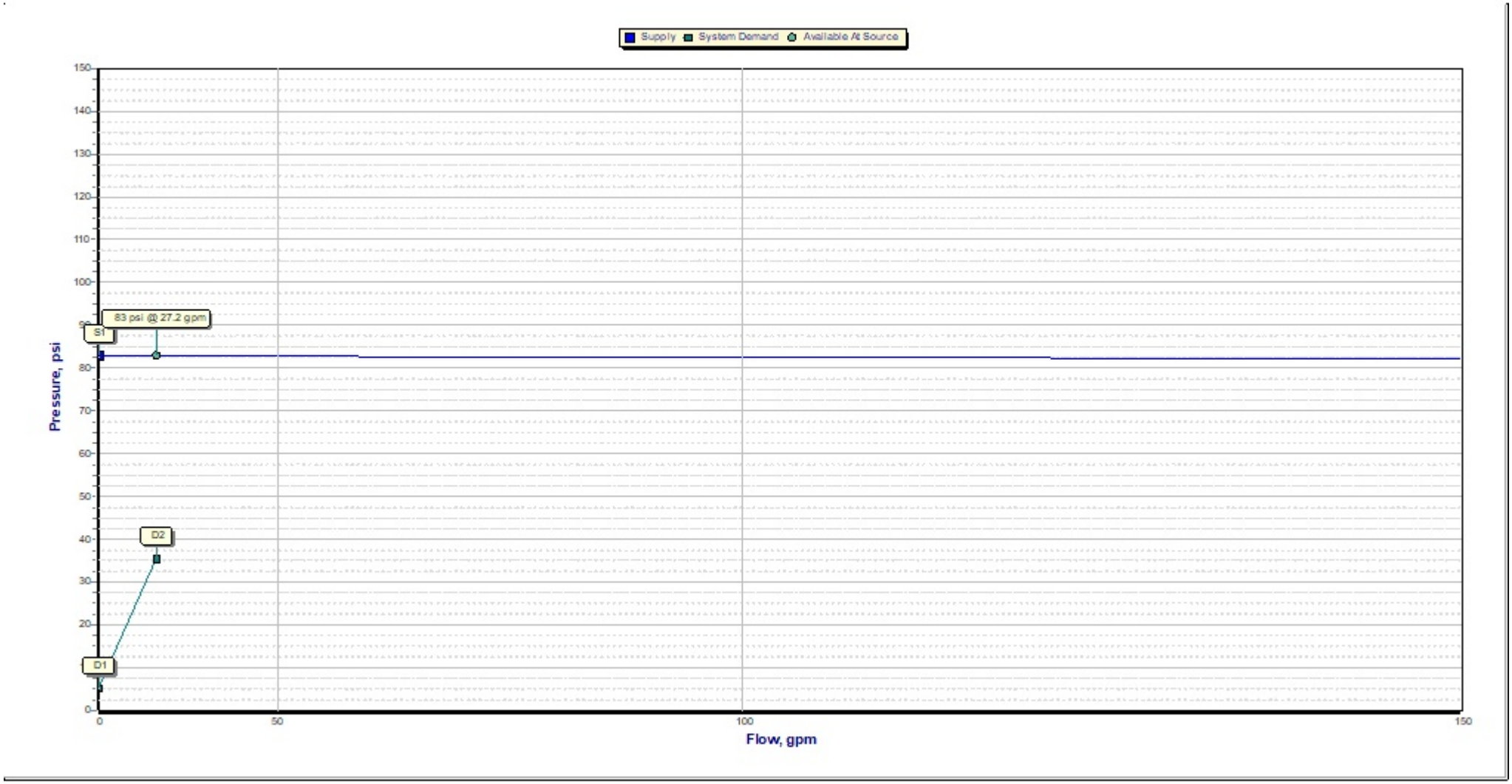
Sprinklers

Ovehead Sprinkler Flow (gpm)	27.2
InRack Sprinkler Flow (gpm)	0
Other (custom defined) Sprinkler Flow (gpm)	0
Total Sprinkler Flow (gpm)	27.2

Other

Required Margin of Safety (psi)	0
W1 - Pressure (psi)	35.6
W1 - Flow (gpm)	27.2
Demand w/o System Pump(s)	N/A

Hydraulic Analysis for : 2



Hydraulic Analysis for : 2

Graph Labels

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	83
S2	Supply point #2 - Residual	1300	46
D1	Elevation Pressure	0	5.2
D2	System Demand	27.2	35.6

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	82.9	45.1	47.4	27.2

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S1	Overhead Sprinkler	192	4.9	0.05	9.6	7	0.068	13	7
S2	Overhead Sprinkler	192	4.9	0.05	9.6	7	0.074	14.2	8.4

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft			gpm gpm	ft² gpm/ft²	psi psi	psi gpm
S1 9	Overhead Sprinkler HEAD	5 Open	13 3.4	192 0.068	7 -5.2	7 9.6
S2 9	Overhead Sprinkler HEAD	5 Open	14.2 4.6	192 0.074	8.4 -5.2	7 9.6
19-I 5.78	Node NODE				26.1 -3.8	
19-O 6.71	Node NODE				18 -4.2	
20 1.79	Node NODE				29.3 -2.1	
24 9.5	Node NODE				9.7 -5.4	
W1 -3	Supply SUPPLY		-27.2		35.6 0	

