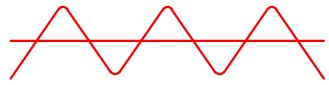









Markup Legend	
Delete Line	
Add Line	
Add Tee	
Add Elbow	
Add Coupling	
Add Head	
Delete Head	
Move Head	
Note: All revisions must be reviewed by Uponsor	

SPRINKLER SYMBOL DEFINITION

MAXIMUM SPACING (TYP)
SPRINKLER MODEL (TYP)
HEAD SYMBOL (TYP)

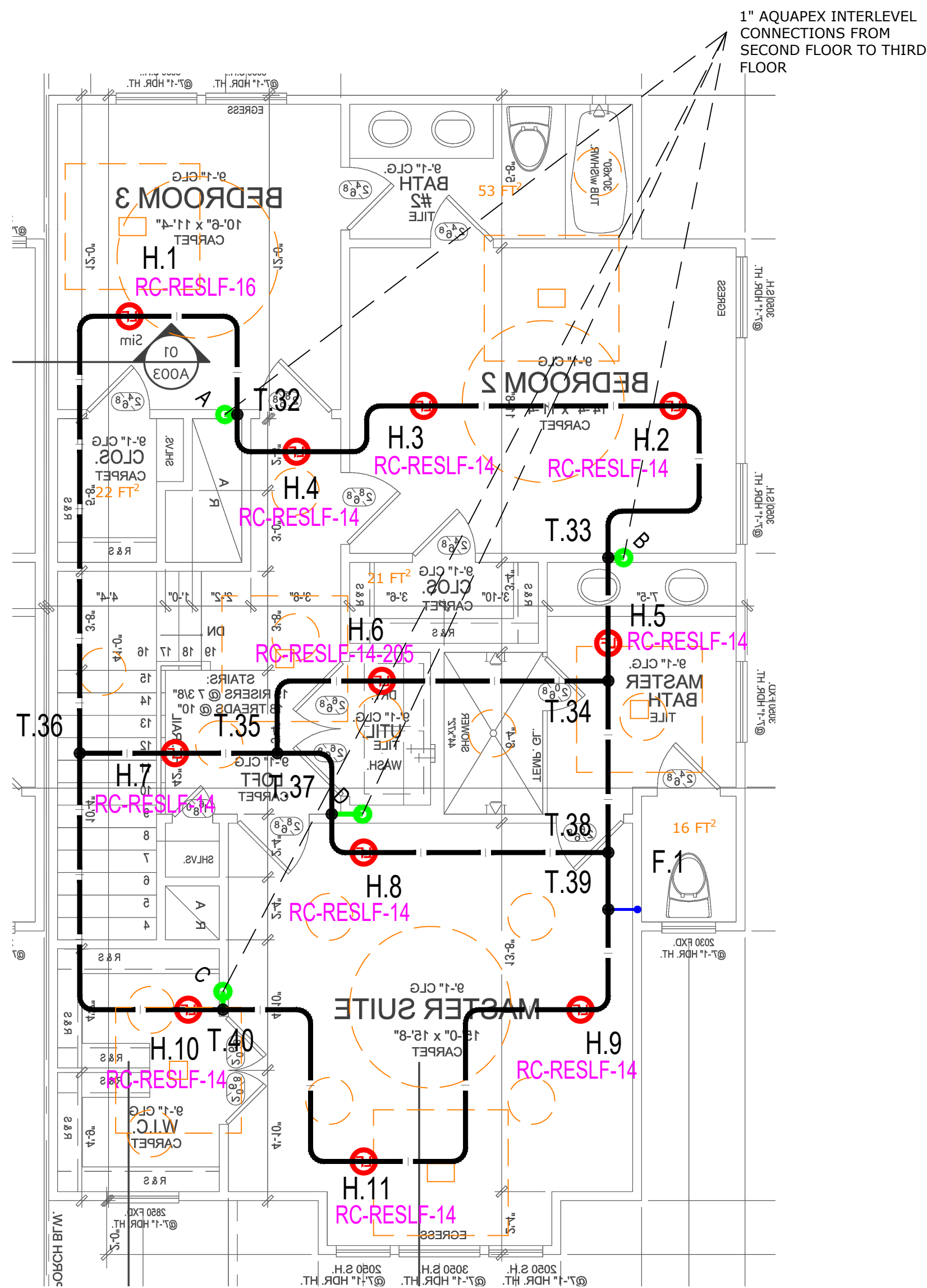
Table F002-1

Multipurpose Fire Safety Systems

The Uponor Residential Fire Safety System is a residential fire protection system installed in combination with the cold side of the domestic potable water system. Only licensed contractors trained by Uponor can install this system.

