



B14-0255

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA, 91910








FSB INDUSTRIES

*"Making the most
of our Enterprise"*

DRAWN BY:	F. C. BORIK	DATE:	11/2/14
REVISED BY:	F. C. BORIK	DATE:	11/2/14
APPROVED BY:	S. B. BORIK	DATE:	11/2/14

LEGEND

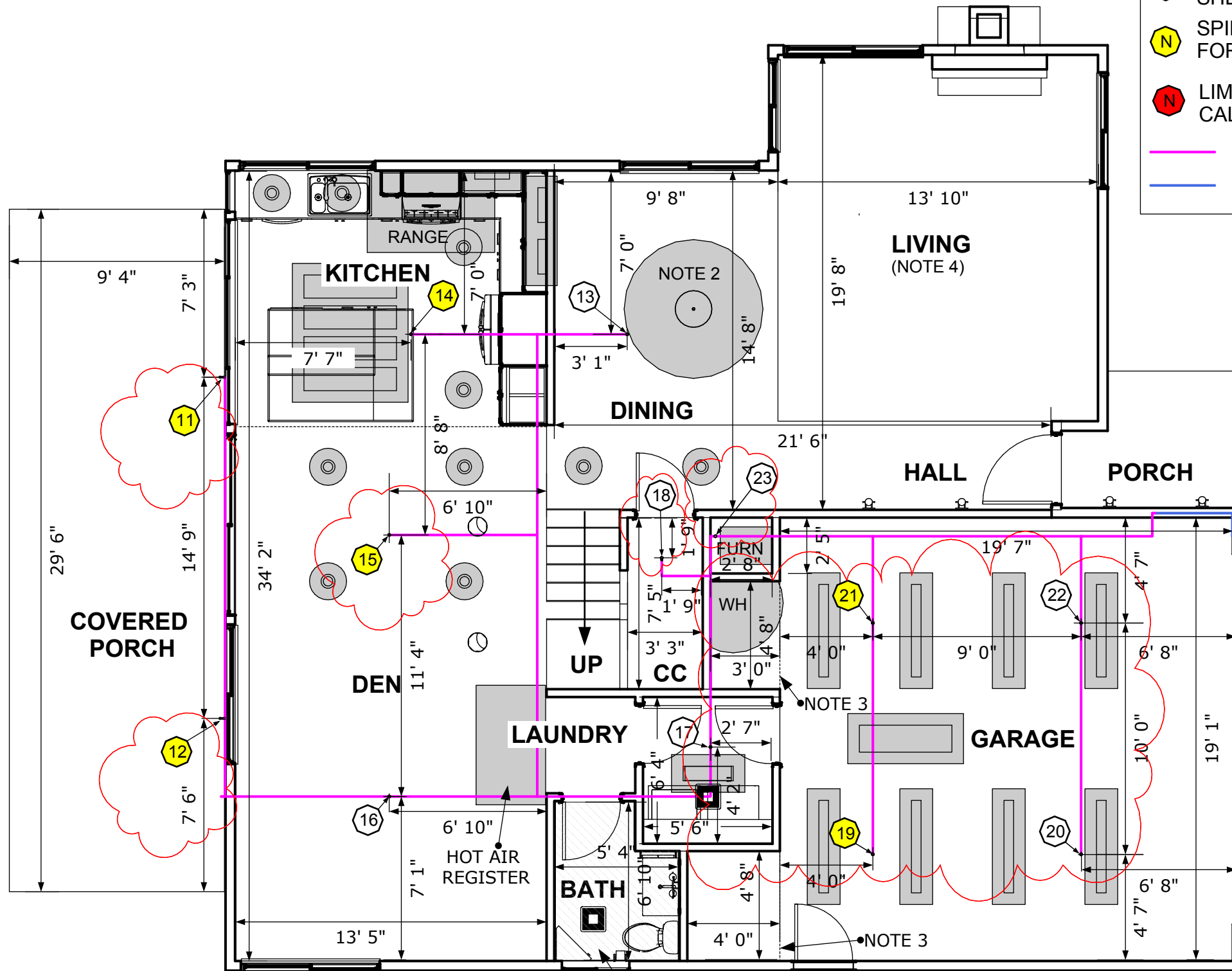
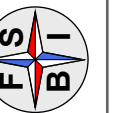
-  SPINKLER HEADS. SEE TABLE OF SPRINKLERS SHEET F-01-03.
-  SPINKLER HEADS CONSIDERED AS CANDIDATES FOR LIMITING SPRINKLERS. SEE SHEET F-01-03.
-  LIMITING SPRINKLERS FOR HYDRAULIC CALCULATIONS. SEE SHEETS F-02-01 THRU F-02-05.
-  SPRINKLER LINES
-  WATER SUPPLY LINE (1" CU)

F-01
1 OF 3

#	REVISION	DATE
0	ORIGINAL	2/7/14
1	ADDED DIMENSIONS	11/7/14
2		
3		
4		

1ST FLOOR FIRE SUPPRESSION
SCALE 1:64 (3/16"=1')

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910








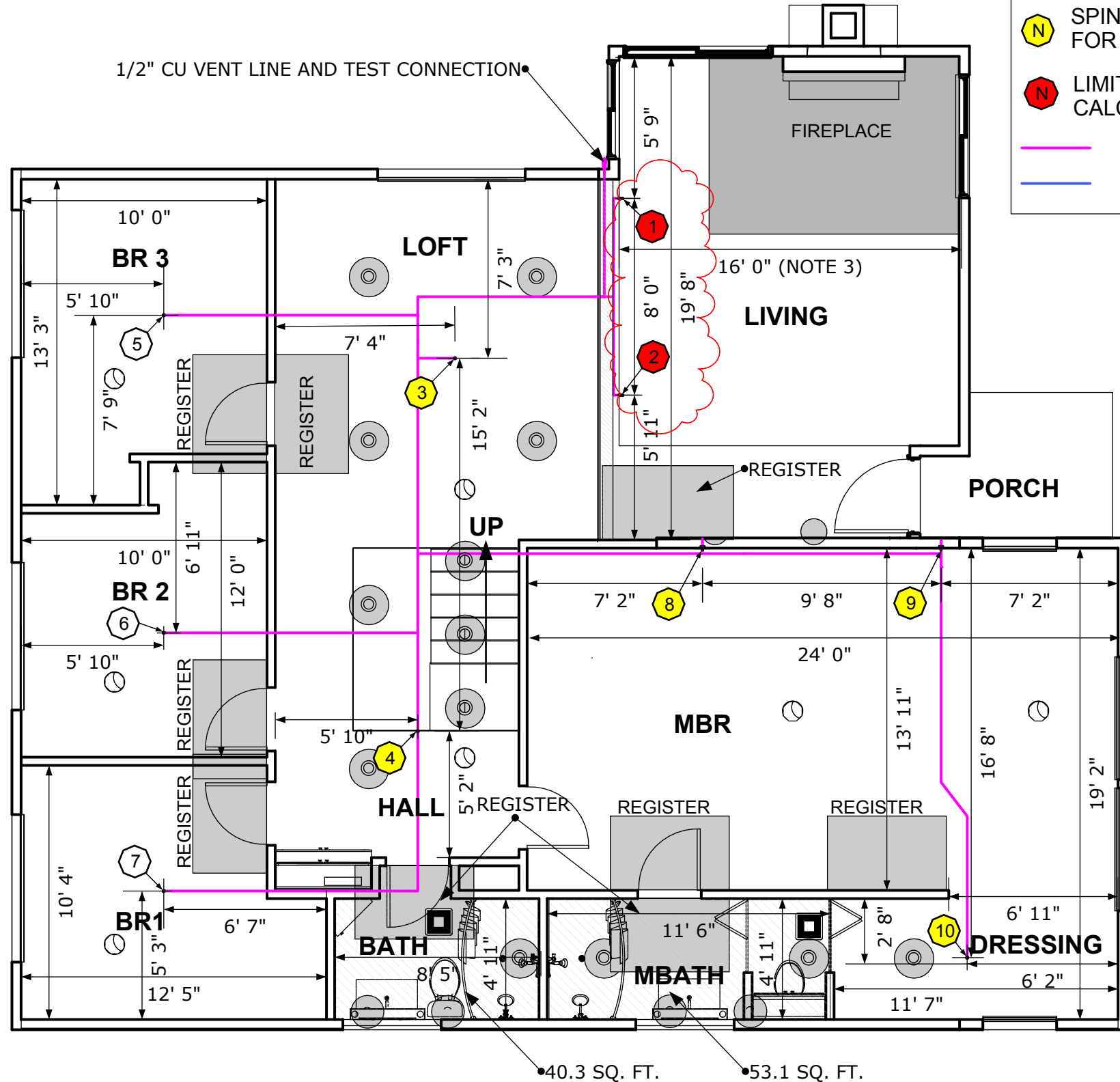
MAIN SHUT-OFF VALVE  WATER METER 

- NOTES:**
- ALL AREAS IN GREY REPRESENT STANDOFFS FROM HEAT SOURCES PER SPRINKLER MANUFACTURER TABLE ON SHEET F-03-02. SOURCES OTHER THAN LIGHTS ARE SPECIFICALLY ANNOTATED AS SUCH.
 - 36" STANDOFF FROM CEILING LIGHT (OBSTRUCTION).
 - CEILING OVER ALCOVE IS 12" LOWER THAN MAIN CEILING. SPRINKLERS #19 AND #21 TO BE EXTENDED 4" BELOW CEILING TO MEET MINIMUM SPRINKLER LATERAL OFFSET OF 4' PER THE DISTANCE FROM OBSTRUCTION TABLE ON SHEET F-04-04.
 - CATHEDRAL CEILING ABOVE LIVING ROOM. SPRINKLERS MOUNTED ON 2F AND SHOWN ON SHEET F-01-02.
 - NO SPRINKLER REQUIRED IN BATHROOM (<55 SF).
 - ALL PIPING AND FITTINGS ARE 1" NOM. CPVC (BLAZEMASTER) UNLESS OTHERWISE NOTED.
 - CURRENT 3/4" WATER METER TO BE REPLACED WITH A 1" METER.

•38 SQ FT

LEGEND

-  SPINKLER HEADS. SEE TABLE OF SPRINKLERS SHEET F-01-03.
-  SPINKLER HEADS CONSIDERED AS CANDIDATES FOR LIMITING SPRINKLERS. SEE SHEET F-01-03.
-  LIMITING SPRINKLERS FOR HYDRAULIC CALCULATIONS. SEE SHEETS F-02-01 THRU F-02-05.
-  SPRINKLER LINES
-  WATER SUPPLY LINE (1" CU)



NOTES:

1. ALL AREAS IN GREY REPRESENT STANDOFFS FROM HEAT SOURCES PER SPRINKLER MANUFACTURER TABLE ON SHEET F-04-04. SOURCES OTHER THAN LIGHTS ARE SPECIFICALLY ANNOTATED AS SUCH.
2. SPRINKLERS #1 AND #2 ARE HSW INSTALLED PER DIAGRAM ON SHEET F-04-04 FOR PITCHED CEILING.
3. LIVING ROOM DIMENSION OF 16' IS DIMENSION PARALLEL TO CATHEDRAL CEILING. CATHEDRAL CEILING IS PITCHED AT 7/12 (30°).
4. NO SPRINKLERS REQUIRED IN BATH AREAS (<55 SF).
5. ALL PIPING AND FITTINGS ARE 1" NOM. CPVC (BLAZEMASTER) UNLESS OTHERWISE NOTED.
6. EXPOSED PIPING WILL BE PAINTED WITH LATEX PAINT TO MATCH SURROUNDINGS AFTER ALL INSPECTIONS ARE COMPLETE.

#	REVISION	DATE
0	ORIGINAL	2/7/14
1	NEW LIMITING SPRINKLERS	3/16/14
2	ADDED DIMENSIONS	11/1/14
3		
4		

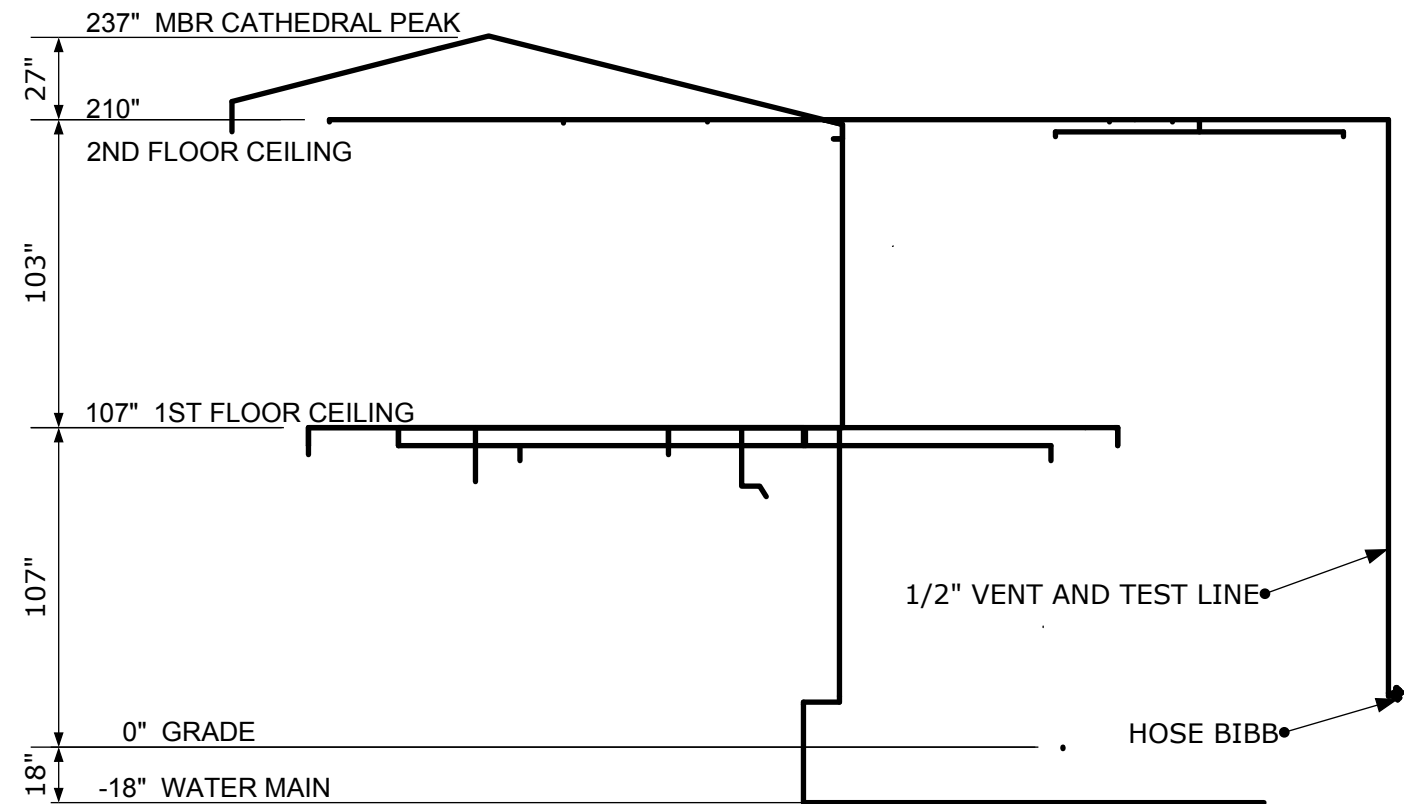
2ND FLOOR FIRE SUPPRESSION
SCALE 1:64 (3/16"=1')