Pipe Data

Path # Pipe Ref.	Type Hgroup	Schedule Size	HWC Rough.	Fittings Eq.Len.	Length Total Len.	Flow Velocity	Fr.Resist. Loss Frict.	Vel.Pres. Loss Elev.	Start End	Start Disch. End Disch.
			in	ft	ft ft	gpm ft/s	psi/ft psi	psi psi		gpm gpm
1 27	Cmain PIPE	CPVC .75	150 0.000084	2(BM.Tee-Br);1(BM.90); 13	18.42 31.42	13 6.93	0.0935 2.9	0.3 -0.2	24 S1	13
1 18	Cmain PIPE	CPVC .75	150 0.000084	2(BM.Tee-Br); 6	13.13 19.13	27.2 14.53	0.3679 7	1.4 1.2	19-O 24	
1 54	BFP BFP	Ames2000B .75	0 0		0.93	27.2 0	8.3183 7.7	0 0.4	19-I 19-O	
1 19	Cmain PIPE	CPVC .75	150 0.000084		3.99	27.2 14.53	0.3679 1.5	1.4 1.7	20 19-I	
1 25	Cmain PIPE	CPVC 1.5	150 0.000084	5(BM.90); 45	171.79 216.79	27.2 4.35	0.0195 4.2	0.1 2.1	W1 20	-27.2
2 36	Brline PIPE	CPVC .75	150 0.000084	1(BM.Tee-Run);1(BM.90); 8	5.83 13.83	14.2 7.6	0.1107 1.5	0.4 -0.2	24 S2	14.2

Pipe Data

Start Tot.Pres. End Tot.Pres.
psi psi
9.7 7
18 9.7
26.1 18
29.3 26.1
35.6 29.3
9.7 8.4

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/psi½)	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	
S1	9	4.9	13	.75	2x(BM.Tee-Br)=6	18.42	150	7	
24	9.5		13	0.874	1x(BM.90)=7	13	0.0935	-0.2	
						31.42		2.9	
24	9.5		14.2	.75	2x(BM.Tee-Br)=6	13.13	150	9.7	
19-O	6.71		27.2	0.874		6	0.3679	1.2	
						19.13		7	
19-O	6.71		0	.75		0.93		18	Ames2000B
19-I	5.78		27.2	0		0	8.3183	0.4	***
						0.93		7.7	
19-I	5.78		0	.75		3.99	150	26.1	
20	1.79		27.2	0.874		0	0.3679	1.7	
						3.99		1.5	
20	1.79		0	1.5	5x(BM.90)=45	171.79	150	29.3	
W1	-3		27.2	1.598		45	0.0195	2.1	
						216.79		4.2	
S2	9	4.9	14.2	.75	1x(BM.Tee-Run)=1	5.83	150	8.4	
24	9.5		14.2	0.874	1x(BM.90)=7	8	0.1107	-0.2	
						13.83		1.5	

* Discharge shown for flowing nodes only

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/psi½)	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	
Path No: 1									
S1	9	4.9	13	.75	2x(BM.Tee-Br)=6	18.42	150	7	
24	9.5		13	0.874	1x(BM.90)=7	13	0.0935	-0.2	
						31.42		2.9	
24	9.5		14.2	.75	2x(BM.Tee-Br)=6	13.13	150	9.7	
19-O	6.71		27.2	0.874		6	0.3679	1.2	
						19.13		7	
19-O	6.71		0	.75		0.93		18	Ames2000B
19-I	5.78		27.2	0		0	8.3183	0.4	***
						0.93		7.7	
19-I	5.78		0	.75		3.99	150	26.1	
20	1.79		27.2	0.874		0	0.3679	1.7	
						3.99		1.5	
20	1.79		0	1.5	5x(BM.90)=45	171.79	150	29.3	
W1	-3		27.2	1.598		45	0.0195	2.1	
						216.79		4.2	
W1								**35.6**	
Path No: 2									
S2	9	4.9	14.2	.75	1x(BM.Tee-Run)=1	5.83	150	8.4	
24	9.5		14.2	0.874	1x(BM.90)=7	8	0.1107	-0.2	
						13.83		1.5	
24								**9.7**	