What to do if Changes are Required

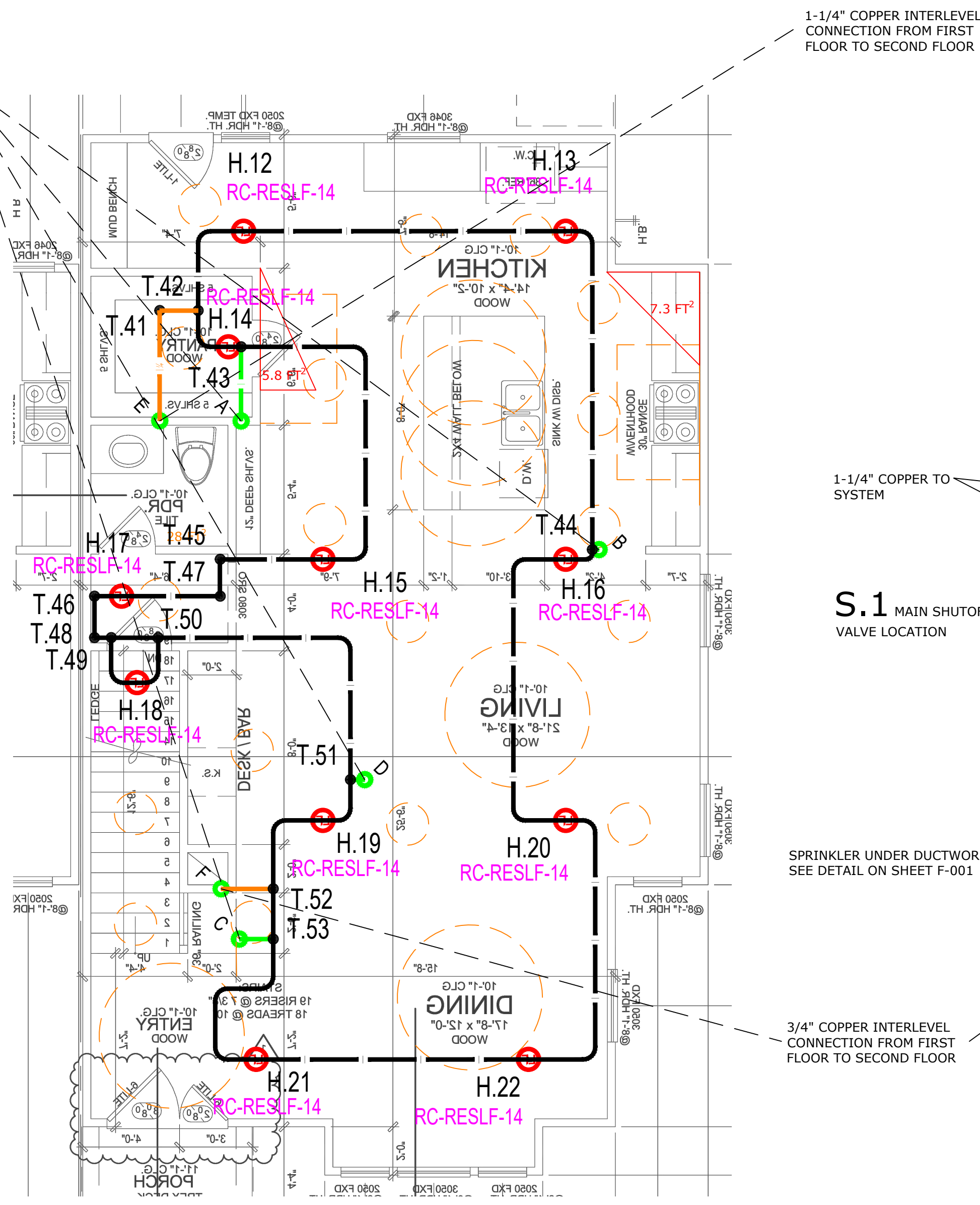
If any features or obstructions require the addition or deletion of sprinkler heads, or significant relocation of sprinkler heads, contact the Uponor Design Department to determine if observed changes require a redesign (888.594.7726).