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



SPRINKLER #	LOCATION	TYPE	MFGR	PART #	K-FACTOR	TEMPERATURE	DESIGN PRESSURE	DESIGN COVERAGE	MAX DIST TO WALL	ACT. DIST. TO WALL	OK?	DESIGN SPACING	ACT. SPACING	OK?
1	LIVING ROOM	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	16'-0"Lx5'-9"W	OK	8'-16'	8'-0"	OK
2	LIVING ROOM	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	16'-0"Lx5'-11"W	OK	8'-16'	8'-0"	OK
3	LOFT	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	7'-4"	OK	8'-16'	15'-2"	OK
4	LOFT	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	5'-10"	OK	8'-16'	15'-2"	OK
5	BR #3	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	7'-9"	OK	8'-16'	N/A - SINGLE	OK
6	BR #2	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	6'-11"	OK	8'-16'	N/A - SINGLE	OK
7	BR #1	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	5'-10"	OK	8'-16'	N/A - SINGLE	OK
8	MBR	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	13'-11"Lx7'-2"W	OK	8'-16'	9'-8"	OK
9	MBR	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	13'-11"Lx7'-2"W	OK	8'-16'	9'-8"	OK
10	MBR DRESSING	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	6'-2"	OK	8'-24"*	16'-8"	OK
11	PATIO	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	9'-4"Lx7'-3"W	OK	8'-16'	14'-9"	OK
12	PATIO	HSW	GLOBE	GL 4231	4.2	ORDINARY (155F)	14.5 PSI	16'x16'	16'Lx8'W	9'-4"Lx7'-6"W	OK	8'-16'	14'-9"	OK
13	DINING	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	7'-8"	OK	8'-16'	N/A - SINGLE	OK
14	KITCHEN	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	7'-7"	OK	8'-16'	8'-8"	OK
15	DEN #1	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	6'-10"	OK	8'-16'	11'-4"	OK
16	DEN #2	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	6'-10"	OK	8'-16'	11'-4"	OK
17	LAUNDRY	RECESSED PENDENT	GLOBE	GL 4110	4.1	INTERMEDIATE (175F)	11.7 PSI	16'x16'	8'	4'-2"	OK	8'-16'	N/A - SINGLE	OK
18	COAT CLOSET	CONCEALED PENDENT	GLOBE	GL 4147	4.1	ORDINARY (155F)	13.4 PSI	16'x16'	8'	6'-8"	OK	8'-16'	N/A - SINGLE	OK
19	GARAGE	RECESSED PENDENT	GLOBE	GL 4110	4.1	ORDINARY (155F)	11.7 PSI	16'x16'	8'	8'-0"	OK	8'-16'	9'-0"	OK
20	GARAGE	RECESSED PENDENT	GLOBE	GL 4110	4.1	ORDINARY (155F)	11.7 PSI	16'x16'	8'	6'-8"	OK	8'-16'	9'-0"	OK
21	GARAGE	RECESSED PENDENT	GLOBE	GL 4110	4.1	ORDINARY (155F)	11.7 PSI	16'x16'	8'	7'-0"	OK	8'-16'	9'-0"	OK
22	GARAGE	RECESSED PENDENT	GLOBE	GL 4110	4.1	ORDINARY (155F)	11.7 PSI	16'x16'	8'	6'-8"	OK	8'-16'	9'-0"	OK
23	FURNACE	RECESSED PENDENT	GLOBE	GL 4110	4.1	INTERMEDIATE (175F)	11.7 PSI	16'x16'	8'	2'-8"	OK	8'-16'	N/A - SINGLE	OK

*MAX SPACING BASED ON DISTANCE TO HSW SPRINKLER



SPRINKLER HEADER ELEVATIONS

WARNING
 THE WATER SYSTEM FOR THIS HOME SUPPLIES FIRE SPRINKLERS THAT REQUIRE CERTAIN FLOWS AND PRESSURES TO FIGHT A FIRE. DEVICES THAT RESTRICT THE FLOW OR DECREASE THE PRESSURE OR AUTOMATICALLY SHUT OFF THE WATER TO THE FIRE SPRINKLER SYSTEM, SUCH AS WATER SOFTENERS, FILTRATION SYSTEMS, AND AUTOMATIC SHUTOFF VALVES, SHALL NOT BE ADDED TO THIS SYSTEM WITHOUT A REVIEW OF THE FIRE SPRINKLER SYSTEM BY A FIRE PROTECTION SPECIALIST. DO NOT REMOVE THIS SIGN.

NFPA 13D WARNING SIGN

WARNING SIGN TO BE ENGRAVED ON A METAL OR PLASTIC MATERIAL WITH LETTERS OF 1/4" (18 pt). (SHOWN FULL SIZE ABOVE). THE SIGN SHALL BE ATTACHED TO THE RESIDENCE WATER MAIN SHUTOFF VALVE USING A PERMANENT MEANS SUCH AS WIRE OR TIE WRAPS.

TABLE OF SPRINKLERS
 NOT TO SCALE

BORIK REMODEL
 1370 BLUE FALLS DRIVE
 CHULA VISTA, CA 91910



#	REVISION	DATE
0	ORIGINAL	2/7/14
1	CPVC REDESIGN	4/6/14
2	TABLE OF SPRINKLERS	11/1/14
3		
4		

LIMITATIONS AND ASSUMPTIONS



September 25, 2014

District Ref. No. FLW-14-043
Project No. N/A

Mr. Borik
FRANK C BORIK
1370 BLUE FALLS DR
CHULA VISTA, CA 91910-6806

SUBJECT: Fire Flow Calculations for 1370 Blue Falls Drive, Chula Vista CA 91910. APN: 642-306-31-00 (PZ: 711 / H-113-013)

Dear Mr. Borik,

Fire flow calculations for the subject site were performed by District Consultant using InfoWATER Version 10.0, under the following assumptions:

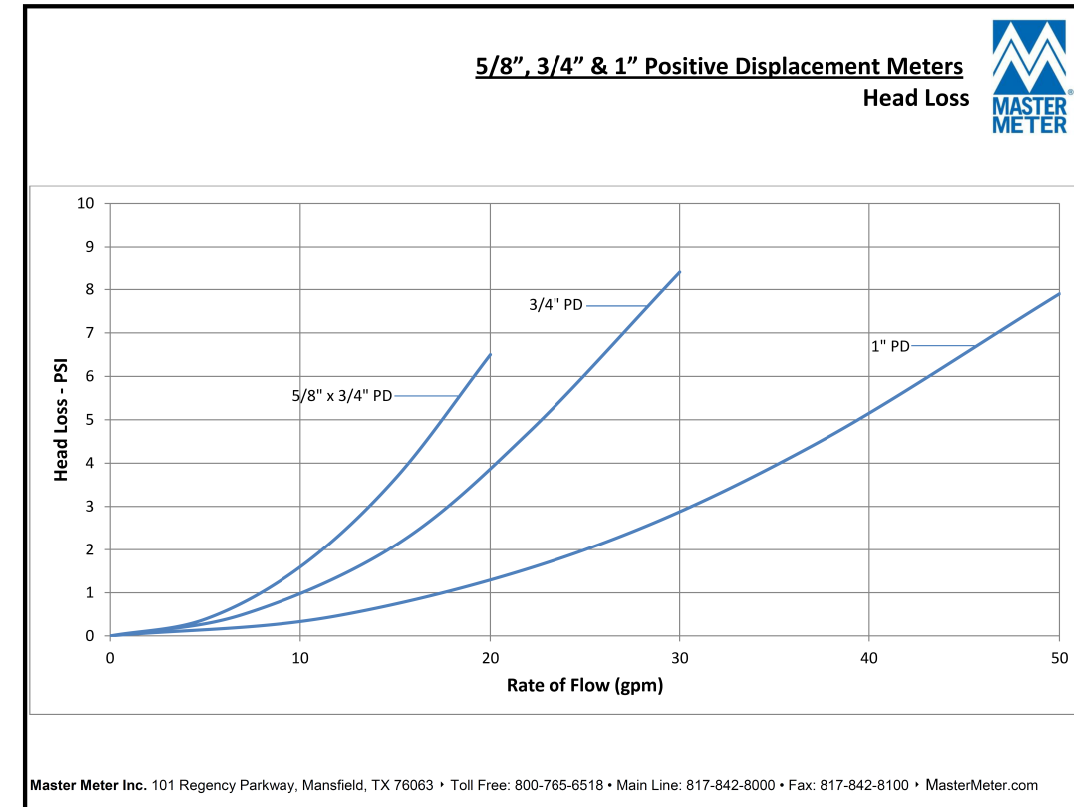
The water levels in storage facilities at the time of a fire are approximate to the operating levels that typically occur during a maximum day.
The prescribed **two-hour** fire duration coincides with a maximum day demand condition.
The immediate area around the fire flow node maintains a minimum pressure of 20 PSI.

The results are as follows:

STATIC PRESSURE: 89 PSI *(Based on tanks half-full)*
RESIDUAL PRESSURE: 79 PSI *(System and fire flow demand of 1,500 gallons per minute)*

Sincerely,

OTAY WATER DISTRICT
ENGINEERING PUBLIC SERVICES



NOTES:

1. HYDRAULIC CALCULATIONS WERE PERFORMED ON EACH COMPARTMENT THAT HAD 2 OR MORE SPRINKLERS. THE LIMITING CASE IS SPRINKLERS #1 AND #2 (SHOWN IN RED ON SHEETS F-01-02 AND F-02-02). ALL CALCULATIONS SHOWN ON SHEETS F-02-02 THRU F-02-05. CALCULATIONS WERE PERFORMED MANUALLY USING THE K-FACTOR FORMULA TO DETERMINE FLOW AND THE HAZEN-WILLIAMS FORMULA FOR PRESSURE LOSS AS A RESULT OF FLOW.
2. MAXIMUM ASSUMED FLOWRATE IS 35 GPM TO ACCOUNT FOR THE LIMITATION OF THE MAXIMUM FLOWRATE FOR A 1" METER OF 40 GPM MINUS A 5 GPM DOMESTIC WATER DEMAND.
3. ALL CALCULATIONS ASSUME THAT A MAXIMUM OF TWO (2) SPRINKLER HEADS ARE FLOWING IN ANY GIVEN COMPARTMENT. CALCULATIONS WERE PERFORMED FOR EVERY COMPARTMENT WHICH CONTAINED AT LEAST TWO (2) SPRINKLER HEADS.
4. SPRINKLERS IN THE LAUNDRY ROOM AND FURNACE ENCLOSURE ARE INTERMEDIATE TEMPERATURE SPRINKLERS (175°F).
5. PRESSURE LOSS FOR THE METER TAKEN FROM THE ABOVE GRAPH USING A 1" METER SIZE AND ACCOUNTED FOR IN THE HYDRAULIC CALCULATIONS.

DATE
11/17/14

REVISION
ORIGINAL

#

0

1

2

3

4

**HYDRAULIC
CALCULATIONS**
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910

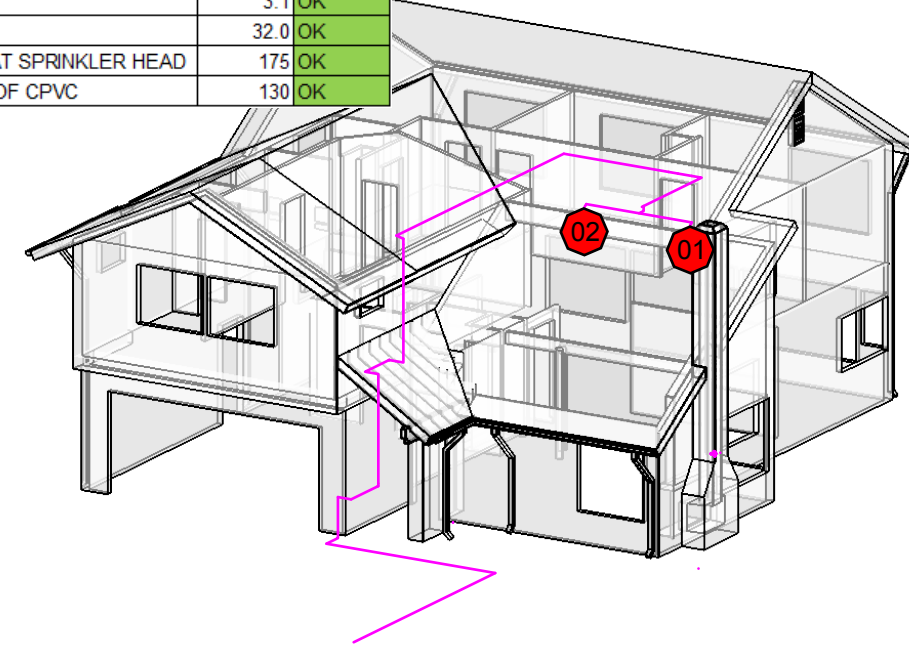


SPRINKLERS #1 & #2 - LIVING ROOM - HSW

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Eqv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node			
1 (Sprinkler #1)	1	210	q	0.0	1"	CPVC Tee Run	0	1	0	0.04	Pt 14.5	2		
			Q	16.0		CPVC Tee Branch	1	5	5				12	Pe 0.0
						CPVC 90° Elbow	1	7	7				16	Pf 0.7
2 (Sprinkler #2)	2	210	q	0.0	1"	CPVC Tee Run	0	1	0	0.04	Pt 14.5	3		
			Q	16.0		CPVC Tee Branch	1	5	5				12	Pe 0.0
						CPVC 90° Elbow	1	7	7				16	Pf 0.7
3 (BR3-Loft-LR Supply)		210	q	0.0	1"	CPVC Tee Run	2	1	2	0.16	Pt 15.2	4		
			Q	32.0		CPVC Tee Branch	2	5	10				33	Pe 0.0
						CPVC 90° Elbow	3	7	21				50.9	Pf 8.3
4 (MBR-Attic Supply)		210	q	0.0	1"	CPVC Tee Run	2	1	2	0.16	Pt 23.5	5		
			Q	32.0		CPVC Tee Branch	1	5	5				14	Pe 0.0
						CPVC 90° Elbow	1	7	7				35.3	Pf 5.7
5 (2F Riser)		107	q	0.0	1"	CPVC Tee Run	1	1	1	0.16	Pt 29.2	6		
			Q	32.0		CPVC Tee Branch	2	5	10				25	Pe 3.7
						CPVC 90° Elbow	2	7	14				35	Pf 5.7
6 (1F Riser)		18	q	0.0	1"	CPVC Tee Run	0	1	0	0.16	Pt 38.6	7		
			Q	32.0		CPVC Tee Branch	1	5	5				19	Pe 3.2
						CPVC 90° Elbow	2	7	14				30.1	Pf 4.9
7 (Riser Manifold)		0	q	0.0	1"	CPVC Tee Run	3	1	3	0.16	Pt 46.7	8		
			Q	32.0		CU Check Valve	1	5	5				11	Pe 0.6
						CU Tee Branch	1	3	3				12.5	Pf 2.0
8 (Water Supply Main)		-18	q	0.0	1"	Cu Elbows	5	3	15	0.27	Pt 49.4	9		
			Q	32.0		1" Ball Valve	1	1	1				16	Pe 0.6
						1" Flow Meter (psi)			3.3				55.3	Pf 14.7
REQUIRED PRESSURE AT STREET MAIN										Pt 68.0				

HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	68.0
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	3.1 OK
FLOWRATE < 35 GPM?	32.0 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK

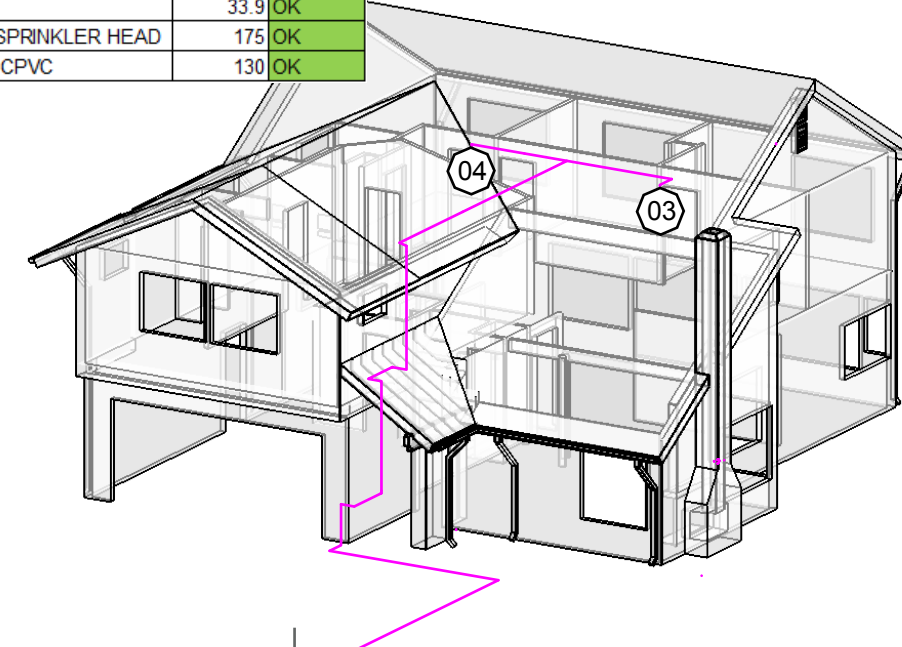
THIS IS THE LIMITING SPRINKLER CASE



SPRINKLERS #3 & #4 - LOFT - CONCEALED PENDENT

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Eqv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node			
1 (Sprinkler #3)	3	210	q	0	1"	CPVC Tee Run	0	1	0	0.04	Pt 13.4	2		
			Q	15.0		CPVC Tee Branch	1	5	5				12	Pe 0.0
						CPVC 90° Elbow	1	7	7				21.4	Pf 0.9
1 (Sprinkler #4)	4	210	q	0.0	1"	CPVC Tee Run	1	1	1	0.04	Pt 14.3	2		
			Q	15.5		CPVC Tee Branch	1	5	5				6	Pe 0.0
						CPVC 90° Elbow	0	7	0				13.2	Pf 0.6
2 (Sprinkler 3-4 Junct)		210	q	18.9	1"	CPVC Tee Run	2	1	2	0.18	Pt 14.8	3		
			Q	33.9		CPVC Tee Branch	1	5	5				14	Pe 0.0
						CPVC 90° Elbow	1	7	7				32.1	Pf 5.8
3 (MBR-Attic Supply)		210	q	0.0	1"	CPVC Tee Run	1	1	1	0.18	Pt 20.6	4		
			Q	33.9		CPVC Tee Branch	1	5	5				6	Pe 0.0
						CPVC 90° Elbow	0	7	0				27.3	Pf 4.9
4 (2F Riser)		107	q	0.0	1"	CPVC Tee Run	1	1	1	0.18	Pt 25.5	5		
			Q	33.9		CPVC Tee Branch	2	5	10				25	Pe 3.7
						CPVC 90° Elbow	2	7	14				35	Pf 6.3
5 (1F Riser)		18	q	0.0	1"	CPVC Tee Run	0	1	0	0.18	Pt 35.6	6		
			Q	33.9		CPVC Tee Branch	1	5	5				19	Pe 3.2
						CPVC 90° Elbow	2	7	14				30.1	Pf 5.4
6 (Riser Manifold)		0	q	0.0	1"	CPVC Tee Run	3	1	3	0.18	Pt 44.2	7		
			Q	33.9		CU Check Valve	1	5	5				11	Pe 0.6
						CU Tee Branch	1	3	3				12.5	Pf 2.3
7 (Water Supply Main)		-18	q	0.0	1"	Cu Elbows	5	3	15	0.30	Pt 47.1	8		
			Q	33.9		1" Ball Valve	1	1	1				16	Pe 0.6
						1" Flow Meter (psi)			3.7				55.3	Pf 16.3
REQUIRED PRESSURE AT STREET MAIN										Pt 67.8				

HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	67.8
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	3.3 OK
FLOWRATE < 35 GPM?	33.9 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



DATE
11/17/14

REVISION
ORIGINAL

0 1 2 3 4

HYDRAULIC CALCULATIONS
NOT TO SCALE

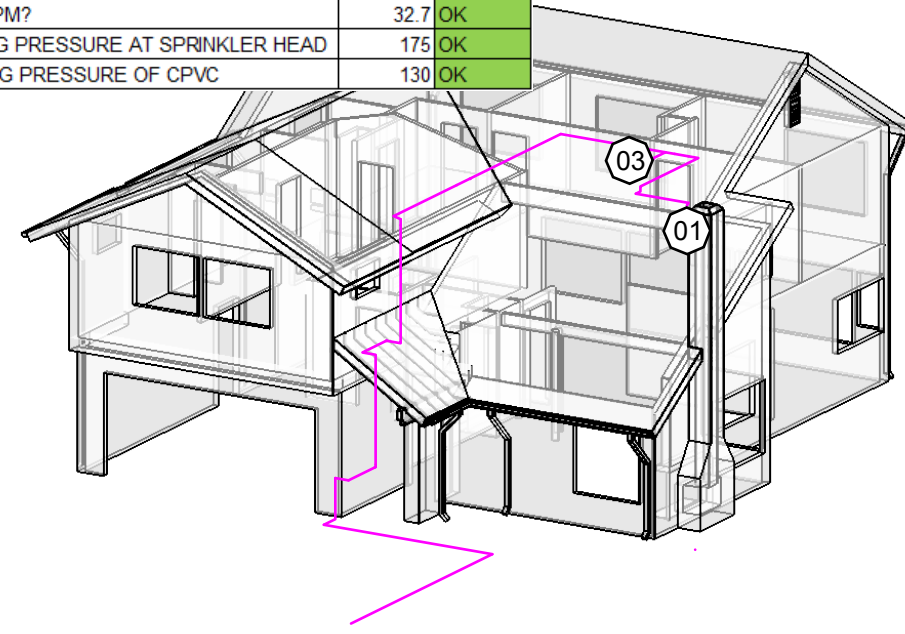
BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



SPRINKLERS #1 & #3 - LR HSW AND LOFT CONCEALED PENDENT

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node
1 (Sprinkler #1)	1	210	q	0	CPVC Tee Run	2	1	2	L 14.1	0.04	Pt 14.5	2
			Q	16.0	CPVC Tee Branch	2	5	10	F 33		Pe 0.0	
					CPVC 90° Elbow	3	7	21	T 47.1		Pf 2.1	
1 (Sprinkler #3)	3	210	q	16.7	CPVC Tee Run	0	1	0	L 9.4	0.17	Pt 16.6	2
			Q	32.7	CPVC Tee Branch	2	5	10	F 17		Pe 0.0	
					CPVC 90° Elbow	1	7	7	T 26.4		Pf 4.5	
3 (MBR-Attic Supply)		210	q	0.0	CPVC Tee Run	1	1	1	L 21.3	0.17	Pt 21.1	4
			Q	32.7	CPVC Tee Branch	1	5	5	F 6		Pe 0.0	
					CPVC 90° Elbow	0	7	0	T 27.3		Pf 4.6	
4 (2F Riser)		107	q	0.0	CPVC Tee Run	1	1	1	L 10	0.17	Pt 25.7	5
			Q	32.7	CPVC Tee Branch	2	5	10	F 25		Pe 3.7	
					CPVC 90° Elbow	2	7	14	T 35		Pf 5.9	
5 (1F Riser)		18	q	0.0	CPVC Tee Run	0	1	0	L 11.1	0.17	Pt 35.3	6
			Q	32.7	CPVC Tee Branch	1	5	5	F 19		Pe 3.2	
					CPVC 90° Elbow	2	7	14	T 30.1		Pf 5.1	
6 (Riser Manifold)		0	q	0.0	CPVC Tee Run	3	1	3	L 1.5	0.17	Pt 43.6	7
			Q	32.7	CU Check Valve	1	5	5	F 11		Pe 0.6	
					CU Tee Branch	1	3	3	T 12.5		Pf 2.1	
					1" Flow Meter (psi)		3.4		55.3		Pf 15.3	
REQUIRED PRESSURE AT STREET MAIN											Pt	65.7

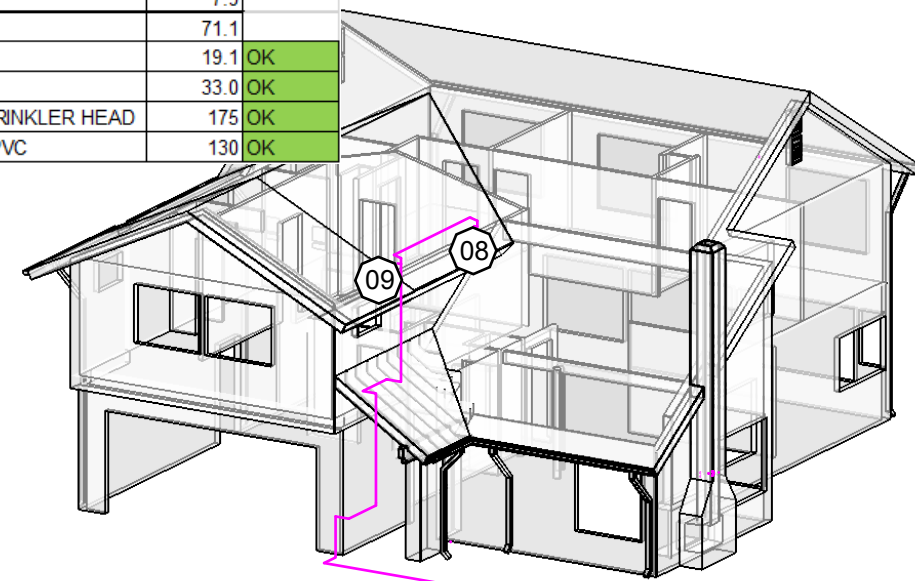
HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	65.7
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	5.4 OK
FLOWRATE < 35 GPM?	32.7 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



SPRINKLERS #8 & #9 - MBR - HSW

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node
1 (Sprinkler #8)	8	210	q	0	CPVC Tee Run	1	1	1	L 11.5	0.04	Pt 14.5	2
			Q	16.0	CPVC Tee Branch	2	5	10	F 32		Pe 0.0	
					CPVC 90° Elbow	3	7	21	T 43.5		Pf 2.0	
2 (Sprinkler #9)	9	210	q	17.0	CPVC Tee Run	0	1	0	L 0	0.17	Pt 16.5	3
			Q	33.0	CPVC Tee Branch	1	5	5	F 5		Pe 0.0	
					CPVC 90° Elbow	0	7	0	T 5		Pf 0.9	
3 (2F Riser)		107	q	0.0	CPVC Tee Run	0	1	0	L 9.1	0.17	Pt 17.3	4
			Q	33.0	CPVC Tee Branch	1	5	5	F 12		Pe 3.7	
					CPVC 90° Elbow	1	7	7	T 21.1		Pf 3.6	
4 (1F Riser)		18	q	0.0	CPVC Tee Run	0	1	0	L 11.1	0.17	Pt 17.3	5
			Q	33.0	CPVC Tee Branch	1	5	5	F 19		Pe 6.9	
					CPVC 90° Elbow	2	7	14	T 30.1		Pf 5.2	
554 (Riser Manifold)		0	q	0.0	CPVC Tee Run	3	1	3	L 1.5	0.17	Pt 29.4	6
			Q	33.0	CU Check Valve	1	5	5	F 11		Pe 0.6	
					CU Tee Branch	1	3	3	T 12.5		Pf 2.2	
6 (Water Supply Main)		-18	q	0.0	Cu Elbows	5	3	15	L 39.3	0.28	Pt 32.2	7
			Q	33.0	1" Ball Valve	1	1	1	F 16		Pe 0.6	
					1" Flow Meter (psi)		3.5		55.3		Pf 15.6	
REQUIRED PRESSURE AT STREET MAIN											Pt	52.0

HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	52.0
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	19.1 OK
FLOWRATE < 35 GPM?	33.0 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



DATE
11/17/14

REVISION
ORIGINAL

#	0	1	2	3	4
---	---	---	---	---	---

HYDRAULIC CALCULATIONS
NOT TO SCALE

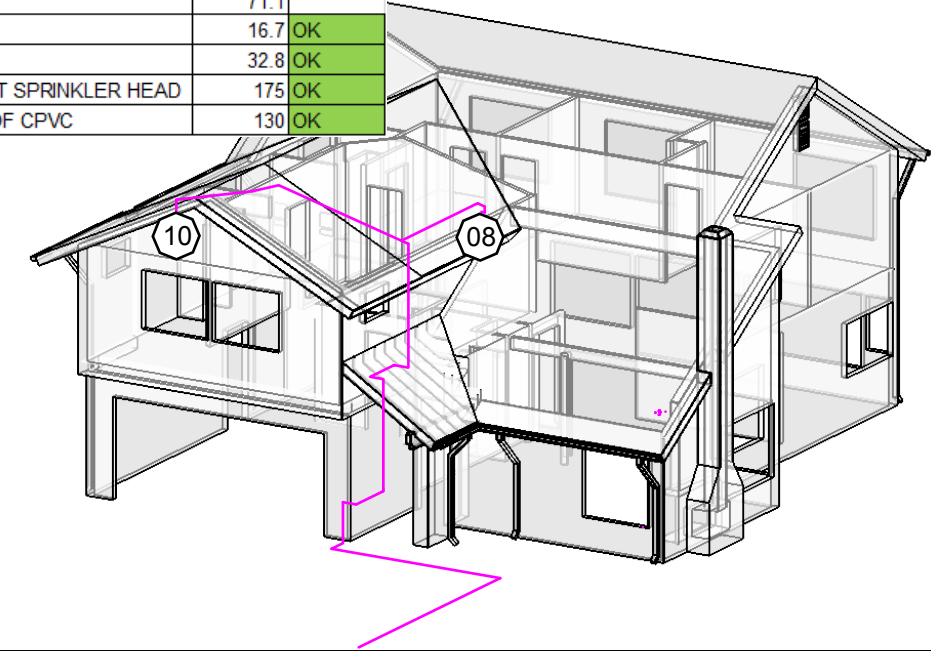
BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