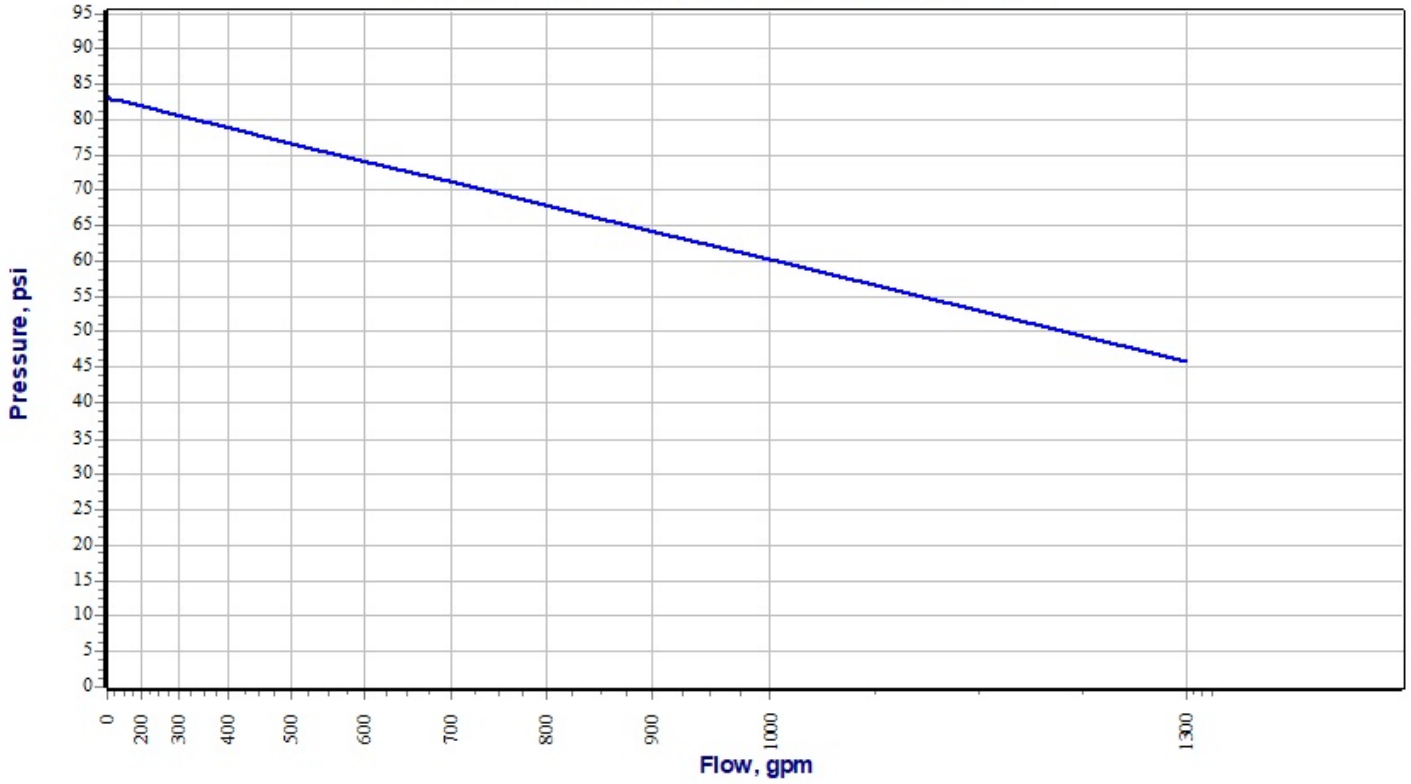
* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

* Maximum Velocity of 14.53 ft/s occurs in the following pipe(s): (19-O-24), (20-19-I)

*** 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.

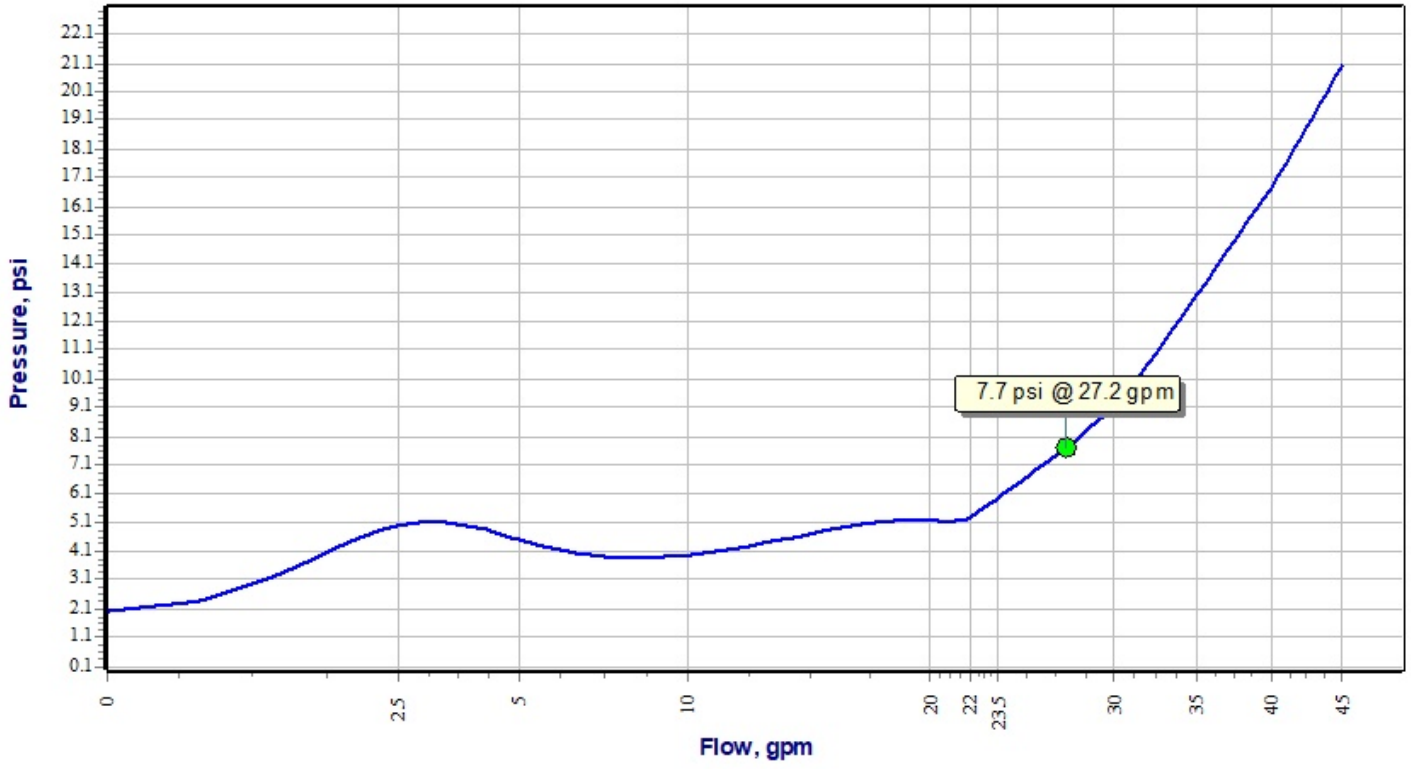
Pressure vs. Flow Function

Design Area: 2; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function

Design Area: 2; BFP Ref.: 54 (Ames2000B, Size = .75); Inlet Node: 19-I; Outlet Node: 19-O