3

THIRD FLOOR

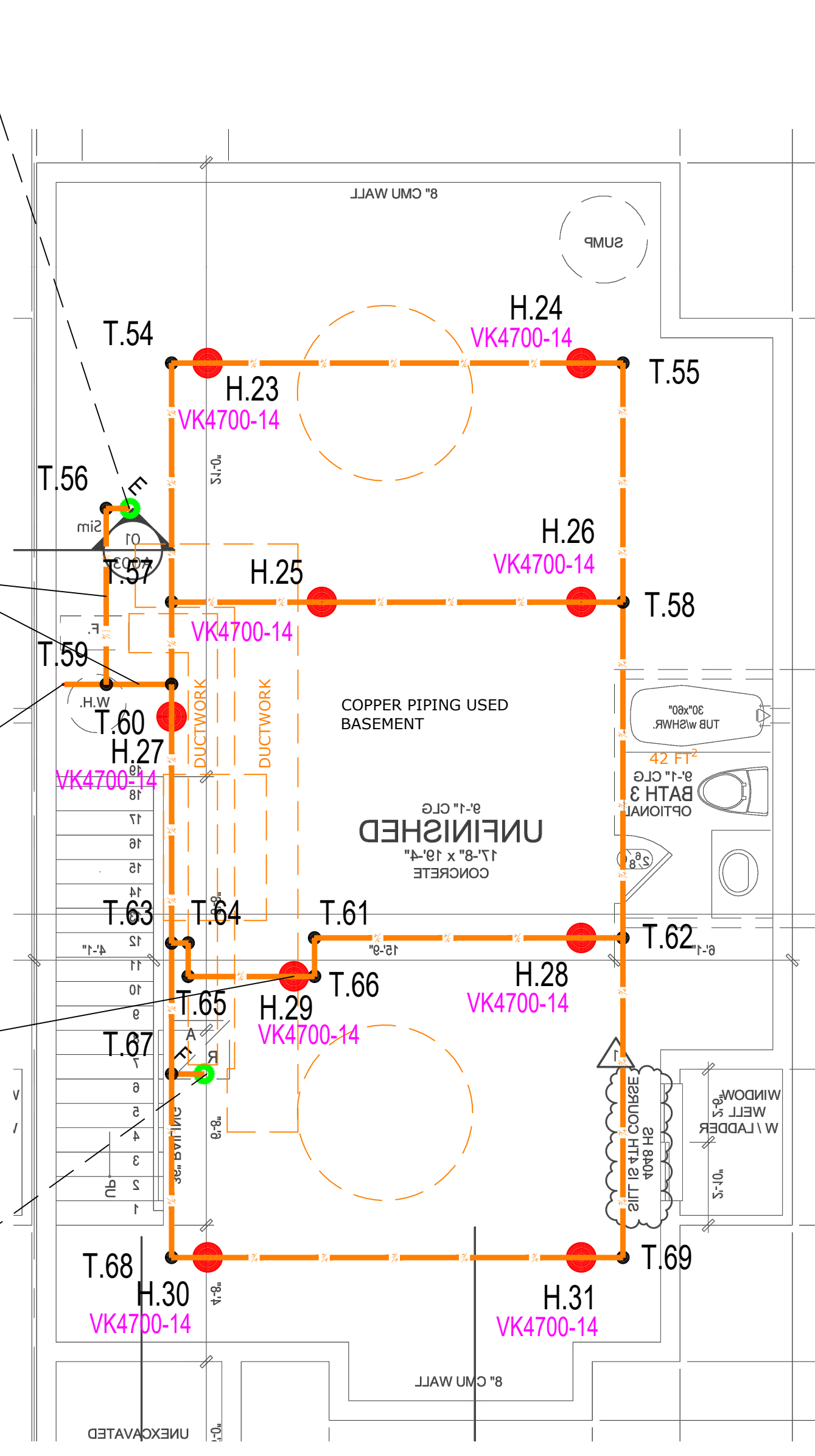
F101

$$1/4'' = 1'-0''$$


2

SECOND FLOOR

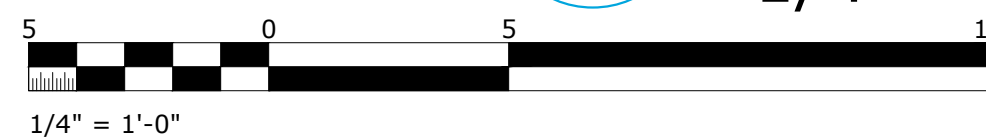
F101

$$1/4'' = 1'-0''$$


1

FIRST FLOOR

F101

$$1/4'' = 1'-0''$$




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COLOR/LINETYPE LEGEND

BLUE LINES= FEED TO FIXTURES (BATH, SHOWER, ETC.).