SPRINKLERS #8 & #10 - MBR - HSW AND CONCEALED PENDENT

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node	
1 (Sprinkler #8)	8	210	q	0	CPVC Tee Run	1	1	1	L 18.2	0.04	Pt 14.5	2	
			Q	16.0	CPVC Tee Branch	2	5	10	F 32		Pe 0.0		
					CPVC 90° Elbow	3	7	21	T 50.2		Pf 2.3		
2 (Sprinkler #10)	10	210	q	16.8	CPVC Tee Run	0	1	0	L 11.5	0.17	Pt 16.8	3	
			Q	32.8	CPVC Tee Branch	1	5	5	F 8		Pe 0.0		
					CPVC 45° Elbow	3	1	3	T 19.5		Pf 3.3		
3 (2F Riser)		107	q	0.0	CPVC Tee Run	0	1	0	L 9.1	0.17	Pt 20.1	4	
			Q	32.8	CPVC Tee Branch	1	5	5	F 12		Pe 3.7		
					CPVC 90° Elbow	1	7	7	T 21.1		Pf 3.6		
4 (1F Riser)		18	q	0.0	CPVC Tee Run	0	1	0	L 11.1	0.17	Pt 20.1	5	
			Q	32.8	CPVC Tee Branch	1	5	5	F 19		Pe 6.9		
					CPVC 90° Elbow	2	7	14	T 30.1		Pf 5.1		
5 (Riser Manifold)		0	q	0.0	CPVC Tee Run	3	1	3	L 1.5	0.17	Pt 32.1	6	
			Q	32.8	CU Check Valve	1	5	5	F 11		Pe 0.6		
					CU Tee Branch	1	3	3	T 12.5		Pf 2.1		
6 (Water Supply Main)		-18	q	0.0	Cu Elbows	5	3	15	L 39.3	0.28	Pt 34.9	7	
			Q	32.8	1" Ball Valve	1	1	1	F 16		Pe 0.6		
					1" Flow Meter (psi)			3.5	55.3		Pf 15.4		
REQUIRED PRESSURE AT STREET MAIN											Pt	54.4	

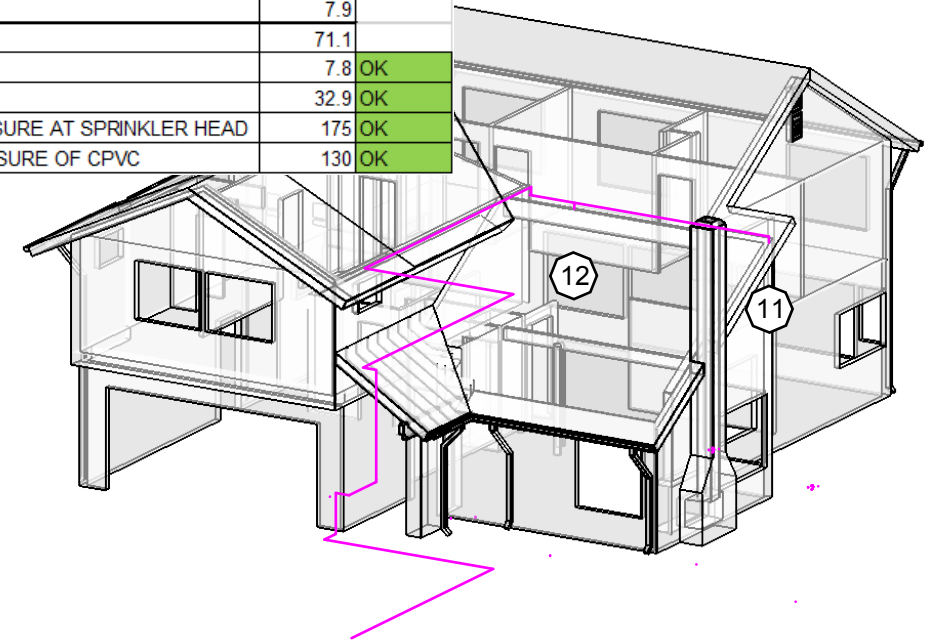
HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	54.4
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	16.7 OK
FLOWRATE < 35 GPM?	32.8 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



SPRINKLERS #11 & #12 - COVERED PATIO - HSW

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node	
1 (Sprinkler #11)	1	107	q	0	CPVC Tee Run	0	1	0	L 14.8	0.04	Pt 14.5	2	
			Q	16.0	CPVC Tee Branch	2	5	10	F 24		Pe 0.0		
					CPVC 90° Elbow	2	7	14	T 38.8		Pf 1.7		
2 (Sprinkler #12)	2	107	q	16.9	CPVC Tee Run	7	1	7	L 49.8	0.17	Pt 16.2	3	
			Q	32.9	CPVC Tee Branch	2	5	10	F 45		Pe 0.0		
					CPVC 90° Elbow	4	7	28	T 94.8		Pf 16.2		
3 (1F Riser)		18	q	0.0	CPVC Tee Run	0	1	0	L 11.1	0.17	Pt 32.5	4	
			Q	32.9	CPVC Tee Branch	1	5	5	F 19		Pe 3.2		
					CPVC 90° Elbow	2	7	14	T 30.1		Pf 5.1		
4 (Riser Manifold)		0	q	0.0	CPVC Tee Run	3	1	3	L 1.5	0.17	Pt 40.8	5	
			Q	32.9	CU Check Valve	1	5	5	F 11		Pe 0.6		
					CU Tee Branch	1	3	3	T 12.5		Pf 2.1		
5 (Water Supply Main)		-18	q	0.0	Cu Elbows	5	3	15	L 39.3	0.28	Pt 43.6		
			Q	32.9	1" Ball Valve	1	1	1	F 16		Pe 0.6		
					1" Flow Meter (psi)			3.5	55.3		Pf 15.5		
REQUIRED PRESSURE AT STREET MAIN											Pt	63.3	

HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	63.3
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	7.8 OK
FLOWRATE < 35 GPM?	32.9 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



DATE
11/17/14

REVISION
ORIGINAL

0
1
2
3
4

HYDRAULIC CALCULATIONS
NOT TO SCALE

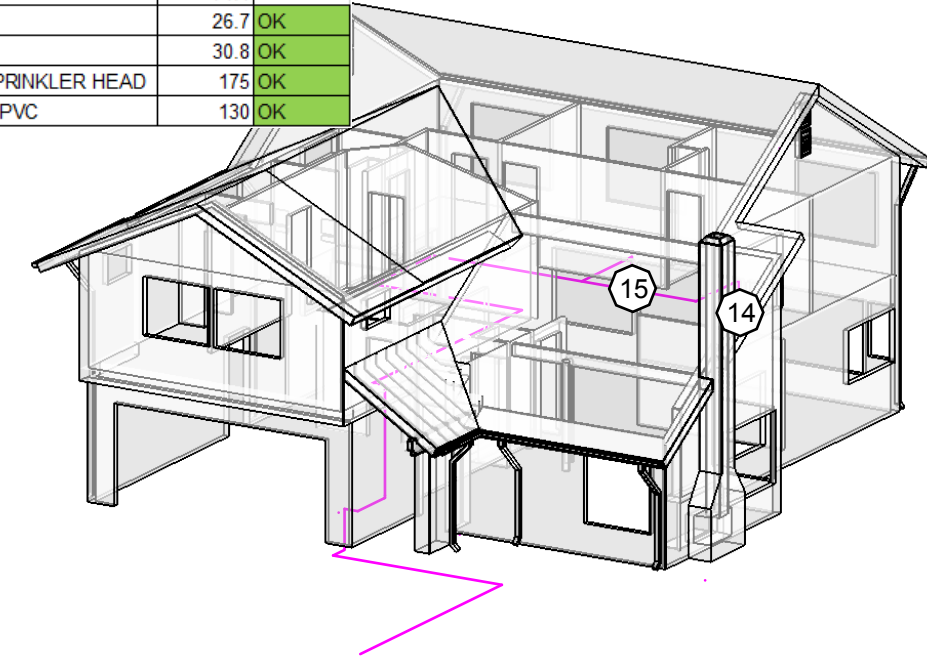
BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



SPRINKLERS #14 & #15 - KITCHEN-DEN - CONCEALED PENDENT

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node	
1 (Sprinkler #14)	14	107	q 0	1"	CPVC Tee Run	0	1	0	L 23.2	0.04	Pt 13.4	2	
			Q 15.0		CPVC Tee Branch	1	5	5	F 12	Pe 0.0			
					CPVC 90° Elbow	1	7	7	T 35.2	Pf 1.4			
2 (Sprinkler #15)	15	107	q 15.8	1"	CPVC Tee Run	1	1	1	L 6.3	0.15	Pt 14.8	3	
			Q 30.8		CPVC Tee Branch	1	5	5	F 6	Pe 0.0			
					CPVC 90° Elbow	0	7	0	T 12.3	Pf 1.9			
3 (1F Supply Header)		107	q 0.0	1"	CPVC Tee Run	5	1	5	L 37.3	0.15	Pt 16.7	4	
			Q 30.8		CPVC Tee Branch	0	5	0	F 33	Pe 0.0			
					CPVC 90° Elbow	4	7	28	T 70.3	Pf 10.6			
4 (1F Riser)		18	q 0.0	1"	CPVC Tee Run	0	1	0	L 11.1	0.15	Pt 16.7	5	
			Q 30.8		CPVC Tee Branch	1	5	5	F 19	Pe 3.2			
					CPVC 90° Elbow	2	7	14	T 30.1	Pf 4.5			
5 (Riser Manifold)		0	q 0.0	1"	CPVC Tee Run	3	1	3	L 1.5	0.15	Pt 24.4	6	
			Q 30.8		CU Check Valve	1	5	5	F 11	Pe 0.6			
					CU Tee Branch	1	3	3	T 12.5	Pf 1.9			
6 (Water Supply Main)		-18	q 0.0	1"	Cu Elbows	5	3	15	L 39.3	0.25	Pt 27.0	7	
			Q 30.8		1" Ball Valve	1	1	1	F 16	Pe 0.6			
					1" Flow Meter (psi)		3.1		T 55.3	Pf 13.7			
REQUIRED PRESSURE AT STREET MAIN											Pt	44.4	

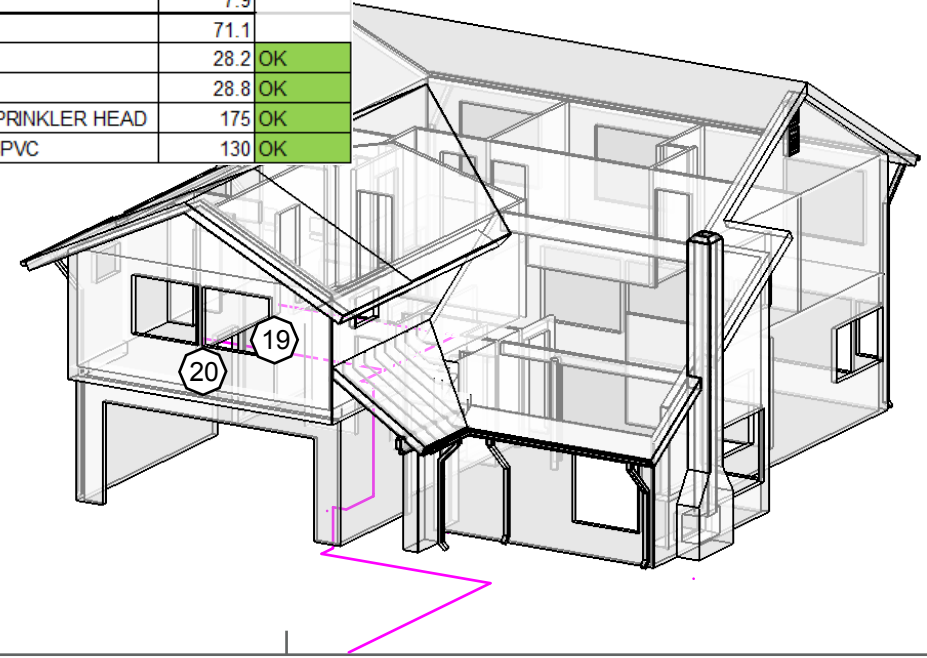
HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	44.4
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	26.7 OK
FLOWRATE < 35 GPM?	30.8 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



SPRINKLERS #19 & #20 - GARAGE - PENDENT

Start Node	ID	Elevation	Flow (GPM)	Pipe Size	Pipe Fittings And Devices. Total numbers in equivalent ft.	Qty	Eq. Ft.	Tot	Equiv. Pipe Lentgh	Friction Loss psi/ft	Pressure Summary	End Node	
1 (Sprinkler #19)	19	107	q 0	1"	CPVC Tee Run	2	1	2	L 23	0.04	Pt 11.7	2	
			Q 14.0		CPVC Tee Branch	1	5	5	F 14	Pe 0.0			
					CPVC 90° Elbow	1	7	7	T 37	Pf 1.3			
2 (Sprinkler #20)	20	107	q 14.8	1"	CPVC Tee Run	1	1	1	L 13.8	0.13	Pt 13.0	3	
			Q 28.8		CPVC Tee Branch	1	5	5	F 13	Pe 0.0			
					CPVC 90° Elbow	1	7	7	T 26.8	Pf 3.6			
3 (1F Riser)		18	q 0.0	1"	CPVC Tee Run	0	1	0	L 14.1	0.13	Pt 16.6	4	
			Q 28.8		CPVC Tee Branch	1	5	5	F 26	Pe 3.2			
					CPVC 90° Elbow	3	7	21	T 40.1	Pf 5.4			
4 (Riser Manifold)		0	q 0.0	1"	CPVC Tee Run	3	1	3	L 1.5	0.13	Pt 25.2	5	
			Q 28.8		CU Check Valve	1	5	5	F 11	Pe 0.6			
					CU Tee Branch	1	3	3	T 12.5	Pf 1.7			
5 (Water Supply Main)		-18	q 0.0	1"	Cu Elbows	5	3	15	L 39.3	0.22	Pt 27.5	6	
			Q 28.8		1" Ball Valve	1	1	1	F 16	Pe 0.6			
					1" Flow Meter (psi)		2.7		T 55.3	Pf 12.1			
REQUIRED PRESSURE AT STREET MAIN											Pt	42.9	

HYDRAULIC PRESSURE SUMMARY (PSI)	
MINIMUM REQUIRED PRESSURE AT WATER MAIN	42.9
STATIC WATER MAIN PRESSURE	89
RESIDUAL PRESSURE	79
10% REDUCTION	7.9
AVAILABLE PRESSURE	71.1
PRESSURE EXCESS	28.2 OK
FLOWRATE < 35 GPM?	28.8 OK
MAXIMUM WORKING PRESSURE AT SPRINKLER HEAD	175 OK
MAXIMUM OPERTING PRESSURE OF CPVC	130 OK



GLOBE RESIDENTIAL SPRINKLER GUIDE

GENERAL DESCRIPTION

Globe Fire Sprinkler Corporation Model GL pendent and horizontal sidewall residential sprinklers are Listed by Underwriters Laboratories Inc. for use in wet pipe sprinkler systems conforming to the design/usage requirements of NFPA 13, NFPA 13D and NFPA 13R. These sprinklers have been specially designed to conform to these standards as a minimum and additionally to the Underwriters Laboratories Inc. Standard for Residential Sprinklers for Fire Protection Service, UL 1626. They are also approved for use by the New York City Department of Buildings. Because residential sprinklers are significantly faster in operation (quick response) than ordinary sprinklers, it is extremely important that they be used in accordance with their U.L. listing, the appropriate NFPA standards and the criteria set forth herein by Globe.