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Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

LEAD FREE*

Series LF2000B

Double Check Valve Assemblies

Sizes: ½" – 2" (15 – 60mm)

Series LF2000B Double Check Valve Assemblies shall be installed at referenced cross-connections to prevent the backflow of polluted water into the potable water supply. Only those cross-connections identified by local inspection authorities as non-health hazard shall be allowed the use of an approved double check valve assembly.

Check with local authority having jurisdiction regarding vertical orientation, frequency of testing or other installation requirements.

These valves meet the requirements of ASSE Std. 1015 and AWWA Std. C510 and are approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The LF2000B features Lead Free* construction to comply with Lead Free* installation requirements.

Features

- Ease of maintenance with only one cover
- Top entry
- Replaceable seats and seat discs
- Modular construction
- Compact design
- ½" – 2" (15 – 50mm) Lead Free* cast silicon copper alloy body construction
- Top mounted ball valve test cocks
- Low pressure drop
- No special tools required
- ½" – 1" (15 – 25 mm) have tee handles

Specifications

A Double Check Valve Assembly shall be installed at each noted location. The Double Check Valve Assemblies shall be constructed using Lead Free* materials. Lead Free* valves shall comply with state codes and standards, where applicable, requiring reduced lead content. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module seats and seat discs shall be replaceable. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves and four top mounted, resilient seated test cocks. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510. Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. Assembly shall be an Ames Company Series LF2000B.

¾" LF2000B (20mm)

Approvals

1015 B64.5 ¾" - 2" (LBV Models Only)

Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

LBV models not listed.

Available Models

Suffix:

B — Quarter turn ball valves

LBV — less ball valves

Pressure – Temperature

Temperature Range: 33°F – 140°F (0.5°C – 60°C)

Maximum Working Pressure: 175 psi (12.06 bar)

Standards

AWWA Std. C510, IAPMO PS31

NOTICE

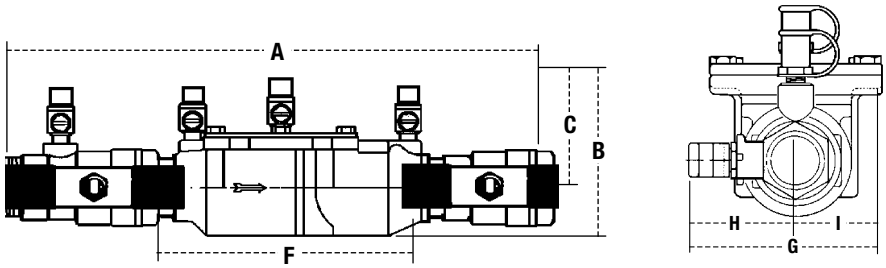
The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

AMES FIRE & WATERWORKS

A WATTS Brand

Dimensions – Weights



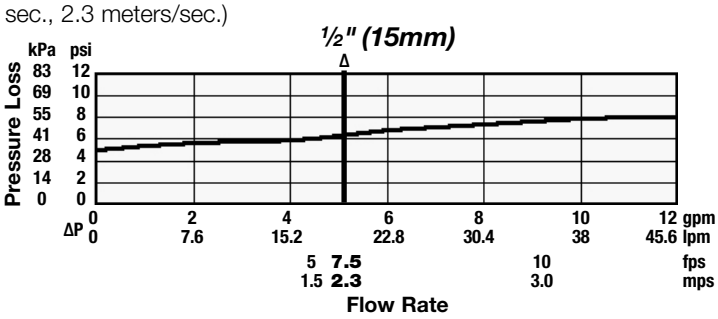
LF2000B

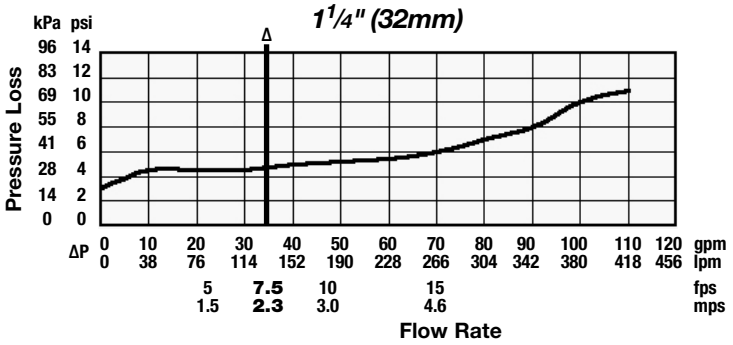
SIZE (DN)		DIMENSIONS														WEIGHT	
		A		B		C		F		G		H		I			
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*
½	15	10	254	4⅝	117	2 7/16	62	5	127	3⅜	85	2 5/16	59	2 1/16	52	4.5	2
¾	20	11⅛	282	4	102	3⅛	79	6 3/16	157	3 7/16	87	2⅛	54	1 5/16	33	5	2.3
1	25	13¼	337	5⅛	130	4	102	7½	191	3⅜	85	11 1/16	43	11 1/16	43	12	5.4
1¼	32	16⅜	416	5	127	3 5/16	84	9½	241	5	127	3	76	2	50	15	6.8
1½	40	16¾	425	4⅞	124	3½	89	9¾	248	51 3/16	148	3⅛	79	2 11/16	68	15.86	7.2
2	50	19½	495	6¼	159	4	102	13⅜	340	6⅛	156	3 7/16	87	2 11/16	68	25.75	11.7