GREEN LINES= INTERLEVEL CONNECTIONS/SUPPLY
BLACK LINES= SPRINKLER HEAD TO SPRINKLER HEAD

BLACK LINES= SPRINKLER HEAD TO SPRINKLER HEAD



 = 1/2" PIPE SIZE

—%— = 3/4" PIPE SIZE

— | — = 1" PIPE SIZE

1" PIPE SIZE

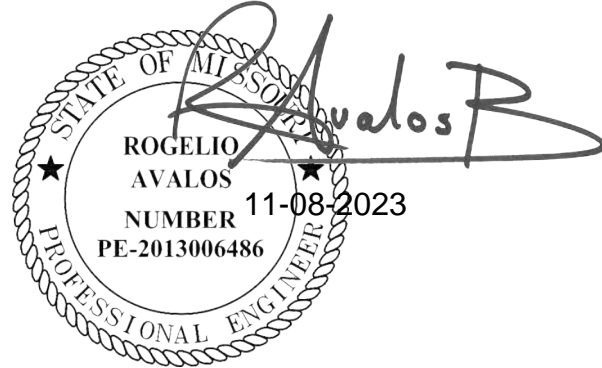
juoda

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DISCLAIMER

THIS SERIES OF DRAWINGS HAS BEEN PREPARED BY UNOPOR, INC. TECHNICAL SERVICES - DESIGN DEPARTMENT AS AN INITIAL DESIGN FOR 13D FIRE SUPPRESSION SYSTEMS FOR YOUR USE IN THE SPECIFICATION, BIDDING AND SALE OF SUCH SYSTEMS. CONSTRUCTION BASED UPON INFORMATION PROVIDED BY YOU. BEFORE STARTING ANY WORK ASSOCIATED WITH THIS DESIGN, IT IS MANDATORY THAT YOU MAKE A CODES CHECK WITH YOUR LOCAL AGENCY TO DETERMINE THE CODES THAT APPLY TO YOUR PROJECT. YOU MUST REPORT ANY ERRORS AND/OR DESIGN CHANGES TO UNOPOR, INC. TECHNICAL SERVICES - DESIGN DEPARTMENT TO DETERMINE IF THE DESIGN OF THE SYSTEM IS AFFECTED. UNOPOR, INC. DOES NOT ASSUME ANY LIABILITY FOR THE DESIGN AND SPECIFICALLY DISCLAIMS ANY WARRANTIES REGARDING THE DESIGN OR ITS USE. ALL DESIGNS ARE PROVIDED "AS-IS". IT SHALL BE YOUR SOLE RESPONSIBILITY TO OBTAIN ALL NECESSARY PERMITS, AND TO OBTAIN ALL APPLICABLE CODES AND SPECIFICATIONS.

SALES REP:



NLV DEVELOPMENT - UNIT E1.1
LONGVIEW & KESSLER
LEES SUMMIT, MO 64081

PROJECT NUMBER:	44424F 003	COMPANY:	S & B PLUMBING INC.
DRAWN BY:	TIM RICOALDA	CONTACT:	MIKE STOREY
CHECKED BY:	BRENT KOTULA	CONTACT PH. NUMBER:	913.681.5075
CERTIFICATION LEVEL:	SET IV	ALLIANCE ID:	3017
CERTIFICATION NUMBER:	113869	PLOT DATE:	08/12/2023
SQUARE FEET:	2880 SQ. FT.	SHEET SCALE:	1/4" = 1'-0"
NO.	DATE	REVISIONS	
		DESCRIPTION	

SHEET DESCRIPTION

ALL FLOORS MIRROR

SHEET NUMBER

F101

AquaSAFE™ GENERAL NOTES:

1. THIS SYSTEM IS DESIGNED AS PER NFPA 13D 2019 EDITION AS A RESIDENTIAL MULTIPURPOSE SYSTEM SECTION 3.3.12.3.

2. UPONOR COMPANY RESERVES THE EXCLUSIVE RIGHTS TO ALL DETAILS AND DRAWINGS AS SHOWN ON THIS SHEET. THESE DETAILS AND DRAWINGS ARE PROPRIETARY INFORMATION OF UPONOR COMPANY AND UNAUTHORIZED USE MAY BE SUBJECT TO PROSECUTION TO THE FULL EXTENT OF THE LAW.

3. THE DESIGN OF THIS SYSTEM IS DICTATED BY SPECIFIC CEILING HEIGHTS AND ROOM SIZES. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT THE CONDITIONS SHOWN ON THESE PLANS ARE EXACTLY AS THEY EXIST IN THE FIELD. DEVIATIONS FROM THE DESIGN MAY CAUSE THE SYSTEM TO BE UNABLE TO CONTROL A FIRE. IF THE BUILDING CONSTRUCTION DIFFERS FROM THE FIRE SPRINKLER PLAN, CONTACT THE SYSTEM DESIGNER IMMEDIATELY.

4. THIS SYSTEM AND THE ACCOMPANYING HYDRAULIC CALCULATIONS ARE DESIGNED IN COMPLIANCE WITH NFPA 13D 2019 EDITION.

5. "STAND-ALONE" OR "MULTIPURPOSE, WET PIPE" SYSTEMS ARE PERMITTED TO ONLY USE ANTI-FREEZE LISTED FOR USE IN NEW SPRINKLER SYSTEMS.