WARNINGS

1. Installation of Globe GL Series Residential Sprinklers must conform to the installation requirements of this guide and must meet NFPA 13, 13D or 13R standards. They must also be installed in accordance with standards set by the authority having jurisdiction over the system installation.
2. The contractor is responsible to give the owner of the system, or his representative, a copy of this guide. Further, the owner should give a copy of this guide to a succeeding owner.
3. The owner is responsible for maintaining the system in proper working order.
4. Residential automatic sprinkler systems should be maintained and inspected in accordance with NFPA 13, 13D, 13R and 25 specifications. Professional maintenance is recommended.
5. Any questions regarding the installation of Globe GL Series Residential Sprinklers not answered in this guide may be directed to the Globe Fire Sprinkler Corporation and/or the National Fire Protection Association, as well as the authority having jurisdiction.
6. When the specifications in this guide are more strict than those of the NFPA Standards or the authority having jurisdiction, this guide must take precedence.
7. Areas such as hallways, stairwells, landings, dinettes and rooms must be separated by beams, lintels or soffits that are 8 or more inches in depth to be considered single compartments.
8. Only use the minimum number of sprinklers necessary for each compartment. Do NOT use more sprinklers than required per compartment.
9. Globe GL Series Residential Sprinklers must not be installed on soffits or beams that are greater than 3 inches in depth.
10. Beams that are 3 inches in depth or greater may be located so that their centerlines are along the boundaries of adjacent sprinkler coverage areas.
11. When a beam or partition extends down from the peak of a room, it tends to slow down the operation of the first sprinkler.
12. Use only a maximum torque of 25 ft. lbs. to install Globe GL Series Residential Sprinklers. Use of higher torque levels may distort the seating area the sprinkler, resulting in leakage.
13. Do not hang anything from the sprinklers.
14. Do not put curtains, drapes or valences around sprinklers.
15. Do not use soap and water, detergents, cleaning agents, ammonia or other chemicals to clean sprinklers. To remove dust, cobwebs, lint, etc., carefully use a feather duster or vacuum with a soft brush attachment.

IMPORTANT NOTES

1. Residential Fire Sprinkler Systems should only be designed and installed by competent professionals having full knowledge of the special design/usage requirements involved. Any changes necessary to an existing approved system should only be performed by such competent professional individuals.
2. Should the original water supply used to design the approved installed system change, it is most important that its effect on the sprinkler system be reviewed by competent professionals familiar with these special fire protection systems.
3. More information concerning Globe's GL Series Residential Sprinklers may be obtained upon request to the Globe "Customer Service Department" at the address contained in this document.

GLOBE RESIDENTIAL SPRINKLER GUIDE

NFPA 13 REQUIREMENTS:

When sprinklers are used in NFPA 13 Systems, A 0.1 Design Density minimum shall be utilized.

NFPA 13D REQUIREMENTS:

For each of the following situations, the number of sprinklers in the design area shall be all of the sprinklers within a compartment, up to a maximum of two sprinklers, that require the greatest hydraulic demand:

- (1). A flat smooth, horizontal ceiling with no beams up to a maximum of 24 ft. above the floor.
- (2). A smooth flat, sloped ceiling with no beams up to a maximum slope of 8 in 12. The highest portion of the ceiling shall not be more than 24 ft. above the floor. The highest sprinkler in the sloped portion of the ceiling shall be above all openings from that compartment containing the sloped ceiling into any communicating spaces.
- (3). A sloped ceiling with beams up to 14 in. deep with pendent sprinklers under the beams. The compartment containing the sloped, beam ceiling shall be a maximum of 600 ft² in area. The slope of the ceiling shall be between 2 in 12 and 8 in 12. The highest portion of the ceiling shall not be more than 24 ft. above the floor. The highest sprinkler in the sloped portion of the ceiling shall be above all openings from the compartment containing the sloped ceiling into any communicating spaces.
- (4). A sloped ceiling with beams of any depth with sidewall or pendent sprinklers in each pocket formed by the beams. The compartment containing the sloped, beamed ceiling shall be a maximum of 600 ft² in area. The slope of the ceiling shall be between 2 in 12 and 8 in 12. The highest portion of the ceiling shall not be more than 24 ft above the floor.

For situations not meeting one of the conditions above, residential sprinklers listed for use in specific ceiling configurations shall be permitted to be used in accordance with their listings.

For situations not meeting one of the conditions above, the number of sprinklers in the design area shall be determined in consultation with the authority having jurisdiction as appropriate for the conditions. Sprinklers shall be installed in accordance with their listing where a type of ceiling configuration is referenced in the listing.

NFPA 13R REQUIREMENTS:

Horizontal Ceiling criteria may be used for sloped ceiling configurations up to 8:12 pitch when acceptable to the Local Authority having Jurisdiction.

The following pages contain illustrations for customers reference. If conflicting data is found, NFPA 13, 13D, or 13R requirements take precedence.

#	REVISION	DATE
0	ORIGINAL	10/25/14
1		
2		
3		
4		

**MANUFACTURER
DATA**
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



GLOBE RESIDENTIAL SPRINKLER DATA

GL SERIES RESIDENTIAL SPRINKLER DESIGN GUIDE

STYLE	SIN MODEL	K FACTOR	TEMP. °F	COVERAGE FT x FT	MINIMUM FLOW GPM *	MINIMUM PRESSURE PSI *
PENDENT & RECESSED	GL4110	4.1	155, 175	12 x 12	11	7.2
				14 x 14	12	8.6
				16 x 16	14	11.7
PENDENT & RECESSED	GL4910	4.9	155, 175	12 x 12	13	7
				14 x 14	14	8.2
				16 x 16	14	8.2
				18 x 18	18	13.5
				20 x 20	20	16.7
ADJUSTABLE CONCEALED PENDENT	GL4147	4.1	155	12 x 12	11	7.2
				14 x 14	15	13.4
				16 x 16	15	13.4
ADJUSTABLE CONCEALED PENDENT	GL4947	4.9	155	12 x 12	13	7
				14 x 14	14	8.2
				16 x 16	14	8.2
				18 x 18	17	12
				20 x 20	20	16.7
ONE INCH ADJUSTABLE CONCEALED PENDENT	GL4906	4.9	155	12 x 12	13	7
				14 x 14	13	7
				16 x 16	13	7
				18 x 18	17	12
				20 x 20	20	16.7
HORIZONTAL SIDEWALL & RECESSED	GL4231	4.2	155, 175	12 x 12	13	9.6
				14 x 14	15	12.8
				16 x 16	16	14.5
				16 x 18	19	20.5
				16 x 20	23	30
HORIZONTAL SIDEWALL & RECESSED	GL4431	4.4	155, 175	12 x 12	13	8.7
				14 x 14	15	11.6
				16 x 16	16	13.2
				16 x 18	19	18.7
				16 x 20	23	27.3
PENDENT & RECESSED	GL5610	5.6	155	12 x 12	15	7.2
				14 x 14	19	11.5
				16 x 16	19	11.5
				18 x 18	21	14.1
PENDENT & RECESSED	GL3010	3.0	155	20 x 20	24	18.4
				12 x 12	8	7.1
				14 x 14	10	11.1

*WHEN THESE SPRINKLERS ARE USED IN NFPA 13 SYSTEMS, A 0.1 DESIGN DENSITY MINIMUM SHALL BE UTILIZED.

GLOBE INSTALLATION DATA NEAR HEAT SOURCES

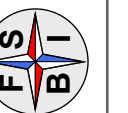
GL SERIES RESIDENTIAL SPRINKLERS PROXIMITY OF SPRINKLERS TO HEAT SOURCES

HEAT SOURCE	DIMENSION
Lateral distance from the sides of an open hearth fireplace	3'-0"
Lateral distance from the sides of a recessed hearth fireplace	3'-0"
Lateral distance from the front of a recessed hearth fireplace	7'-0"
Lateral distance from the surface of a coal or wood burning stove	3'-6"
Lateral distance from the surface of a kitchen range	1'-6"
Lateral distance from a wall oven	1'-6"
Lateral distance from the surface of hot air flues	1'-6"
Lateral distance from uninsulated heating ducts	1'-6"
Lateral distance from uninsulated water pipes	1'-0"
Lateral distance from the edges of a ceiling mounted hot air diffuser	2'-0"
Lateral distance from the sides of a wall mounted hot air diffuser	2'-0"
Lateral distance from the front of a wall mounted hot air diffuser	3'-0"
Lateral distance from the surface of a water heater or furnace	0'-6"
Lateral distance from a 250 watt, or less, light fixture	0'-6"

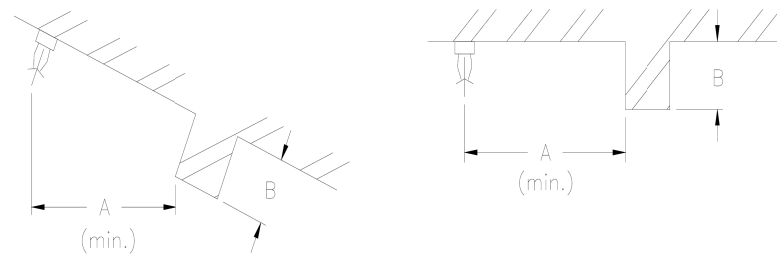
DATE	REVISION	#
10/25/14	ORIGINAL	0
		1
		2
		3
		4

**MANUFACTURER
DATA**
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910

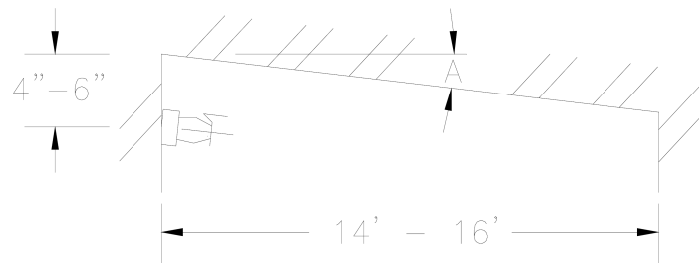


GL SERIES RESIDENTIAL PENDENT SPRINKLERS DISTANCE FROM OBSTRUCTIONS



MIN. ALLOWABLE A	B DIMENSION
2'-4"	0'-4"
3'-4"	0'-6"
4'-0"	0'-8"
4'-4"	0'-10"
5'-0"	1'-0"
5'-8"	1'-2"
6'-4"	1'-4"

GL SERIES RESIDENTIAL HORIZONTAL SIDEWALL AND RECESSED HORIZONTAL SIDEWALL SPRINKLERS USED ON A PITCHED CEILING WITH DEFLECTOR PARALLEL TO CEILING



NOTE: ANGLE A NOT TO EXCEED 30°.

TABLE 2a. Dimensions and Physical Characteristics of Copper Tube: TYPE K

Nominal or Standard Size, inches	Nominal Dimensions, inches			Calculated Values (based on nominal dimensions)				
	Outside Diameter	Inside Diameter	Wall Thickness	Cross Sectional Area of Bore, sq inches	Weight of Tube Only, pounds per linear ft	Weight of Tube & Water, pounds per linear ft	Contents of Tube per linear ft	
							Cu ft	Gal
1/4	.375	.305	.035	.073	.145	.177	.00051	.00379
3/8	.500	.402	.049	.127	.269	.324	.00088	.00660
1/2	.625	.527	.049	.218	.344	.438	.00151	.0113
5/8	.750	.652	.049	.334	.418	.562	.00232	.0174
3/4	.875	.745	.065	.436	.641	.829	.00303	.0227
1	1.125	.995	.065	.778	.839	1.18	.00540	.0404
1 1/4	1.375	1.245	.065	1.22	1.04	1.57	.00847	.0634
1 1/2	1.625	1.481	.072	1.72	1.36	2.10	.0119	.0894
2	2.125	1.959	.083	3.01	2.06	3.36	.0209	.156
2 1/2	2.625	2.435	.095	4.66	2.93	4.94	.0324	.242
3	3.125	2.907	.109	6.64	4.00	6.87	.0461	.345
3 1/2	3.625	3.385	.120	9.00	5.12	9.01	.0625	.468
4	4.125	3.857	.134	11.7	6.51	11.6	.0813	.608
5	5.125	4.805	.160	18.1	9.67	17.5	.126	.940
6	6.125	5.741	.192	25.9	13.9	25.1	.180	1.35
8	8.125	7.583	.271	45.2	25.9	45.4	.314	2.35
10	10.125	9.449	.338	70.1	40.3	70.6	.487	3.64
12	12.125	11.315	.405	100.55	57.8	101	.701	5.25

TABLE 7. Pressure Loss in Fittings and Valves Expressed as Equivalent Length of Tube, feet

Nominal or Standard Size, in	Fittings					Valves			
	Standard Ell		90° Tee Side Branch	90° Tee Straight Run	Coupling	Ball	Gate	Butfly	Check
	90°	45°							
3/8	.5	—	1.5	—	—	—	—	—	1.5
1/2	1	.5	2	—	—	—	—	—	2
5/8	1.5	.5	2	—	—	—	—	—	2.5
3/4	2	.5	3	—	—	—	—	—	3
1	2.5	1	4.5	—	—	.5	—	—	4.5
1 1/4	3	1	5.5	.5	.5	.5	—	—	5.5
1 1/2	4	1.5	7	.5	.5	.5	—	—	6.5
2	5.5	2	9	.5	.5	.5	.5	7.5	9
2 1/2	7	2.5	12	.5	.5	—	1	10	11.5
3	9	3.5	15	1	1	—	1.5	15.5	14.5
3 1/2	9	3.5	14	1	1	—	2	—	12.5
4	12.5	5	21	1	1	—	2	16	18.5
5	16	6	27	1.5	1.5	—	3	11.5	23.5
6	19	7	34	2	2	—	3.5	13.5	26.5
8	29	11	50	3	3	—	5	12.5	39

NOTES: Allowances are for streamlined soldered fittings and recessed threaded fittings. For threaded fittings, double the allowances shown in the table. The equivalent lengths presented above are based upon a C factor of 150 in the Hazen-Williams friction loss formula. The lengths shown are rounded to the nearest half foot.