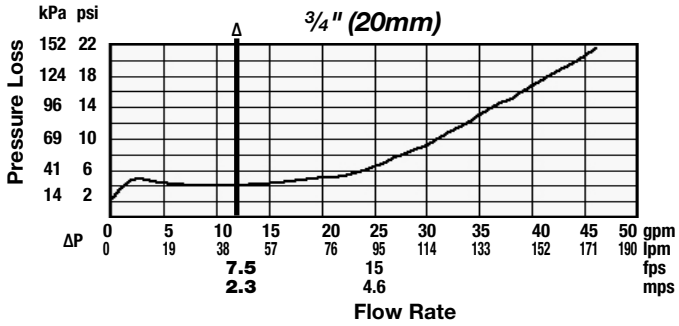
Strainer sold separately

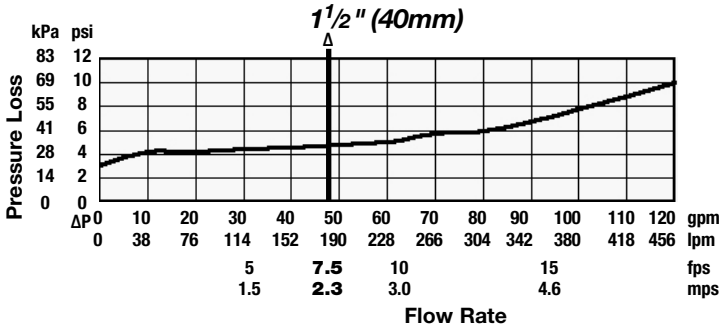
Capacities

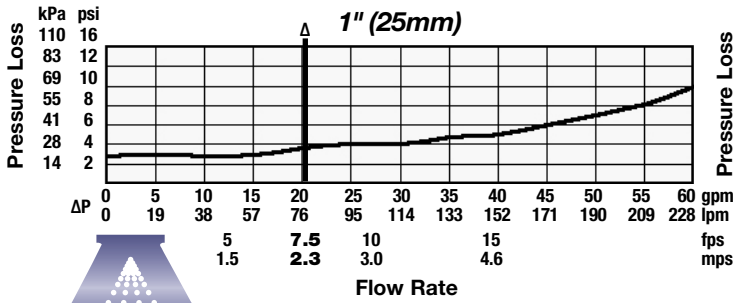
As compiled from documented Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California lab tests. *Typical maximum system flow rate (7.5 feet/sec., 2.3 meters/sec.)

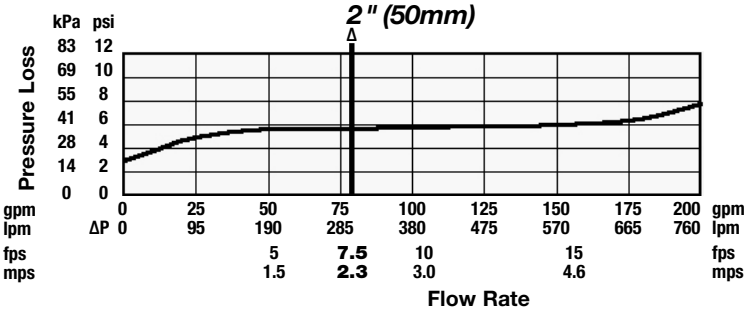












AMES
FIRE & WATERWORKS

A **WATTS** *Brand*

USA: Backflow Tel: (978) 689-6066 • Fax: (978) 975-8350 • AmesFireWater.com
USA: Control Valves Tel: (713) 943-0688 • Fax: (713) 944-9445 • AmesFireWater.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • AmesFireWater.ca
Latin America: Tel: (52) 81-1001-8600 • AmesFireWater.com

BLAZEMASTER CPVC Fire Sprinkler Pipe & Fittings Submittal Sheet

General Description

TYCO CPVC Pipe and Fittings produced by Tyco Fire Protection Products (TFPP) are designed exclusively for use in wet pipe automatic fire sprinkler systems. The TYCO CPVC Pipe and Fittings are produced from BLAZEMASTER CPVC compound that is a specially developed thermoplastic compound composed of post chlorinated polyvinyl chloride (CPVC) resin and state of the art additives. TYCO CPVC Pipe and Fittings are easier to install than traditional steel pipe systems, and at the same time, provide superior heat resistance and strength as compared to traditional CPVC and PVC piping materials used in the plumbing trade. Various adapters are available to connect CPVC pipe to metallic piping. All female pipe thread adapters have brass inserts for durability. Grooved adapters connect directly to grooved end valves and metallic pipe, with flexible grooved end couplings.

NOTICE

The CPVC Pipe and Fittings produced with BLAZEMASTER CPVC compound described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Technical Data

Sizes
3/4 Inch thru 3 Inch

Maximum Working Pressure
175 psi

Approvals
UL and C-UL Listed
FM Approved
LPCB Approved
NSF Certified
MEA Approved
City of Los Angeles

(Refer to Installation Handbook IH-1900 dated June 2008 for exact listing/approval information.)