6. MODIFICATIONS ARE PROHIBITED. SPRINKLERS THAT HAVE BEEN PAINTED, CAULKED, MODIFIED OR DAMAGED MUST BE REPLACED.

7. A SINGLE CONTROL VALVE ARRANGED TO SHUT OFF BOTH THE DOMESTIC SYSTEM AND THE SPRINKLER SYSTEM SHALL BE INSTALLED.

8. OWNERS MANUAL MUST BE PROVIDED TO THE OWNER.

9. AT THE MAIN SHUT OFF VALVE, A TAG OR A SIGN STATING THE FOLLOWING IS REQUIRED; "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 SHUT OFF VALVES, **SHALL NOT** BE ADDED TO THIS SYSTEM WITHOUT REVIEW OF THE FIRE SPRINKLER SYSTEM BY A FIRE PROTECTION SPECIALIST. **DO NOT REMOVE THIS SIGN**".

10. ALL INTERIOR PIPING TO BE UPONOR "AquaPEX®" UNLESS NOTED.

11. UPONOR "AquaPEX" TUBING TO BE SUPPORTED PER NFPA 13D AND MANUFACTURER'S RECOMMENDATIONS.

12. MINIMUM SPACING BETWEEN SPRINKLERS IS 8'-0" REFER TO SPACING CHARTS FOR MAXIMUM SPACING BETWEEN SPRINKLERS AND FROM WALLS. SPRINKLER HEAD MANUFACTURERS MAY HAVE MORE RESTRICTIVE SPACING LIMITATIONS.

13. SPRINKLERS ARE NOT NECESSARILY CENTERED IN ROOMS DUE TO LIGHT FIXTURES OR OTHER CEILING MOUNTED OBSTRUCTIONS.

14. THE PLUMBING TIE IN CONNECTIONS ARE SCHEMATIC IN NATURE AND CAN BE INSTALLED OFF THE SPRINKLER LOOP ANYWHERE BETWEEN SPRINKLER TO SPRINKLER CONNECTION.

15. THIS SUGGESTED LAYOUT IS BASED UPON INFORMATION PROVIDED BY OTHERS. CHANGES IN CONSTRUCTION OR FIELD CONDITIONS MAY OCCUR WHICH MAY REQUIRE CHANGES TO THE LAYOUT. IT IS THE RESPONSIBILITY OF THE INSTALLER TO NOTIFY UPONOR TECHNICAL SERVICES OF SUCH CHANGES.

16. NFPA 13D 8.2.5* OBSTRUCTIONS TO RESIDENTIAL SPRINKLERS
 - 8.2.5.7* SHADOW AREAS SHALL BE PERMITTED IN THE PROTECTION AREA OF A SPRINKLER AS LONG AS THE CUMULATIVE DRY AREAS DO NOT EXCEED 15 FT² PER SPRINKLER.
 - 8.2.5.8 SMALL AREAS CREATED BY ARCHITECTURAL FEATURES, SUCH AS PLANTER BOX WINDOWS, BAY WINDOWS, AND SIMILAR FEATURES, SHALL BE EVALUATED AS FOLLOWS:
 - (1) WHERE NO ADDITIONAL FLOOR AREA IS CREATED BY THE ARCHITECTURAL FEATURE, NO ADDITIONAL SPRINKLER PROTECTION IS REQUIRED.
 - (2) WHERE ADDITIONAL FLOOR AREA IS CREATED BY AN ARCHITECTURAL FEATURE, NO ADDITIONAL SPRINKLER PROTECTION IS REQUIRED, PROVIDED ALL OF THE FOLLOWING CONDITIONS ARE MET;
 - (a) THE FLOOR AREA SHALL NOT EXCEED 18 FT² (1.7 M²)
 - (b) THE FLOOR AREA SHALL NOT BE GREATER THAN 24 INCHES IN DEPTH AT THE DEEPEST POINT OF THE ARCHITECTURAL FEATURE TO THE PLANE OF THE PRIMARY WALL WHERE MEASURED ALONG THE FINISHED FLOOR.
 - (c) THE FLOOR SHALL NOT BE GREATER THAN 9FT IN LENGTH WHERE MEASURED ALONG THE PLANE OF THE PRIMARY WALL.
 - (d) MEASURED FROM THE DEEPEST POINT OF THE ARCHITECTURAL FEATURE TO THE SPRINKLER SHALL NOT EXCEED THE MAXIMUM LISTED SPACING OF THE SPRINKLER.
 - (3) THE HYDRAULIC DESIGN SHALL NOT BE REQUIRED TO CONSIDER THE AREA CREATED BY THE ARCHITECTURAL FEATURE.