DATA FROM THE COPPER TUBING HANDBOOK,
COPPER DEVELOPMENT ASSOCIATION, 2011

F-03
3 OF 10

DATE
10/25/14

REVISION
ORIGINAL

0 1 2 3 4

MANUFACTURER
DATA
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910





RD13 RISER



VSR-SG Specifications:
UL, CUL, CSFM listed, and CE Marked
Service Pressure: 175 PSI (12.07 BAR) - UL
Flow Sensitivity Range for Signal: 4-10 GPM (15-38 LPM) - UL
Maximum Surge: 18 FPS (5.5 MPS)
Contact Ratings: Two sets of SPDT (Form C)
 10.0 Amps at 125/250V AC
 2.0 Amps at 30V DC Resistive
 10 m Amps min. at 24V DC
Conduit Entrances: Two knockouts provided for 1/2" conduit.
Environmental Specifications:
 Temperature range: 40°F - 120°F (4.5°C - 49°C) - UL
Replacement VSR-SG: Stock number 1144460

Service Use:
 Automatic Sprinkler NFPA-13
 One or two family dwelling NFPA-13D
 Residential occupancy up to four stories NFPA-13R
 National Fire Alarm Code NFPA-72
 British Standard BS9251
Optional: Cover Tamper Switch Kit, stock number 0090148
Replaceable Components: Retard/Switch Assembly, stock number 1029030
Gauge and flow switch shipped loose in box.

Models:

1"	RD13 Riser	PN 1119067
1 1/4"	RD13 Riser	PN 1119077
1 1/2"	RD13 Riser	PN 1119087
2"	RD13 Riser	PN 1119097

The RD13 Riser (with NPT connectors) is constructed from Listed CPVC products suitable for fire sprinkler services subject to the limitations and installation requirements of Flameguard® CPVC pipe and Spears® CPVC fittings. The RD13 Riser incorporates a VSR-SG flow switch, gauge, and drain/test valve. The VSR-SG flow switch is equipped with union connection to facilitate the installation and removal of the switch in confined spaces.

Installation

- Using appropriate fittings connect the main water supply to the bottom of the riser and the drain connection to an adequate drain location capable of handling the drain discharge. The riser can be mounted in the horizontal or vertical position. Direction of flow is indicated in Fig. 1. The waterflow switch must be located on the top or on the side of the pipe when installed in the horizontal position. This will prevent debris from entering the throat of the waterflow switch which could interfere with proper operation. The 1" NPT adaptor coupling is shipped loose and may be used to ease installation.
- Following CPVC manufacturer's instructions for preparation and gluing of CPVC piping systems, glue the main riser to the main supply line for the sprinkler heads.
Note: All glued connections must be completed and cured before the flowswitch is installed.

Threaded Connections

- A thread sealant shall be used in making threaded connections. Teflon® thread tape is the recommended sealant. Some thread sealants other than Teflon thread tape contain solvents or other materials that may be damaging to CPVC. For other types of thread sealants, which have been specifically investigated and confirmed to be "System Compatible", refer to www.spearsmfg.com. Attach gauge to riser. Apply Teflon® tape to male fitting of gauge only. See Fig. 1.
- Check to make sure the proper paddle is installed on the switch. (Paddle size must match the riser pipe size and Tee manufacture.)
- Install the flow switch to the RD13 Riser. **Verify that the o-ring is properly positioned in its groove.** Hand tighten the nut to the union after orienting



Do not over-tighten the union nut, hand tighten only. Use of a wrench may cause damage to the union nut.

Potter Electric Signal Company, LLC • St. Louis, MO • Cust Service: 866-572-3005 • Tech Support: 866-956-0988 • Canada 888-882-1833 • www.pottersignal.com

PRINTED IN USA

MFG. #5401152 - REV J
02/12

PAGE 1 OF 2

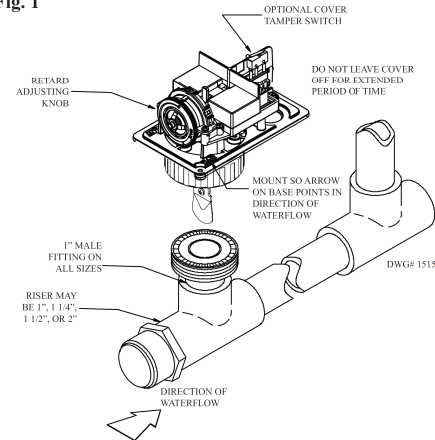


RD13 RISER

Removal

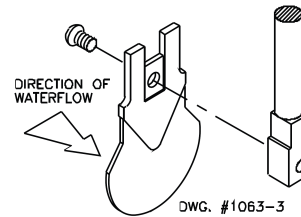
- To prevent accidental water damage, all control valves should be shut tight and the system completely drained before waterflow detectors are removed or replaced.
- Turn off electrical power to the detector, then disconnect wiring.
- Loosen nut on union fitting.
- Lift detector clear of pipe.

Fig. 1



Retard Adjustment

The delay can be adjusted by rotating the retard adjustment knob from 0 to the max setting (60-90 seconds). The time delay should be set at the minimum required to prevent false alarms.



Important:

The paddles have raised lettering that show the pipe size and the TEE manufacturer they are to be used with. The proper paddle must be used. The paddle must be properly attached and the screw that holds the paddle must be securely tightened.

Fig. 2 Dimensions *(See Chart Below)

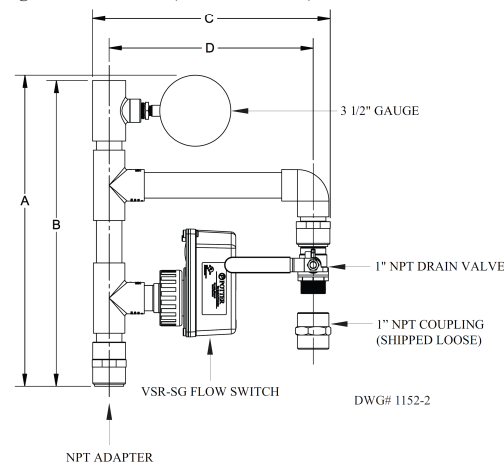
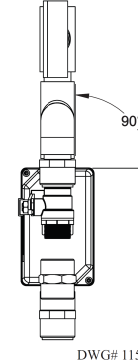


Fig. 3 Orientation



Flow switch must be properly orientated. Side of cover must be perpendicular with the pipe. Improper orientation could delay or prevent notification of waterflow.

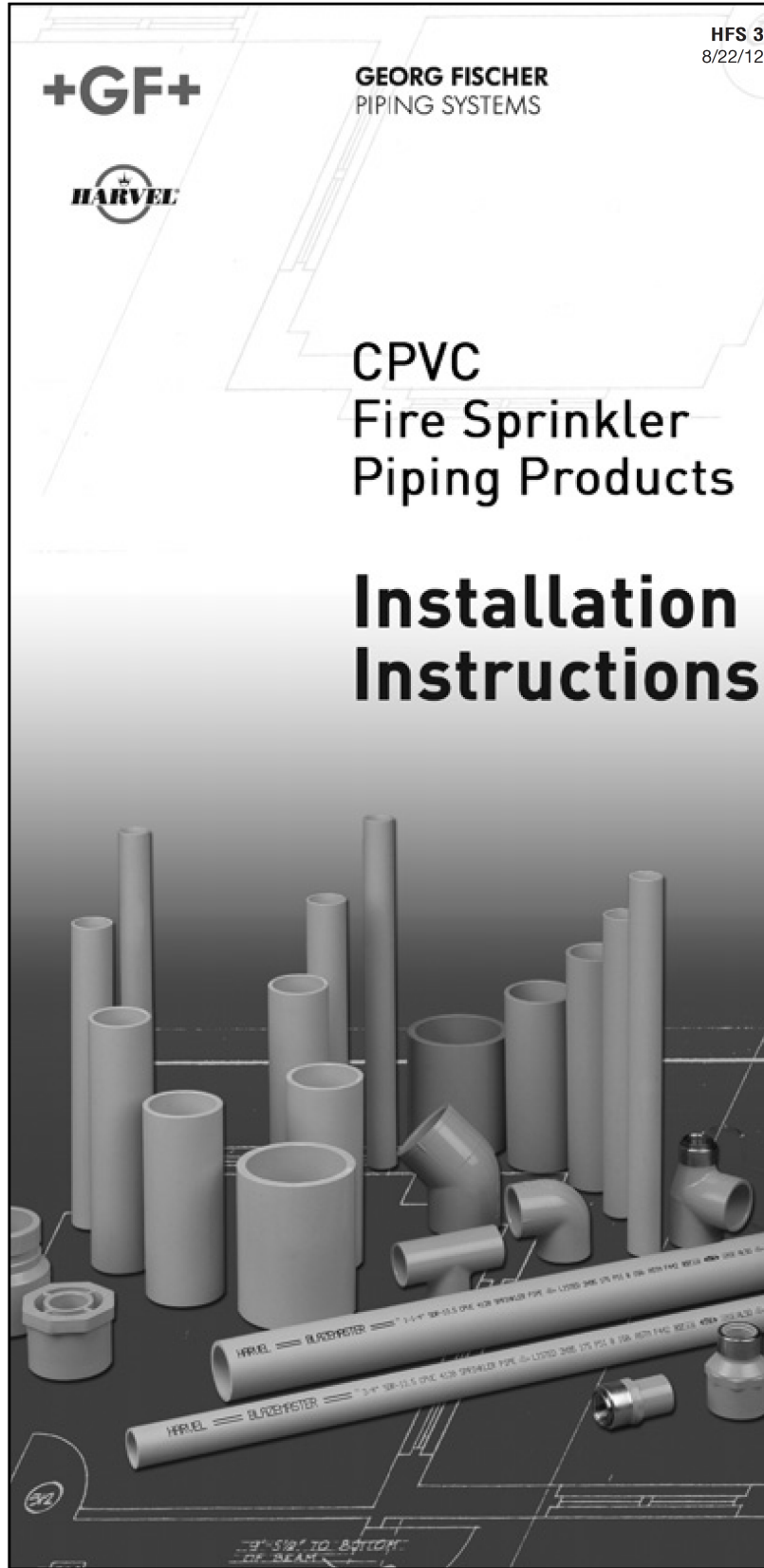
*RD13 Risers (ASSEMBLED DIMENSIONS)										
Riser Size	Model Number	Part Number	Dimension "A"		Dimension "B"		Dimension "C"		Dimension "D"	
			(in.)	(mm.)	(in.)	(mm.)	(in.)	(mm.)	(in.)	(mm.)
1"	RD13-100-1	1119067	16	406	15 3/4	400	12 1/4	311	10 1/2	267
1 1/4"	RD13-125-1	1119077	16 5/8	422	16 1/2	419	12 1/2	318	10 5/8	270
1 1/2"	RD13-150-1	1119087	N/A	N/A	16 3/4	425	12 3/4	324	10 3/4	273
2"	RD13-200-1	1119097	N/A	N/A	18 1/4	464	13 3/8	340	11 1/8	283

PRINTED IN USA

MFG. #5401152 - REV J
02/12

PAGE 2 OF 2





HFS 3
8/22/12

Technical Data

Product Ratings and Capabilities

GF HARVEL CPVC Fire Sprinkler pipe is produced in SDR 13.5 dimensions. SDR, or Standard Dimensional Ratio, means the pipe wall thickness is directly proportional to the outside diameter. GF Harvel CPVC Fire Sprinkler pipe is produced to the specifications of ASTM F 442. CPVC Fire Sprinkler fittings are produced in Schedule 40 and 80 dimensions in accordance with ASTM F437, ASTM F438, and ASTM F439. Underwriters Laboratories has listed GF Harvel CPVC Fire Sprinkler Products for a rated working pressure of 175 psi at 150° F for sprinkler service.

Nominal Size	Average OD	Average ID	Pounds Per Feet
3/4 (20)	1.050 (26.7)	.874 (22.5)	.168
1 (25)	1.315 (33.4)	1.101 (28.2)	.262
1-1/4 (32)	1.660 (42.2)	1.394 (35.6)	.418
1-1/2 (40)	1.900 (48.3)	1.598 (40.7)	.548
2 (50)	2.375 (60.3)	2.003 (50.9)	.859
2-1/2 (65)	2.875 (73.0)	2.423 (61.5)	1.257
3 (80)	3.500 (88.9)	2.950 (75.0)	1.867

Hydraulic Design

Hydraulic calculations for the sizing of a GF Harvel CPVC Fire Sprinkler System shall be calculated using a Hazen-Williams C value of 150. Pipe friction loss calculations shall be made according to NFPA Standard 13.

The following table shows the allowance for friction loss for fittings, expressed as equivalent length of pipe. (For additional information regarding friction loss, refer to HFS-4 Friction Loss Table.)

	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
Tee Run	1	1	1	1	1	2	2
Tee Branch	3	5	6	8	10	12	15
90° Elbow	7	7	8	9	11	12	13
45° Elbow	1	1	2	2	2	3	4
Coupling	1	1	1	1	1	2	2

Concealed Installations

With concealed installations, in accordance with the UL Listing, the minimum protection shall consist of one layer of 3/8 in. gypsum wallboard, or a suspended membrane ceiling with lay-in panels or tiles having a weight of not less than .35 lbs. per ft². when installed with metallic support grids, or 1/2 in. plywood soffits. For residential occupancies defined in NFPA 13D and 13R, the minimum protection may consist of one layer of 1/2 in. plywood.

GF Harvel CPVC Fire Sprinkler piping products can be used in sprinkler systems employing sprinkler heads rated at 225°F or lower when installed concealed (protected) in accordance with the Listing, and the maximum temperature rating (150°F) of the pipe and fittings is not exceeded.

Exposed Installations

As an alternative to the minimum protection requirements called out for concealed installations, GF Harvel CPVC Fire Sprinkler Products are UL Listed for systems without protection, (exposed) when subject to the following additional limitations:

Standard Coverage and Residential Sprinklers

Exposed CPVC Fire Sprinkler piping shall be installed below a smooth, flat, horizontal ceiling construction and require the use of FS-5 one step solvent cement.

Pendent Sprinklers

Light Hazard or Residential Pendent Sprinklers

Listed quick response, 170°F maximum temperature rated pendent sprinklers having deflectors installed within 8 inches of the ceiling; or, Listed residential, 170°F maximum temperature rated pendent sprinklers located in accordance with their Listing and a maximum distance between sprinklers not to exceed 15 feet. The piping shall be mounted directly to the ceiling.

#	REVISION	DATE
0	ORIGINAL	10/25/14
1		
2		
3		
4		

**MANUFACTURER
DATA**
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



can be modified and adhered to the pipe as a bearing support such that the shoulder of the fitting rests on the clamp. Follow GF Harvel's recommended cure time.

7. Do not use riser clamps that squeeze the pipe and depend on compression of the pipe to support the weight.
8. Hangers and straps shall not compress, distort, cut or abrade the piping and shall allow for free movement of the pipe to allow for thermal expansion and contraction.
9. Maintain vertical piping in straight alignment with supports at each floor level, or at 10 feet (3.05 m) intervals, whichever is less.
10. CPVC risers in vertical shafts or in buildings with ceilings over 25 feet (7.62 m), shall be aligned straightly and supported at each floor level, or at 10 feet (3.05 m) intervals, whichever is less.

Garages per NFPA 13R

GF Harvel CPVC Fire Sprinkler Products are UL Listed for use in 13R Garage systems with the following restrictions:

- Protection shall be provided for GF Harvel CPVC sprinkler pipe and fittings. The minimum protection shall consist of either one layer of 3/8 in. thick gypsum or 1/2 in. thick plywood.
- Listed pendent or sidewall sprinklers with a maximum temperature rating of 225°F shall be utilized. All sprinklers shall be installed per the manufacturer's published installation instructions.
- The system shall be installed per the requirements of NFPA 13R.
- The CPVC pipe and fittings shall be installed per Georg Fischer Harvel LLC CPVC Fire Sprinkler Piping Products Installation Instructions

NOTICE

NFPA 13D, Section 8.6.4, states: "Sprinklers are not required in garages, open attached porches, carports, and similar structures." Since sprinklers are not required in NFPA 13D garages, these installations do not fall within the scope of the UL Listing. However, GF Harvel CPVC Fire Sprinkler Piping Products may be installed in NFPA 13D garages with the approval of the local authority having jurisdiction.

Solvent Cementing Procedures

CAUTION

Read and understand all instructions prior to assembly. Follow all instructions. Failure to follow instructions during joining and testing may result in pipe failure, clogged waterways, or leakage.

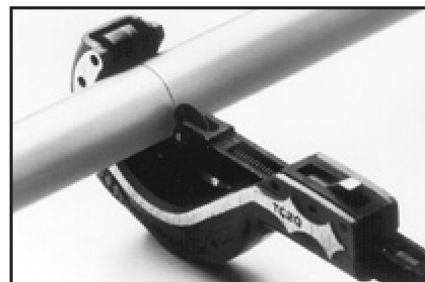
GF Harvel recommends the use of Spears FS-5 One-Step Low VOC Solvent Cement to join the pipe and fittings. However, Ipex BM-5, Nibco FP-1000, and Tyco Fire Products TFP-500 CPVC solvent cements can also be used provided that the assembly and curing instructions referenced in this manual are used. The One-Step process eliminates the need of the primer application, as the cement itself provides adequate softening of the joining surfaces. This joining method simplifies installation by reducing labor and offers faster curing times prior to pressure testing in most cases. Note: Follow appropriate cure times for the solvent cement chosen.

BEFORE APPLYING CEMENT, appropriate safety precautions should be taken. Cement should be stored in the shade between 40°F and 110°F. Eliminate all ignition sources. Avoid breathing vapors. Use only with adequate ventilation; explosion-proof general mechanical ventilation or local exhaust is recommended to maintain vapor concentrations below recommended exposure limits. In confined or partially enclosed areas, a NIOSH-approved organic vapor cartridge respirator with full face-piece is recommended. Containers should be kept tightly closed when not in use, and covered as much as possible when in use. Avoid frequent contact with skin; wearing PVA coated protective gloves and an impervious apron are recommended. Avoid any contact with eyes; splash proof chemical goggles are recommended. (Please refer to GENERAL SAFETY BULLETIN ON SOLVENT CEMENTS FOR PLASTIC PIPE - HFS-2, and MATERIAL SAFETY DATA SHEETS for SPEARS CPVC One-Step FS-5 Cement. Verify expiration dates stamped on cement can bottom prior to use.)

Cutting

CPVC pipe can be easily cut with a ratchet cutter, a wheel-type plastic tubing cutter, a power saw or a fine toothed saw. Tools used to cut CPVC must be designed for plastic use and must be in good condition in accordance with the tool manufacturer's recommendations. It is important to cut the pipe square. A square cut provides the surface of the pipe with maximum bonding area.

If any indication of damage or cracking is evident at the pipe end, cut off at least 2 inches (50 mm) beyond any visible crack.



NOTICE

Care must be exercised if using ratchet cutters as they may split the pipe if not properly used and maintained.

- Only use ratchet cutters that contain a sharp blade (blades dull quickly)
- Only use ratchet cutters at temperatures of 50°F (10°C) or warmer
- Only use good quality ratchet cutters capable of consistently cutting the pipe squarely
- Failure to follow any of the above directions may result in leakage or property damage

Deburring & Beveling

Burrs and filings can prevent proper contact between pipe and fitting during assembly, and must be removed from the outside and the inside of the pipe. A chamfering tool or a file is suitable for this purpose. A slight bevel (approximately 10° to 15°) shall be placed at the end of the pipe to ease entry of the pipe into the socket. This will minimize the chance that the edges of the pipe will wipe solvent cement from the fitting socket during the insertion of the pipe.



Fitting Preparation

Using a clean, dry rag, wipe loose dirt and moisture from the fitting socket and pipe end. Moisture can slow the cure time, and at this stage of assembly, excessive water can reduce joint strength.

Prior to assembly, all piping system components should be inspected for damage or irregularities. Mating components should be checked to assure that tolerances and engagements are compatible. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the component product in question to determine usability.

Check the dry fit of the pipe and fitting. The pipe should enter the fitting socket easily 1/3 to 2/3 of the way. If the pipe bottoms in the fitting with little interference, use extra solvent cement in making the joint.



BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910

MANUFACTURER DATA
NOT TO SCALE

#	REVISION	DATE
0	ORIGINAL	10/25/14
1		
2		
3		
4		

REVISION

DATE

Sidewall Sprinklers
Light Hazard or Residential Horizontal Sidewall Sprinklers

Listed quick response, 170°F maximum temperature rated horizontal sidewall sprinklers having deflectors installed within 6 inches from the ceiling and within 4 inches from the sidewall; or, Listed residential 170°F maximum temperature rated horizontal sidewall sprinklers located in accordance with their Listing and a maximum distance between sprinklers not to exceed 14 feet. The piping shall be mounted directly to the sidewall.

Listed quick response 200°F maximum temperature rated horizontal sidewall sprinklers having deflectors installed within 12 inches from the ceiling and within 6 inches from the sidewall; or, Listed residential 200°F maximum temperature rated horizontal sidewall sprinklers located in accordance with their Listing and a maximum distance between sprinklers not to exceed 14 feet. The piping shall be mounted directly to the sidewall.

Light Hazard Upright Quick Response Sprinklers

Listed quick response 155°F maximum temperature rated upright sprinklers having deflectors installed within 4 inches from the ceiling and a maximum distance between sprinklers not to exceed 15 feet. The maximum distance from the ceiling to the centerline of the main run of the pipe shall not exceed 7-1/2 inches, and the distance from the centerline of a sprinkler head to a hanger shall be 3 inches. Rigid pipe hangers secured to the ceiling shall be utilized for the application.

Light Hazard Extended Coverage and Residential Sprinklers

These installations shall be installed below a smooth, flat, horizontal ceiling construction, are limited to unobstructed construction, require the use of Schedule 80 fittings on sizes 1-1/2 inches and larger, and require the use of FS-5 one step solvent cement. For pendent sprinkler installations the piping shall be mounted directly to the ceiling. For horizontal sidewall sprinkler installations the piping shall be mounted directly to the sidewall.

Light Hazard Extended Coverage or Residential Pendent Sprinklers

Listed light hazard, extended coverage, quick response 155°F maximum temperature rated pendent sprinklers having deflectors installed within 8 inches from the ceiling, and a maximum distance between sprinklers not to exceed 20 feet, and an application density not less than 0.10 gpm/ft.

Listed residential 155°F maximum temperature rated pendent sprinklers having deflectors installed within 8 inches from the ceiling, a maximum distance between sprinklers not to exceed 20 feet, and an application density not less than 0.10 gpm/ft².

Combustible Attic Spaces with Specific Use Sprinklers

In accordance with the UL Listing, GF Harvel CPVC Fire Sprinkler Products may be installed within the attic space provided the attic space is protected with UL Listed Tyco Fire Products Specific Application Attic Sprinklers.

Specific Application Attic Sprinklers are sprinklers designed to provide protection of specific light hazard combustible, as well as non-combustible, attic spaces requiring sprinkler protection.

Installation Requirements

When using the Specific Application Attic Sprinklers, GF Harvel CPVC Fire Sprinkler Products may be installed to feed the wet system sprinklers below the ceiling and exposed to feed wet system specific application attic sprinklers provided the system is installed in accordance with the Tyco Fire Products' Technical Data Sheet TFP610 (dated October 2005) for Specific Application Attic Sprinklers.

System Risers Per NFPA 13, 13D and 13R

1. GF Harvel CPVC fire sprinkler piping products may be used as system risers in accordance with NFPA 13 Light Hazard, NFPA 13D and 13R when installed protected (concealed). The minimum protection shall consist of either 3/8 inch (9.5 mm) thick gypsum wallboard or 1/2 inch (12.7 mm) thick plywood.
2. GF Harvel CPVC fire sprinkler piping products may be used as system risers in accordance with NFPA 13D and 13R when installed without protection (exposed). When installed exposed, the following limitations shall apply:

- a. Exposed Risers: The riser shall be installed below a smooth, flat, horizontal ceiling construction. A Listed residential pendent sprinkler is to be installed with its deflector at the distance from the ceiling specified in the sprinkler Listing.

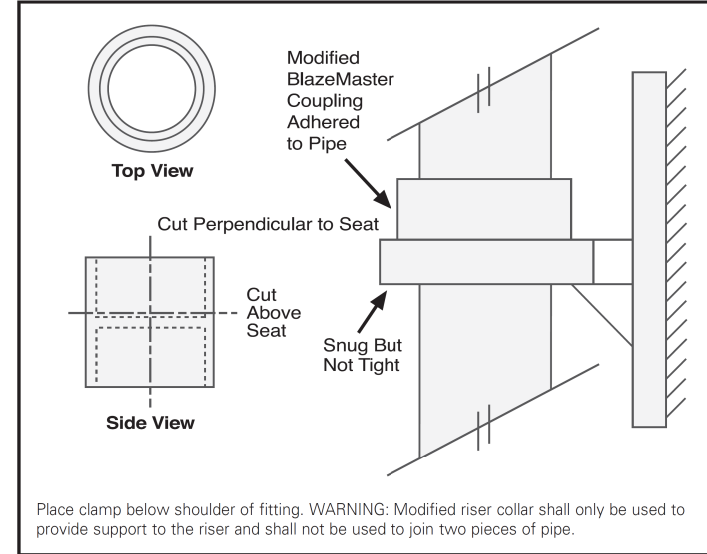
OR

The riser shall be installed below a horizontal unfinished basement ceiling (in accordance with NFPA 13D) constructed utilizing nominal 2 in. x 10 in. or nominal 2 in. x 12 in. exposed solid wood joists on 16 in. centers. A Listed residential pendent sprinkler is to be installed with its deflector a maximum of 1-3/4 in. below the bottom of the solid wood joist in anticipation of future installation of a finished ceiling.

When installing GF Harvel CPVC Fire Sprinkler Products in conjunction with 2 in. x 12 in. solid wood joists, the maximum system working pressure under flowing conditions shall not exceed 100 psi and the maximum system working pressure under static (non-flowing) conditions shall not exceed 175 psi.

- b. The Listed residential pendent sprinkler is to have a maximum temperature rating of 155°F and a minimum K-factor of 3.0 and is to be installed at a maximum horizontal distance of 12 inches from the centerline of the riser. The system is to be designed based upon the

Recommended method for securing GF Harvel CPVC fire sprinkler pipe vertically



- listed flows for the sprinkler selected except that the flow is not to be less than 11 gpm per sprinkler.
- c. The riser shall be supported vertically within 2 feet of the ceiling or bottom of the joist.
- d. The minimum riser diameter shall be 1 in. and the maximum riser diameter shall be 2 in.
- e. The maximum distance between the wall(s) and the outside surface of the riser pipe shall be 1-1/2 in.
- f. All solvent cement joints shall be made with Spears FS-5 One-Step Solvent Cement in strict accordance with GF Harvel's assembly instructions for the application of One-Step cement.
- g. These instructions are applicable only to UL Listed BlazeMaster® CPVC pipe and fittings, and require the use of Schedule 80 fittings for riser sizes 1-1/2 in. and larger.
3. The system shall be installed per the requirements of NFPA 13, Section 9.2.5 (2002 Edition), Support of Risers.
4. GF Harvel CPVC Fire Sprinkler Products shall be installed per GF Harvel CPVC Fire Sprinkler Piping Products installation and design manual.
5. Risers shall be supported by pipe clamps or by hangers located on the horizontal connection close to the riser. Only Listed hangers and clamps shall be used.
6. Vertical lines must be supported at intervals (described in 7 and 8) to avoid placing excessive load on a fitting at the lower end. Do this by using riser clamps or double bolt pipe clamps Listed for this service. The clamps must not exert compressive stresses on the pipe. If possible, the clamps should be located just below a fitting so that the shoulder of the fitting rests against the clamp. If necessary, a coupling

DATE
10/25/14

REVISION
ORIGINAL

#	0	1	2	3	4

MANUFACTURER DATA
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



Solvent Cement Application

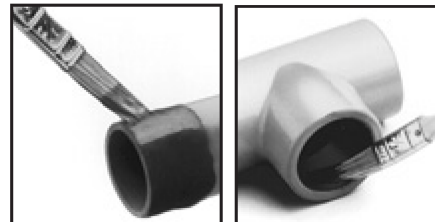
⚠ CAUTION

Prior to using CPVC Solvent Cements, review and follow all precautions found on the container labels, material safety data sheet, and standard practice for safe handling ASTM F402. Failure to follow precautions may result in injury.

The solvent cement shall be applied when the pipe and fittings are clean and free of any dirt, moisture and debris.

Use a dauber that is properly sized for the pipe. For 3/4 inch and 1 inch pipe, use a dauber that is 1/2 inch in size. For 1-1/4 inch through 3 inch pipe, use a dauber that is 3/4 inch in size.

Only use solvent cements that have been specifically formulated and listed/approved for use with CPVC fire sprinkler systems and approved by the pipe and fitting manufacturers.



Vigorously apply a heavy, even coat of cement to the outside pipe end. Apply a medium coat to the fitting socket. Pipe sizes 1-1/4 inch (32 mm) and above shall always receive a second cement application on the pipe end. **FIRST APPLY CEMENT ON THE PIPE END, THEN IN THE FITTING SOCKET, AND, FINALLY, ON THE PIPE END AGAIN.**

NOTICE

- Too much solvent cement can cause clogged waterways or pipe failure.
- Do not allow excess cement to puddle in the pipe and fitting assembly.
- To prevent this puddling, the inside of the fitting socket should receive a lighter coating of solvent cement than the outside of the pipe.
- Excess cement on the outside of the joint should be wiped off and the solvents will evaporate. However, the solvent cement inside the fitting will stay there.