Manufacture Source
U.S.A.

Material
Pipe:
ASTM F442, SDR 13.5

Fittings:
ASTM F438 (Sch. 40)
ASTM F439 (Sch. 80)
ASTM F1970

Color
Orange

Installation

TYCO CPVC Pipe and Fittings are to be to be installed in accordance with Installation Handbook IH-1900 dated April 2016.

Care and Maintenance

TYCO CPVC Pipe and Fittings are to be maintained and serviced in accordance with this section.

Before closing a fire protection system control valve for inspection or maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection system must first be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and de-vices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems should be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com

GLOBAL HEADQUARTERS | 1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

tyco Fire Protection Products

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

RAPID RESPONSE Series LFII Residential 4.9 K-factor Pendent Sprinkler Wet Pipe and Dry Pipe Systems

General Description

TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers (TY2234) are decorative, fast response, frangible bulb sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels. When aesthetics and optimized flow characteristics are the major consideration, the Series LFII Residential Sprinklers (TY2234) should be the first choice.

The Series LFII Residential Sprinklers are intended for use in the following scenarios:

- wet and dry pipe residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D
- wet and dry pipe residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R
- wet and dry pipe sprinkler systems for the residential portions of any occupancy per NFPA 13

The recessed version of the Series LFII Residential Sprinklers is intended for use in areas with finished ceilings. It employs a two-piece Style 20 Recessed Escutcheon. The Recessed Escutcheon provides 1/4 inch (6,4 mm) of recessed adjustment or up to 1/2 inch (12,7 mm) of total adjustment from the flush ceiling position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the pipe drops to the sprinklers must be cut.

The Series LFII Residential Sprinklers have been designed with heat sensitivity and water distribution characteristics proven to help in the control of residential fires and to improve the chance for occupants to escape or be evacuated.

Dry Pipe System Application
The Series LFII Residential Pendent and Recessed Pendent Sprinklers offers a laboratory approved option for designing dry pipe residential sprinkler systems, whereas, most residential sprinklers are laboratory approved for wet systems only.

Through extensive testing, it has been determined that the number of design sprinklers (hydraulic design area) for the Series LFII Residential Pendent and Recessed Pendent Sprinklers (TY2234) need not be increased over the number of design sprinklers (hydraulic design area) as specified for wet pipe sprinkler systems, as is accustomed for density/area sprinkler systems designed per NFPA 13.

Consequently, the Series LFII Residential Sprinklers offer the features of non-water filled pipe in addition to not having to increase the number of design sprinklers (hydraulic design area) for systems designed to NFPA 13, 13D, or 13R.

IMPORTANT
Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

NOTICE
The Series LFII Residential Pendent and Recessed Pendent Sprinklers (TY2234) described herein must be installed and maintained in compliance with this document and the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

NSF® Certified to NSF/ANSI 61

Sprinkler Identification Number (SIN)

TY2234

Technical Data

Approvals
UL Listed (for use with wet pipe and dry pipe systems)

C-UL Listed (for use only with wet pipe systems)

Certified to all requirements of NSF/ANSI 61

(Refer to the Design Criteria section for details on these approvals.)

Maximum Working Pressure
175 psi (12,1 bar)

Discharge Coefficient
K=4.9 gpm/psi$^{1/2}$ (70,6 lpm/bar$^{1/2}$)

Temperature Rating
155°F (68°C) or 175°F (79°C)

Finishes
Natural Brass, Pure White, Signal White, or Chrome Plated

Physical Characteristics

Frame	Brass
Button	Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Bulb (3 mm)	Glass
Compression Screw	Bronze
Deflector	Bronze

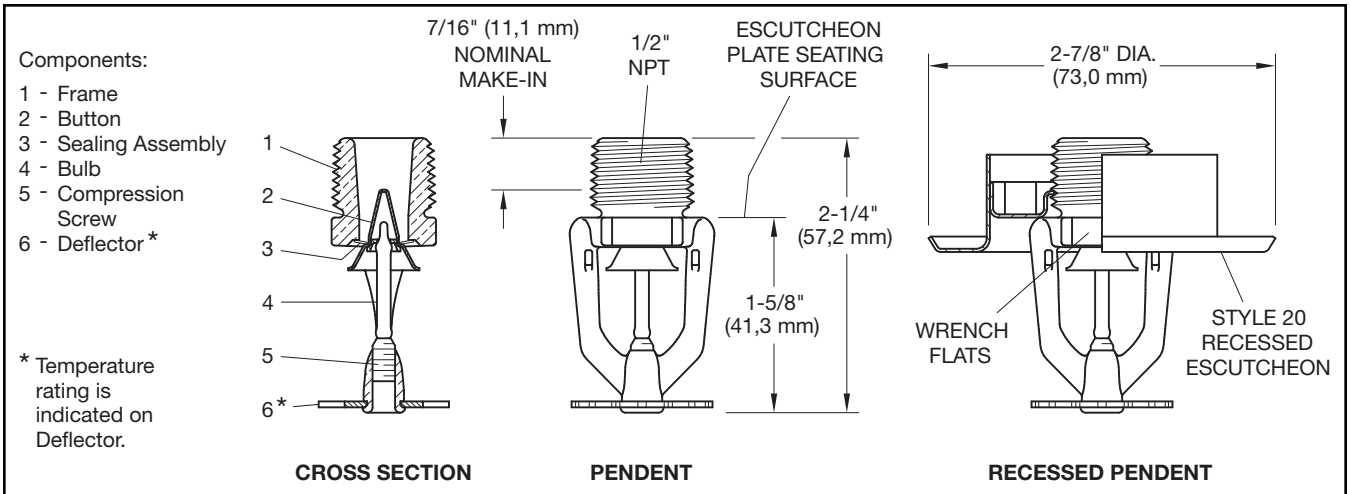


FIGURE 1
RAPID RESPONSE SERIES LFII RESIDENTIAL
4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)

Operation

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass bulb, allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers are UL and C-UL Listed for installation in accordance with this section.