17. NFPA 13D 8.3 LOCATION OF SPRINKLERS.
 - 8.3.1 SPRINKLERS SHALL BE INSTALLED IN ALL AREAS EXCEPT WHERE OMISSION IS PERMITTED BY 8.3.2 THROUGH 8.3.8.
 - 8.3.2 SPRINKLERS SHALL NOT BE REQUIRED IN BATHROOMS OF 55 FT² (5.1 M²) AND LESS
 - 8.3.3 SPRINKLERS SHALL NOT BE REQUIRED IN CLOTHES CLOSETS, LINEN CLOSETS, AND PANTRIES THAT MEET ALL OF THE FOLLOWING CONDITIONS:
 - (1) THE AREA OF THE SPACE DOES NOT EXCEED 24 FT² (2.2 M²).
 - (2) THE WALLS AND CEILINGS ARE SURFACED WITH NONCOMBUSTIBLE OR LIMITED-COMBUSTIBLE MATERIALS AS DEFINED IN NFPA 220, STANDARD ON TYPES OF BUILDING CONSTRUCTION.
 - 8.3.4* SPRINKLERS SHALL NOT BE REQUIRED IN GARAGES, OPEN ATTACHED PORCHES, CARPORTS, AND SIMILAR STRUCTURES
 - 8.3.5 SPRINKLERS SHALL NOT BE REQUIRED IN ATTICS WITH OR WITHOUT STORAGE, PENTHOUSE EQUIPMENT ROOMS, ELEVATOR MACHINE ROOMS, CONCEALED SPACES DEDICATED EXCLUSIVELY TO AND CONTAINING ONLY DWELLING UNIT VENTILATION EQUIPMENT, FLOOR/CEILING SPACES, ELEVATOR SHAFTS, CRAWL SPACES, AND OTHER CONCEALED SPACES THAT ARE NOT USED OR INTENDED FOR LIVING PURPOSES.
 - 8.3.5.1* SUCH SPACES THAT CONTAIN FUEL-FIRED EQUIPMENT SHALL ALSO COMPLY WITH 8.3.5.1.1 OR 8.3.5.1.2.
 - 8.3.5.1.1 WHERE THE FUEL-FIRED EQUIPMENT IS ABOVE ALL OF THE OCCUPIED AREAS OF THE DWELLING UNIT, NO SPRINKLER PROTECTION SHALL BE REQUIRED IN THE CONCEALED SPACE.
 - 8.3.5.1.2 WHERE FUEL-FIRED EQUIPMENT IS BELOW OR ON THE SAME LEVEL AS OCCUPIED AREAS OF THE DWELLING UNIT, AT LEAST ONE QUICKRESPONSE INTERMEDIATE TEMPERATURE SPRINKLER SHALL BE INSTALLED ABOVE THE EQUIPMENT OR AT THE WALL SEPARATING THE SPACE WITH THE FUEL-FIRED EQUIPMENT FROM THE OCCUPIED SPACE.
 - 8.3.6 SPRINKLERS SHALL NOT BE REQUIRED IN UNHEATED ENCLOSURES AT THE BUILDING AT ENTRANCES/EXITS AS LONG AS THE DWELLING UNIT HAS ANOTHER ENTRANCE/EXIT.
 - 8.3.7 SPRINKLERS SHALL NOT BE REQUIRED FOR CEILING POCKETS THAT MEET THE FOLLOWING CONDITIONS:
 - (1) THE TOTAL VOLUME OF ALL UNPROTECTED CEILING POCKETS IN A COMPARTMENT DOES NOT EXCEED 100 FT³ (2.83 M³).
 - (2) THE ENTIRE FLOOR UNDER THE UNPROTECTED CEILING POCKET IS PROTECTED BY THE SPRINKLERS AT THE LOWER CEILING ELEVATION.
 - (3)* THE INTERIOR FINISH OF THE UNPROTECTED CEILING POCKET EXCLUDING DECORATIVE TREATMENTS IS NONCOMBUSTIBLE OR LIMITED-COMBUSTIBLE MATERIAL.
 - (4) SKYLIGHTS NOT EXCEEDING 32 FT² (2.97 M²) SHALL BE PERMITTED TO HAVE A PLASTIC COVER.
 - 8.3.8 SPRINKLERS SHALL NOT BE REQUIRED IN CLOSETS IN GARAGES AND EXTERIOR CLOSETS (REGARDLESS OF SIZE) LOCATED ON EXTERIOR BALCONIES, EXTERIOR BREEZEWAYS/CORRIDORS, OR ACCESSED FROM OUTDOORS WHERE THE CLOSET DOES NOT HAVE DOORS OR UNPROTECTED PENETRATIONS DIRECTLY INTO THE DWELLING UNIT.
 - 8.3.9 SPRINKLERS SHALL BE INSTALLED IN ANY CLOSET USED FOR HEATING AND/OR AIR-CONDITIONING EQUIPMENT, WASHERS AND/OR DRYERS, OR WATER HEATERS EXCEPT AS ALLOWED BY 8.3.8.