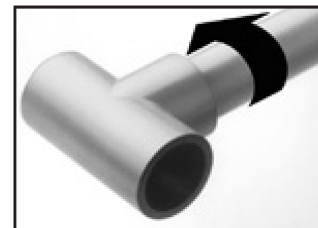
Improper installation techniques which allow too much solvent cement will weaken the wall of the pipe or fitting which may result in leakage or property damage.

Special care shall be exercised when assembling CPVC fire sprinkler systems in temperatures below 40°F (4°C). In colder temperatures extra time must be allowed for the solvent cement to set and cure. Extra care should be taken to prevent damaging the pipe during handling. When solvent welding pipe and fittings in colder temperatures, make certain that the cement has not become lumpy or has "gelled". Gelled cement must be discarded.

At temperatures above 80°F (27°C) make sure both surfaces to be joined are still wet with cement during assembly. Higher temperatures and/or wind accelerate the evaporation of the volatile solvents in the cement. Pipe stored in direct sunlight may have surface temperatures 20°F to 30°F above the air temperature. If possible store the pipe and fittings, or, at least, the ends to be solvent welded, out of the direct sunlight prior to cementing. The solvents will penetrate hot surfaces more deeply. In conditions like this it is very important to avoid puddling the solvent cement inside the fitting socket.

Assembly

After applying cement, immediately insert the pipe into the fitting socket, while rotating the pipe one-quarter turn until the pipe bottoms out at the fitting stop. Properly align the fitting for the installation at this time. Pipe must bottom to the stop. Hold the assembly for 30 seconds to ensure initial bonding. **A**



bead of solvent cement should be evident around the pipe and fitting juncture. If this bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied. If insufficient cement is applied, the fitting must be cut out and discarded. Cement in excess of the bead should be wiped off with a rag.

Care shall be exercised when installing sprinkler heads. Sprinkler head fittings shall be allowed to cure for a minimum of 30 minutes prior to installing the sprinkler head. When installing sprinkler heads, be sure to anchor or hold the pipe drop securely to avoid rotating the pipe in previously cemented connections. Previously joined fittings shall also be permitted to cure for a minimum of 30 minutes.

NOTICE

Sprinkler heads shall be installed only after all the CPVC pipe and fittings, including the sprinkler head adapters, are solvent welded and allowed to cure for a minimum of 30 minutes.

- Sprinkler head fittings should be visually inspected to ensure that the water way and threads are clear of any excess cement.
- Once the installation is complete and cured per Table I, II or III (under Set and Cure Times), the system shall be hydrostatically tested.
- Sprinklers shall not be installed in the fittings prior to the fittings being cemented in place.

Set and Cure Times

⚠ CAUTION

- Solvent cement set and cure times are a function of pipe size, temperature, relative humidity, and tightness of fit.
- Curing time is faster for drier environments, smaller pipe sizes, higher temperatures and tighter fits.
- Cure times should be increased when moisture is present such as during cut-ins to live sprinkler lines.

INADEQUATE CURING OF SOLVENT CEMENT JOINTS WILL RESULT IN LEAKAGE OR PROPERTY DAMAGE.

Solvent cement set and cure times are a function of pipe size, temperature, relative humidity, and tightness of fit. Curing time is faster for drier environments, smaller pipe sizes, higher temperatures and tighter fits. Cure times should be increased when moisture is present such as during cut-ins to live sprinkler lines.



The assembly must be allowed to set, without any stress on the joint, for 1 to 5 minutes, depending on pipe size and temperature. Following the initial set period, the assembly can be handled carefully, **avoiding significant stresses to the joint.**

NOTICE

A specific procedure for modifications or repairs to existing CPVC fire sprinkler lines is included in this manual.

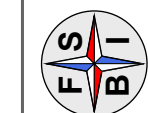
Cement Requirements	
Fitting Size (In.)	Number of Joints Per Quart (estimated)
3/4	270
1	180
1-1/4	130
1-1/2	100
2	70
2-1/2	50
3	40

Note: Use of solvent products other than those recommended by Georg Fischer Harvel LLC will automatically void the warranty on the pipe and fittings.

DATE	REVISION	#
10/25/14 <td>ORIGINAL <td>0</td> </td>	ORIGINAL <td>0</td>	0
		1
		2
		3
		4

MANUFACTURER DATA
NOT TO SCALE

BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910



Refer to the following tables for minimum cure times prior to pressure testing

TABLE I 225 psi (1552 kPa) Test Pressure (maximum) Ambient Temperature During Cure Period			
Pipe Size	60 to 120°F (16 to 49°C)	40 to 59°F (4 to 15°C)	0 to 39°F (-18 to 3°C)
3/4" (20 mm)	1 hr.	4 hrs.	48 hrs.
1" (25 mm)	1-1/2 hrs.	4 hrs.	48 hrs.
1-1/4" & 1-1/2" (32 mm & 40 mm)	3 hrs.	32 hrs.	10 days
2" (50 mm)	8 hrs.	48 hrs.	Note 1
2-1/2" & 3" (65 mm & 80 mm)	24 hrs.	96 hrs.	Note 1

TABLE II 200 psi (1379 kPa) Test Pressure (maximum) Ambient Temperature During Cure Period			
Pipe Size	60 to 120°F (16 to 49°C)	40 to 59°F (4 to 15°C)	0 to 39°F (-18 to 3°C)
3/4" (20 mm)	45 mins.	1-1/2 hrs.	24 hrs.
1" (25 mm)	45 mins.	1-1/2 hrs.	24 hrs.
1-1/4" & 1-1/2" (32 mm & 40 mm)	1-1/2 hrs.	16 hrs.	120 hrs.
2" (50 mm)	6 hrs.	36 hrs.	Note 1
2-1/2" & 3" (65 mm & 80 mm)	8 hrs.	72 hrs.	Note 1

TABLE III 100 psi (960 kPa) Test Pressure (maximum) Ambient Temperature During Cure Period			
Pipe Size	60 to 120°F (16 to 49°C)	40 to 59°F (4 to 15°C)	0 to 39°F (-18 to 3°C)
3/4" (20 mm)	15 mins.	15 mins.	30 mins.
1" (25 mm)	15 mins.	30 mins.	30 mins.
1-1/4" (32 mm)	15 mins.	30 mins.	2 hrs.

Note 1:
For these sizes, the solvent cement can be applied at temperatures below 40°F (4.5°C). However, the sprinkler system temperature must be raised to a temperature of 40°F (4.5°C) or above and allowed to cure per the above recommendations prior to pressure testing.

System Acceptance Testing (Hydrostatic Pressure Test)

Once an installation is completed and **joints are properly cured**, the system should be pressure tested with water at 200 psi (1379 kPa) for 2 hours. See Table II under Set and Cure Times for curing conditions at 200 psi (1379 kPa).

The system should be pressure tested with water at 50 psi (345 kPa) in excess of maximum pressure when the maximum system pressure is to be maintained in excess of 150 psi (1034 kPa). See Table I under Set and Cure Times for curing conditions at 225 psi (1552 kPa). This is in accordance with the requirements established by NFPA Standard 13, Section 24.2.1 (2007 Edition).

Sprinkler systems in one- and two-family dwellings and mobile homes may be pressure tested with water at line pressure, after following Table III under Set and Cure Times curing conditions, in accordance with the requirements established by NFPA 13D, Section 4.3 (2007 Edition).

When pressure testing, the sprinkler system shall be slowly filled with water and the air bled from the highest and farthest sprinkler heads before pressure testing is applied. Air must be removed from piping systems (plastic or metal) to prevent it from being locked in the system when pressure is applied. Entrapped air can generate excessive surge pressures that can result in bodily injury and/or property damage, regardless of the piping materials used.

If a leak is found, the fitting must be cut out and discarded. A new section can be installed using couplings or a union. Unions should be used in accessible areas only.

⚠ WARNING



AIR OR COMPRESSED GAS MUST NEVER BE USED FOR SYSTEM ACCEPTANCE TESTING (HYDROSTATIC PRESSURE TEST). SYSTEM FAILURE WHEN USING COMPRESSED AIR/GAS FOR SYSTEM ACCEPTANCE TESTING CAN RESULT IN BODILY INJURY, DEATH AND/OR PROPERTY DAMAGE

IF YOU DO THIS, YOU ARE AN IDIOT AND DO NOT UNDERSTAND HYDRAULICS!

Hangers and Supports

Because GF Harvel CPVC Fire Sprinkler pipe is rigid, it requires fewer supports than flexible plastic systems. Vertical runs shall be supported so as not to place the weight of the run on a fitting or joint. Horizontal runs shall be braced so that stress loads (caused by bending or snaking the pipe) will not be placed on a fitting or joint. For information regarding bending or snaking GF Harvel CPVC Fire Sprinkler pipe refer to tables V and VI in the Reference Tables section. The support spacing is shown on the following table.

Support Spacing Requirements			
Nominal Pipe Size Inches (millimeters)	Maximum Support Spacing		
	Feet	Meters	
3/4 (20)	5-1/2	1.7	
1 (25)	6	1.8	
1-1/4 (32)	6-1/2	2.0	
1-1/2 (40)	7	2.1	
2 (50)	8	2.4	
2-1/2 (65)	9	2.7	
3 (80)	10	3.0	
4 (100)	10	3.0	

Some hangers designed for metal pipe may support GF Harvel CPVC Fire Sprinkler pipe, but their suitability must be clearly established. The pipe hanger must have a load bearing surface of at least 1/2 in. Hangers with sufficient load bearing surface shall be selected on pipe size (i.e. 1-1/2 in. hangers for 1-1/2 in. pipe). The hanger shall not have rough or sharp edges which come in contact with the pipe. Hangers must not be of a type which binds the pipe from movement.

The pipe hangers must comply with the requirements in NFPA 13, 13D and 13R.

When a sprinkler head activates, a significant reactive force can be exerted on the pipe. With a pendent head, this reactive force can cause the pipe to lift vertically if it is not properly secured, especially if the sprinkler drop is from small diameter pipe. The closest hanger shall brace the pipe against vertical lift-up. See tables A and B.



BORIK REMODEL
1370 BLUE FALLS DRIVE
CHULA VISTA, CA 91910

MANUFACTURER DATA
NOT TO SCALE

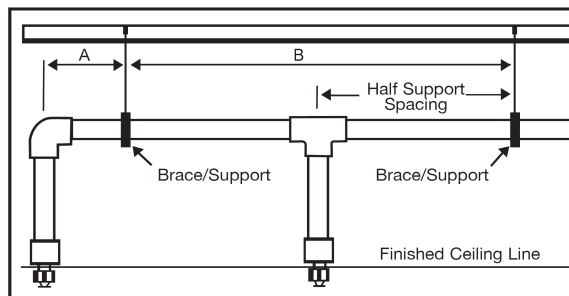
#	REVISION	DATE
0	ORIGINAL	10/25/14
1		
2		
3		
4		

TABLE A
Maximum Support Spacing Distance End Line Sprinkler Head Drop Elbow

Nominal Pipe Size (in.)	Less than 100 psi	More than 100 psi
3/4	9"	6"
1	12"	9"
1-1/4	16"	12"
1-1/2 - 3	24"	12"

TABLE B
Maximum Support Spacing Distance Inline Sprinkler Head Drop Tee

Nominal Pipe Size (in.)	Less than 100 psi	More than 100 psi
3/4	4'	3'
1	5'	4'
1-1/4	6'	5'
1-1/2 - 3	7'	7'



Two common methods are used to brace GF Harvel CPVC pipe.

1. One technique uses a standard band hanger, positioning the threaded support rod to a 1/16 inch above the pipe, however it is important that the rod must never come in contact with the pipe.
2. We highly recommend the use of the U.L. Listed Tolco surge restrainer, which is used in conjunction with Tolco band hangers. This easily installed combination restricts the upward movement of the pipe while not allowing the threaded support rod to contact the pipe. Other approaches are a split ring hanger or a special escutcheon which prevents upward movement of the sprinkler through the ceiling.



Tolco Surge Restrainer Pipe Bracing with Standard Band Hanger

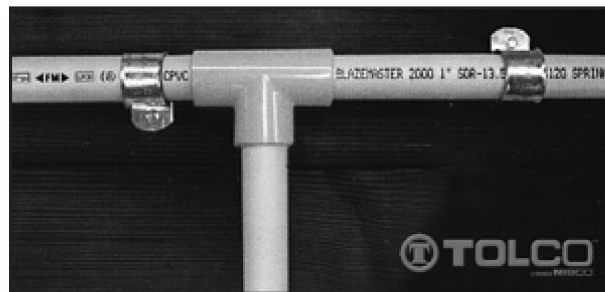
For installation of exposed GF Harvel CPVC Fire Sprinkler piping, Listed support devices for thermoplastic sprinkler piping or other Listed support devices shall be used to mount the piping directly to the ceiling or side-wall.

Pipe hangers are available that have been designed and tested for use with CPVC plastic only and are UL Listed for this purpose.

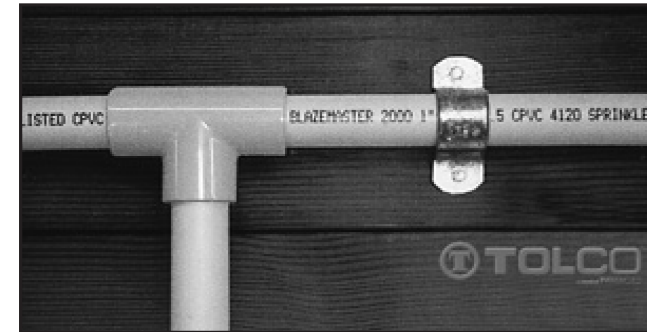
The following Listed examples are manufactured by Tolco, Inc. These products incorporate special features which are designed to protect the pipe and ease installation. The patented flared edge design protects the pipe from coming in contact with any rough or sharp surface. The hex head self-threading screw (furnished with the product) is easily installed using a cordless electric drill and socket attachment. No predrilling of a pilot hole in wood is required.

For additional information on Tolco hangers/supports please contact them directly:

Tolco Inc, 1375 Sampson Avenue, Corona, California 92879
PH: 951-737-5599 PH: 800-786-5266 FAX: 951-737-0330



Tolco Single Fastener can function as a hanger, or as a restraining device by inverting the hanger and installing with the fastener mounting tab downward. Installing this type as a restrainer will prevent the upward movement of the sprinkler head during activation.



Tolco Double Fastener can function as a hanger and a hold down strap.



Tolco Hanger/Restrainer can function as a hanger or as a restrainer and can be mounted from the top or bottom of a beam. The fastener mounting edges are designed to allow the screws to be installed horizontally. This is a benefit when overhead clearance is limited.



Tolco Stand-Off Hanger/Restrainer can function as a hanger or as a restrainer for installations where a standard offset is required. The Stand-Off Hanger can perform as both a hanger and restrainer on horizontal piping, and as a stabilizer for vertical sprinkler head drops. The manufacturer furnishes listed fasteners for use into wood.