Residential Sprinkler Design Guide
When conditions exist that are outside the scope of the provided criteria, refer to the Residential Sprinkler Design Guide TFP490 for the manufacturer's recommendations that may be acceptable to the local authority having jurisdiction.

System Types
Per the UL Listing, wet pipe and dry pipe systems may be utilized. Per the C-UL Listing, only wet pipe systems may be utilized.

Refer to Technical Data Sheet TFP485 for the use of residential sprinklers in residential dry pipe systems.

Ceiling Types
Smooth flat horizontal, or beamed, or sloped, in accordance with the 2013 Edition of NFPA 13D, 13R, or 13, as applicable.

Hydraulic Design (NFPA 13D and 13R)
For systems designed to NFPA 13D or NFPA 13R, the minimum required sprinkler flow rates are given in Tables A and B as a function of temperature rating and the maximum allowable coverage areas. The sprinkler flow rate is the minimum required discharge from each of the total number of "design sprinklers" as specified in NFPA 13D or NFPA 13R. The number of "design sprinklers" specified in NFPA 13D and 13R for wet pipe systems is to be applied when designing dry pipe systems.

Hydraulic Design (NFPA 13)
For systems designed to NFPA 13, the number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in Table A or B as a function of temperature rating and the maximum allowable coverage area.
- A minimum discharge of 0.1 gpm/ft^2 over the "design area" comprised of the four most hydraulically demanding sprinklers for actual coverage areas protected by the four sprinklers.

The number of design sprinklers specified in NFPA 13 for wet pipe systems is to be applied when designing dry pipe systems.

Dry Pipe System Water Delivery
When using the Series LFII Residential Sprinklers (TY2234) in dry pipe sprinkler systems, the time for water delivery must not exceed 15 seconds for the most remote operating sprinkler.

Obstruction to Water Distribution
Sprinklers are to be located in accordance with the obstruction rules of NFPA 13D, 13R, and 13 as applicable for residential sprinklers as well as with the obstruction criteria described within the Technical Data Sheet TFP490.

Operational Sensitivity
Sprinklers are to be installed with a deflector-to-ceiling distance of 1-1/4 to 4 inches.

Sprinkler Spacing
The minimum spacing between sprinklers is 8 feet (2,4 m). The maximum spacing between sprinklers cannot exceed the length of the coverage area (Table A or B) being hydraulically calculated (e.g., maximum 12 feet for a 12 ft. x 12 ft. coverage area, or 20 feet for a 20 ft. x 20 ft. coverage area).

Maximum Coverage Area [1] Ft. x Ft. (m x m)	WET PIPE SYSTEM Minimum Flow and Residual Pressure [2][3]				Deflector to Ceiling	Installation Type	Minimum Spacing Ft. (m)
	Ordinary Temperature Rating 155°F (68°C)		Intermediate Temperature Rating 175°F (79°C)				
	Flow gpm (l/min)	Pressure psi (bar)	Flow gpm (l/min)	Pressure psi (bar)			
12 x 12 (3,7 x 3,7)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)	Smooth Ceilings 1-1/4 to 4 inches Beamed Ceilings per NFPA 13D or 13R 1-1/4 to 1-3/4 inches below bottom of beam.	Recessed using Style 20 Escutcheon or non-recessed per NFPA 13D, 13R, or 13	8 (2,4)
14 x 14 (4,3 x 4,3)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)			
16 x 16 (4,9 x 4,9)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)			
18 x 18 (5,5 x 5,5)	17 (64,3)	12.0 (0,83)	17 (64,3)	12.0 (0,83)			
20 x 20 (6,1 x 6,1)	20 (75,7)	16.7 (1,15)	20 (75,7)	16.7 (1,15)			

Notes:
1. For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.
2. Requirement is based on minimum flow in gpm (lpm) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.
3. For NFPA 13 residential applications, the greater of 0.1 gpm/ft.^{2} over the design area or the flow in accordance with the criteria in this table must be used.

TABLE A
WET PIPE SYSTEM
SERIES LFII RESIDENTIAL 4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

Maximum Coverage Area [1] Ft. x Ft. (m x m)	DRY PIPE SYSTEM Minimum Flow and Residual Pressure [2][3]				Deflector to Ceiling	Installation Type	Minimum Spacing Ft. (m)
	Ordinary Temperature Rating 155°F (68°C)		Intermediate Temperature Rating 175°F (79°C)				
	Flow gpm (l/min)	Pressure psi (bar)	Flow gpm (l/min)	Pressure psi (bar)			
12 x 12 (3,7 x 3,7)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)	Smooth Ceilings 1-1/4 to 4 inches Beamed Ceilings per NFPA 13D or 13R 1-1/4 to 1-3/4 inches below bottom of beam.	Recessed using Style 20 Escutcheon or non-recessed per NFPA 13D, 13R, or 13	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (53,0)	8.2 (0,57)	14 (53,0)	8.2 (0,57)			
16 x 16 (4,9 x 4,9)	15 (56,8)	9.4 (0,65)	15 (56,8)	9.4 (0,65)			
18 x 18 (5,5 x 5,5)	18 (68,1)	13.5 (0,93)	18 (68,1)	13.5 (0,93)			
20 x 20 (6,1 x 6,1)	21 (79,5)	18.4 (1,27)	21 (79,5)	18.4 (1,27)			

Notes:
1. For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.
2. Requirement is based on minimum flow in gpm (lpm) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.
3. For NFPA 13 residential applications, the greater of 0.1 gpm/ft.^{2} over the design area or the flow in accordance with the criteria in this table must be used.