18. INSULATION GUIDE LINES PER NFPA 13D.
 - 9.1.1* WET PIPE SYSTEMS. A WET PIPE SYSTEM SHALL BE PERMITTED TO BE TO BE USED WHERE ALL PIPING IS INSTALLED IN AREAS NOT SUBJECT TO FREEZING, INCLUDING AREAS PROPERLY INSULATED TO MAINTAIN 40°F.
 - A.9.1.1 IN AREAS SUBJECT TO FREEZING, CARE SHOULD BE TAKEN IN UNHEATED ATTIC SPACES TO COVER SPRINKLER PIPING COMPLETELY WITH INSULATION. INSTALLATION SHOULD FOLLOW THE GUIDELINES OF THE INSULATION MANUFACTURER. FIGURE A.9.1.1(A) THROUGH FIGURE A.9.1.1(F) SHOW SEVERAL METHODS THAT CAN BE CONSIDERED. THESE ARE FOR ILLUSTRATIVE PURPOSES ONLY. CONSULTATION WITH THE GENERAL CONTRACTOR AND/OR OWNER IS RECOMMENDED TO ENSURE PROPER METHODS AND MATERIALS ARE USED TO MAKE SURE 40°F WILL BE MAINTAINED.
- Attic Insulation Detail
-
- From the [Uponor AquaSAFE Attic Insulation Guidelines](#) we use the following formula for the recommended minimum amount of insulation required on top of our pipe for figure 2 alternative installation.
- Where,

Ti = Temperature of the indoor, conditioned living space (specified as minimum 60°F)

To = Temperature of the outdoor, unconditioned living space (**LEES SUMMIT, ST** record low = **-10°F**)

Ri = R value of the insulation between the tubing and the conditioned space-5/8" gypsum = R0.56 + 3.5" Blown in cellulose insulation = 3.13 per inch for total R-10.955 + R-0.56 = R-11.515

Ro = R value of the insulation above the tubing

$$Ro = \frac{Ri(To - 40)}{(40 - Ti)} \quad Ro = \frac{11.515(-10 - 40)}{(40 - 60)} \quad Ro = \frac{-575.75}{20} \quad Ro = \underline{\underline{28.78}}$$

Where,

Blown Cellulose insulation has an R-Value of 3.13 per 1" of insulation we use the following calculation to measure the depth of the insulation from the finished ceiling for ease of installation:

$$\text{Total blown in depth} = \frac{Ro + Ri}{R - \text{value per inch}} = \frac{28.78 + 11.515}{3.13} = \underline{\underline{40.295}}$$