TABLE B
DRY PIPE SYSTEM
SERIES LFII RESIDENTIAL 4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

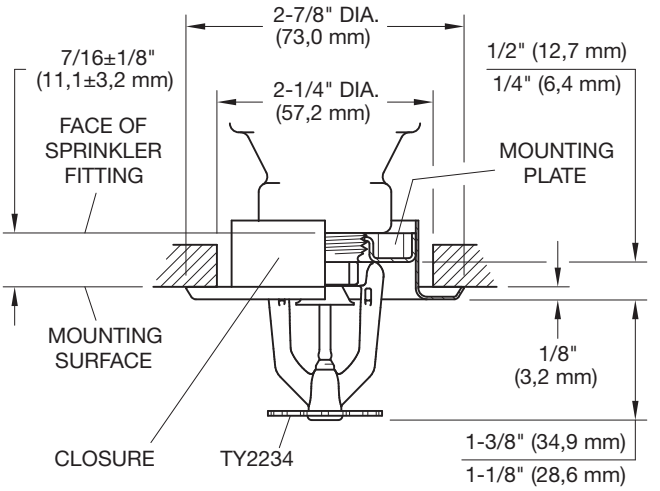


FIGURE 2
STYLE 20 RECESSED ESCUTCHEON FOR USE WITH THE RAPID RESPONSE SERIES LFII RESIDENTIAL PENDENT SPRINKLER

Installation

TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers must be installed in accordance with this section.

General Instructions
Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch (1,6 mm).

A leak-tight 1/2 inch NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in an Escutcheon Plate by under- or over- tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Pendent Sprinklers
The Series LFII Residential Pendent Sprinklers must be installed in accordance with the following instructions:

Step 1. Install pendent sprinklers in the pendent position with the deflector parallel to the ceiling.

Step 2. With pipe thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Figure 3). With reference to Figure 1, apply the W-Type 6 Sprinkler Wrench to the wrench flats.

Recessed Pendent Sprinklers
The Series LFII Residential Recessed Pendent Sprinklers must be installed in accordance with the following instructions:

Step A. Install recessed pendent sprinklers in the pendent position with the deflector parallel to the ceiling.

Step B. After installing the Style 20 Mounting Plate over the sprinkler threads and with pipe thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step C. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Figure 4). With reference to Figure 1, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats.

Step D. After the ceiling has been installed or the finish coat has been applied, slide on the Style 20 Closure over the Series LFII Residential Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.

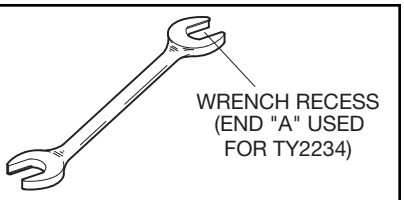


FIGURE 3
W-TYPE 6
SPRINKLER WRENCH

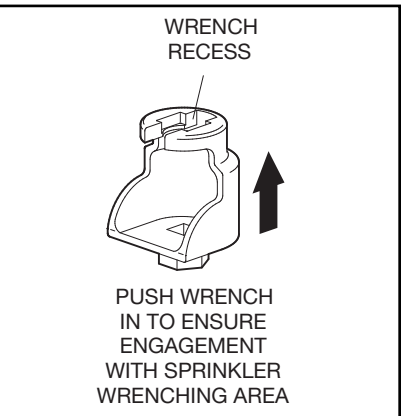


FIGURE 4
W-TYPE 7 RECESSED
SPRINKLER WRENCH

Care and Maintenance

TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers must be maintained and serviced in accordance with this section:

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and notify all personnel who may be affected by this action.

Absence of the outer piece of an escutcheon, which is used to cover a clearance hole, can delay sprinkler operation in a fire situation.

The owner must assure that the sprinklers are not used for hanging any objects and that the sprinklers are only cleaned by means of gently dusting with a feather duster; otherwise, non-operation in the event of a fire or inadvertent operation may result.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb (Ref. Installation section).

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and part number (P/N).

Sprinkler Assemblies
Specify: Series LFII 4.9K Residential Pendent Sprinkler (TY2234), (specify temperature rating), with (specify) finish, P/N (specify):

155°F (68°C)

Natural Brass	51-201-1-155
Pure White (RAL 9010)*	51-201-3-155
Signal White (RAL 9003)	51-201-4-155
Chrome Plated	51-201-9-155

175°F (79°C)

Natural Brass	51-201-1-175
Pure White (RAL 9010)*	51-201-3-175
Signal White (RAL 9003)	51-201-4-175
Chrome Plated	51-201-9-175

*** Eastern Hemisphere sales only**

Recessed Escutcheon
Specify: Style 20 Recessed Escutcheon with (specify*) finish, P/N (specify*)

*** Refer to Technical Data Sheet TFP770.**

Sprinkler Wrenches
Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387

Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

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