Total blown in depth = **12.87"** or **13"** for ease of installation

In essence, with the worst case scenario of 60°F indoor air temperature, an outdoor air temperature matching the record low of **-10°F**, with blown insulation between the tubing and the conditioned space. A total minimum of **13"** inch of blown insulation in the attic on top of the sheet rock is required to maintain tubing temperature of 40°F in accordance with 9.1.1 of NFPA 13D 2019 edition.
- Sprinkler Under Duct Detail
-
- Senju RC-RES: Open Web Truss/TJI Construction
-
- Senju RC-RES: Traditional Wood Framing Construction
-
- STEP 1
-
- PLACE SPRINKLER IN THE CENTER OF THE 12"x12" SQUARE OF 6 MIL VAPOR BARRIER, MAKE SURE IT IS TIGHT AROUND THE THREADS OF THE SPRINKLER.
- STEP 2
-
- INSTALL SPRINKLER INTO THE SPRINKLER ADAPTOR TEE, LETTING THE 12"x12" SQUARE OF VAPOR BARRIER HANG DOWN OVER THE SPRINKLER.
- STEP 3
-
- WHEN INSTALLING THE VAPOR BARRIER ON THE CEILING CUT OUT A HOLE AROUND THE SPRINKLER AND PULL 12"x12" SQUARE THROUGH THE HOLE. TAPE THE 12"x12" SQUARE SECURELY TO THE VAPOR BARRIER.
- STEP 4
-
- Insulation Recommendations
- In areas subject to freezing, care should be taken in unheated attic spaces to cover Uponor AquaPEX tubing completely with insulation. Insulation should follow the guidelines of the insulation manufacturer. See Uponor Document "[Uponor AquaSAFE Attic Insulation Guidelines](#)" for attic installation guidelines (Provided in Contractors Documents package or online at [www.Uponorpro.com](#)).
- Extreme Temperature Installations
- AquaSAFE Residential Fire Safety systems are often installed in attics or other areas exposed to temperature extremes of heat and/or cold. Follow the recommended extreme weather installation instructions to isolate and protect system components from extreme temperatures. Because this system also delivers domestic cold water directly to plumbing fixtures, Uponor highly recommends that you protect the tubing with adequate insulation in warm weather areas to minimize heating of the cold water supply.
- Installation methods include, but are not limited to:
- Tenting over the fire sprinkler piping.
 - Additional layers of batt insulation.
 - Increased depth of blown-in insulation.
- Caution:** If you will be installing spray foam insulation, make sure to protect all components during application. Consult with the spray foam manufacturer to ensure compatibility with all products before application.
- Consultation with local building officials is encouraged to ensure compliance with local building codes.
- Bending PEX Tubing
- The minimum bend radius of Uponor PEX tubing in any direction is six times the outside diameter (**6 x OD**). Bend supports are available for 3/8", 1/2", 3/4" and 1" Uponor AquaPEX tubing to facilitate 90-degree rigid bends.
- | Fitting Size | Minimum Tubing Length |
|-----------------------|-----------------------|
| 3/8" ProPEX Fitting | 2" |
| 1/2" ProPEX Fitting | 2" |
| 3/4" ProPEX Fitting | 3" |
| 1" ProPEX Fitting | 3 1/2" |
| 1 1/4" ProPEX Fitting | 4 1/2" |
- High Upstream Pressure
- If the upstream pressure exceeds 80 psi a pressure reducing valve may need to be installed. Some jurisdictions may require a pressure reducing valve regardless of upstream pressure.
-
- Recessed Assembly Sprinkler Placement
- Align bottom of fire sprinkler mounting bracket to bottom of mounting member surface for typical recessed installation. Use top screw holes.
-
- See General Notes 8.2.5.8 for Architectural Feature Requirements
- Planter Box Window, Bay Window or Similar Feature. If no additional floor area is created **No Additional Sprinkler is Required.**
-
- If additional floor area is created. Cannot exceed 18 ft², be more than 2'-0" deep, more than 9'-0" wide and be within the coverage area of the sprinkler. **No Additional Sprinkler is Required.**
- NFPA 13D Table 7.5.6.3 Distances From Heat Sources
- | Heat Source | Ordinary Temp. 135°-170° | Intermediate Temp. 175°-225° |
|-----------------------------|--------------------------|------------------------------|
| Side of Fireplace | 36" | 12" |
| Front of Fireplace | 60" | 36" |
| Wood Burning Stove | 42" | 12" |
| Kitchen Range | 18" | 9" |
| Wall Oven | 18" | 9" |
| Hot Air Flues | 18" | 9" |
| Uninsulated Heat Ducts | 18" | 9" |
| Uninsulated Hot Water Pipes | 12" | 6" |
| Side of Hot Air Diffuser | 24" | 12" |
| Front of Hot Air Diffuser | 36" | 18" |
| Hot Water Heater | 6" | 3" |
| Furnace | 6" | 3" |
| 50W-250W Light Fixture | 6" | 3" |
| 250W-499W Light Fixture | 12" | 6" |
-
- Tubing Support Spacing:
- (Anchor AquaPEX Tubing Securely Enough to Support the Tubing, Yet Relaxed Enough to Allow the Tubing to Expand and Contract)
- Along Horizontal Runs, Install Supports Every 32", if Horizontal Runs are Continuously Supported, Place Tubing Supports at Six-Foot Intervals.
 - Along Vertical Runs, Install Supports Every Four to Five Feet, at Each Floor and at a Mid-story Guide.
- In-line Flow Test
- The In-line Flow Test can be constructed on site. It performs a flow test to ensure proper system operation and flow (see **Figure F001-8**).
-
- Flow Test
- To ensure the system provides enough water for proper fire sprinkler performance, you should conduct a flow verification test.
- Note:** The NFPA 13D Installation Standard does not require flow verification.
- Before performing a flow verification test, confirm the water pressures by contacting the Water and Sewer Department of your local city. Ensure the available water pressure matches the pressure used in the system design.
- Note:** The sprinkler plan indicates the most hydraulically remote sprinkler (or pair of sprinklers). For test requirements on other sprinklers, consult your local code.
- Note:** It is a good idea to notify the fire inspector at least 24 hours prior to performing a flow verification test. This may speed up the inspection process and eliminate the need to repeat the test for the inspector.
- Note:** See "[AquaSAFE Flow Test Instruction Sheet](#)" (Provided in Contractors Documents package or online at [www.Uponorpro.com](#)) for more information on Flow Test Setup, Assembly, Performing the Test and Troubleshooting. If there are any questions please contact Uponor.
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- uponor
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-
- NLV DEVELOPMENT - UNIT E1.1
LONGVIEW & KESSLER
LEES SUMMIT, MO 64081
- SHEET DESCRIPTION
GENERAL NOTES & DETAILS
- SHEET NUMBER
- F001
- DESIGN SERVICES
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- SALES REP: