PLUMBING LEGEND

AFF	ABOVE FINISHED FLOOR
ARCH	ARCHITECTURAL
BFF	BELOW FINISHED FLOOR
B.G.	BELOW GRADE
BTU	BRITISH THERMAL UNIT
CAP.	CAPACITY
C.I.	CAST IRON
COMP.	COMPARTMENT
CONT.	CONTINUATION
CU.	CUBIC
DIA.	DIAMETER
ELEV.	ELEVATION
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
F.F.	FINISH FLOOR
FLG.	FLANGE
FT	FOOT / FEET
G	GAS
GA.	GAUGE
GALV.	GALVANIZED
GPM	GALLONS PER MINUTE
G.V.	GATE VALVE
HP	HORSEPOWER
kW	KILOWATT
LAV	LAVATORY
LBS	POUNDS
MAX.	MAXIMUM
MBH	THOUSANDS OF BTUs PER HOUR
MIN.	MINIMUM
M.J.	MECHANICAL JOINT
N.I.M.	NOT IN MECHANICAL
PROT.	PROTECTION
PRV	PRESSURE REDUCING VALVE
PSI, PSIG	POUNDS PER SQUARE INCH
P/T	PRESSURE / TEMPERATURE
REQ'D	REQUIRED
TYP.	TYPICAL
VTR	VENT THROUGH ROOF
WC	WATER CLOSET

X / XX — EQUIPMENT MARK NUMBER

XXX — FIXTURE MARK

(#) — NOTE

RISER DIAGRAM

(CW) COLD WATER

(HW) HOT WATER

(HWR) HOT WATER RECIRC

(W) BELOW GRADE WASTE

(W) ABOVE GRADE WASTE

(V) VENT

RD — (RD) RAIN DRAIN

OD — (OD) OVERFLOW RAIN DRAIN

G — (G) NATURAL GAS

F — (F) FIRE WATER

PRESSURE/TEMP RELIEF VALVE

BUTTERFLY VALVE

GAS PRESSURE REGULATING VALVE

PIPE TURNED UP, PIPE TURNED DOWN

GATE VALVE

BALL VALVE

BALANCING VALVE

CHECK VALVE

UNION

DOUBLE CHECK ASSEMBLY

CAP

TEE

ELBOW

CLEANOUT

19TH AND PETYGROVE

PLUMBING PLANS

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS–PRODUCING FIXTURE.
EXCEPTION: STACKS RECEIVING THE DISCHARGE FROM LESS THEN 3 STORIES OF PLUMBING FIXTURES

HEAT TRACE (FREEZE PROTECTION) ALL PIPING SUBJECTED TO FREEZING CONDITIONS. ALL HEAT TRACED PIPE TO BE INSULATED.

HEAT TRACE WASTE TRAPS, INSULATE WASTE PIPING EXPOSED TO FREEZING CONDITIONS

ROUTE ALL HVAC UNIT CONDENSATE DRAINS TO AN APPROVED LOCATION (OPTIONS LISTED BELOW)

- ROUTE TO CLOTHES WASHER BOX VIA TOP DISCHARGE – IPS WATER TITE MODEL W8900 OR EQUAL.
- ROUTE ALL CONDENSATES DOWN IN WALLS IN COMMON DRAIN SYSTEM AND ROUTE TO HUB DRAINS OR MOP SINKS – CONTRACTOR TO SIZE DRAIN SYSTEM BASED ON NUMBER OF CONNECTED UNITS.
- PROVIDE CONDENSATE PUMPS ON ALL UNITS THAT ARE NOT GRAVITY DRAINED.

ROUTE VENTS FROM FLOOR DRAINS/SINKS BELOW SLAB AND UP ON/IN A WALL TO VENT STACKS ABOVE. (ROUTE INDIVIDUAL VENTS UNTIL ABOVE FLOOD LINE OF FIXTURE).

PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

(B) — HW/CW RISER UP TO SEVENTH FLOOR CEILING SPACE. SEE DETAIL 1/P6.01.

(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

(H) — ROUTE CONDENSATE PIPING TO OVER MOP SINK OR HUB DRAIN AS SHOWN ON PLANS.

(I) — CW & HW FOR COFFEE BAR/SINK/BOTTLE FILLER. ROUTE VENT LINE UP TO VENT STACKS ABOVE – –COORDINATE EXACT FIXTURES WITH OWNER

(J) — PROVIDE TYPICAL DIRT LEG, GAS COCK, UNION AND FLEX CONNECTION TO APPLIANCE. PROVIDE VENTED OR VENTLESS REGULATOR AS REQUIRED BY CODE.

(K) — 3" RADON PIPING ROUTED BELOW SLAB AND UP IN MECHANICAL CHASE TO ROOF. ROOF MOUNT RADON FANS TO INSTALLED IF REQUIRED BY TESTING. SEE 6/P601

(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

1) Install plumbing products approved by the state plumbing board or approved listing agency.
2) Shower valves and bathtub valves require pressure balance valves with a maximum 120 degrees F. outlet temperature.
3) 2017 OREGON State Plumbing Code. Based on the 2015 UPC.

GENERAL NOTES

1. WORK SHALL COMPLY WITH CURRENT OREGON SPECIALTY CODE.
2. COORDINATE INSTALLATION WITH OTHER TRADES.
3. KEEP ALL ROOFTOP EQUIPMENT 10 FEET FROM EDGE OF ROOF, MINIMUM.
4. MAINTAIN 10 FEET CLEARANCE BETWEEN ALL MECHANICAL AIR INTAKES AND PLUMBING AND RADON VENTS

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STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2005
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH / PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

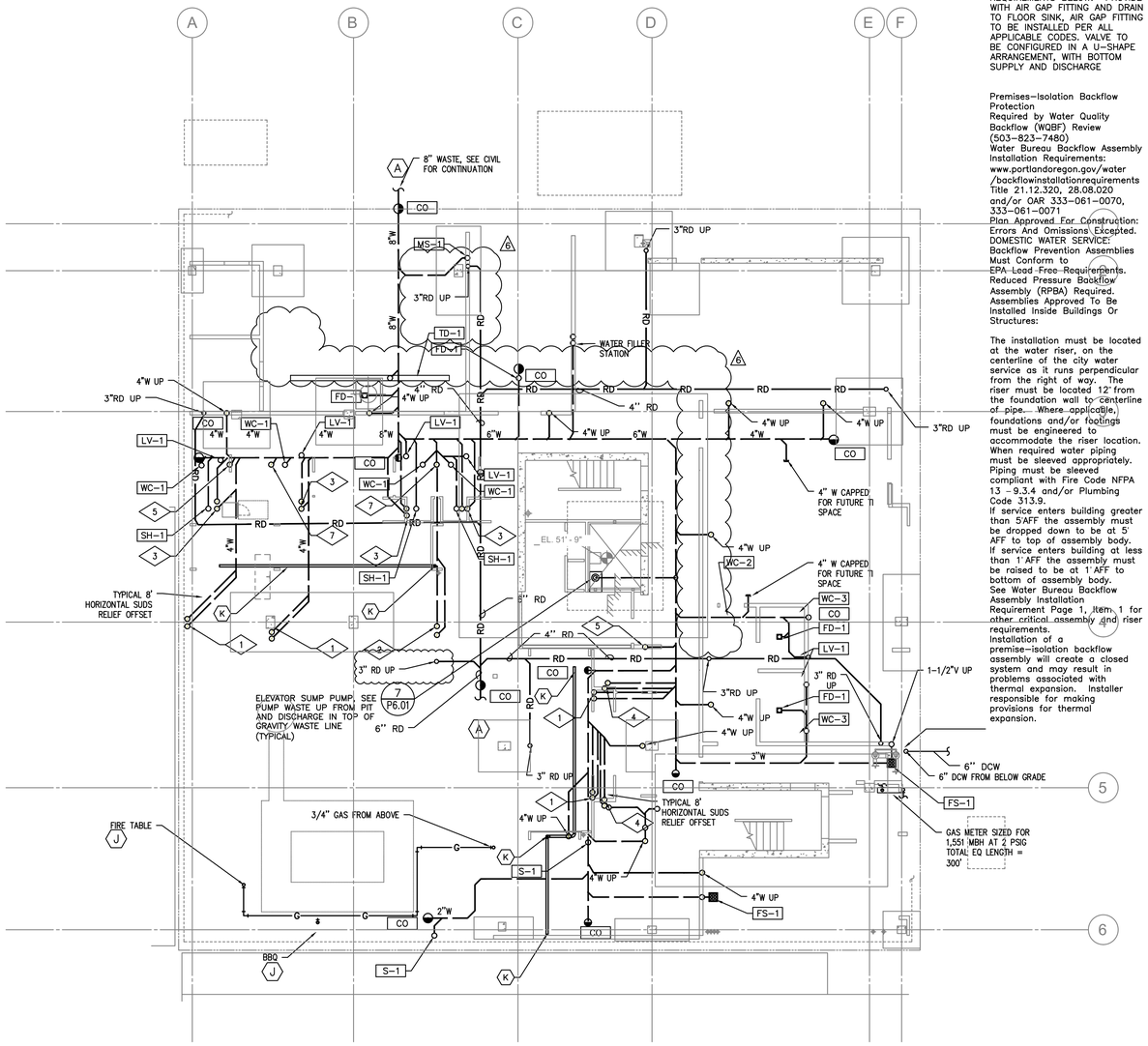
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING
TITLE SHEET

SHEET NUMBER
P001



RISER DETAILS:

SEE SHEET X P401 FOR RISER DIAGRAMS

◇ = RISER NUMBER

1 P1.00 PLUMBING PLAN–UNDERSLAB
SCALE: 1/8" = 1'-0"

RPBA (REDUCED PRESSURE BACKFLOW PREVENTER) TO BE INSTALLED AS NOTED BY CITY REQUIREMENTS BELOW. PROVIDE WITH AIR GAP FITTING AND DRAIN TO FLOOR SINK, AIR GAP FITTING TO BE INSTALLED PER ALL APPLICABLE CODES. VALVE TO BE CONFIGURED IN A U–SHAPE ARRANGEMENT, WITH BOTTOM SUPPLY AND DISCHARGE

Premises–Isolation Backflow Protection
Required by Water Quality Backflow (WQBF) Review (503–823–7480)
Water Bureau Backflow Assembly Installation Requirements:
www.portlandoregon.gov/water/backflowinstallationrequirements
Title 21.12.320, 28.08.020 and/or OAR 333–061–0070, 333–061–0071
Plan Approved For Construction: Errors And Omissions Excepted.
DOMESTIC WATER SERVICE:
Backflow Prevention Assemblies Must Conform to EPA Lead Free Requirements.
Reduced Pressure Backflow Assembly (RPBA) Required.
Assemblies Approved To Be Installed Inside Buildings Or Structures:

The installation must be located at the water riser, on the centerline of the city water service as it runs perpendicular from the right of way. The riser must be located 12" from the foundation wall to centerline of pipe. Where applicable, foundations and/or footings must be engineered to accommodate the riser location. When required water piping must be sleeved appropriately. Piping must be sleeved compliant with Fire Code NFPA 13 – 9.3.4 and/or Plumbing Code 313.9.
If service enters building greater than 5'AFF the assembly must be dropped down to be at 5' AFF to top of assembly body.
If service enters building at less than 1'AFF the assembly must be raised to be at 1'AFF to bottom of assembly body.
See Water Bureau Backflow Assembly Installation Requirement Page 1, Item 1 for other critical assembly and riser requirements.
Installation of a premise–isolation backflow assembly will create a closed system and may result in problems associated with thermal expansion. Installer responsible for making provisions for thermal expansion.

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS–PRODUCING FIXTURE.
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PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

(B) — HW/CW RISER UP TO SEVENTH FLOOR CEILING SPACE. SEE DETAIL 1/P6.01.

(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

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(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

1) Install plumbing products approved by the state plumbing board or approved listing agency.
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GENERAL NOTES

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54,607 PE
OREGON
JULY 11, 2005
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

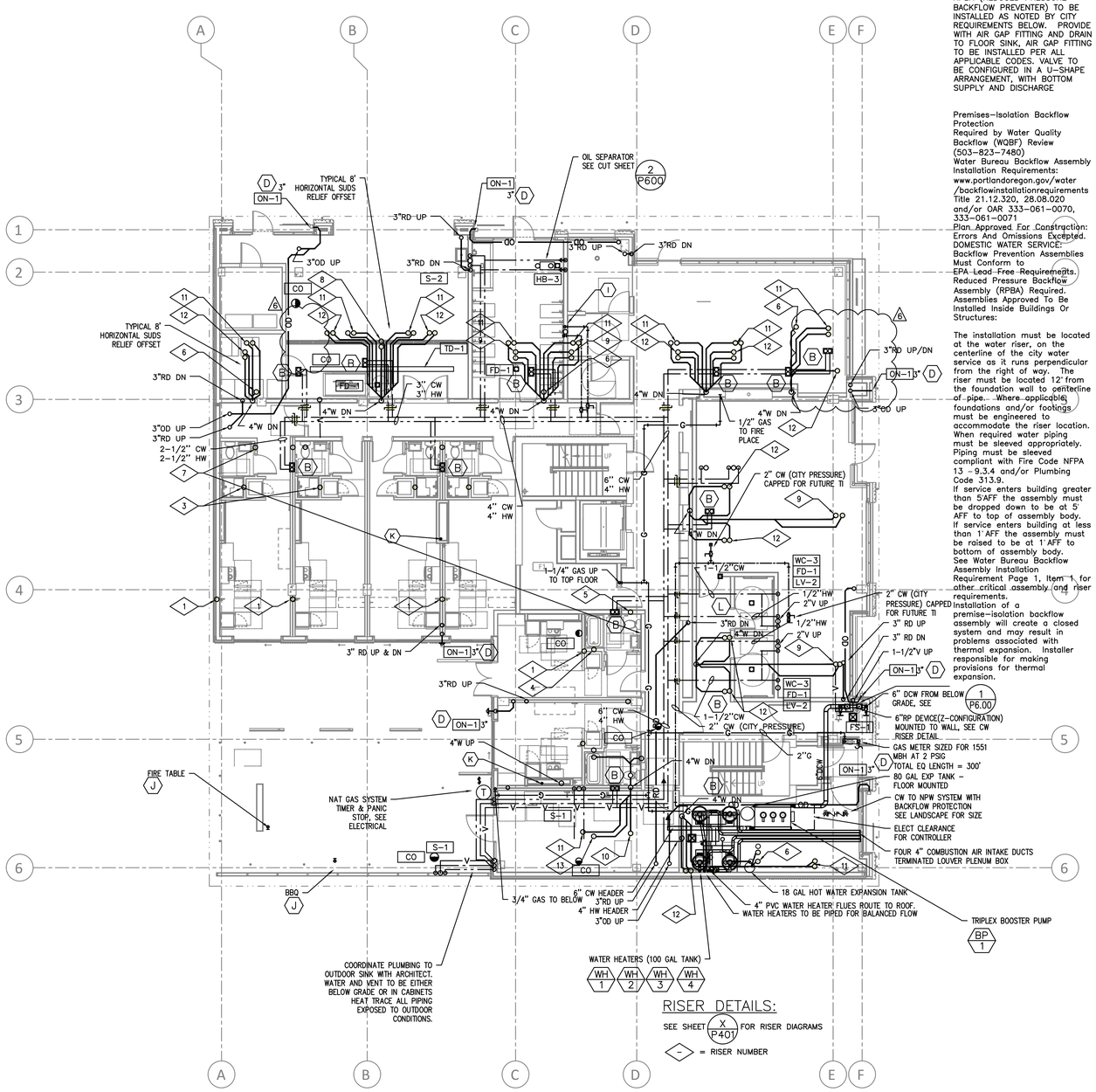
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - UNDERSLAB

SHEET NUMBER
P100



RISER DETAILS:

SEE SHEET X P401 FOR RISER DIAGRAMS

- = RISER NUMBER

1 P1.01 PLUMBING PLAN-LEVEL 1 GROUND FLOOR
SCALE: 1/8" = 1'-0"

RPBA (REDUCED PRESSURE BACKFLOW PREVENTER) TO BE INSTALLED AS NOTED BY CITY REQUIREMENTS BELOW. PROVIDE WITH AIR GAP FITTING AND DRAIN TO FLOOR SINK, AIR GAP FITTING TO BE INSTALLED PER ALL APPLICABLE CODES. VALVE TO BE CONFIGURED IN A U-SHAPE ARRANGEMENT, WITH BOTTOM SUPPLY AND DISCHARGE

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DOMESTIC WATER SERVICE: Backflow Prevention Assemblies Must Conform to EPA Lead-Free Requirements. Reduced Pressure Backflow Assembly (RPBA) Required. Assemblies Approved To Be Installed Inside Buildings Or Structures:

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PLAN NOTES:

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(L) — WET VENT RESTROOM FIXTURES.

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MARK R. DENYER
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6	IFC	04.01.22

TRUE NORTH PLAN NORTH

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NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

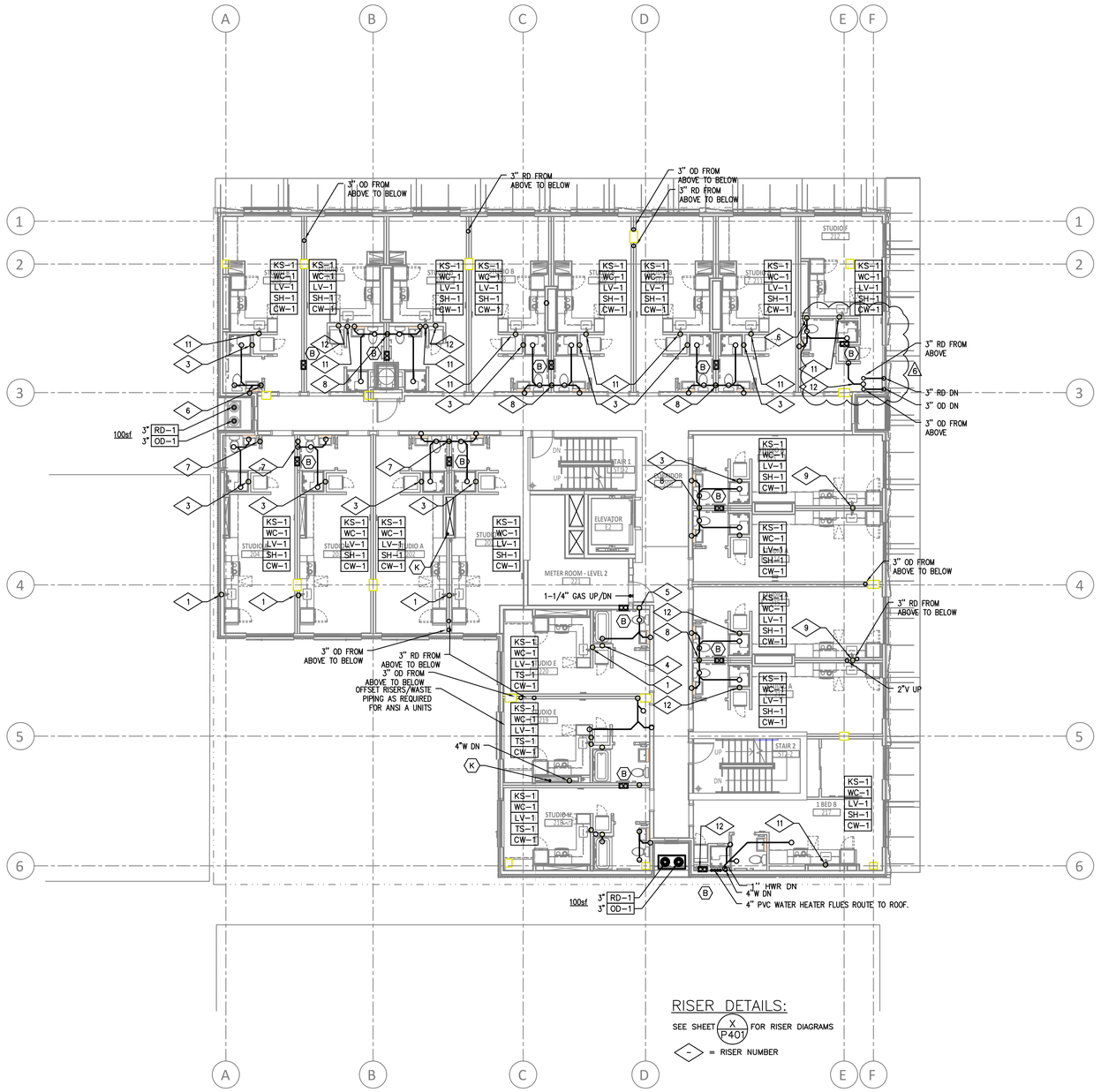
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 1 GROUND FLOOR

SHEET NUMBER
P101



1 P1.01 PLUMBING PLAN–LEVEL 2
SCALE: 1/8" = 1'-0"

RISER DETAILS:

SEE SHEET X P401 FOR RISER DIAGRAMS

– = RISER NUMBER

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PLAN NOTES:

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ISSUANCE
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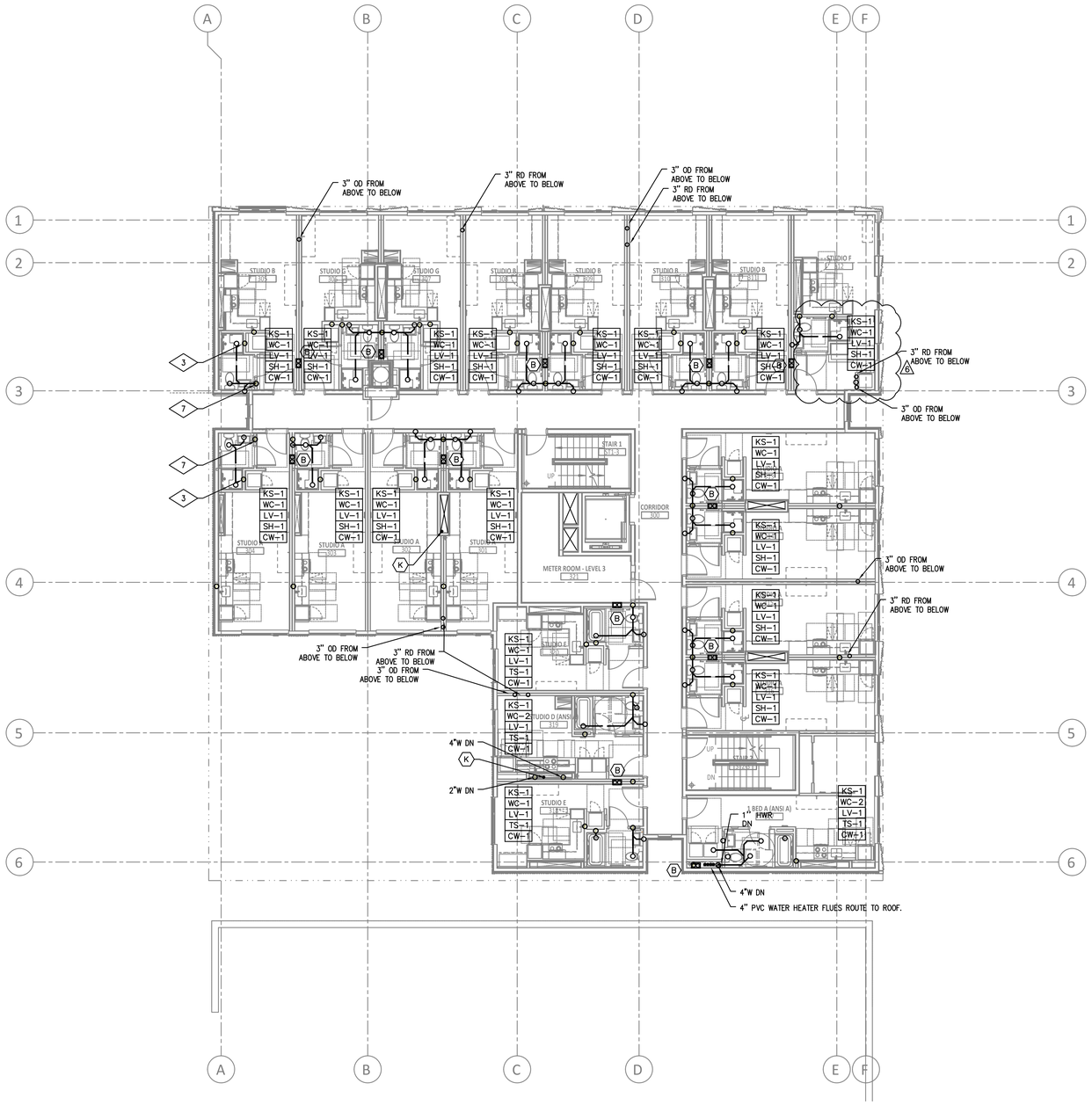
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 2

SHEET NUMBER
P102



1 P1.03 PLUMBING PLAN–LEVEL 3–6
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

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HEAT TRACE WASTE TRAPS, INSULATE WASTE PIPING EXPOSED TO FREEZING CONDITIONS

ROUTE ALL HVAC UNIT CONDENSATE DRAINS TO AN APPROVED LOCATION (OPTIONS LISTED BELOW)

- ROUTE TO CLOTHES WASHER BOX VIA TOP DISCHARGE – IPS WATER TITE MODEL W8900 OR EQUAL.
- ROUTE ALL CONDENSATES DOWN IN WALLS IN COMMON DRAIN SYSTEM AND ROUTE TO HUB DRAINS OR MOP SINKS – CONTRACTOR TO SIZE DRAIN SYSTEM BASED ON NUMBER OF CONNECTED UNITS.
- PROVIDE CONDENSATE PUMPS ON ALL UNITS THAT ARE NOT GRAVITY DRAINED.

ROUTE VENTS FROM FLOOR DRAINS/SINKS BELOW SLAB AND UP ON/IN A WALL TO VENT STACKS ABOVE. (ROUTE INDIVIDUAL VENTS UNTIL ABOVE FLOOD LINE OF FIXTURE).

PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

(B) — HW/CW RISER UP TO SEVENTH FLOOR CEILING SPACE. SEE DETAIL 1/P6.01.

(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

(H) — ROUTE CONDENSATE PIPING TO OVER MOP SINK OR HUB DRAIN AS SHOWN ON PLANS.

(I) — CW & HW FOR COFFEE BAR/SINK/BOTTLE FILLER. ROUTE VENT LINE UP TO VENT STACKS ABOVE – –COORDINATE EXACT FIXTURES WITH OWNER

(J) — PROVIDE TYPICAL DIRT LEG, GAS COCK, UNION AND FLEX CONNECTION TO APPLIANCE. PROVIDE VENTED OR VENTLESS REGULATOR AS REQUIRED BY CODE.

(K) — 3" RADON PIPING ROUTED BELOW SLAB AND UP IN MECHANICAL CHASE TO ROOF. ROOF MOUNT RADON FANS TO INSTALLED IF REQUIRED BY TESTING. SEE 6/P601

(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

1) Install plumbing products approved by the state plumbing board or approved listing agency.
2) Shower valves and bathtub valves require pressure balance valves with a maximum 120 degrees F. outlet temperature.
3) 2017 OREGON State Plumbing Code. Based on the 2015 UPC.

GENERAL NOTES

1. WORK SHALL COMPLY WITH CURRENT OREGON SPECIALTY CODE.
2. COORDINATE INSTALLATION WITH OTHER TRADES.
3. KEEP ALL ROOFTOP EQUIPMENT 10 FEET FROM EDGE OF ROOF, MINIMUM.
4. MAINTAIN 10 FEET CLEARANCE BETWEEN ALL MECHANICAL AIR INTAKES AND PLUMBING AND RADON VENTS

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STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2006
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

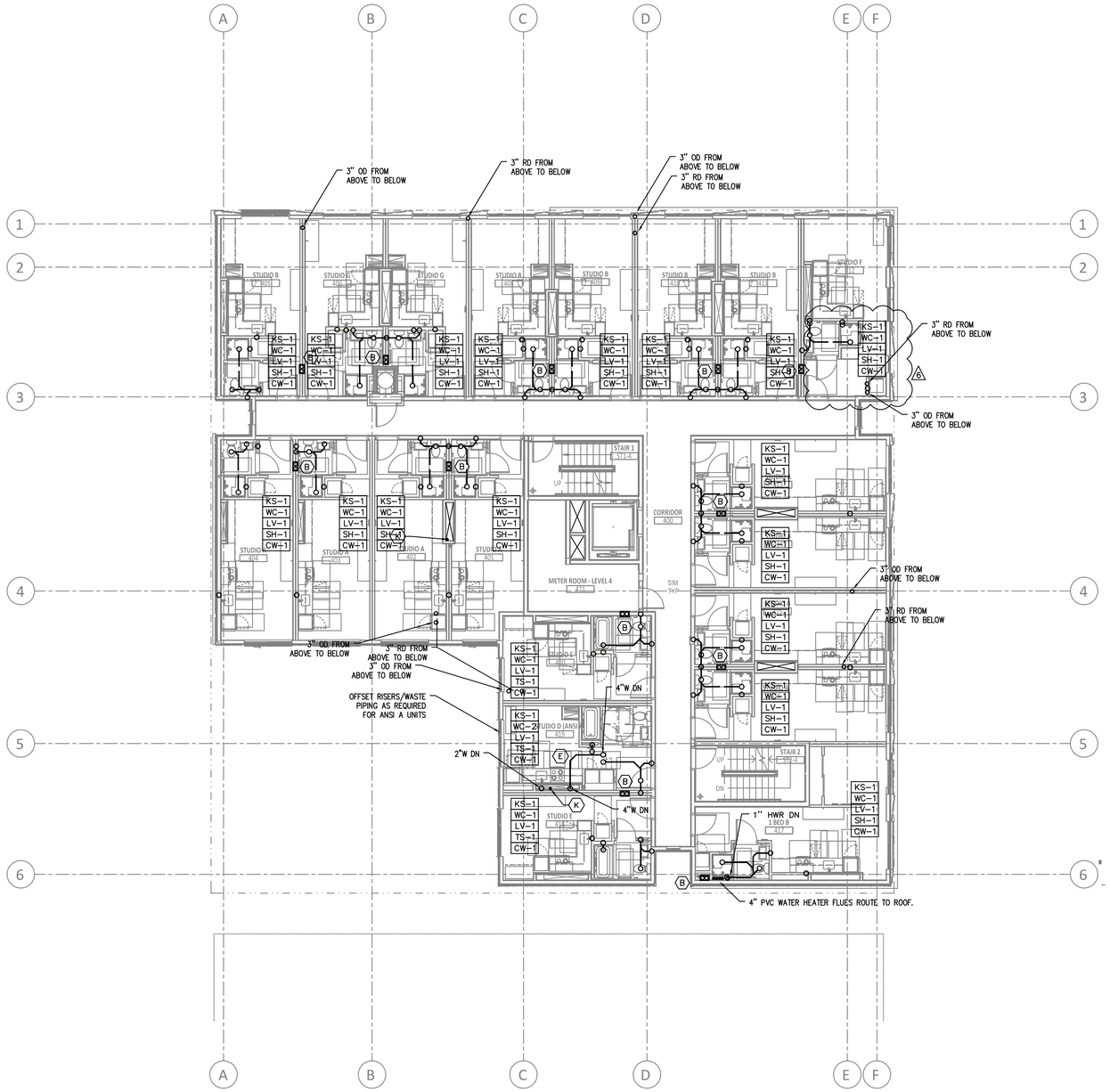
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 3-7

SHEET NUMBER
P103



1 P1.04 PLUMBING PLAN–LEVEL 4
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS–PRODUCING FIXTURE.
EXCEPTION: STACKS RECEIVING THE DISCHARGE FROM LESS THEN 3 STORIES OF PLUMBING FIXTURES

HEAT TRACE (FREEZE PROTECTION) ALL PIPING SUBJECTED TO FREEZING CONDITIONS. ALL HEAT TRACED PIPE TO BE INSULATED.

HEAT TRACE WASTE TRAPS, INSULATE WASTE PIPING EXPOSED TO FREEZING CONDITIONS

ROUTE ALL HVAC UNIT CONDENSATE DRAINS TO AN APPROVED LOCATION (OPTIONS LISTED BELOW)

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ROUTE VENTS FROM FLOOR DRAINS/SINKS BELOW SLAB AND UP ON/IN A WALL TO VENT STACKS ABOVE. (ROUTE INDIVIDUAL VENTS UNTIL ABOVE FLOOD LINE OF FIXTURE).

PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

(B) — HW/CW RISER UP TO SEVENTH FLOOR CEILING SPACE. SEE DETAIL 1/P6.01.

(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

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(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

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3) 2017 OREGON State Plumbing Code. Based on the 2015 UPC.

GENERAL NOTES

1. WORK SHALL COMPLY WITH CURRENT OREGON SPECIALTY CODE.
2. COORDINATE INSTALLATION WITH OTHER TRADES.
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ISSUANCE
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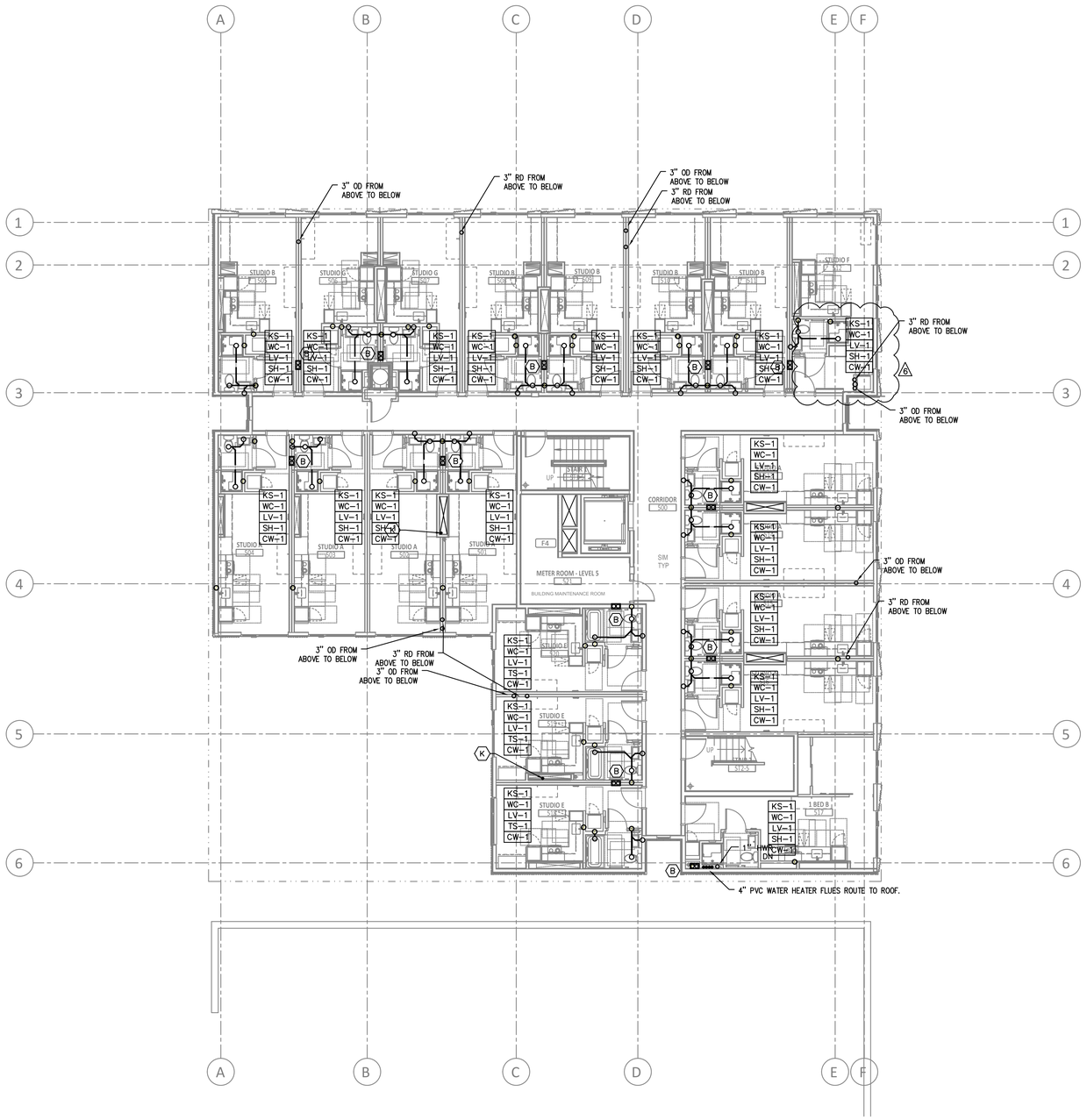
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 4

SHEET NUMBER
P104



1 PLUMBING PLAN–LEVEL 5
P1.05 SCALE: 1/8" = 1'-0"

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS–PRODUCING FIXTURE.
EXCEPTION: STACKS RECEIVING THE DISCHARGE FROM LESS THEN 3 STORIES OF PLUMBING FIXTURES

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PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

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(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

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(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

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2) Shower valves and bathtub valves require pressure balance valves with a maximum 120 degrees F. outlet temperature.
3) 2017 OREGON State Plumbing Code. Based on the 2015 UPC.

GENERAL NOTES

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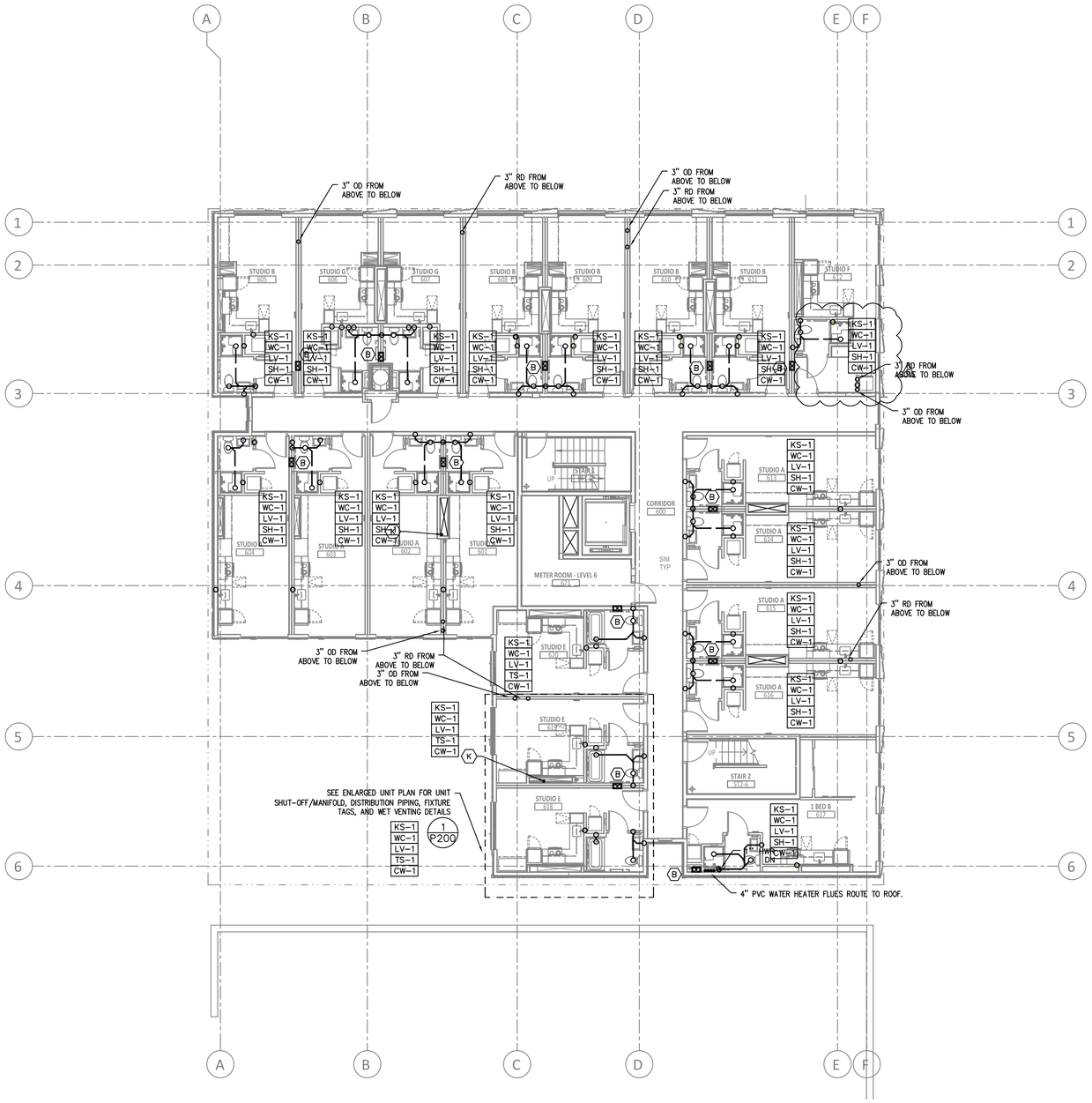
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 5

SHEET NUMBER
P105



1 P1.06 PLUMBING PLAN–LEVEL 6
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS–PRODUCING FIXTURE.
EXCEPTION: STACKS RECEIVING THE DISCHARGE FROM LESS THEN 3 STORIES OF PLUMBING FIXTURES

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PLAN NOTES:

(A) — 6" RD TO (USING 1/4"/FT SLOPE) TO CIVIL POC.

(B) — HW/CW RISER UP TO SEVENTH FLOOR CEILING SPACE. SEE DETAIL 1/P6.01.

(C) — SEE DETAIL 3/P6.01 FOR UNIT DISTRIBUTION.

(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

(H) — ROUTE CONDENSATE PIPING TO OVER MOP SINK OR HUB DRAIN AS SHOWN ON PLANS.

(I) — CW & HW FOR COFFEE BAR/SINK/BOTTLE FILLER. ROUTE VENT LINE UP TO VENT STACKS ABOVE – –COORDINATE EXACT FIXTURES WITH OWNER

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(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

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ISSUANCE
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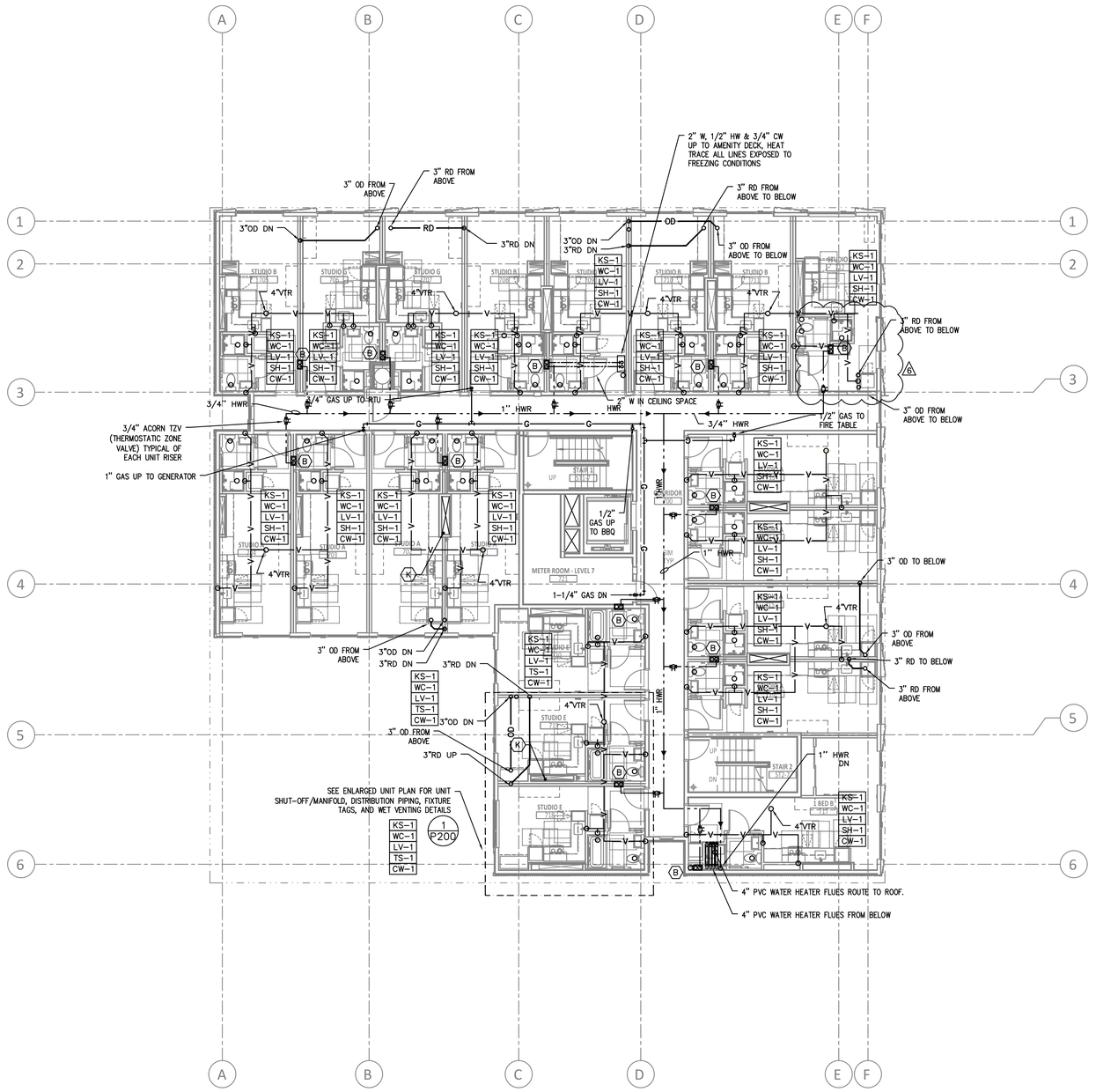
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING PLAN - LEVEL 6

SHEET NUMBER
P106



1 P1.07 PLUMBING PLAN–LEVEL 7
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

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PLAN NOTES:

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(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

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DATE
04.01.2022

FULL SHEET SIZE
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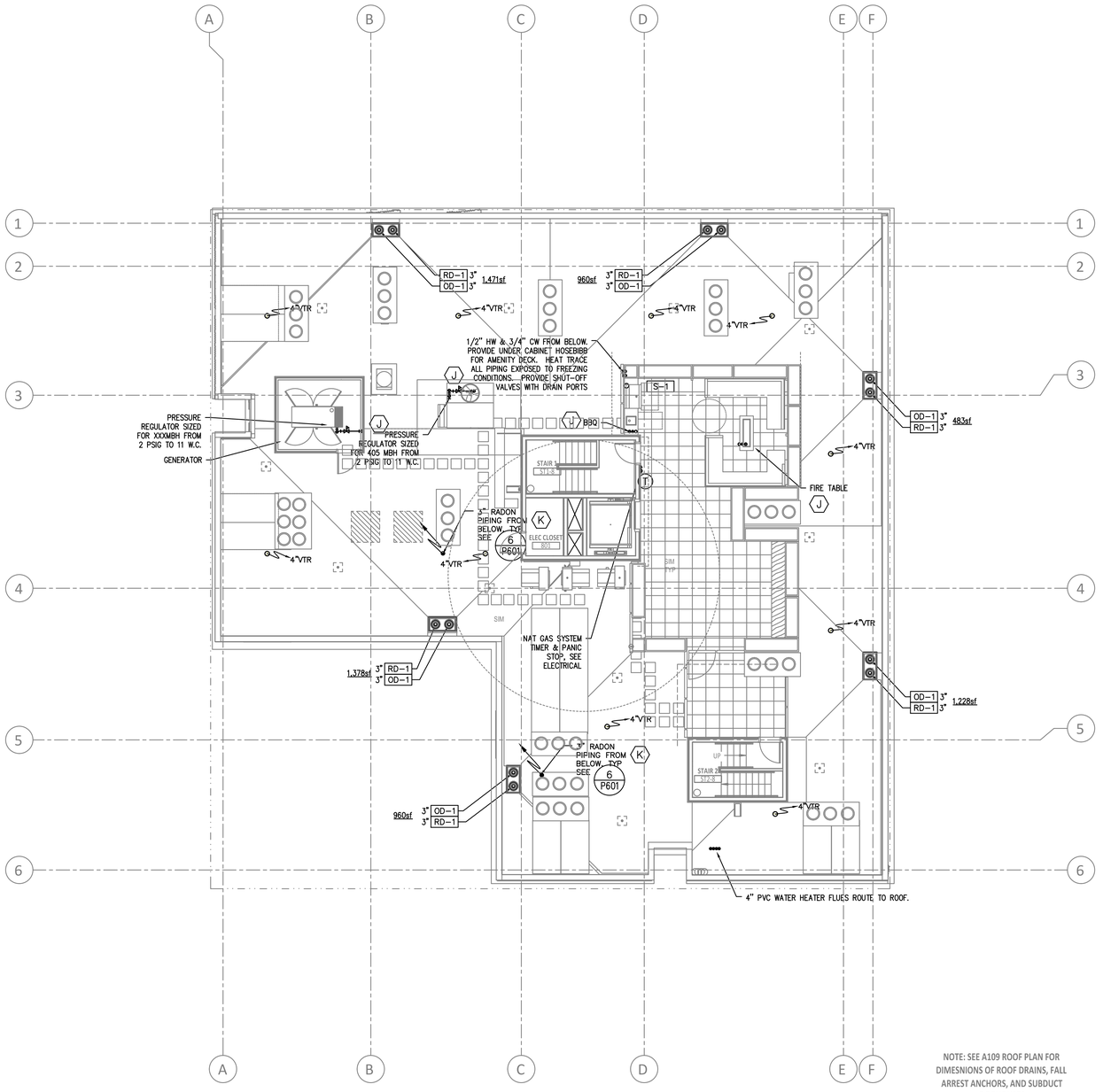
DRAWING TITLE
PLUMBING PLAN - LEVEL 7

SHEET NUMBER
P107



NOTE: SEE A109 ROOF PLAN FOR DIMESNIONS OF ROOF DRAINS, FALL ARREST ANCHORS, AND SUBDUCT DOGHOUSES

1 P1.08 PLUMBING PLAN–ROOF
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

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(D) — OVERFLOW NOZZLE AT 12" ABOVE FINISH GRADE. SIZE SHOWN ON PLAN.

(E) — OFFSET PIPING AS REQUIRED IN FOR SUDS RELIEF.

(F) — ROUTE CONDENSATE PIPING DOWN INSIDE WALL. DAYLIGHT AT FIRST FLOOR LEVEL.

(G) — PROVIDE HW/CW WATER SHUT OFF VALVES IN EACH UNIT. SEE TYPICAL DOMESTIC RISER DIAGRAM ON 4/P6.01 FOR HW/CW SIZING.

(H) — ROUTE CONDENSATE PIPING TO OVER MOP SINK OR HUB DRAIN AS SHOWN ON PLANS.

(I) — CW & HW FOR COFFEE BAR/SINK/BOTTLE FILLER. ROUTE VENT LINE UP TO VENT STACKS ABOVE – –COORDINATE EXACT FIXTURES WITH OWNER

(J) — PROVIDE TYPICAL DIRT LEG, GAS COCK, UNION AND FLEX CONNECTION TO APPLIANCE. PROVIDE VENTED OR VENTLESS REGULATOR AS REQUIRED BY CODE.

(K) — 3" RADON PIPING ROUTED BELOW SLAB AND UP IN MECHANICAL CHASE TO ROOF. ROOF MOUNT RADON FANS TO INSTALLED IF REQUIRED BY TESTING. SEE 6/P601

(L) — WET VENT RESTROOM FIXTURES.

PLUMBING NOTES:

1) Install plumbing products approved by the state plumbing board or approved listing agency.
2) Shower valves and bathtub valves require pressure balance valves with a maximum 120 degrees F. outlet temperature.
3) 2017 OREGON State Plumbing Code. Based on the 2015 UPC.

GENERAL NOTES

1. WORK SHALL COMPLY WITH CURRENT OREGON SPECIALTY CODE.
2. COORDINATE INSTALLATION WITH OTHER TRADES.
3. KEEP ALL ROOFTOP EQUIPMENT 10 FEET FROM EDGE OF ROOF, MINIMUM.
4. MAINTAIN 10 FEET CLEARANCE BETWEEN ALL MECHANICAL AIR INTAKES AND PLUMBING AND RADON VENTS

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WWW.MFIA-ENG.COM
CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2006
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

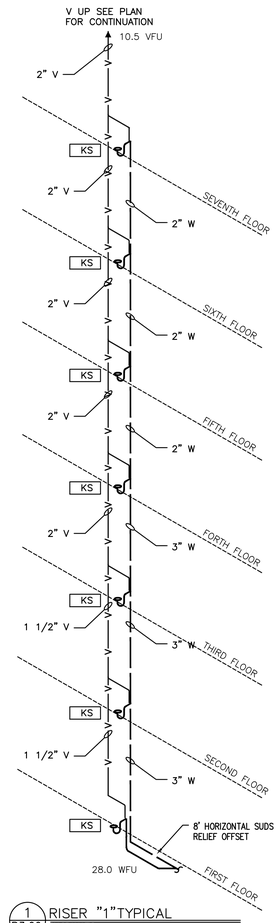
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

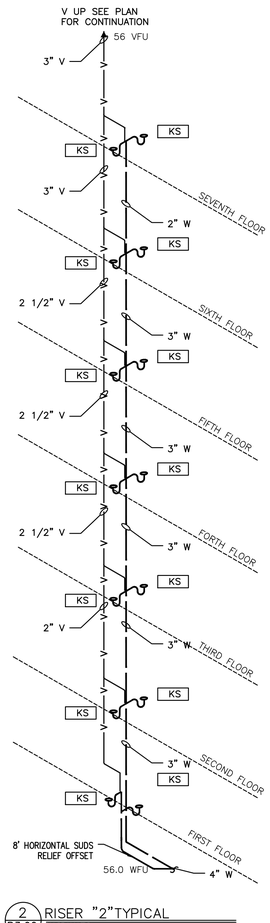
DRAWING TITLE
PLUMBING PLAN - ROOF

SHEET NUMBER
P108



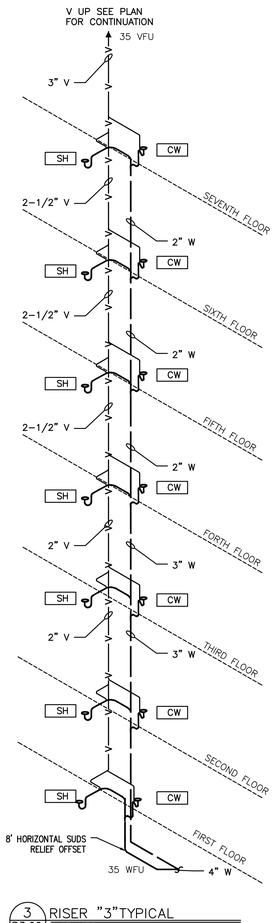
1 P3.00 RISER "1"TYPICAL DIAGRAMATIC

KS w/DW=4.0DFU



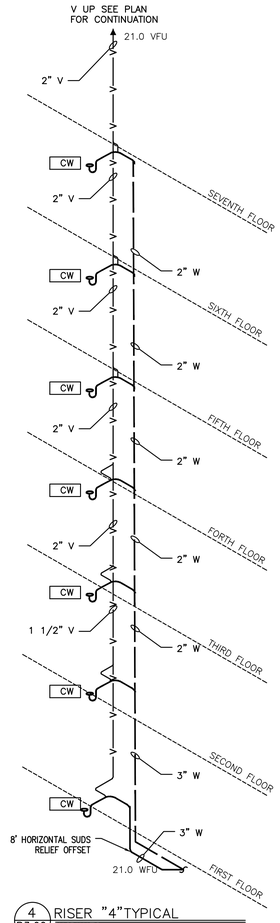
2 P3.00 RISER "2"TYPICAL DIAGRAMATIC

KS w/DW(x2)=8.0DFU



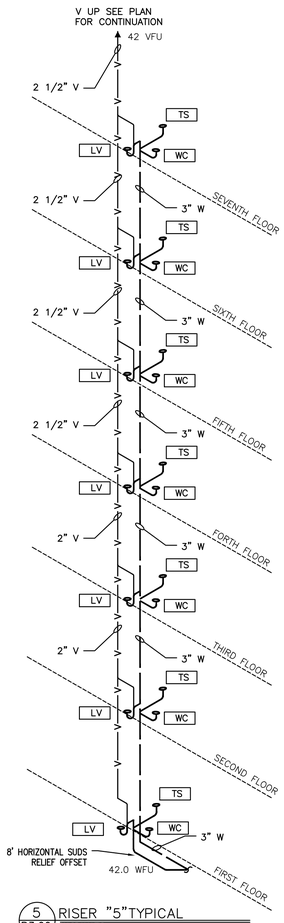
3 P3.00 RISER "3"TYPICAL DIAGRAMATIC

SH,CW=5.0DFU



4 P3.00 RISER "4"TYPICAL DIAGRAMATIC

CW=3.0DFU



5 P3.00 RISER "5"TYPICAL DIAGRAMATIC

WC,TS,LV=6.0DFU

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS– PRODUCING FIXTURE.
EXCEPTION: STACKS RECEIVING THE DISCHARGE FROM LESS THEN 3 STORIES OF PLUMBING FIXTURES

HEAT TRACE (FREEZE PROTECTION) ALL PIPING SUBJECTED TO FREEZING CONDITIONS.

HEAT TRACE WASTE TRAPS, INSULATE WASTE PIPING EXPOSED TO FREEZING CONDITIONS

ROUTE ALL HVAC UNIT CONDENSATE DRAINS TO AN APPROVED LOCATION (OPTIONS LISTED BELOW)

- ROUTE TO CLOTHES WASHER STAND PIPE, OF UNIT BELOW
- ROUTE ALL CONDENSATES DOWN IN EXTERIOR WALL IN COMMON DRAIN SYSTEM AND ROUTE THROUGH 1ST FLOOR TO FLOOR SINK IN UTILITY ROOM – CONTRACTOR TO SIZE DRAIN SYSTEM BASED ON NUMBER OF CONNECTED UNITS.
- PROVIDE CONDENSATE PUMPS ON ALL UNITS THAT ARE NOT GRAVITY DRAINED.

ROUTE VENTS FROM FLOOR DRAINS/SINKS BELOW SLAB AND UP ON/IN A WALL TO VENT STACKS ABOVE. (ROUTE INDIVIDUAL VENTS UNTIL ABOVE FLOOD LINE OF FIXTURE).

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ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

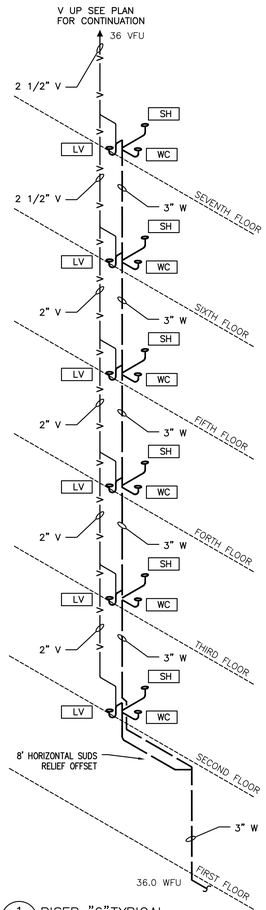
PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

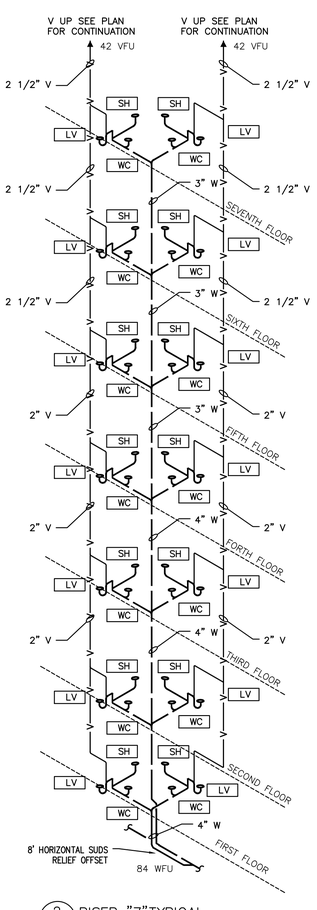
DRAWING TITLE
PLUMBING RISER DIAGRAMS

SHEET NUMBER
P300



1 P301 RISER "6" TYPICAL DIAGRAMATIC

WC,SH,LV=6.0DFU



2 P301 RISER "7" TYPICAL DIAGRAMATIC

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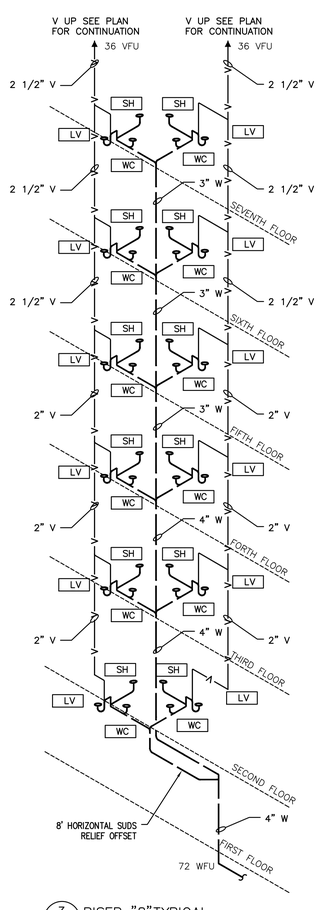
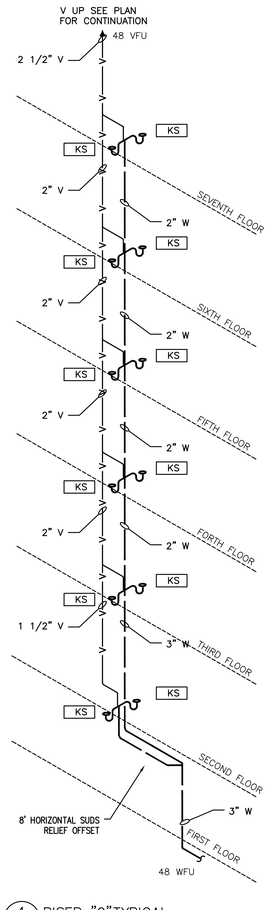


3 P301 RISER "8" TYPICAL DIAGRAMATIC

WC,SH,LV(x2)=12.0DFU



4 P301 RISER "9" TYPICAL DIAGRAMATIC

KS, w/DW(x2)=8.0DFU

GENERAL NOTES:

DRAINAGE CONNECTIONS SHALL NOT BE MADE INTO A DRAINAGE PIPING SYSTEM WITHIN 8 FT OF ANY VERTICAL TO HORIZONTAL CHANGE OF DIRECTION OF A STACK CONTAINING A SUDS– PRODUCING FIXTURE.
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DRAWING TITLE
PLUMBING RISER DIAGRAMS

SHEET NUMBER
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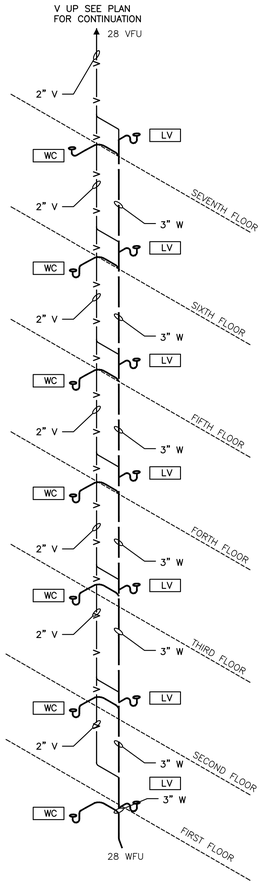
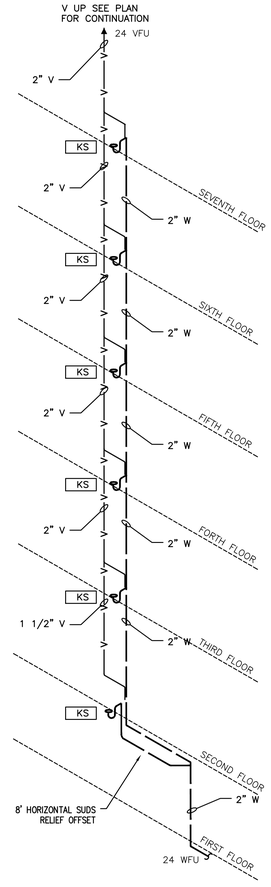


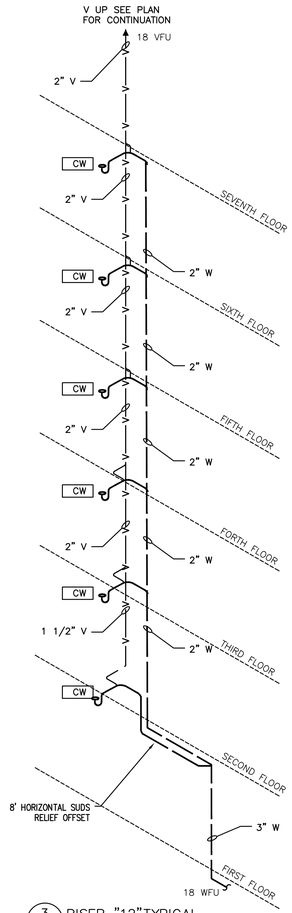
1 P3.02 RISER "10" TYPICAL
DIAGRAMATIC

WC,LV=4.0DFU



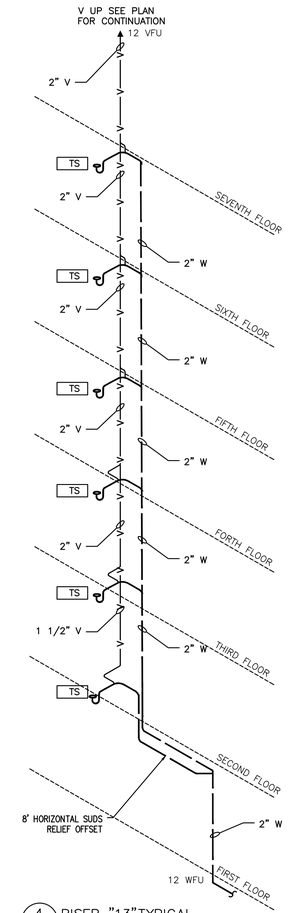
2 P3.02 RISER "11" TYPICAL
DIAGRAMATIC

KS, w/DW=4.0DFU



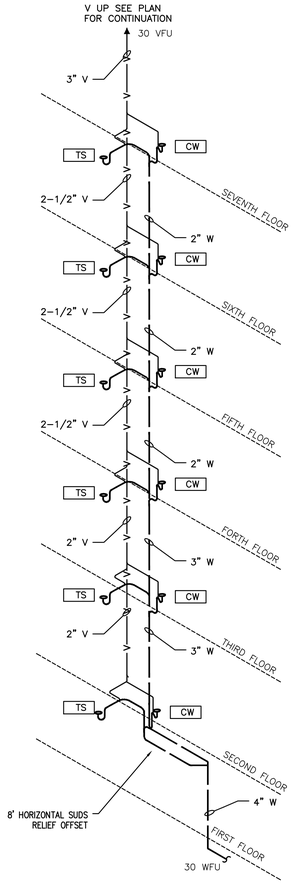
3 P3.02 RISER "12" TYPICAL
DIAGRAMATIC

CW=3.0DFU



4 P3.02 RISER "13" TYPICAL
DIAGRAMATIC

TS=2.0DFU



5 P3.02 RISER "14" TYPICAL
DIAGRAMATIC

TS,CW=5.0DFU

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ISSUANCE
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PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING RISER DIAGRAMS

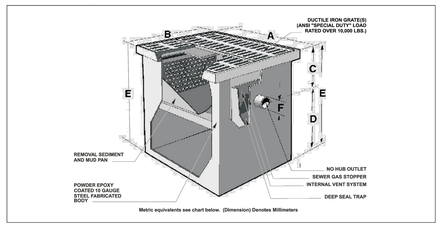
SHEET NUMBER
P302

Location: _____

MIFAB — MI-OS — OIL / SEDIMENT INTERCEPTOR

Specification: MIFAB® Series MI-OS ____ (specify model) sanitary powder epoxy coated inside and outside fabricated 10 gauge steel oil / sediment interceptor with sludge capacity of ____ lbs. (specify). Interceptor complete with ANSI rated "Special Duty" ductile iron grate(s) with load rating over 10,000 lbs., removable sediment bucket and mud pan, deep seal trap with integral sewer gas stopper, internal vent system, cleanout plug and side outlet.

Function: Used in service areas to receive wastewater with sediment and oil contaminants through the top grate(s). Sediment bucket and mud pan are designed to capture debris and prevent drain line clogging. Integral sewer gas stopper will prevent harmful gasses from entering via the outlet. Electrostatically applied powder epoxy coating ensures extra long life.



Metric equivalents see chart below. (Dimension) Denotes Millimeters

MODEL NO.	SLUDGE CAPACITY LBS.	GRATE FREE AREA SQ. IN.	NO. OF GRATES	A	B	C	D	E	F	LIQUID HOLDING CAP. U.S.G.	LIQUID HOLDING CAP. CU. FT.	SHIPPING WEIGHT (lbs.)	WEIGHT WHEN FILLED WITH WATER (lbs.)
◉ MI-OS-1	12	49	1	24.375"	12.5"	4.5"	10.5"	15.0"	2"	12	1.6	140	221.00
○ MI-OS-2	60	131	2	24.375"	24.5"	7.620"	17.620"	25.25"	4"	40	6.13	300	594.00
○ MI-OS-3	100	262	3	36.625"	24.375"	11"	22"	33"	4"	77	10.25	445	1020.00
○ MI-OS-4	200	393	4	48.750"	24.375"	11"	22"	33"	4"	103	15.8	560	1334.00
○ MI-OS-5	300	524	8	48.750"	48.675"	11"	22"	33"	4"	193.33	29.7	650	1600.00

Note: Reduce the "A" and "B" dimensions by 1" (25) to determine the actual body length and width dimensions. The lid overhangs the body by 1/2" (13) on all four sides.

	SUFFIX	OPTIONAL VARIATIONS
☐	-3	Stainless steel grate (veneer)
☐	-AP	Anode pack
☐	-BA	Buy American Act compliant product
☐	-C	Extension "C" as required
☐	-FL	Anchor flange
☐	-FLM	Anchor flange and membrane clamp
☐	-OV	2" (51) adjustable draw off valve
☐	-SS	Stainless steel cover shroud
☐	-T	F.I.P. female threaded inlet and outlet
☐	-TL	Lid (s) to receive tile or terrazzo
☐	specify	Special size inlet and outlet

CALIFORNIA PROPOSITION 65 WARNING. This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Job Name: _____ Page No: _____

Section No: _____ Contractor: _____

Schedule No: _____ Purchase Order No: _____

MIFAB reserves the right to make changes in material and design without formal notice and obligation. **USA: 1-800-465-2736 www.mifab.com CAN: 1-800-387-3880**

Page I28 **2017-06-16**

2 P6.00 OIL SEPARATOR
SCALE: DETAIL

Portland Water Bureau Development Services • 1120 SW 5th Avenue Room 600 • Portland OR 97204

Instructions for Completing Water Meter Sizing Worksheet (Commercial or Mixed Use) W-4

Phone 503-823-7368 • Email devrev@portlandoregon.gov

The Water Meter Sizing Worksheet helps determine the water meter size needed for projects requiring new or upsized water services.

Who needs to complete this form?
Complete this form if you have new construction, alternations, or additions to commercial or mixed use that require a new or upsized water service that will connect to the public water system.

This worksheet must be completed if the applicant is planning to:
- Construct a new building
- Add or remove plumbing fixtures

Potential commercial building permit applicants may also complete this worksheet in preplanning or planning stages. If you are interested in Systems Development Charges related to such a project, please feel free to complete the worksheet and contact Portland Water Bureau's Development Services staff. Our staff can discuss water services and meter configurations that might meet your needs, and can answer questions related to the water service portion of building permits.

What kind of information does this worksheet request?
The Meter Sizing Worksheet is an inventory of the plumbing fixtures in your project. Each fixture is given a value based on typical water use. Follow the instructions to determine the water meter size that will provide optimum water flow throughout your site. You will calculate Total Fixture Unit Values and be able to match this value to the meter size.

Where do I send the worksheet?
Applicants for commercial building permits typically submit this form with the Systems Development Charge Form, Commercial Projects packet, available at Bureau of Development Services.

If you are researching a building permit application, you may contact Portland Water Bureau Development Services for preplanning and planning assistance with the worksheet.

Portland Water Bureau Development Services
Please feel free to call Development Services should you need assistance.

Phone 503-823-7368
Email devrev@portlandoregon.gov

Mailing address:

1120 SW 5th Avenue, Room 600
Portland, OR 97204-1926

Walk-in Assistance:

1900 SW 4th Avenue, 1st Floor DSC
For hours of operation call 503-823-7310, option 1

Mtr Sizing Co 081508 rev3 07/14 **1**

Portland Water Bureau Development Services 1120 SW 5th Avenue Portland OR 97204

Water Meter Sizing Worksheet Commercial or Mixed Use W-4

Revised: May 2008 According to UPC-2005-Appendix A

Phone: 503-823-7368 email: devrev@portlandoregon.gov

Building Permit Number	Service Address

(1) Type of Fixture	(2) Total Fixtures in New/Remodeled Structure		(3) Fixture Values		(4) Total Fixture Unit Value
Bar sink		x	2.0	=	
Bathtub or Tub/Shower	20	x	4.0	=	80
Clinic Sink		x	3.0	=	
Clothes Washer	126	x	4.0	=	504
Dishwasher	126	x	1.5	=	189
Drinking Fountain		x	0.5	=	
Hose Bibb, 1st one	1	x	2.5	=	2.5
Hose Bibb, each additional	3	x	1.0	=	3
Kitchen Sink	126	x	1.5	=	189
Laundry Sink		x	1.5	=	
Lavatory Sink	128	x	1.0	=	128
Mop or Service Sink		x	3.0	=	
Shower	106	x	2.0	=	212
Urinal, 1st one		x	20.0	=	
Urinal, each additional		x	15.0	=	
Water Closet	126	x	2.5	=	315
Water Closet, Flushometer Valve - 1st one	1	x	40.0	=	40
Water Closet, Flushometer - each additional	1	x	25.0	=	25
Note: *Fixture units for flushometers are approximate values. Values will be reviewed and may be adjusted by Portland Water Bureau Staff on a case-by-case basis.*				**Total Fixture Units:**	1,687.5

Instructions

Column 2: Enter the total number of each fixture type for the completed new structure. If the project has an existing structure that will be using the same water meter enter the total number of each fixture type for the completed project.

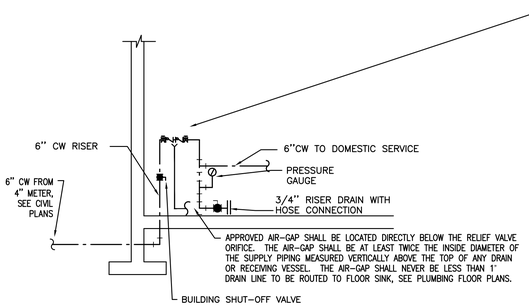
Column 3: Per unit value of each fixture type

Column 4: Enter the number of column 2 times column 3

Fixture Unit Count (column 4 total)	Required Meter Size
0 - 22	5/8" meter
22.5 - 37	3/4" meter
37.5 - 89	1" meter
89.5 - 286	1.5 meter
286.5 - 532	2" meter
532.5 - 1,300	3" meter
1,300.5 - 3600	4"meter
3,600.5 - 8,200	6" meter

Note: There may be SDC credit if existing meters are utilized or removed. SDC fees are not assessed to fire lines. Fees are due at the time the water service installation is paid. Call Portland Water Bureau Development Services, 503-823-7368 with any questions.

PWB 0608, Rev5 07/17



1 P6.00 DOMESTIC RISER
SCALE: DETAIL

Premises-Isolation Backflow Protection
Required by Water Quality Backflow (WQBF) Review (503-823-7480)
Water Bureau Backflow Assembly Installation Requirements:
www.portlandoregon.gov/water/backflowinstallationrequirements
Title 21.12.320, 28.08.020 and/or OAR 333-061-0070, 333-061-0071
Plan Approved For Construction: Errors And Omissions Excepted.
DOMESTIC WATER SERVICE:
Backflow Prevention Assemblies Must Conform to EPA Lead Free Requirements.
Reduced Pressure Backflow Assembly (RPBA) Required.
Assemblies Approved To Be Installed Inside Buildings Or Structures:

The installation must be located at the water riser, on the centerline of the city water service as it runs perpendicular from the right of way. The riser must be located 12" from the foundation wall to centerline of pipe. Where applicable, foundations and/or footings must be engineered to accommodate the riser location. When required water piping must be sleeved appropriately. Piping must be sleeved compliant with Fire Code NFPA 13 - 9.3.4 and/or Plumbing Code 313.9.
If service enters building greater than 5'AFF the assembly must be dropped down to be at 5' AFF to top of assembly body.
If service enters building at less than 1'AFF the assembly must be raised to be at 1'AFF to bottom of assembly body.
See Water Bureau Backflow Assembly Installation Requirement Page 1, Item 1 for other critical assembly and riser requirements.
Installation of a premise-isolation backflow assembly will create a closed system and may result in problems associated with thermal expansion. Installer responsible for making provisions for thermal expansion.

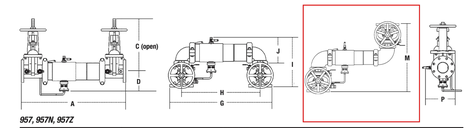
Specifications

The Reduced Pressure Zone Assembly shall consist of two independent torsion spring check modules, a differential pressure relief valve located between and below the two modules, two drip tight shutoff valves, and required torsion spring check modules and relief valve shall be contained with a sleeve accessible single housing constructed from 304 (Schedule 40) stainless steel pipe with groove end connections. Torsion spring checks shall have replaceable elastomer discs and in operation produce drip tight closure against the reverse flow of liquid caused by backpressure or backsiphonage. Assembly shall be a Watts Regulator Company Series 957, 957N, 957Z.

NOTICE
When installing a drain line on Series 957 backflow preventers, use 957AG air gaps. See ES-AG/EL/TC for additional information.

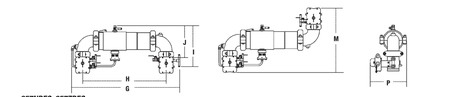
Available Models & Options

Suffix:
NRS – non-rising stem, resilient seated gate valves
OSY – UL/FM outside stem and yoke resilient seated gate valves
BFG – UL/FM grooved gear operated butterfly valves with tamper switch
QT – 2½" - 4" (65 - 100mm) quarter-turn ball valves
*OSY FxG – Flanged inlet gate connection and grooved outlet gate connection
**OSY GxF – Grooved inlet gate connection and flanged outlet gate connection
***OSY GxG – Grooved inlet gate connection and grooved outlet gate connection
****ALERT with SentryPlus™ Alert flood detection system
*Available with grooved NRS gate valves – consult factory
**Post indicator plate and operating nut available – consult factory
***Consult factory for dimensions
**** Not available with the 957N or 957Z



957, 957N, 957Z

SIZE	A in.	A mm	C (OSY) in.	C (OSY) mm	C (NRS) in.	C (NRS) mm	D in.	D mm	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm	M in.	M mm	P in.	P mm	957NRS lbs.	957NRS kgs.	957OSY lbs.	957OSY kgs.	957N NRS lbs.	957N NRS kgs.	957N OSY lbs.	957N OSY kgs.
2½	30⅛	781	16⅛	416	9⅛	238	6½	165	29⅛	738	21½	546	15½	393	8⅛	223	21⅛	540	9⅛	234	118	54	128	58	126	57	136	62
3	31⅛	806	18⅛	479	10⅛	260	6⅞	170	30⅛	768	22⅛	565	17⅛	435	9⅛	233	23	584	10⅛	267	134	61	148	67	147	67	161	73
4	33⅛	857	22⅛	578	12⅛	310	7	178	33	838	23¼	597	18⅛	470	9⅛	252	26¼	667	11⅛	284	164	74	187	85	187	85		
6	43⅛	1105	30⅛	765	16	406	8½	216	44⅛	1137	33½	851	23⅛	589	13⅛	332	34⅛	870	15	381	276	125	298	135	317	144	339	154
8	49⅛	1264	37⅛	959	19⅛	506	9⅞	246	54⅛	1375	40⅛	1019	27⅛	697	15⅞	398	36⅛	937	17⅛	437	441	200	483	219	516	234	556	253
10	57⅛	1467	45⅛	1162	23⅛	605	11⅛	285	66	1676	49½	1257	32½	826	17⅛	440	44⅛	1124	20	508	723	328	783	355	893	405	950	431



957NBFG, 957ZBFG

SIZE	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm	M in.	M mm	P in.	P mm	957NBFG lbs.	957NBFG kgs.	957ZBFG lbs.	957ZBFG kgs.
2½	32½	826	23	584	15½	394	9½	241	19¾	502	11⅞	300	67	30		
3	34	864	24	610	16½	414	10⅛	256	21¼	540	12⅛	308	70	32		
4	35⅝	905	25½	648	17⅝	437	10⅞	279	23½	597	12⅝	321	87	39		
6	46½	1181	35¼	895	20½	521	13½	343	27¼	692	15	382	160	73		

Noryl® is a registered trademark of SABIC Innovative Plastics Holding BV.

PLUMBING CONNECTION SCHEDULE

MARK	FIXTURE	W	V	CW	HW	REMARKS
WC-1	WATER CLOSET	3"	2"	1/2"		FLOOR MOUNT, TANK TYPE, 1.28 GPF
WC-2	WATER CLOSET, ADA	3"	2"	1/2"		FLOOR MOUNT, TANK TYPE, ADA 1.28 GPF
WC-3	WATER CLOSET. PUBLIC	4"	2"	1-1/2"		WLL HUNG, FLUSH VALVE, ADA 1.28 GPF
LV-1	LAVATORY	1-1/2"	1-1/2"	1/2"	1/2"	COUNTERMOUNT - 1.5 GPM - *
LV-2	LAVATORY, PUBLIC	1-1/2"	1-1/2"	1/2"	1/2"	WALL HUNG, ADA, - 1.5 GPM - *
TS-1	TUB/SHOWER	1-1/2"	1-1/2"	1/2"	1/2"	1.5 GPM SHOWER HEAD - **
SH-1	SHOWER	1-1/2"	1-1/2"	1/2"	1/2"	ADA, GRAB BARS + 1.5 GPM SHOWER HEAD - **
KS-1	KITCHEN SINK	2"	1-1/2"	1/2"	1/2"	SINGLE COMPARTMENT W/ DISPOSAL 1.5 GPM ****
KS-2	LEASING KITCHEN SINK	2"	1-1/2"	1/2"	1/2"	SINGLE COMPARTMENT W/ DISPOSAL 1.5 GPM ****
S-1	SINK	2"	1-1/2"	1/2"	1/2"	SINGLE COMPARTMENT W/ DISPOSAL 1.5 GPM ****
CW-1	CLOTHES WASHER FITTING	2"	2"	1/2"	1/2"	VALVE & WASTE BOX WITH BALL VALVES - ***
FD-1	FLOOR DRAIN	3"	VL			SIOUX CHIEF
FS-1	FLOOR SINK	4"	VL			J.R. SMITH 3150 ENAMELED CAST IRON
TD-1	TRENCH DRAIN	4"	VL			SEE CUT SHEETS
HB-1	HOSE BIB			3/4"		NON-FREEZE; CONFIRM LOCATIONS W/ ARCH
HB-2	HOSE BIB			3/4"		INDOOR
HB-3	HOSE BIB			3/4"	3/4"	INDOOR, HOT & COLD
MS-1	MOP SINK	2"	1-1/2"	1/2"	1/2"	VACUUM PROTECTED
RD-1	RAIN DRAIN	SIZED ON DRAWING				JR SMITH 1010-1020
OD-1	OVERFLOW RAIN DRAIN					JR SMITH 1070

V.L. - VENTED LINE
* PROVIDE WITH ASSE 1070 APPROVED POINT OF USE MIXING VALVE OR LAV FAUCET WITH APPROVED TEMPERATURE LIMIT STOP.
** PROVIDE WITH ASSE 1016 APPROVED TEMPERATURE AND PRESSURE SHOWER MIXING VALVE.
*** PROVIDE ACCESSIBLE VALVE BOX (SINGLE THROW DUAL BALL VALVE) WITH STAND PIPE FITTING LOCATED TO THE SIDE OF THE WASHER.
**** PROVIDE ALL PIPES, FITTINGS AND ACCESSORIES FOR A COMPLETE DISHWASHER INSTALLATION.
***** PROVIDE RECESSED BOX.

GAS WATER HEATERS

MARK NUMBER	WH 1	WH 2	WH 3	WH 4
CAPACITY (GAL)	100	100	100	100
INPUT RATE (MBH)	199	199	199	199
OUTPUT RATE (MBH)	193	193	193	193
EFFICIENCY (%)	97%	97%	97%	97%
FUEL	NAT GAS	NAT GAS	NAT GAS	NAT GAS
RECOVERY CAP. (GPH) @ 80°F RISE	294	294	294	294
GAS VENT DIA. (INCHES)	4" PVC	4" PVC	4" PVC	4" PVC
COMBUSTION AIR INTAKE	4" PVC	4" PVC	4" PVC	4" PVC
DESIGN WEIGHT (LBS)	1400	1400	1400	1400
BASIS OF DESIGN: AO SMITH	BTH-199Mxi	BTH-199Mxi	BTH-199Mxi	BTH-199Mxi

PUMPS

MARK NUMBER	CP 1
SERVICE	DHW RECIRC
TYPE	CIRC
CONTROLLED BY	AQUASTAT
ARRANGEMENT	IN-LINE
FLOW RATE (GPM)	7.5
HEAD (FT)	30
MOTOR HP	1/3 HP
RPM	---
DESIGN WEIGHT (LBS)	20

BOOSTER PUMP

MARK NUMBER	BP 1
SERVICE	DOMESTIC BOOSTER PUMP
STARTER TYPE	VFD
ARRANGEMENT	TRIPLEX VERTICAL TURBINE
FLOW RATE (GPM)	290 GPM
INLET PRESSURE	~60 PSI
HEAD (FT)	130'
PUMP SPEED	3172 RPM
FLOW RATE PER PUMP	96 GPM
DUTY POINT POWER	3 X 4.38 HP
MOTOR HP (3)	7.5
RPM	3600
CONTROLLED BY	PUMP CONT.
DESIGN WT	??? LBS
SUCTION PIPE SIZE	4"
DISCHARGE PIPE SIZE	4"
ELECTRICAL POWER	208-3
BASIS OF DESIGN (GRUNDFOS)	MULTI E 3CRE 20-3

EXPANSION TANKS

MARK NUMBER	EXP 1
TYPE	BLADDER
SERVICE	DOMESTIC WATER
ASME RATED	YES
TANK VOLUME (GAL)	79
ACCEPTANCE VOLUME (GAL)	--
CONNECTION SIZE	1-1/2"
CONNECTION LOCATION	BOTTOM
BASIS OF DESIGN -WESSELLS	FXA-300

IFC

Pettygrove-PLUMBING CALCULATIONS - 2017 OPSC

		DOMESTIC WATER SERVICE				SANITARY WASTE SERVICE	
FIXTURE TYPE	NUMBER OF FIXTURES	WATER FIXTURE UNITS	TOTAL WSFU	TOTAL CW FIXTURE UNITS	TOTAL HW FIXTURE UNITS	DRAINAGE FIXTURE UNITS	TOTAL DFU
BATHTUB or COMBO BATH/SHOWER	20	4	80	60	60	2	40
CLOTHES WASHER	126	4	504	378	378	3	378
DISHWASHER (INDEPENDENT DRAIN)	126	1.5	189	141.75	141.75	2	252
KITCHEN SINK (ONE 1-1/2" TRAP)	126	1.5	189	141.75	141.75	2	252
LAVATORY (SINGLE)	128	1	128	96	96	1	128
RECEPTOR (ELEVATOR WASTE)	1	0	0	0	0	100	100
SHOWERS, (STALL)	106	2	212	159	159	2	212
SINK GENERAL (2" TRAP)	2	3	6	4.5	4.5	4	8
WATER CLOSET (1.6 GPF TANK-PRIVATE)	126	2.5	315	315	0	3	378
WATER CLOSET (1.6 GPF FLUSHOMETER VALVE-First)	1	40	40	40	0	3	3
WATER CLOSET (1.6 GPF FLUSHOMETER VALVE-Second)	1	30	30	30	0	3	3
TOTAL	763		1693	1366	981		1754
	GPM		290	260	200	**WASTE SIZE**	**8"**
	Supply Size		6"	6"	4"		
	Meter Size		4"	**Per Oregon W-4**			

YBA architects
123 NW 2ND AVE SUITE 204 - PORTLAND, OR 97209
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2007 S.E. Ash St.
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WWW.MFIA-ENG.COM
CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER 54,607 OREGON JULY 11, 2000 MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

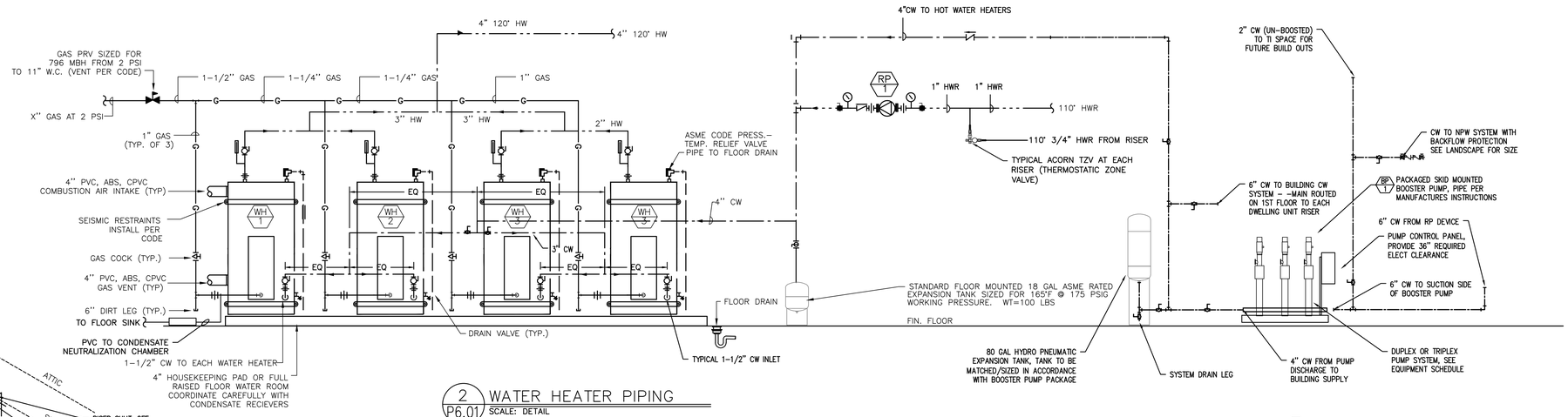
PROJECT NUMBER
170290

DATE
04.01.2022

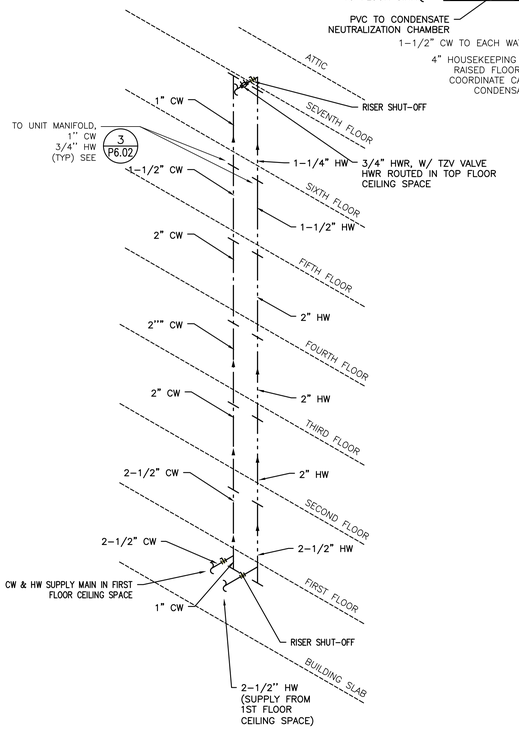
FULL SHEET SIZE
30 X 42

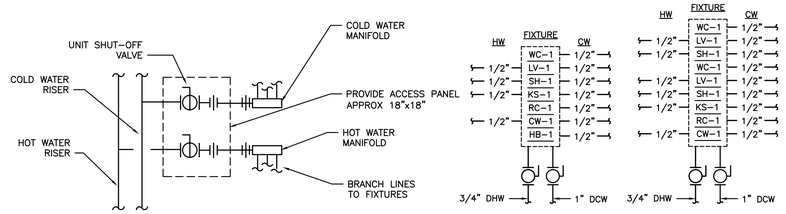
DRAWING TITLE
PLUMBING SCHEDULES, LEGENDS AND DETAILS

SHEET NUMBER
P600

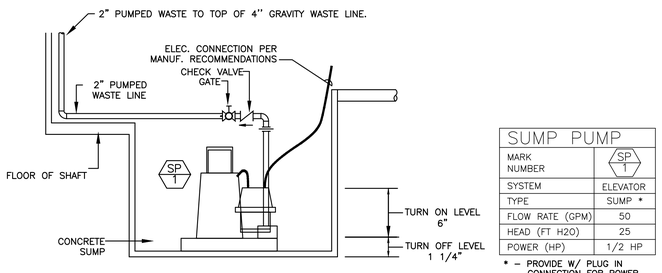


2 P6.01 WATER HEATER PIPING
SCALE: DETAIL





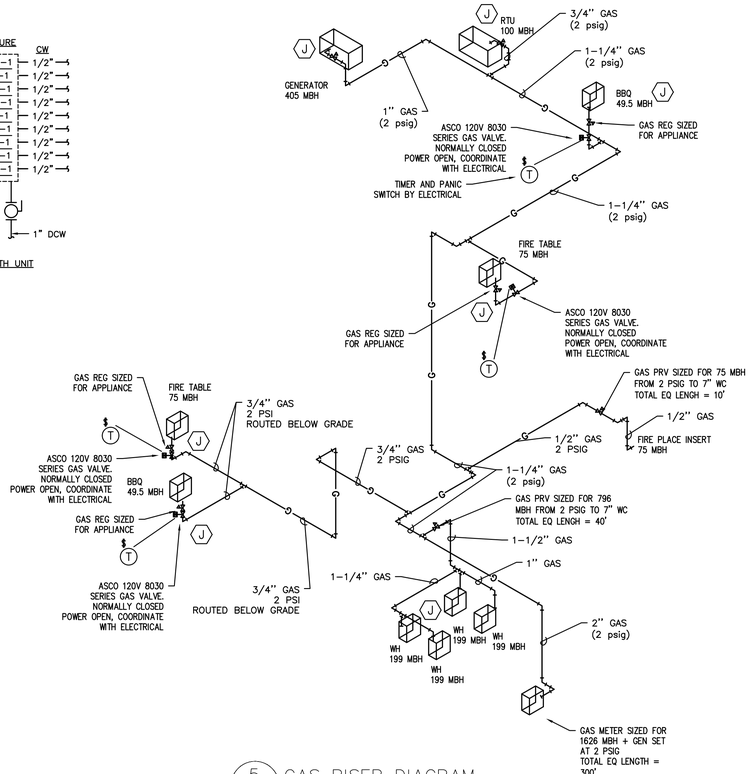
3 P6.00 UNIT DISTRIBUTION MANIFOLD
SCALE: DETAIL



SUMP PUMP	
MARK NUMBER	SP 1
SYSTEM	ELEVATOR
TYPE	SUMP *
FLOW RATE (GPM)	50
HEAD (FT H2O)	25
POWER (HP)	1/2 HP

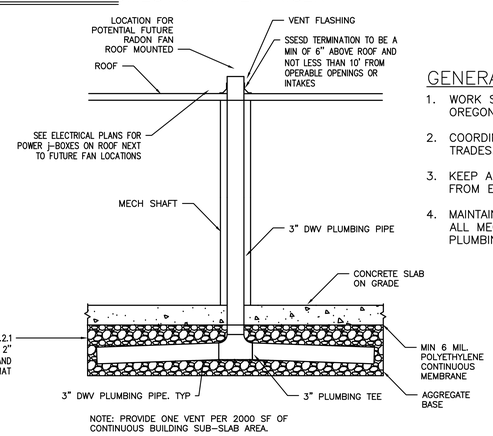
* - PROVIDE W/ PLUG IN CONNECTION FOR POWER

4 P601 ELEVATOR SUMP
SCALE: DETAIL



5 P601 GAS RISER DIAGRAM
SCALE: DETAIL

1 P6.01 TYPICAL DOUBLE STACK DOMESTIC WATER RISER
SCALE: DETAIL



6 601 RADON VENTING
NOT TO SCALE

GENERAL NOTES

1. WORK SHALL COMPLY WITH CURRENT OREGON SPECIALTY CODE.
2. COORDINATE INSTALLATION WITH OTHER TRADES.
3. KEEP ALL ROOFTOP EQUIPMENT 10 FEET FROM EDGE OF ROOF, MINIMUM.
4. MAINTAIN 10 FEET CLEARANCE BETWEEN ALL MECHANICAL AIR INTAKES AND PLUMBING AND RADON VENTS

PLAN NOTES:

(J) — PROVIDE TYPICAL DIRT LEG, GAS COCK, UNION AND FLEX CONNECTION TO APPLIANCE. PROVIDE VENTED OR VENTLESS REGULATOR AS REQUIRED BY CODE.

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INC. WWW.MFIA-ENG.COM
CONTACT: Mark Denyer

STAMP
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REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2000
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

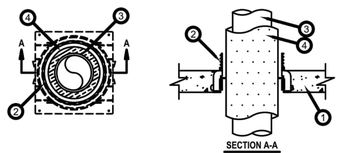
DRAWING TITLE
PLUMBING DETAILS

SHEET NUMBER
P601

System No. F-A-5015

F Rating — 2 Hr
T Ratings — 1/2 and 3/4 Hr (See Item 3)

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115



1. Floor Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
1A. Floor Assembly - (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series Designs in the Fire Resistance Directory and as summarized below:
A. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
B. Concrete — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-75/2.5"N, CP 680-110/4"N, CP 680-160/6"N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6".
3. Through Penetrants — One metallic pipe, conduit or tubing to be installed within the firestop device. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe, conduit or tubing may be used:
A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
C. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
The firestop device and metallic penetrant shall be sized as follows:

Nom Pipe Diam, in. (mm)	Nom Thick. Of Pipe Insul., in. (mm)	Firestop Device	T-Rating, Hr
1/2 (13)	1 (25)	CP 680-75/2.5"N, CP 682-72/2.5"CP 680-M 2", CP 680-P 2"	3/4
1 (25)	3/4 (19)	CP 680-75/2.5"N CP 680-P 3"	1/2
1 (25)	1 (25)	CP 680-M 3", CP 680-P 3"	1/2
1 (25) (see Item 5)	1 (25)	CP 682-110/4"CP 680-M 4"	1/2
2 (51)	1 (25)	CP 680 110/4"N, CP682 110/4"CP 680-M 4", CP 680-P 4"	1/2
2 (51)	3/4 (19)	CP 680-100/4"NCP 680-P 4"	1/2
4 (102)	3/4 (19)	CP 680-160/6"NCP 680-P 6	1/2

4. Tube Insulation - Plastics+ — Nom ¾ or 1 in. (19 or 25 mm) thick acryonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
See Plastics+ (QMFZ2) Category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-0VA may be used.
5. Packing Material — (Not Shown) - When using a 1 in. (25 mm) diam pipe with 1 in. (25 mm) thick AB/PVC pipe insulation in a 4 in. (102 mm) device, and a min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation shall be firmly packed into top of devices, flush with the top of the device.
*Bearing the UL Classification Mark

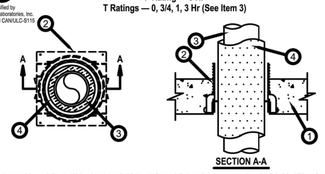
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. December 14, 2006

System No. F-A-5016

F Rating — 3 Hr
T Ratings — 0, 3/4, 1, 3 Hr (See Item 3)

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115



1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
1A. Floor Assembly - (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
A. Concrete — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-110/4" N , CP 680-160/6" N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"
3. Through Penetrants — One metallic pipe or tubing to be installed within the firestop device. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe or tubing may be used:
Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
The firestop device and metallic penetrant shall be sized as follows:

Nom Pipe Diameter*	Nom Pipe Cover-in. (mm)	Firestop	T Rating-Hr
1/2 in. (13 mm)	1 (25)	CP 680-75/2.5"N, CP 682-75/2.5"	3
		CP 680-M 2", CP 680-P 2"	
1 in. (25 mm)	1 (25)	CP 680-110/4"N, CP 682-110/4"	3/4
		CP 680-M 3", CP 680-P 3", CP 680-M 4", CP 680-P 4"	
2 in. (51 mm)	3/4 (19)	CP 680-110/4"N	1
		CP 680-P 4"	
4 in. (102 mm)	3/4 (19)	CP 680-160/6"N	3/4
		CP 680-P 6"	

* - When pipe diameter smaller than shown in above table is used, the insulated pipe shall be installed in conjunction with Item 5 and the T Ratings are 0 hr.
4. Tube Insulation - Plastic+ — Nom 3/4 or 1 in. (19 or 25 mm) thick acryonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
See Plastics+ (QMFZ2) Category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-0VA may be used.
5. Packing Material — (Not Shown) When pipe sizes are less than those shown in the table in Item 3, min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m3) mineral wool insulation shall be firmly packed to the fullest extent possible within the device flush with top surface of device.
*Bearing the UL Classification Mark

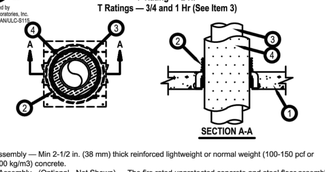
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. December 14, 2006

System No. F-A-5017

F Rating — 2 Hr
T Ratings — 3/4 and 1 Hr (See Item 3)

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115



1. Floor Assembly — Min 2-1/2 in. (38 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
1A. Floor Assembly - (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series Designs in the Fire Resistance Directory and as summarized below:
A. Concrete — Min 2-1/2 in. (38 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-75/2.5"N, CP 680-110/4"N, CP 680-160/6"N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"
3. Through Penetrants — One metallic pipe or tubing to be installed within the firestop device. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe or tubing may be used:
A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
C. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
The firestop device, metallic penetrant and pipe covering shall be sized as follows:

Nom Pipe Diam, in. (mm)	Nom Pipe Covering Thickness, in. (mm)	Firestop Device	T Rating, Hr
1/2 (13)	1 (25)	CP 680-75/2.5"N, CP 682-75/2.5"	3/4
		CP 680-M 2", CP 680-P 2"	
1 (25)	1 (25)	CP 680-M 3", CP 680-P 3"	3/4
1 (25) (See Item 5)	1-1/2 (38)	CP 682-110/4"	3/4
		CP 680-M 4", CP 680-P 4"	
2 (51)	1 (25)	CP 680-110/4"N, CP 682-110/4"	1
		CP 680-M 4", CP 680-P 4"	
2 (51)	2 (51)	CP 680-160/6"N	3/4
		CP 680-P 6"	
4 (102)	1 (25)	CP 680-160/6"N	3/4
		CP 680-P 6"	

4. Pipe Covering* — Nom 1, 1-1/2 and 2 in. (25, 38 and 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units, jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied SSL tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
See Pipe and Equipment Covering-Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
5. Packing Material — When using a 1 in. (25 mm) diam pipe with 1-1/2 in. (38 mm) thick glass fiber pipe insulation in a 4 in. (102 mm) device, a min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation shall be firmly packed into top of device, flush with the top of the device.
*Bearing the UL Classification Mark

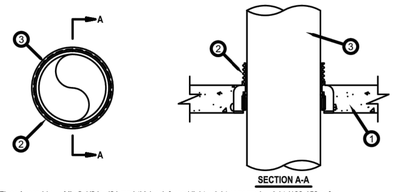
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. December 14, 2006

System No. F-A-2053

F Rating — 2 Hr
T Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft (See Item 3)
L Rating At 400 F — Less Than 1 CFM/sq ft (See Item 3)
W Ratings — Class 1 (See Items 3, 4 and 4A)

Classified by Underwriters Laboratories, Inc. to UL 1479



1. Floor Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
1A. Floor Assembly - (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
A. Concrete — Min 2-1/2 in (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete assembly in accordance with accompanying installation instructions. The 3, 4 and 6 in. devices may extend a max 2 in. (51 mm) above the top surface of the concrete. The max extension above the slab for the 2 and 2.5 in. devices is not restricted.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-75/2.5"N, CP 680-110/4"N, CP 680-160/6"N, CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"
3. Through Penetrants — One nonmetallic pipe or conduit to be installed within the firestop system. Pipe or conduit to be rigidly supported on both sides of floor assembly. For W Rating with Water Barrier Module, pipe shall be installed from bottom of device. The following types and sizes of nonmetallic pipes or conduits may be used:
A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR11 or SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
C. Rigid Nonmetallic Conduit+ — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).
The firestop devices and nonmetallic penetrants shall be sized as follows:

Nom Pipe Diameter	Firestop Device
1/2 in. to 2 in. (19 mm to 51 mm)	CP 680-75/2.5"N
	CP 680-P 2"
3 in. (76 mm)	CP 680-P 3"
3 in. to 4 in. (76 mm to 102 mm)	CP 680-110/4"N
	CP 680-P 4"
6 in. (152 mm)	CP 680-160/6"N
	CP 680-P 6"

++ L Rating applies only to CP 680-P devices and only when the nom diam of pipe equals size of device (2 in. diam pipe in 2" device etc.) L Rating does not apply to CP 680N devices.
4. Firestop Device* — (Not shown) -Top seal plug for use with CP 680-75/2.5"N devices and nom pipe or conduit sizes 3/4 in. (19 mm) to 2 in. (51 mm), installed in accordance with the manufacturer\'s instructions. The top seal plug is optional for nom 1-1/2 in. (38 mm) pipes and conduits. Top seal plugs are required for all pipes and conduits less than nom 1-1/2 in. (38 mm). W Rating applies only when the CPS or IPS Top Seal Plugs are used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CPS and IPS Top Seal Plugs
4A. Firestop Device* - Water Barrier Module — (Optional, Not Shown) - Applies to nom 2", 3" and 4" water barrier modules used in combination with the CP 680-P 2", CP 680-P 3" and CP 680-P 4" devices, respectively, and supplied by device manufacturer. Module is threaded onto top of device. W Rating applies only when water barrier module is used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — Water Barrier Module
*Bearing the UL Classification Mark
+Bearing the UL Listing Mark

Hilti Firestop Systems

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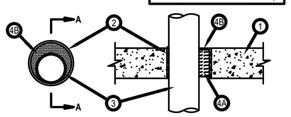
Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   - ** Minimum and maximum Width of Joints*
   - ** Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   - ** 2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   - ** NFPA 101 Life Safety Code*
   - ** All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   - ** ATTENTION: Fire Rated Assembly*
   - ** UL System #*
   - ** Product(s) used*
   - ** Hourly Rating (F-Rating)*
   - ** Installation Date*

System No. C-AJ-1421

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2 or 3 Hr	F Rating — 2 or 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings — 2 or 3 Hr
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft
	L Rating at 400 F — Less Than 1 CFM/sq ft



1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 6 in. (152 mm).
See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Metallic Sleeve — (Optional) Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces.
3. Through-Penetrant — One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, tube or conduit and periphery of opening shall be min 0 in. (point contact) to max 5-3/8 in. (137 mm). Pipe or conduit to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or conduits may be used:
A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel conduit.
F. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System — The firestop system shall consist of the following:
A. Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.
B. Fill, Void or Cavity Material* - Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. For 3 Hr rated assemblies, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/pipe interface at the point contact location on the top surface of floor and on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL GG, CFS-S SIL SL, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP604 Self-Leveling Firestop Sealant. CP604 and CFS-S SIL SL shall be used in floor applications only.
When CP604, CFS-S SIL GG or CFS-S SIL SL (floors only) is used, F Rating is 2 Hr.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

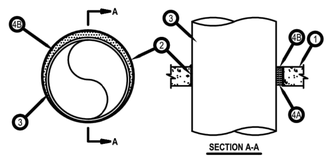
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 28, 2015

System No. C-AJ-1226

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 3 Hr
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 0 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 32 in. (813 mm).
2. Metallic Sleeve — (Optional) Nom 32 in. (813 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extending a max of 3 in. (76 mm) above floor or beyond both surfaces of wall.
2A. Sheet Metal Sleeve — (Optional) Max 6 in. (152 mm) diam, min 26 ga. galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.
2B. Sheet Metal Sleeve — (Optional) - Max 12 in. (305 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.
3. Through-Penetrant — One metallic pipe, tube or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Penetrant may be installed with continuous point contact. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic penetrants may be used:
A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit — Nom 6 in. (152 mm) diam (or smaller) steel conduit.
F. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System — The firestop system shall consist of the following:
A. Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall or sleeve as required to accommodate the required thickness of fill material.
B. Fill, Void or Cavity Material* — Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sleeve or with both surfaces of wall or sleeve. At the point or continuous contact locations between penetrant and concrete or sleeve, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete or sleeve/ pipe penetrant interface on the top surface of floor and on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

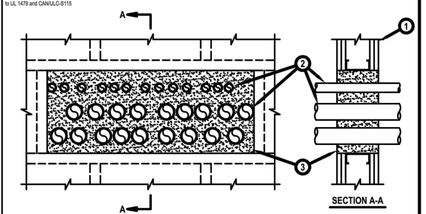
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 07, 2015

System No. W-L-1249

F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Rating - 1/2 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115



1. Wall Assembly The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features.
A. Studs Steel studs 3-1/2 in. deep, fabricated from 25 MSG galv steel, spaced max 24 in. OC.
B. Gypsum Boards* The gypsum board type, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max area of opening is 360 sq in. with max dimension of 30 in.
The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants One or more nom 2 in. diam (or smaller) rigid steel conduit or electrical metallic tubing (EMT) to be installed within the opening. The annular space between conduits or tubing shall be min 0 in. (point contact) to max 3-3/8 in. The annular space between conduits or tubing and periphery of opening shall be min 0 in. (point contact) to max 3 in. Conduit or tubing to be rigidly supported on both sides of wall assembly.
3. Fill Void or Cavity Material - Foam* Fill material applied within annulus flush with both surfaces of the wall. Min fill material thickness for 1 Hr F Rating is 4-3/4 in. Min fill material thickness for 2 Hr F Rating is 6 in.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC -- CP 620 Fire Foam
*Bearing the UL Classification Mark

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. December 7, 2001

1 P7.01 UL PIPING DETAILS
SCALE: DETAIL

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MEI Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
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CONTACT: Mark Denryer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2005
MARK R. DENTER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

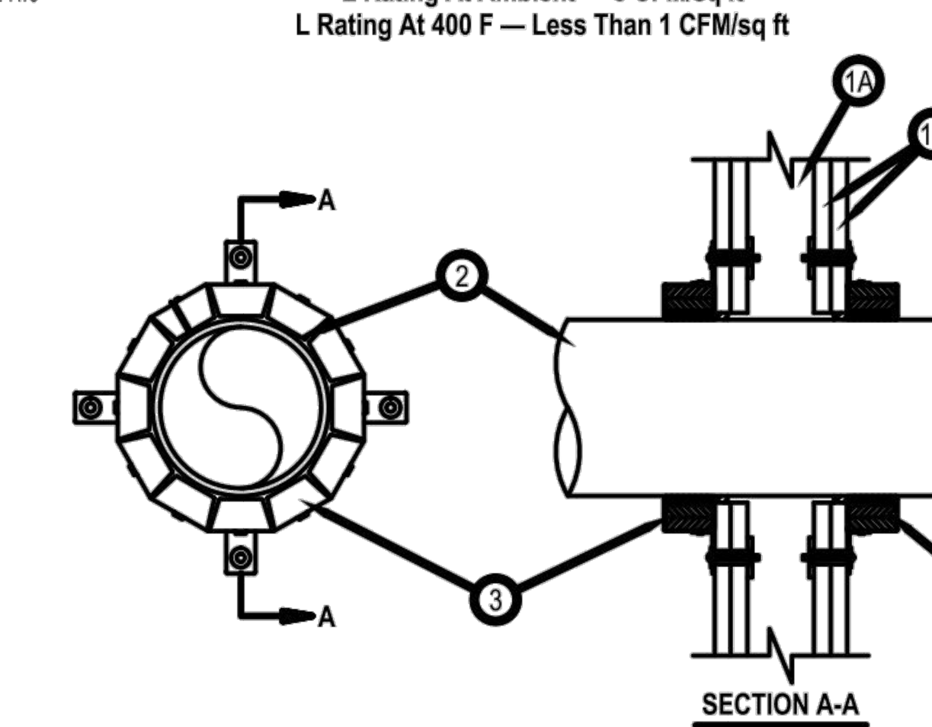
DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P701

System No. W-L-2078

Classified by Underwriters Laboratories, Inc. to UL 1479

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



1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 11-1/2 in. (292 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrants — One nonmetallic pipe, conduit or tubing to be installed within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems
   D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   E. Polyvinylidene Fluoride (PVDF) Pipe — Nom 4 in. (102 mm) diam (or smaller) PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   When max 6 in. diam pipe is used, T Rating is equal to the hourly fire rating of the wall. When nom 8 in. or 10 in. (203 or 254 mm) diam pipe is used, T Rating is 0 hr.
3. Firestop Device* — Firestop Collar — Firestop collar shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to both sides of the wall using the anchor hooks provided with the collar. (Minimum two anchor hooks for 1-1/2 and 2 in. (38 and 51 mm) diam pipes, three anchor hooks for 3 and 4 in. (76 and 102 mm) diam pipes, four anchor hooks for 6 in. (152 mm) diam pipes, ten anchor hooks for 8 in. (203 mm) diam pipes and twelve anchor hooks for 10 in. (254 mm) diam pipes. The anchor hooks are to be secured to the surface of wall with 3/16 in. (4.8 mm) diam by 2-1/2 in. (64 mm) long steel toggle bolts along with washers. As an alternate for pipe sizes of nom 4 in. diam or less, min No. 10 by 1-1/2 in. (254 by 38 mm) long drywall or laminate screws with min 3/4 in. (19 mm) steel washers may be used. When the drywall or laminate screw is used, T Rating shall not exceed 1 hr.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50/1.5"N, CP 643 63/2"N, CP 643 90/3"N, CP 643 110/4"N, CP 643 160/6"N, CP 644 200/8" andCP 644 250/10" Firestop Collars
4. Fill, Void or Cavity Material* — Sealant - (Not Shown) — Min 1/2 in. (13 mm) thickness of sealant applied within the annular space for nom 8 in. and 10 in. (203 and 254 mm) diam pipes, flush with each side of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with each side of wall, to attain the L Ratings for max 6 in. (152 mm) diam pipes.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

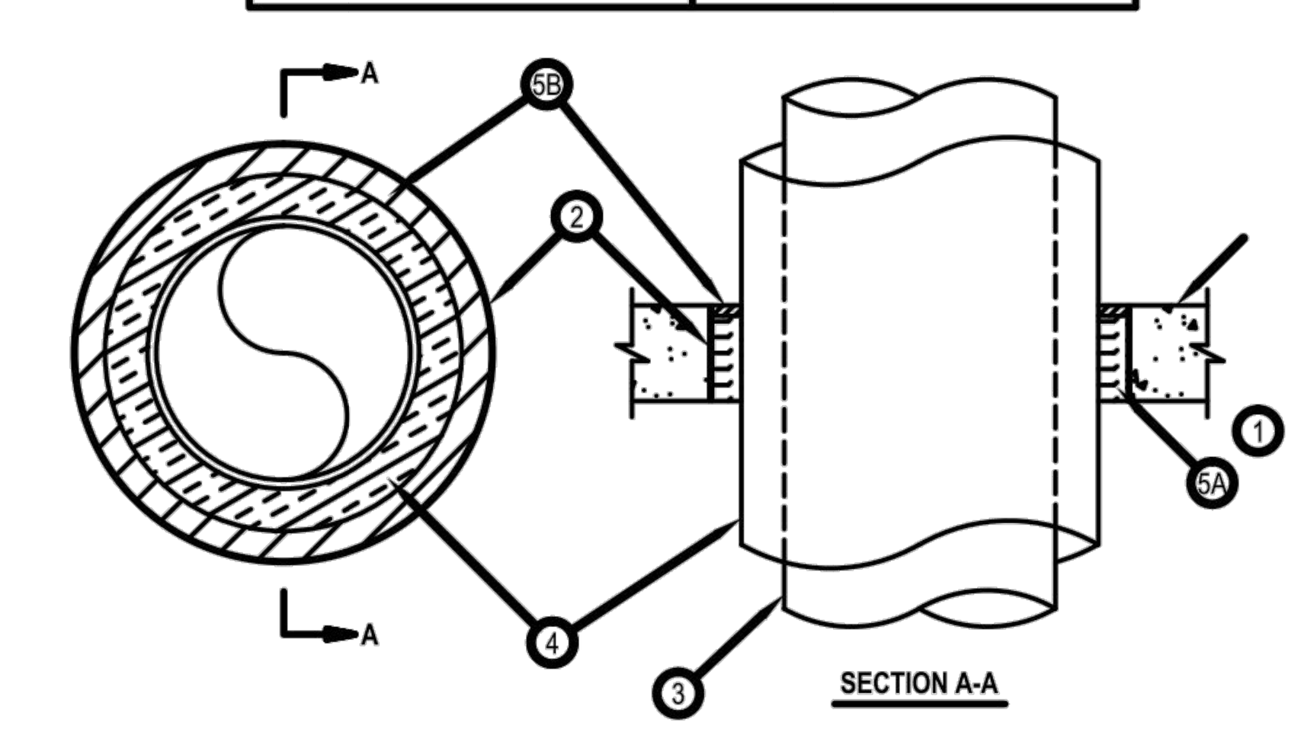
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. C-AJ-5091

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 and 1 Hr (See Items 2 and 4)	FT Ratings — 0 and 1 Hr (See Items 2 and 4)
L Rating At Ambient — 4 CFM/sq ft	FH Rating — 2 Hr
L Rating At 400 F — Less Than 1 CFM/sq ft	FTH Ratings — 0 and 1 Hr (See Items 2 and 4)
	L Rating At Ambient —4 CFM/sq ft
	L Rating At 400 F —Less Than 1 CFM/sq ft



1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 29 in. (737 mm).
   See Concrete Blocks (CAZT) category in the Fire Resistance directory for names of manufacturers.
2. Metallic Sleeve — (Optional) — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extending a max of 3 in. (76 mm) above floor or beyond both surfaces of wall. If the steel sleeve extends beyond the top surface of the floor or both surfaces of the wall, the T Rating of the firestop system is 0 hr.
2A. Sheet Metal Sleeve — (Optional) - Max 6 in. (152 mm) diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approximately mid- height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
2B. Sheet Metal Sleeve — (Optional) - Max 12 in. (305 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approximately mid- height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
3. Through Penetrants — One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
4. Pipe Covering — Min 1/2 in. (13 mm) to max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the periphery of the opening shall be min 1/2 in. (13 mm) to max 12 in. (305 mm). When thickness of pipe covering is less than 2 in. (51 mm), the T Rating for the firestop system is 0 hr.
   See Pipe Equipment Covering — Materials — (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4A. Pipe Covering — (Not Shown) — As an alternate to Item 4, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf or 224 kg/m³) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. The annular space shall be min 1/2 in. (13 mm) to max 12 in. (305 mm).
5. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

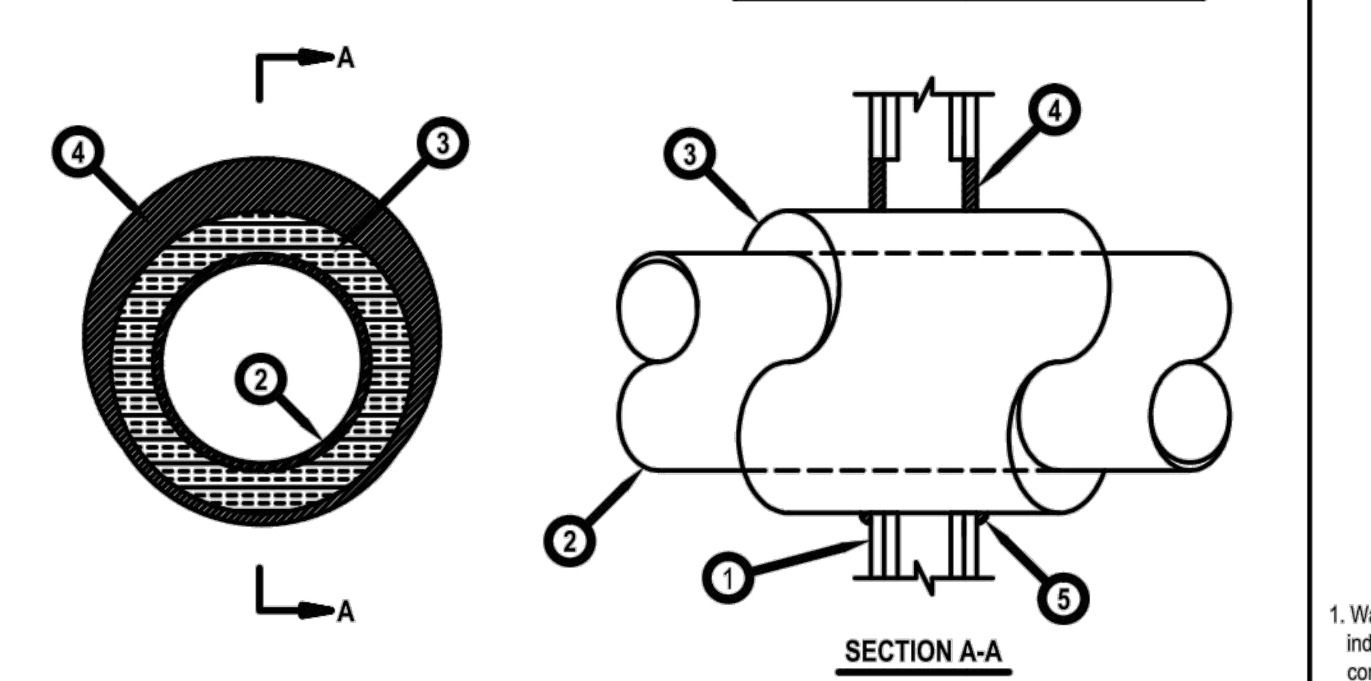
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-5029

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)	F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft	FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4)
L Rating At 400 F — Less Than 1 CFM/Sq Ft	FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
	L Rating At Ambient — 4 CFM/Sq Ft
	L Rating At 400 F — Less Than 1 CFM/Sq Ft



1. Wall Assembly — The 1, 2 or 3 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH rating and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in. (473 mm).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper tube shall not exceed 4 in. (102 mm).
   D. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
3. Pipe Covering* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   The hourly T, FT, FTH Ratings of the firestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FTH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FTH Ratings when copper penetrants are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm).
3A. Pipe Covering* — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in item 3 above.
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Material* — Sealant — For 1 and 2 hr F and FH Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 3 hr F and FH Rating, min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

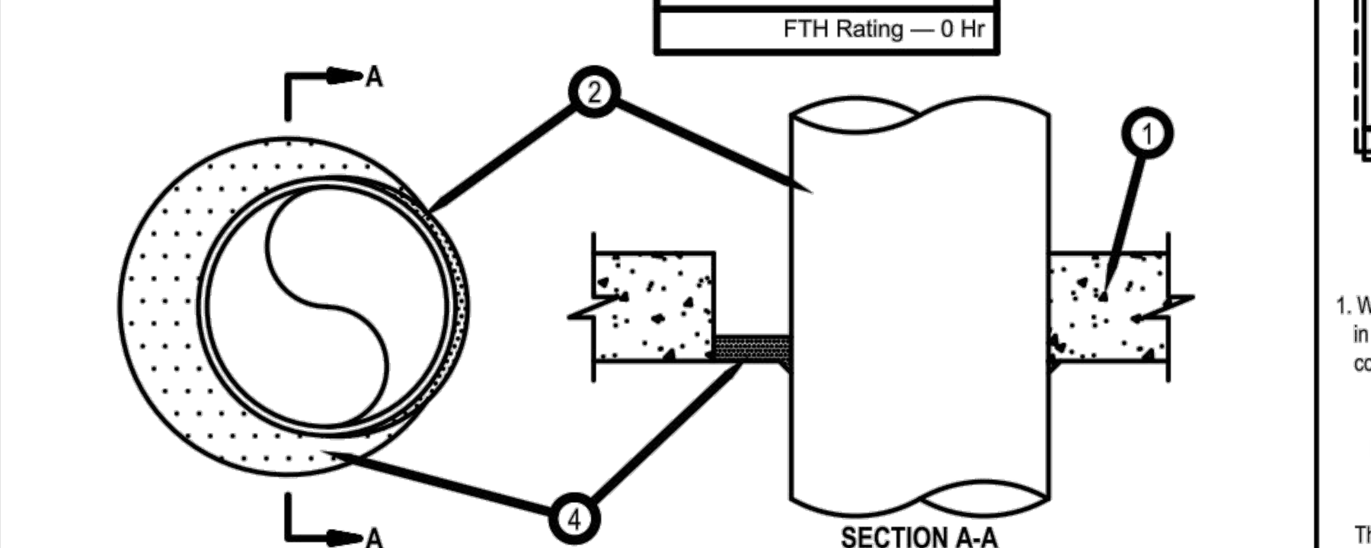
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. C-AJ-1184

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 3 Hr
	FTH Rating — 0 Hr



1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Floor may also be constructed of any min 7-1/2 in. (190 mm) thick UL Classified hollow core Precast Concrete Units*. Max diam of opening is 14 in. (356 mm) when concrete floor or wall is used and max 7 in. (178 mm) when precast concrete units are used.
   See Concrete Blocks (CAZT) and Precast Concrete Units (CFTV) categories in the Fire Resistance Directory for names of manufacturers.
2. Through-Penetrants — One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 3-1/4 in. (83 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. Steel Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or steel conduit.
   D. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) regular (or heavier) copper pipe.
3. Forms — (Not Shown, Optional) — Used as a form to prevent leakage of fill material during installation. Forms to be rigid sheet material, cut to fit the contour of the penetrating item and positioned as required to accommodate the required thickness of fill material. Forms to be removed after fill material has cured. Additional forming material may be used concrete block wall is penetrated. A min 1/2 in. (13 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation is firmly packed into the annulus as a permanent form and recessed from both surfaces of the wall as required to accommodate the required thickness of fill material.
4. Fill, Void or Cavity Material* — Sealant — Min 1 in. (25 mm) thickness of fill material applied within the annulus. At the point contact location between through penetrant and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete through penetrant interface. When precast concrete units are used, the fill material shall be installed within annular space, flush with lower surface of floor. When concrete block wall is penetrated, a min 1 in. (25 mm) thickness of fill material shall be applied within the annulus flush with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS605, FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

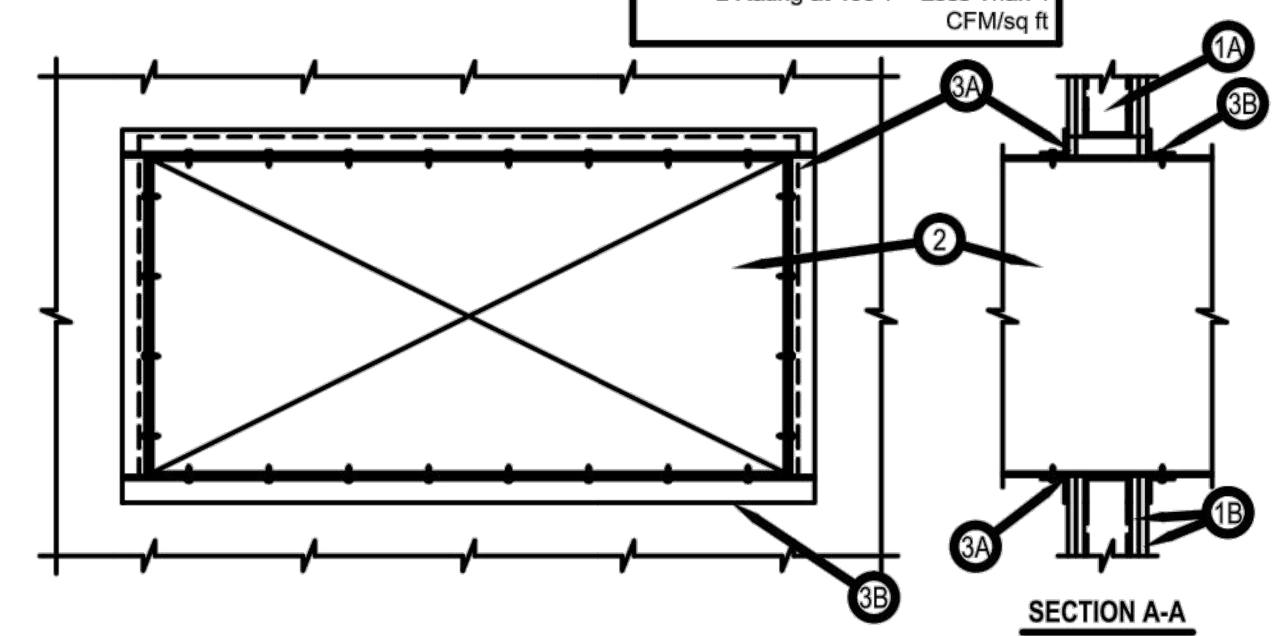
Hilti Firestop Systems

1 / P7.02 — UL PIPING DETAILS
SCALE: DETAIL

System No. W-L-7040

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Items 1 and 3)	F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Rating - 0 Hr	FT Rating - 0 Hr
L Rating at Ambient - Less Than 1 CFM/sq ft	FH Ratings - 1 and 2 Hr (See Items 1 and 3)
L Rating at 400°F - Less Than 1 CFM/sq ft	FTH Rating - 0 Hr
	L Rating at Ambient - Less Than 1 CFM/sq ft
	L Rating at 400°F - Less Than 1 CFM/sq ft



1. Wall Assembly — The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or V400 Series Wall and Partition Designs in the Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (61 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick with square or tapered edges. The gypsum wallboard type, number of layers and sheet orientation shall be as specified in the individual Wall and Partition Design Number. Max area of opening is 1300 in.2 (0.84 m2) with the dimension of 50 in. (1.27 m). The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Duct — Nom 24 in. by 48 in. (610 by 1219 mm) (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed within the firestop system. The annular space shall be min 0 (point contact) in. to a max 2 in. (51 mm) Duct to be rigidly supported on both sides of the wall assembly.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material*—Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus flush with both surfaces of wall. At point contact location, a min 1/2 in. (13 mm) diam bead of fill material shall be applied to the wall/duct interface on both surfaces of wall. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant, FS-ONE Intumescent Sealant, CP601S Elastomeric Firestop Sealant or CP606 Flexible Sealant.
   B. Steel Retaining Angle — No. 18 MSG (0.048 in.) galv steel angles cut to fit contour of duct with a 2 in. overlap on the duct and a min 1 in. overlap on the gypsum board assembly on both sufaces of wall. 2 in. leg of angle secured to duct with min No. 8 by 3/4 in. long sheet metal screws, spaced a max of 6 in. OC. When bead of fill material is used at joint contact locations, angles shall be installed prior to full material curing.

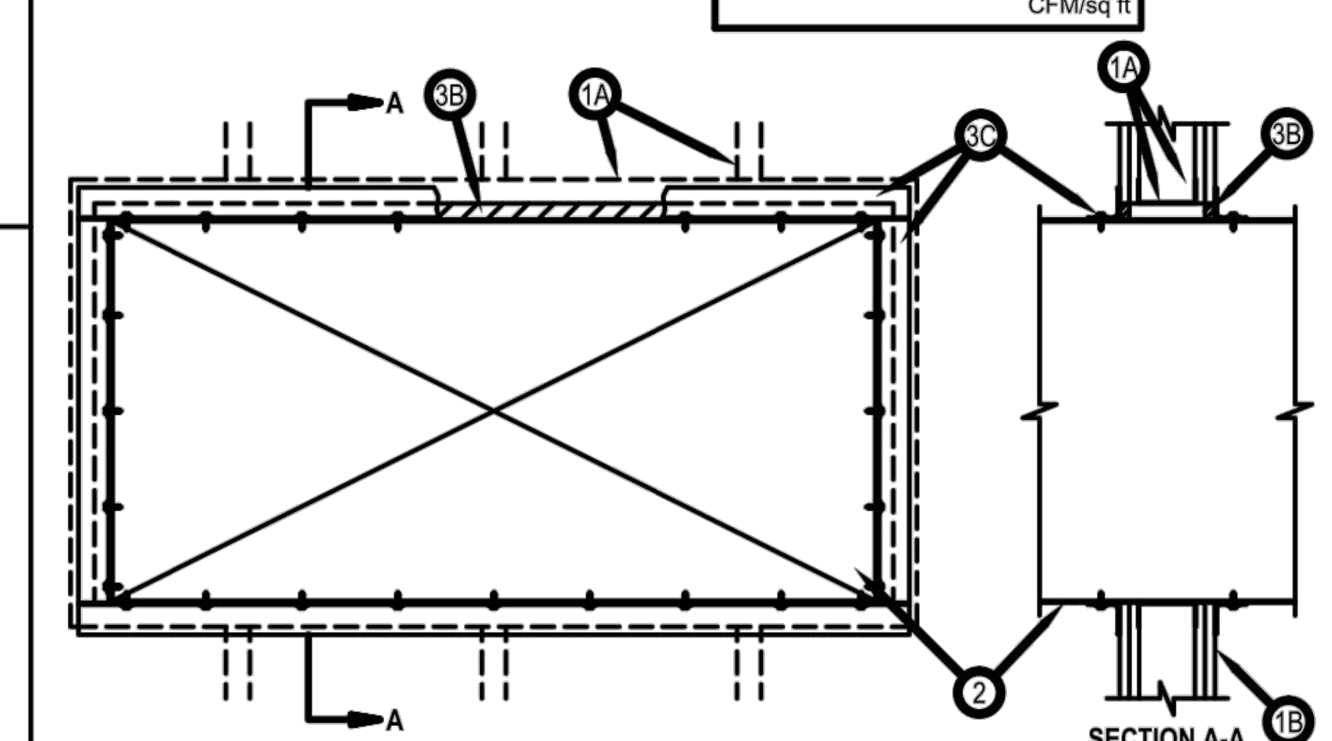
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-7155

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 Hr	FT Ratings — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings — 1 and 2 Hr (See Item 1)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Ratings — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft
	L Rating at 400 F — Less Than 1 CFM/sq ft



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC. Additional steel studs shall be used to completely frame the opening.
   B. Gypsum Board* — 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max area of opening is 73.7 sq ft (6.85 m2) with a max dimension of 104 in. (2.64 m).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Duct — Max 100 in. by 100 in. (2.5 by 2.5 m) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. The space between the steel duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.
2A1. Through-Pentrating Product* — As an alterate to Item 2. Fiber cement with galvanized steel facing, 3/8 in.(10 mm) thick composite metallic duct, with a max cross-sectional area of 43.0 sq ft, (4 m2) and a max individual dimension of 78 3/4 in. (2 m). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct HP.
2A2. Through-Pentrating Product* — As an alternate to Item 2. Fiber cement with galvanized steel facing, 1/4 in. (6 mm) thick, with a max cross-sectional area of 1764 sq in. (1.14 m2), and a max individual dimension of 42 in. (1067 mm). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly and installed in accordance. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct SD.
2A3. Through-Pentrating Product* — As an alternate to Item 2. Galvanized steel faced duct panel, with a max cross-sectional area of 2450 sq in. (1.58 m2), and a max individual dimension of 49-1/2 in. (1258 mm) Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct GNX.
3 Firestop System — The firestop system shall consist of the following:
   A. Packing Material — (Optional, Not Shown) — Polyethylene backer rod, mineral wool batt insulation or fiberglass batt insulation friction fitted into annular space. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   A1. Packing Material — Required as specified in Table below. Min 3-3/4 in. (95 mm) or 5 in. (127 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 and 2 hr rated assemblies, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Min 1/4 in. (6 mm) diam bead of fill material shall be applied at the point contact location between the steel duct and the gypsum board. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL GG Sealant, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP606 Flexible Firestop Sealant
   C. Steel Retaining Angles — Min No. 16 gauge galv steel angles sized to lap steel duct a min of 2 in. (51 mm) and to lap wall surfaces a min of 1 in. (25 mm). When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. Steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material, sealant and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

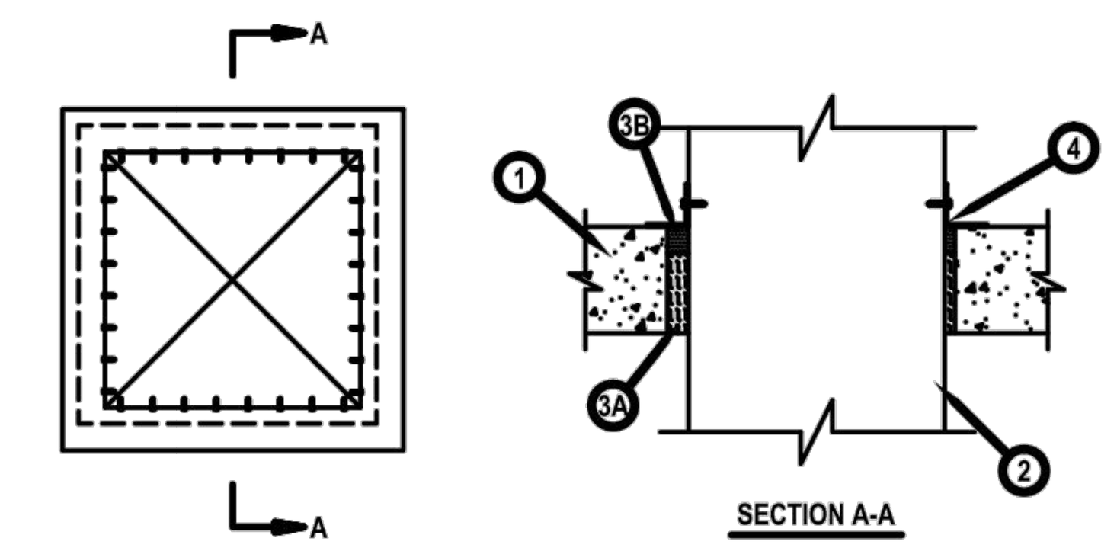
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. C-AJ-7051

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 3 Hr	F Rating — 3 Hr
T Rating - 1 Hr	FT Rating - 1 Hr
	FH Rating - 3 Hr
	FTH Rating - 1 HR



1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete floor or min 5-1/2 in. (140 mm) thick lightweight on normal weight concrete wall. Wall may also be constructed of any UL Classified Concrete Blocks*. Max area of opening is 1024 in. sq (6606 cm2) with a max dimension of 32 in. (813 mm).
   See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Steel Duct — Nom 30 by 30 in. (762 by 762 mm) by No. 24 gauge (or heavier) galv steel duct. One steel duct to be positioned within the firestop system. The annular space shall be min 1/4 in. (6 mm) to max 1-3/4 in. (44 mm). Duct to be rigidly supported on both sides of floor or wall assembly.
3. Firestop System — The firestop system shall consist of the following:
   A. Packing Materials — Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form between the bare steel duct and the periphery of the opening. Packing material to be recessed from top surface of floor or both surfaces of wall as required to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 606 Flexible Firestop Sealant, FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
4. Steel Retaining Angle — Nom 2 in. by 2 in. (51 by 51 mm) by No. 16 gauge (or heavier) steel angles attached to all four sides of the steel duct on the top surface or both surfaces of the wall. The angles shall be attached with No. 8 (or larger) steel sheet metal screws spaced max of 1 in. (25 mm) from each end and a max of 3 in. (76 mm) OC.

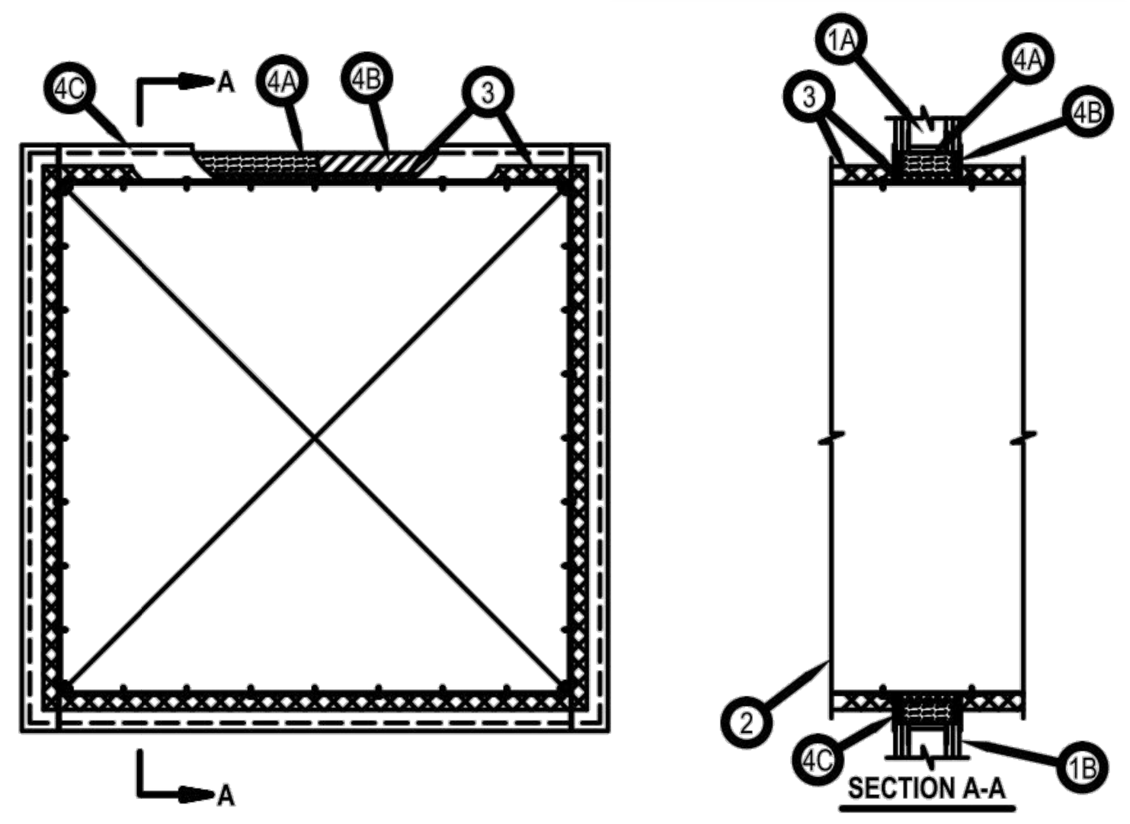
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-7156

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers and orientation shall be as specified in the individual Wall and Partition Design. Max size of opening is 210 sq in. (1355 cm2) with a max width of 14-1/2 in. (368 mm) for wood studs. Max size of opening is 76.2 sq ft. (7 m2) with a max width of 105-1/2 in. (2.7 m) for steel studs.
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall in which it is installed.
2. Steel Duct — Max 100 by 100 in. (2.5 by 2.5 m) steel duct to be installed within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Steel duct to be rigidly supported on both sides of wall assembly.
3. Batts and Blankets* — Nom 1-1/2 or 2 in. (38 or 51 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed minimum 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm).
   See Batts and Blankets (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.
4. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 3-5/8 (92 mm) or 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 or 2 hr fire-rated walls, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
   C. Steel Retaining Angles — Min No. 16 gauge (0.059 in. or 1.5 mm) galv steel angles sized to lap steel duct a min of 2 in. 51 mm) and lap wall surfaces a min of 1 in. (25 mm). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max 1-1/2 in. (38 mm) thick insulation is used, steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   ** Minimum and maximum Width of Joints*
   ** Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   ** 2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   ** NFPA 101 Life Safety Code*
   ** All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   ** ATTENTION: Fire Rated Assembly*
   ** UL System #*
   ** Product(s) used*
   ** Hourly Rating (F-Rating)*
   ** Installation Date*

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STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER 54,607 OREGON JULY 11, 2000 MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH / PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

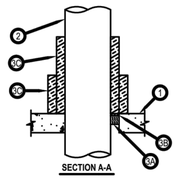
FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P702

System No. F-A-1105

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 2 Hr	FT Rating - 2 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 2 Hr
L Rating At 400 F - 4 CFM/sq ft	FTH Rating - 2 Hr
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - 4 CFM/sq ft



SECTION A-A

1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. As an alternate, any min 2 hr fire rated D700, D800 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory having a min 2-1/2 in. (64 mm) thickness of lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete topping over the steel deck may be used. Max diam of opening is 12-3/4 in. (324 mm).
2. Through-Penetrant — One metallic pipe installed concentrically or eccentrically within opening. Annular space between penetrant and periphery of opening shall be min of 0 in. (point contact) to max 2 in. (51 mm). Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
   A. Steel Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. Iron Pipe — Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
3. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. When CP 604, CFS-S SIL GG or CFS-S SIL SL sealant is used (see Item 3B), min thickness of packing material is 4 in. (102 mm) and min thickness of floor is 4-1/2 in. (114 mm). Packing material to be recessed from top surface of floor to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Materials* - Sealant — Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP 604 Self-Leveling Firestop Sealant, CFS-S SIL GG or CFS-S SIL SL Sealant
   W Rating applies only when CP 604, CFS-S SIL GG or CFS-S SIL SL Sealant is used.
   C. Duct Wrap Material* — Encapsulated duct wrap tightly wrapped around penetrant to extend 24 in. (610 mm) above the floor for penetrants of nom 4 in. (102 mm) diam or smaller, and 36 in. (914 mm) above floor for penetrants greater than a nom 4 in. (102 mm) diam. An additional layer of encapsulated duct wrap tightly wrapped around the first layer of duct wrap to extend 12 in. (305 mm) (914 mm) above floor. All longitudinal seams of both layers of duct wrap and joints between layers of duct wrap are sealed with foil tape. One of the following types and thicknesses of duct wrap may be used:
   C1. Nom 1-1/2 in. (38 mm) or 2 in. (51 mm) thick encapsulated duct wrap.
   UNIFRAX I L L C — Fyrewrap Duct Insulation or FireWrap Duct 1.5 Insulation
   C2. Nom 1-1/2 in. (38 mm) thick encapsulated duct wrap.
   THERMAL CERAMICS INC — FireMaster FastWrap XL Duct Insulation

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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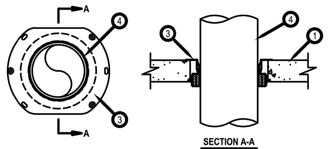
System No. F-A-2213

F Ratings — 2 and 3 Hr (See Items 1 and 1A)
T Ratings — 0, 1/4 and 1/2 Hr (See Items 2, 2A and 4)
L Rating At Ambient — Less Than 1 CFM/sq ft (See Item 3A)
L Rating At 400 F — 4 CFM/sq ft (See Item 3A)
W Rating — Class I (See Item 3A)



SECTION A-A

1. Floor Assembly — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. When concrete thickness is min 4-1/2 in. (114 mm), F Rating is 3 hr.
1A. Floor Assembly — (Optional, Not Shown) — The fire rated concrete and steel deck floor assembly shall be constructed of the materials and in the manner specified in the individual D700, D800 or D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. Concrete — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete, as measured over crest of fluted steel deck. When concrete topping thickness is min 4-1/2 in. (114 mm), F Rating is 3 hr.
   B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Metallic Sleeve — (Optional, Not Shown) -Nom 4, 5 or 6 in. (102, 127 or 152 mm) diam Schedule 10 (or heavier) steel sleeve cast or grouted into floor assembly, flush with floor surfaces. When metallic sleeve is used, T Rating is 0 Hr.
2A. Sheet Metal Sleeve — (Optional, Not Shown) — Nom 4, 5, 6 or 9 in. (102, 127, 152 or 229 mm) diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and flush with the top surface of the concrete floor. When sheet metal sleeve is used, T Rating is 0 Hr.
3. Firestop Device* — Drop-in firestop device installed in core-drilled or sleeved opening in concrete floor assembly in accordance with accompanying installation instructions. The firestop device flange should be secured to the top surface of the floor with three 1/4 in. (6 mm) diam by min 1-1/4 in. (32 mm) long steel expansion bolts or screw anchors (installed in a triangular fashion through holes provided). As alternates to the anchors specified above, Hilti 1/4 in. (6 mm) diam by 1-1/4 in. (32 mm) long KWIK-CON II+ concrete screw anchor, Hilti 1/4 in. (6 mm) diam by 1-3/4 in. (45 mm) long KWIK-BOLT 3 steel expansion anchor or Hilti 1/4 in. (6 mm) by 3/4 in. (19 mm) long Metal HIT Anchor may be used. In addition, for nom 2 in. (51 mm), 3 in. and 4 in. (102 mm) firestop devices, four 11/16 in. (18 mm) long Hilti X-GH P18 MX steel fasteners may be installed through the steel flange, two on each side. The firestop devices shall be installed as detailed in the following table:

Core Hole or Sleeve Diam, In. (mm)	Firestop Device	Nom Diam of Through Penetrant, In. (mm)
4 (102)	CFS-DID 2"MD	2 (51) or smaller+
5 (102)	CFS-DID 3"MD	3 (76)
6 (152)	CFS-DID 4"MD	4 (102)
9 (229)	CFS-DID 6"MD	6 (152)

\+ For pipe smaller than nom 2 in. (51 mm) diam, Adapter and Top Seal Plug is required to be used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-DID 2"MD, CFS-DID 3"MD, CFS-DID 4"MD, CFS-DID 6"MD
3A. Firestop Device* - Water Barrier Module — (Optional, Not Shown) - Used in combination with the CFS-DID device and supplied by device manufacturer. Module is threaded onto top of device.
W Rating and L Rating apply only when water barrier module is used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — Water Barrier Module
4. Through Penetrant — One nonmetallic pipe to be installed within the firestop device. Pipe to be rigidly supported on both sides of floor assembly. The following types of pipe may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   C. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   T Rating is 1/4 hr when Pipe D is used.

*Bearing the UL Classification Mark

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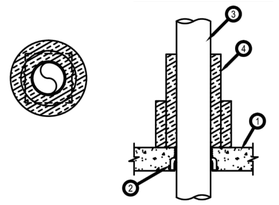
System No. F-A-1106

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 2 Hr	FT Rating - 2 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 2 Hr
L Rating At 400 F - 4 CFM/sq ft	FTH Rating - 2 Hr
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - 4 CFM/sq ft



SECTION A-A

1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. As an alternate, any min 2 hr fire rated D700, D800 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory having a min 2-1/2 in. (64 mm) thickness of lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete topping over the steel deck may be used.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions. Device sized to nom diam of penetrant. Device is to be trimmed flush with the top surface of the floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6" Cast-In Firestop Device.
2A. Firestop Device* — Water Barrier Module — (Optional, Not Shown) - Used in combination with the CP 680-P device to achieve a W Rating. Module is threaded onto top of device. W Rating applies only when water barrier module is used and pipe is installed from bottom of device.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — Water Barrier Module
3. Through-Penetrant — One metallic pipe installed concentrically or eccentrically within opening. Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
   A. Steel Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. Iron Pipe — Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
4. Duct Wrap Material* — Encapsulated duct wrap tightly wrapped around penetrant to extend 24 in. (610 mm) above the floor for penetrants greater than a nom 4 in. (102 mm) diam or smaller, and 36 in. (914 mm) above floor for penetrants greater than a nom 4 in. (102 mm) diam. An additional layer of encapsulated duct wrap tightly wrapped around the first layer of duct wrap to extend 12 in. (305 mm) (914 mm) above floor. All longitudinal seams of both layers of duct wrap and joints between layers of duct wrap are sealed with foil tape. One of the following types and thicknesses of duct wrap material shall be used.
   A. Nom 2 in. (51 mm)) or 1-1/2 in. (38 mm) thick encapsulated duct wrap.
   UNIFRAX I L L C — FyreWrap 2.0 Duct Insulation or FyreWrap 1.5 Duct Insulation
   B. Nom 1-1/2 in. (38 mm) thick encapsulated duct wrap.
   THERMAL CERAMICS INC — FireMaster FastWrap XL Duct Insulation

*Bearing the UL Classification Mark

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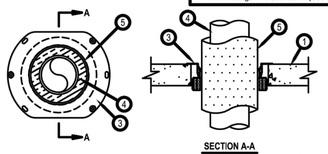
System No. F-A-5046

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2 and 3 Hr (See Items 1 and 1A)	F Ratings — 2 and 3 Hr (See Items 1 and 1A)
T Ratings — 0 and 1/2 Hr (See Item 2)	FT Ratings — 0 and 1/2 Hr (See Item 2)
	FH Ratings — 2 and 3 Hr (See Items 1 and 1A)
	FTH Ratings — 0 and 1/2 Hr (See Item 2)



SECTION A-A

1. Floor Assembly — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. When concrete thickness is min 4-1/2 in. (114 mm), F Rating is 3 hr.
1A. Floor Assembly — (Optional, Not Shown) — The fire rated concrete and steel deck floor assembly shall be constructed of the materials and in the manner specified in the individual D700, D800 or D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. Concrete — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete, as measured over crest of fluted steel deck. When concrete topping thickness is min 4-1/2 in. (114 mm), F and FH Ratings are 3 hr.
   B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Metallic Sleeve — (Optional, Not Shown) - Nom 4, 5 or 6 in. (102, 127 or 152 mm) diam Schedule 10 (or heavier) steel sleeve cast or grouted into floor assembly, flush with floor surfaces. When metallic sleeve is used, T, FT and FTH Ratings are 0 Hr.
2A. Sheet Metal Sleeve — (Optional, Not Shown) - Nom 4, 5, 6 or 9 in. (102, 127, 152 or 229 mm) diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and flush with the top surface of the concrete floor. When sheet metal sleeve is used, the T, FT and FTH Ratings are 0 Hr.
3. Firestop Device* — Drop-in firestop device installed in core-drilled or sleeved opening in concrete floor assembly in accordance with accompanying installation instructions. The firestop device flange should be secured to the top surface of the floor with three 1/4 in. (6 mm) diam by min 1-1/4 in. (32 mm) long steel expansion bolts or screw anchors (installed in a triangular fashion through holes provided). As alternates to the anchors specified above, Hilti 1/4 in. (6 mm) diam by 1-1/4 in. (32 mm) long KWIK-CON II+ concrete screw anchor, Hilti 1/4 in. (6 mm) diam by 1-3/4 in. (45 mm) long KWIK-BOLT 3 steel expansion anchor or Hilti 1/4 in. (6 mm) by 3/4 in. (19 mm) long Metal HIT Anchor may be used. In addition, for nom 2 in. (51 mm), 3 in. and 4 in. (102 mm) firestop devices, four 11/16 in. (18 mm) long Hilti X-GH P18 MX steel fasteners may be installed through the steel flange, two on each side. The firestop devices shall be installed as detailed in the following table:

Nom Pipe or Tube (Item 4) Diam, In. (mm)	Insulation Type (Item 5 or 5A) and Thickness, In. (mm)	Firestop Device	Core Hole or Sleeve Diam, In. (mm)
1/2 (13)	3/4 or 1 (19 or 25) AB/PVC	CFS-DID 2"MD	4 (102)
1 (25)	3/4 or 1 (19 or 25) AB/PVC	CFS-DID 3"MD	5 (127)
2 (51)	3/4 or 1 (19 or 25) AB/PVC	CFS-DID 4"MD	6 (152)
4 (102)	3/4 or 1 (19 or 25) AB/PVC	CFS-DID 6"MD	9 (229)
1/2 (13)	1 (25) Glass Fiber	CFS-DID 2"MD	4 (102)
1 (25)	1 (25) Glass Fiber	CFS-DID 3"MD	5 (127)
1 (25)	1-1/2 (38) Glass Fiber	CFS-DID 4"MD	6 (152)
2 (51)	1 (25) Glass Fiber	CFS-DID 4"MD	6 (152)
2 (51)	2 (51) Glass Fiber	CFS-DID 6"MD	9 (229)
4 (102)	1 (25) Glass Fiber	CFS-DID 6"MD	9 (229)

System No. F-A-5046 (cont.)

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2 and 3 Hr (See Items 1 and 1A)	F Ratings — 2 and 3 Hr (See Items 1 and 1A)
T Ratings — 0 and 1/2 Hr (See Item 2)	FT Ratings — 0 and 1/2 Hr (See Item 2)
	FH Ratings — 2 and 3 Hr (See Items 1 and 1A)
	FTH Ratings — 0 and 1/2 Hr (See Item 2)

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-DID 2"MD, CFS-DID 3"MD, CFS-DID 4"MD, CFS-DID 6"MD
4. Through Penetrant — One metallic pipe or tubing to be installed within the firestop device. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe or tubing may be used:
   A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile pipe.
   C. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
5. Tube Insulation - Plastics+ — Nom 3/4 or 1 in. (19 or 25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
   See Plastics+ (QMFZ2) Category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-5VA may be used.
5A. Pipe Covering* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units, jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied SSL tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
   See Pipe and Equipment Covering-Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

*Bearing the UL Classification Mark

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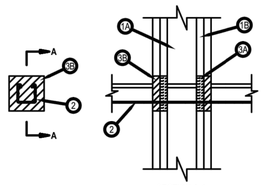
System No. W-L-7130

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr	FT Rating - 0 Hr
	FH Ratings - 1 and 2 Hr (See Item 1)
	FTH Rating - 0 Hr



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — One or two layers of gypsum board, as specified in the individual Wall and Partition Design. Max area of rectangular opening is 15 sq in. (96 cm2) with max dimension of 5 in. (127 mm). In lieu of rectangular opening max diam of circular opening is 3 in. (76 mm).
   The F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly.
2. Through Penetrants — One metallic strut, cable, rod or angle service support to be installed within the firestop system. An annular space of min 1/8 in. (3 mm) to max 7/8 in. (22 mm) is required within the firestop system. Strut, cable, rod or angle service support to be rigidly supported on both sides of floor or wall assembly. The strut, cable, rod or angle service support may be installed at an angle not greater than 45 degrees from the perpendicular. The following types and sizes of metallic strut, cable, rod or angle service support may be used:
   A. Steel Strut — Max 1-5/8 by 1-5/8 in. (41 by 41 mm) channel strut formed from min 0.105 in. (2.7 mm) thick galv or painted steel.
   B. Steel Strut — Max 3-1/4 by 1-5/8 in. (83 by 41 mm) H strut formed from min 0.105 in. (2.7 mm) thick galv or painted steel.
   C. Cable — Max 3/8 in. (9.5 mm) diam unjacketed galv steel cable.
   D. Threaded Rod — Max 1 in. (25 mm) diam galv steel threaded rod.
   E. Steel Angle — 2 by 2 by 1/8 in. (51 by 51 by 3 mm) thick steel angle.
3. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 1/2 in. (13 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be located between penetrant and periphery of opening, and within channels of struts. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material. When through penetrant is oriented perpendicular to wall or when Type FS-ONE Sealant (Item 3B) is used, packing material is optional.
   B. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus and within the channel struts, flush with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant, CP 606 Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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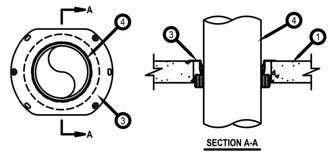
1 P7.03 UL PIPING DETAILS
SCALE: DETAIL

System No. F-A-1128

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2 and 3 Hr (See Items 1 and 1A)	F Ratings — 2 and 3 Hr (See Items 1 and 1A)
T Ratings — 0 and 1/4 Hr (See Item 2)	FT Ratings — 0 and 1/4 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/sq ft (See Item 3A)	FH Ratings — 2 and 3 Hr (See Items 1 and 1A)
L Rating At 400 F — Less Than 1 CFM/sq ft (See Item 3A)	FTH Ratings — 0 and 1/4 Hr (See Item 2)
W Rating — Class 1 (See Item 3A)	L Rating At Ambient — Less Than 1 CFM/sq ft (See Item 3A)
	L Rating At 400 F — Less Than 1 CFM/sq ft (See Item 3A)



SECTION A-A

1. Floor Assembly — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. When concrete thickness is min 4-1/2 in. (114 mm), the F and FH Ratings are 3 hr.
1A. Floor Assembly — (Optional, Not Shown) — The fire rated concrete and steel deck floor assembly shall be constructed of the materials and in the manner specified in the individual D700, D800 or D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. Concrete — Min 2-1/2 in. (64 mm) to max 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete, as measured over crest of fluted steel deck. When concrete topping thickness is min 4-1/2 in. (114 mm), F and FH Ratings are 3 hr.
   B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling Design.
2. Metallic Sleeve — (Optional, Not Shown) - Nom 4, 5 or 6 in. (102, 127 or 152 mm) diam Schedule 10 (or heavier) steel sleeve cast or grouted into floor assembly, flush with floor surfaces. When metallic sleeve is used, the T, FT and FTH Ratings are 0 Hr.
2A. Sheet Metal Sleeve — (Optional, Not Shown) - Nom 4, 5, 6 or 9 in. (102, 127, 152 or 229 mm) diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and flush with the top surface of the concrete floor. When sheet metal sleeve is used, the T, FT and FTH Ratings are 0 Hr.
3. Firestop Device* — Drop-in firestop device installed in core-drilled or sleeved opening in concrete floor assembly in accordance with accompanying installation instructions. The firestop device flange should be secured to the top surface of the floor with three 1/4 in. (6 mm) diam by min 1-1/4 in. (32 mm) long steel expansion bolts or screw anchors (installed in a triangular fashion through holes provided). As alternates to the anchors specified above, Hilti 1/4 in. (6 mm) diam by 1-1/4 in. (32 mm) long KWIK-CON II+ concrete screw anchor, Hilti 1/4 in. (6 mm) diam by 1-3/4 in. (45 mm) long KWIK-BOLT 3 steel expansion anchor or Hilti 1/4 in. (6 mm) by 3/4 in. (19 mm) long Metal HIT Anchor may be used. In addition, for nom 2 in. (51 mm), 3 in. (76 mm) and 4 in. (102 mm) firestop devices, four 11/16 in. (18 mm) long Hilti X-GH P18 MX steel fasteners may be installed through the steel flange, two on each side. The firestop devices shall be installed as detailed in the following table:

Core Hole or Sleeve Diam, In. (mm)	Firestop Device	Nom Diam of Through Penetrant, In. (mm)
4 (102)	CFS-DID 2"MD	2 (51) or smaller+
5 (102)	CFS-DID 3"MD	3 (76)
6 (152)	CFS-DID 4"MD	4 (102)
9 (229)	CFS-DID 6"MD	6 (152)

\+ For pipe smaller than nom 2 in. (51 mm) diam, Adapter and Top Seal Plug is required to be used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-DID 2"MD, CFS-DID 3"MD, CFS-DID 4"MD, CFS-DID 6"MD
3A. Firestop Device* - Water Barrier Module — (Optional, Not Shown) - Used in combination with the CFS-DID device and supplied by device manufacturer. Module is threaded onto top of device.
W Rating and L Rating apply only when water barrier module is used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — Water Barrier Module
4. Through Penetrant — One metallic pipe, conduit or tubing to be installed within the firestop device. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe, conduit or tubing may be used:
   A. Steel Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
   D. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
   E. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   F. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular) or heavier copper pipe.

*Bearing the UL Classification Mark

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Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

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STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
MARK R. DERRYER
54,607
OREGON
JULY 11, 2005
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

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NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

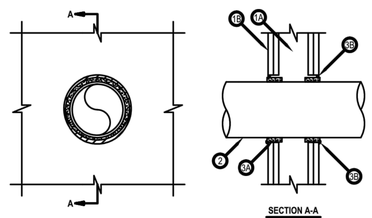
DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P703

System No. W-L-2406

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1/2 and 3/4 Hr (See Item 2)
L Rating At Ambient - 1.2 CFM/sq ft (See Item 3B)
L Rating At 400 F - Less Than 1 CFM/sq ft (See Item 3B)

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — One or two layers of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. See Table under Item 3B for max diam of opening.
2. Through-Penetrants — One nonmetallic pipe installed within the firestop system. See Table under Item 3B for annular space required in the firestop system. Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping system.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   The T Rating for 2 hr fire-rated walls is 0 hr. The T Rating for 1 hr fire-rated walls is 3/4 hr for nom 1-1/2, 2 and 3 in. (38, 51 and 76 mm) diam through penetrants. The T Rating for 1 hr fire-rated walls is 1/2 hr for nom 4 and 6 in. (102 and 152 mm) diam through penetrants.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* — Wrap Strip — See Table under Item 3B for min size of intumescent wrap strip. The wrap strip is continuously wrapped around the outer circumference of the pipe once and slid into the annular space such that approx 1/8 in. (3 mm) of the wrap strip protrudes from the wall surface. Wrap strip is held in place with integral fastening tape. Wrap strip installed on each surface of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 644S - 1.5" US, CP 644S - 2" US, CP 644S - 3" US, CP 644S - 4" US and CP 644S - 6" US
   B. Fill, Void or Cavity Material* — Caulk — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 2 hr fire-rated walls, 1/4 in. (6 mm) bead fill material also applied at wrap strip/gypsum wall interface. In 1 hr fire-rated walls, fill material is optional for nom 1-1/2, 2, 3 and 4 in. (38, 51, 76 and 102 mm) diam penetrants. In 2 hr fire-rated walls, fill material is optional for nom 1-1/2, 2 and 3 in. (38, 51 and 76 mm) diam penetrants. Fill material is required to be used to attain L Ratings.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

Norm Pipe Diam, in. (mm)	Wrap Strip	Wrap Strip Size, thick. X width, in. (mm)	Max Diam of Opening, in. (mm)	Annular Space, In. (mm)	
				Min	Max
1-1/2 (38)	CP 644S - 1.5" US	3/16 x 1 (5 x 25)	2-3/8 (60)	3/16 (5)	5/16 (8)
2 (51)	CP 644S - 2" US	3/16 x 1 (5 x 25)	3 (76)	3/16 (5)	5/16 (8)
3 (76)	CP 644S - 3" US	3/16 x 1-3/4 (5 x 44)	4 (102)	3/16 (5)	5/16 (8)
4 (102)	CP 644S - 4" US	3/8 x 1-3/4 (10 x 44)	5-3/8 (137)	3/8 (10)	1/2 (13)
6 (152)	CP 644S - 6" US	1/2 x 1-3/4 (13 x 44)	8 (203)	9/16 (14)	13/16 (21)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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System No. F-C-2160

F Rating — 1 and 2 Hr
T Rating — 1 and 2 Hr

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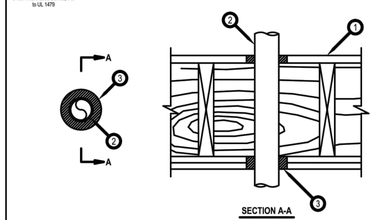


SECTION A-A

1. Floor-Ceiling Assembly — The 1 and 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels (Not Shown) — Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard (Item 1D). Furring channels spaced max 24 in. (610 mm).
   D. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw-attached to furring channels. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).

1.1 Chase Wall — (Optional, not Shown) — The through penetrants (Item No. 2) may be routed through a fire-rated single, double or staggered wood stud/gypsum wall board chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel nom 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One nonmetallic pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 1/2 in. (13 mm) and max 1-1/8 in. (29 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
3. Fill, Void or Cavity Materials*-Sealant — Fill Material forced into annular space to fill space to max extent possible. Sealant shall be installed flush with top surface of floor or sole plate and bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

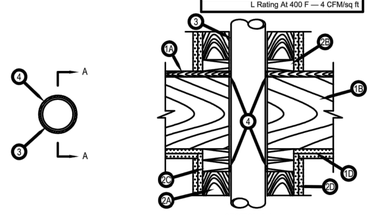
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. F-C-1009

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 1/4 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



SECTION A-A

1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening to be max 1 in. (25 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe.
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) —(As required.) Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Diam of opening to be max 1 in. (25 mm) larger than diam of pipe.
2. Chase Wall — (Optional) - The through penetrant (Item 3) may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall having a fire rating consistent with that of the floor-ceiling assembly. Depth of chase wall to be min 1 in. greater than the diameter of the through penetrant. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs. Nom 2 by 4 in. (51 by 102 mm) studs are allowed for through-penetrants (Item 3) not exceeding nom 2 in. (51 mm) diam.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is to be max 1 in. (25 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe. Plates may be discontinuous over opening, terminating at two opposing edges of opening. Max length of discontinuity to be 1 in. (25 mm) greater than diam of through penetrant.
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is to be max 1 in. (25 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe. Plates may be discontinuous over opening, terminating at two opposing edges of opening. Max length of discontinuity to be 1 in. (25 mm) greater than diam of through penetrant.
   D. Steel Plate — When lumber plates are discontinuous, nom 1-1/2 in. (38 mm) wide No. 20 gauge (or heavier) galv steel plates shall be installed to connect each discontinuous lumber plate and to provide a form for the fill material. Steel plates sized to lap 2 in. (51 mm) onto each discontinuous lumber plate and secured to lumber plates with steel screws or nails.
   E. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through Penetrants — One metallic pipe, conduit or tubing to be installed within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The annular space within the firestop system shall be min 0 in. (point contact) to max 1 in. (25 mm). The following types and sizes of metallic pipes or conduits may be used:
   A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or steel conduit.
   D. Copper Tubing — Nom (102 mm) 4 in. diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe — Nom (102 mm) 4 in. diam (or smaller) Regular (or heavier) copper pipe.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor or the sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S, CFS-S SIL GG, CP606, FS-One Sealant or FS-ONE MAX Intumescent Sealant (Note: L Ratings apply only when FS-ONE Sealant is used.)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

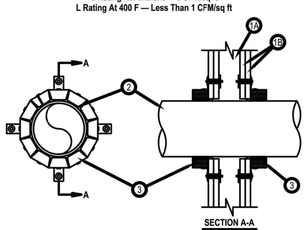
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. W-L-2078

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

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 11-1/2 in. (292 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrants — One nonmetallic pipe, conduit or tubing to be installed within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems
   D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   E. Polyvinylidene Fluoride (PVDF) Pipe — Nom 4 in. (102 mm) diam (or smaller) PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   When max 6 in. diam pipe is used, T Rating is equal to the hourly fire rating of the wall. When nom 8 in. or 10 in. (203 or 254 mm) diam pipe is used, T Rating is 0 hr.
3. Firestop System* — Firestop Collar — Firestop collar shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to both sides of the wall using the anchor hooks provided with the collar. (Minimum two anchor hooks for 1-1/2 and 2 in. (38 and 51 mm) diam pipes, three anchor hooks for 3 and 4 in. (76 and 102 mm) diam pipes, four anchor hooks for 6 in. (152 mm) diam pipe, ten anchor hooks for 8 in. (203 mm) diam pipes and twelve anchor hooks for 10 in. (254 mm) diam pipes. The anchor hooks are to be secured to the surface of wall with 3/16 in. (4.8 mm) diam by 2-1/2 in. (64 mm) long steel toggle bolts along with washers. As an alternate for pipe sizes of nom 4 in. diam or less, min No. 10 by 1-1/2 in. (254 by 38 mm) long drywall or laminate screws with min 3/4 in. (19 mm) steel washers may be used. When the drywall or laminate screw is used, T Rating shall not exceed 1 hr.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50\1.5"N, CP 643 63/2"N, CP 643 90/3"N, CP 643 110/4"N, CP 643 160/6"N, CP 644 200/8" and CP 644 250/10" Firestop Collars
4. Fill, Void or Cavity Material* — Sealant - (Not Shown) — Min 1/2 in. (13 mm) thickness of sealant applied within the annular space for nom 8 in. and 10 in. (203 and 254 mm) diam pipes, flush with each side of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with each side of wall, to attain the L Ratings for max 6 in. (152 mm) diam pipes.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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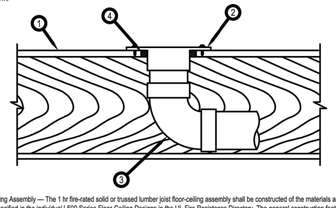
Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

System No. F-C-2203

F Rating — 1 Hr
T Rating — 1 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
   B. Wood Joist* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design.
2. Closet Flange — Acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) closet stub sized to accommodate drain pipe. Closet flange installed over drain piping within floor opening with flange secured to plywood floor with steel screws. Diam of circular opening through flooring (Item 1A) to be max 1/2 in. (13 mm) larger than outside diam of closet flange.
3. Drain Piping — Nom 4 in. (102 mm) diam (on smaller) Schedule 40 acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) drain pipe and 90 degree elbow for use in vented (drain, waste or vent) piping systems. Pipe installed concentrically within firestop system.
4. Fill, Void or Cavity Materials*—Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the bottom surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
5. Water Closet — (Not Shown)—Floor mounted vitreous china water closet.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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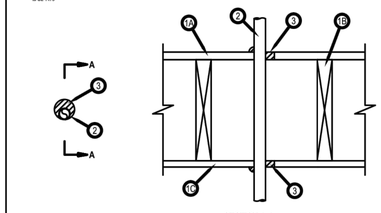
System No. F-C-2334

F Rating — 1 Hr
T Rating — 1 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

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

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

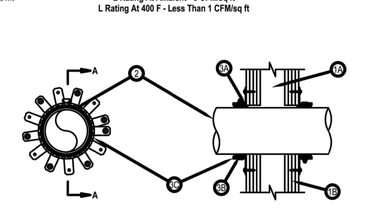
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 20, 2015

System No. W-L-2447

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

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The 1, 2, 3 or 4 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 1/2 in. (13 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max diam of opening is 7 in. (178 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One nonmetallic pipe to be installed concentrically or eccentrically within the firestop system. Annular space between pipe and periphery of opening to be min 0 in. (point contact) and max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core PVC for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR13.5 CPVC for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   The hourly T Rating of the firestop system is 1 hr except that for nom 2 in. (51 mm) diam (or smaller) penetrants, the hourly T Rating is equal to the hourly fire rating of the wall assembly in which it is installed.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Materials*- Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
      HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
   B. Fill Void or Cavity Material* - Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (45 mm) wide intumescent wrap strip continuously wrapped around the pipe. Wrap strip butted tightly against both surfaces of wall. The number of layers of wrap strip required depends on penetrant size as specified in the Table below.
      HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP644S-E/W45/1-3/4

Nom Pipe Diam, in.	No. of Layers of Wrap Strip Required
6 (or smaller)	3
4 (or smaller)	2
2 (or smaller)	1

   C. Steel Collar — Collar fabricated from coils of precut min 0.017 in. (0.43 mm) thick (No. 28 MSG) galv steel available from the sealant manufacturer. Collar shall be nom 1-3/4 in. (45 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchors tabs on 2 in. (51 mm) centers for securement to wall assembly. The anchor tabs shall be bent 90 degree outward for securement to the wall assembly. The opposite side incorporates retainer tabs, 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, prebent toward the pipe surface. Collar shall be tightly wrapped over the wrap strip, overlapping min. 1 in. (25 mm) at seam. A nom 1/2 in. (13 mm) wide stainless steel band clamp shall be secured to the collar at its mid-height. Anchor tabs of collar secured to surface of wall by means of nom 3/16 in. diam by 2-1/2 in. long steel toggle bolts in conjunction with 1-1/4 in. (32 mm) diam steel fender washers at every other anchor tab. As an alternate, in 1 and 2 hr rated walls, every anchor tab of collar may be secured to surface of wall by means of nom 1-1/4 in. (32 mm) long steel laminating drywall screws in conjunction with 1-1/4 in. (32 mm) diam steel fender washers. A collar is used on both sides of wall.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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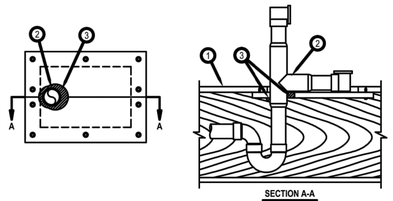
System No. F-C-2204

F Rating - 1 Hr
T Rating - 1/2 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Floor — Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in theUL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Rectangular cutout in flooring to accommodate the bathtub drain piping (Item 2) to be max 8 in. by 12 in. (203 by 305 mm). Cutout to be patched on underside of subfloor using one layer of min 3/4 in. (19 mm) thick plywood or min 5/8 in. (16 mm) thick gypsum board (Item 1C) sized to lap min 2 in. (51 mm) beyond each edge of rectangular cutout. Patch split into two pieces at opening and hole-sawed for bathtub drain piping. Diam of opening hole sawed through patch to accommodate drain piping (Item 2) to be 1 in. (25 mm) larger than outside diam of drain piping and positioned such that the annular space between drain piping and periphery of opening is min 0 in. (point contact) to max 1 in. (25 mm). Two pieces positioned around drain piping, with cut edges tightly butted, and screw-attached to underside of subfloor with 1-1/4 in. (32 mm) long steel screws spaced max 6 in. (152 mm) OC.
   B. Wood Joists* — Nom 10 in. (154 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (122 cm) wide as specified in the individual Floor-Ceiling Design.
2. Drain Piping — Nom 1-1/2 in. (38 mm, or smaller) diam Schedule 40 acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) pipe and drain fittings cemented together and provided with ABS or PVC bathtub waste/overflow fittings. Annular space shall be min 0 in. (point contact) to max 1 in.
3. Fill Void or Cavity Materials* — Min 5/8 in. (16 mm) depth or fill material applied within the annulus, flush with both surfaces of plywood or gypsum board patch.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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1 P7.04 UL PIPING DETAILS
SCALE: DETAIL

YBA architects
123 NW 2ND AVE SUITE 204 - PORTLAND, OR 97209
T: 971.888.5107 - E-MAIL: INFO@YB-A.COM

MFA Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
INC. WWW.MFIA-ENG.COM
CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2005
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH
PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

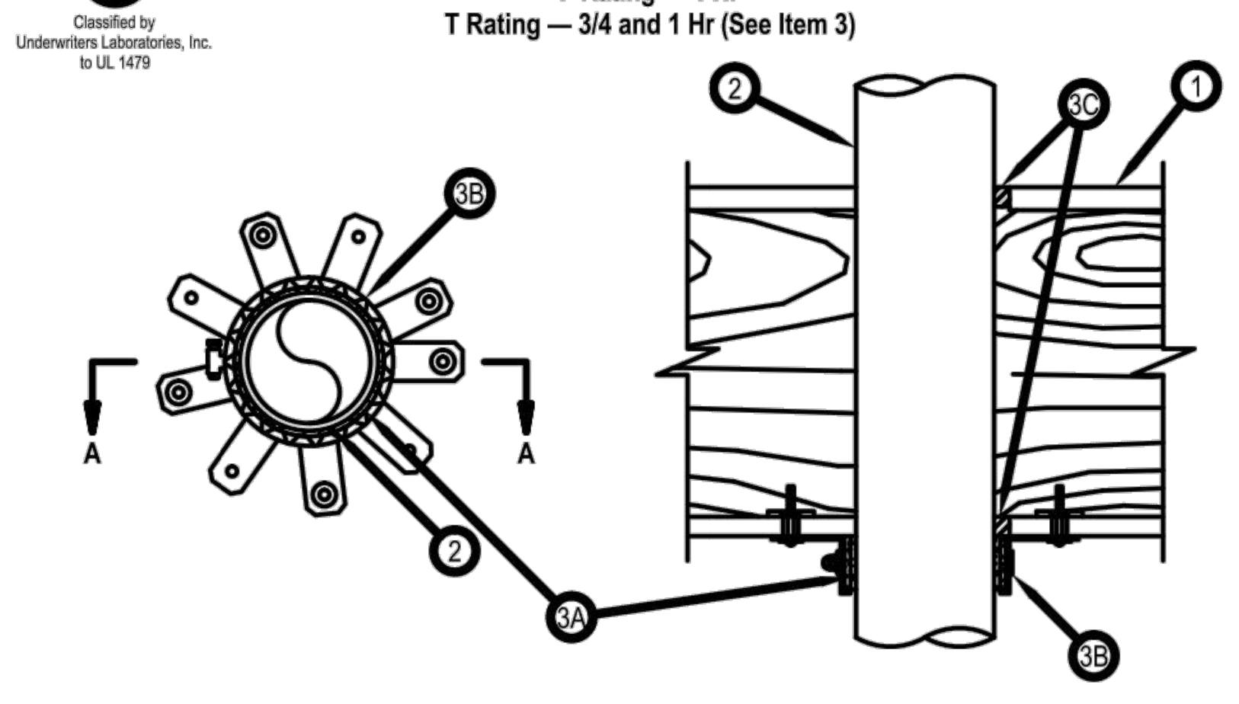
DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P704

System No. F-C-2232

F Rating — 1 Hr
T Rating — 3/4 and 1 Hr (See Item 3)

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (122 cm) wide as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
2. Through Penetrants — One nonmetallic pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 0 in. (point contact) and max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 4 in. (102 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
3. Nonmetallic Pipe Coupling — (Optional) Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC, Schedule 40 ABS or SDR13.5 CPVC coupling corresponding to pipe type installed such that the top of the coupling is flush with the bottom surface of the ceiling and extending downward.
4. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* - Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (44 mm) wide intumescent wrap strip. Layers of wrap strip continuously wrapped around the pipe and held in place with tape. Wrap strip butted tightly against surface of ceiling.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP648-E W45/1-3/4" Wrap Strip

Nom Diam of Pipe, in. (mm)	Number of Wrap Strips	Min/Max Annular Space, in. (mm)	T-Rating - Hr.
2 (51)	1	0-1/4 (0-6)	1
3 (76)	2	0-1/2 (0-13)	3/4
4 (102)	2	0-1/2 (0-13)	3/4

   B. Steel Collar — Collar fabricated from coils of precut min 0.017 in. (0.43 mm) thick (No. 28 MSG) galv steel available from the sealant manufacturer. Collar shall be nom 1-3/4 in. (44 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchors tabs on 2 in. (51 mm) centers for securement to floor/ceiling assembly. The opposite side incorporates retainer tabs, 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, prebent toward the pipe surface. Collar shall be tightly wrapped over the wrap strip, overlapping min. 1 in at seam. A nom 1/2 in. (13 mm) wide stainless steel hose clamp shall be secured to the collar at its mid-height. Every other anchor tab of collar secured to gypsum ceiling with 1/4 in. (6 mm) diam by 1-1/2 in. (38 mm) long steel toggle bolts in conjunction with 1/4 in. by 3/4 in. (6 by 19 mm) diameter steel washers.
   C. Fill, Void or Cavity Materials*-Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the gypsum board ceiling. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor. When ABS pipe is installed at point contact, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/floor interface on top surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX SEALANT
   4A. Firestop System — (Optional, Not shown) As an option to Item 4, the firestop system shall consist of the following:
   A. Firestop Device* — Galv steel collar lined with an intumescent material sized to fit the specific diam of pipe shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to the gypsum board ceiling with 1/4 in. diam by 1-1/2 in. (38 mm) long steel toggle bolts with 3/4 in. (19 mm) diam steel washers through hanger tabs provided.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50/1.5"N, CP 643 63/2"N, CP 643 90/3"N or CP 643 110/4"N Firestop Collar.
   B. Fill, Void or Cavity Materials*-Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the gypsum board ceiling. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor. When ABS pipe is installed at point contact, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/floor interface, flush with top surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant

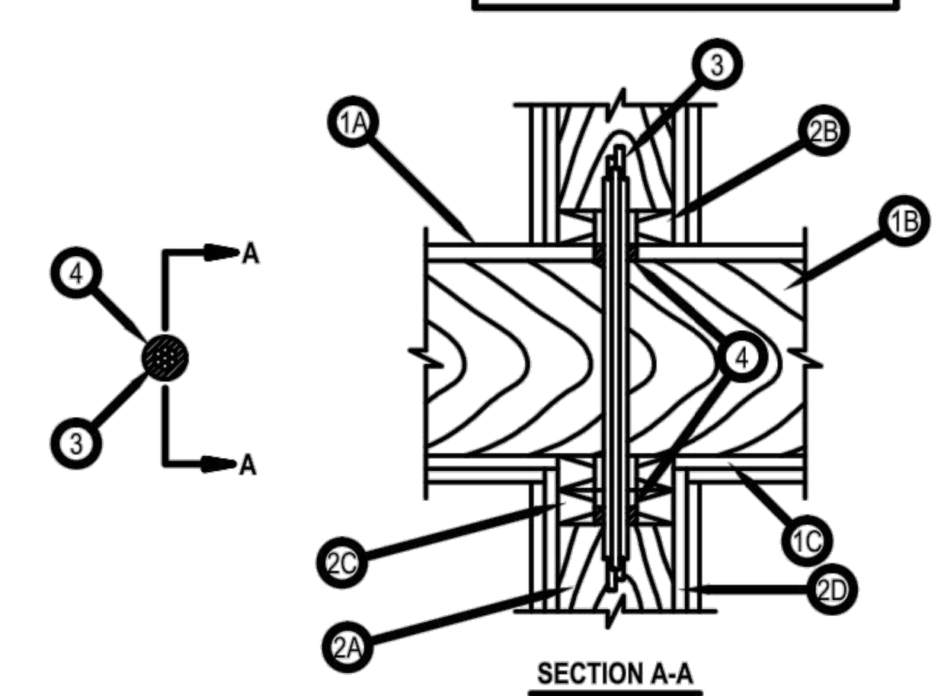
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. F-C-3012

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1 and 1-3/4 Hr (See Item 3)	FT Ratings — 0, 1 and 1-3/4 Hr (See Item 3)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 0, 1 and 1-3/4 Hr (See Item 3)



SECTION A-A

1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening for 1 or 2 hr assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening for 1 or 2 hr assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly.
2. Chase Wall — (Optional) - The through penetrant (Item 3) shall be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening for 1 or 2 hr rated assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening for 1 or 2 hr rated assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Cables — In 1 hr fire-rated assemblies, aggregate cross-sectional area of cables in opening to be max 45 percent of the cross-sectional area of the opening (max 2 in. (51 mm) diam bundle). Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of copper conductors may be used:
   A. RG 59 coaxial cable with single copper conductor, cellular polyethylene cellular foam insulation and polyvinyl chloride (PVC) jacket.
   B. Max 8/C No. 22 AWG telephone cable with polyvinyl chloride (PVC) jacketing.
   C. Max 2/C No. 12 AWG cable with polyvinyl chloride (PVC) insulation and jacketing.
   D. Max 3/C with ground No. 2/0 AWG aluminum or copper Type SER cable with polyvinyl chloride (PVC) insulation.
   E. Max 3/C with ground No. 2/0 AWG Type NM cable with polyvinyl chloride (PVC) insulation.
   F. Max 3/C No. 12 AWG MC (BX) cable with polyvinyl chloride (PVC) insulation.
   G. Max 1 in. diam metal clad TEK cable with PVC jacket.
   H. Max 4/C with ground No. 300 kcmil (or smaller) aluminum SER cable with PVC insulation and jacket.
   I. Through Penetrating Product* - Any cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.
   See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.
   The T Rating is 1 and 1-3/4 hr for 1 and 2 hr rated assemblies, respectively, for cables 3A through 3G. The T Rating is 0 hr for cables 3H and 3I.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material also applied within the annulus, flush with bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS611A Sealant or FS-One Sealant or FS-ONE MAX Intumescent Sealant

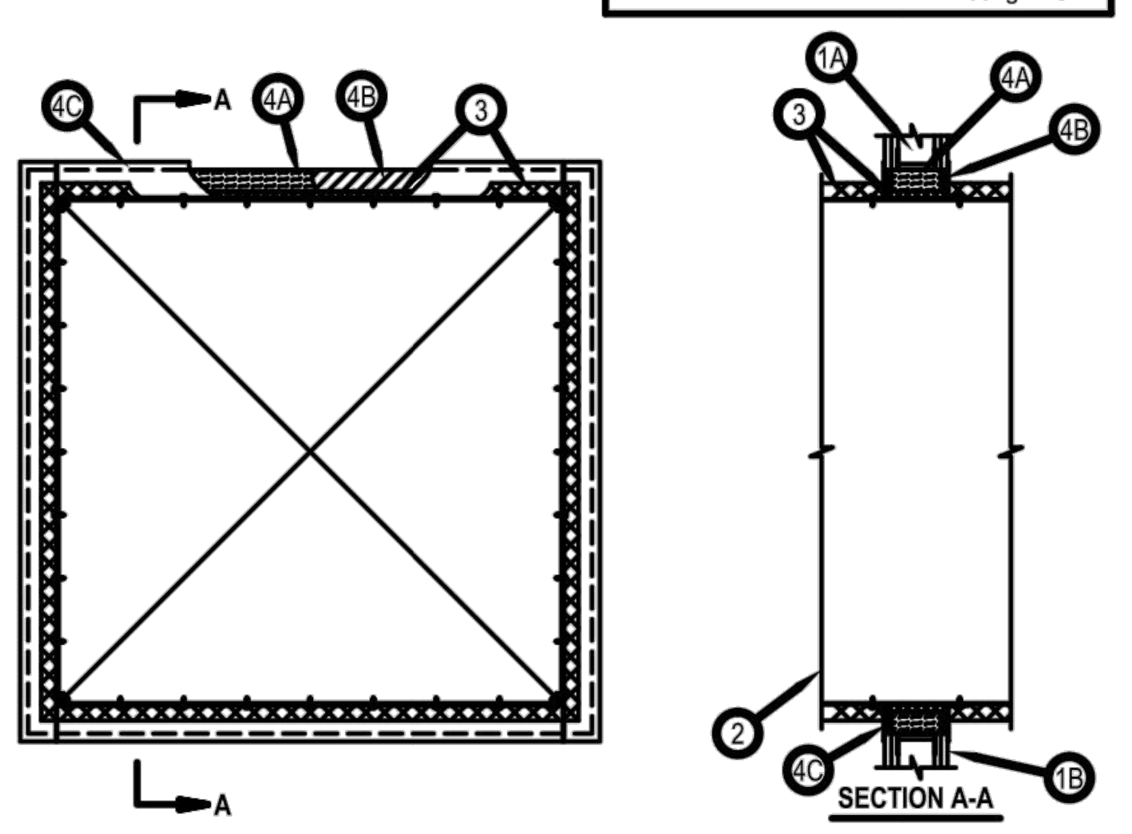
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-7156

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers and orientation shall be as specified in the individual Wall and Partition Design. Max size of opening is 210 sq in. (1355 cm2) with a max width of 14-1/2 in. (368 mm) for wood studs. Max size of opening is 76.2 sq ft. (7 m2) with a max width of 105-1/2 in. (2.7 m) for steel studs.
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall in which it is installed.
2. Steel Duct — Max 100 by 100 in. (2.5 by 2.5 m) steel duct to be installed within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Steel duct to be rigidly supported on both sides of wall assembly.
3. Batts and Blankets* — Nom 1-1/2 or 2 in. (38 or 51 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed minimum 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm).
   See Batts and Blankets (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.
4. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 3-5/8 (92 mm) or 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 or 2 hr fire-rated walls, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
   C. Steel Retaining Angles — Min No. 16 gauge (0.059 in. or 1.5 mm) galv steel angles sized to lap steel duct a min of 2 in. 51 mm) and lap wall surfaces a min of 1 in. (25 mm). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max 1-1/2 in. (38 mm) thick insulation is used, steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

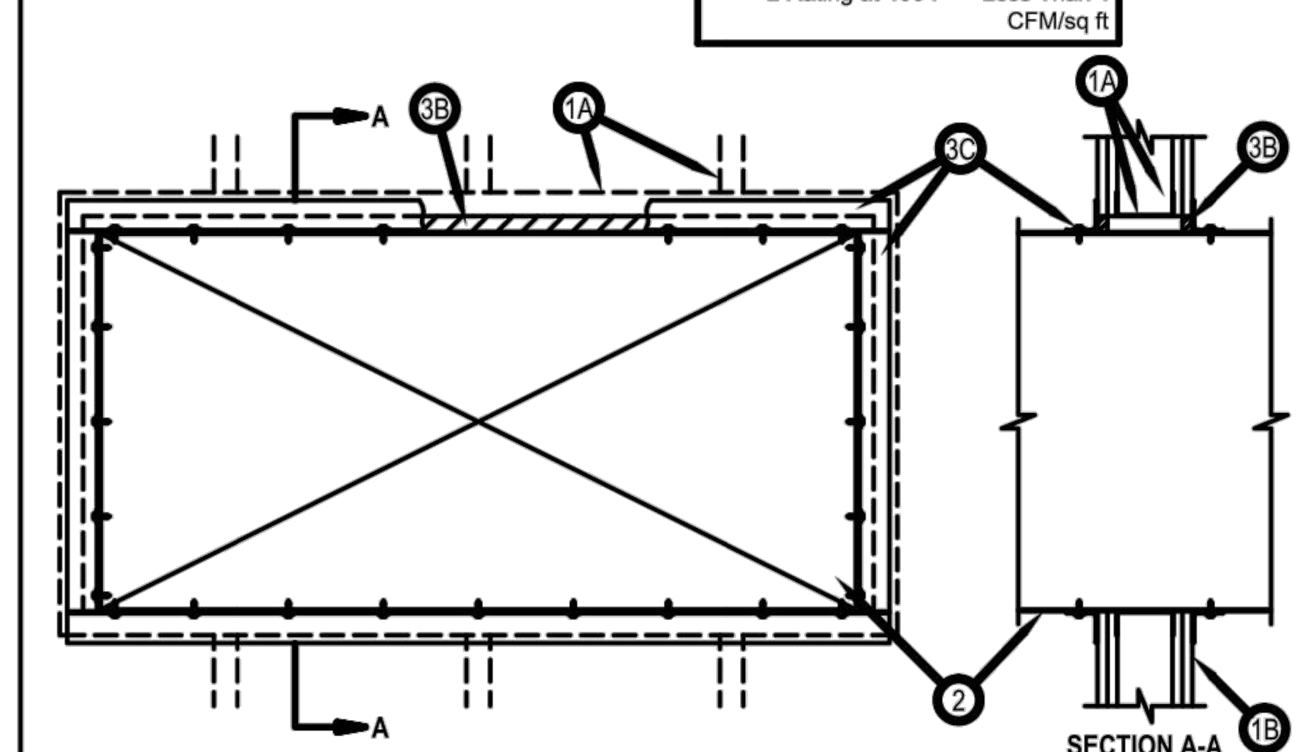
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-7155

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 Hr	FT Ratings — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings — 1 and 2 Hr (See Item 1)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Ratings — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft
	L Rating at 400 F — Less Than 1 CFM/sq ft



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC. Additional steel studs shall be used to completely frame the opening.
   B. Gypsum Board* — 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max area of opening is 73.7 sq ft (6.85 m2) with a max dimension of 104 in. (2.64 m).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Duct — Max 100 in. by 100 in. (2.5 by 2.5 m) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. The space between the steel duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.

2A1. Through-Pentrating Product* — As an alterate to Item 2. Fiber cement with galvanized steel facing, 3/8 in.(10 mm) thick composite metallic duct, with a max cross-sectional area of 43.0 sq ft, (4 m2) and a max individual dimension of 78 3/4 in. (2 m). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
DURASYSTEMS BARRIERS INC — Type DuraDuct HP.

2A2. Through-Pentrating Product* — As an alternate to Item 2. Fiber cement with galvanized steel facing, 1/4 in. (6 mm) thick, with a max cross-sectional area of 1764 sq in. (1.14 m2), and a max individual dimension of 42 in. (1067 mm). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly and installed in accordance. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
DURASYSTEMS BARRIERS INC — Type DuraDuct SD.

2A3. Through-Pentrating Product* — As an alternate to Item 2. Galvanized steel faced duct panel, with a max cross-sectional area of 2450 sq in. (1.58 m2), and a max individual dimension of 49-1/2 in. (1258 mm) Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
DURASYSTEMS BARRIERS INC — Type DuraDuct GNX.

3 Firestop System — The firestop system shall consist of the following:
   A. Packing Material — (Optional, Not Shown) — Polyethylene backer rod, mineral wool batt insulation or fiberglass batt insulation friction fitted into annular space. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   A1. Packing Material — Required as specified in Table below. Min 3-3/4 in. (95 mm) or 5 in. (127 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 and 2 hr rated assemblies, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Min 1/4 in. (6 mm) diam bead of fill material shall be applied at the point contact location between the steel duct and the gypsum board.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL GG Sealant, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP606 Flexible Firestop Sealant
   C. Steel Retaining Angles — Min No. 16 gauge galv steel angles sized to lap steel duct a min of 2 in. (51 mm) and to lap wall surfaces a min of 1 in. (25 mm). When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. Steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material, sealant and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

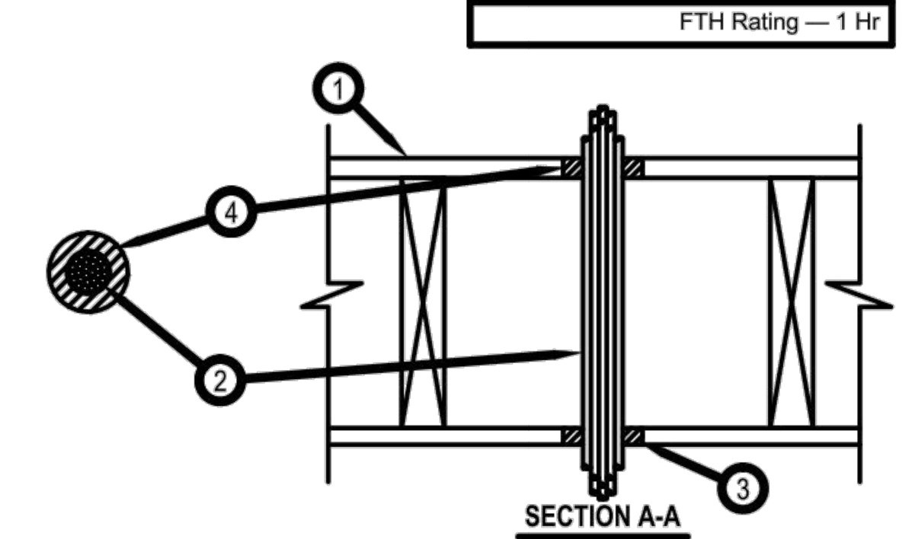
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. F-C-3044

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 3 in. (76 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 3 in. (76 mm).
1.1 Chase Wall — (Not Shown, Optional)—The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening shall be 3 in. (76 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening shall be 3 in. (76 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Cables — Aggregate cross-sectional area of cables in opening to be max 25 percent of the cross-sectional area of the opening. The annular space within the firestop system shall be 3/4 in. Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of cables may be used:
   A. RG 59 coaxial cable with single copper conductor, cellular polyethylene cellular foam insulation and polyvinyl chloride (PVC) jacket.
   B. Max 25 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) jacketing.
   C. Max 3/C No. 10 AWG cable (Type NM).
   D. Max 3/C with ground No. 2/0 AWG aluminum or copper Type SER cable with polyvinyl chloride (PVC) insulation.
   E. Max 24 fiber optic cable.
   F. Through Penetrating Products* — Three conductor No. 10 AWG Metal-Clad Cable.
   AFC CABLE SYSTEMS INC
3. Fill, Void or Cavity Materials*-Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annular space, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within annular space, flush with bottom surface of the gypsum wallboard or lower top plate. Sealant forced into the interstices of the cables on both sides of the wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

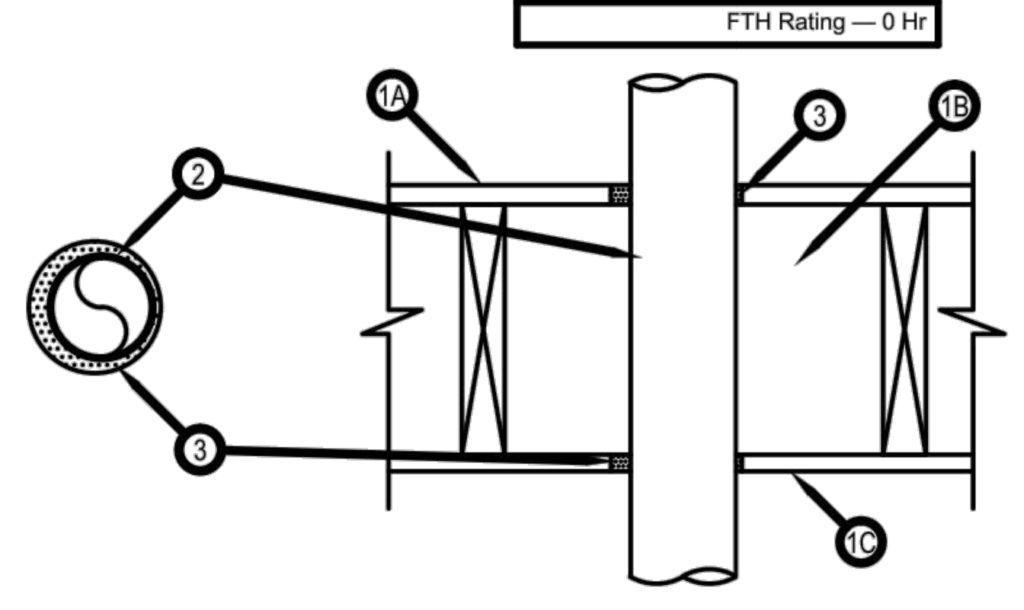
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
+Bearing the UL Listing Mark

Hilti Firestop Systems

System No. F-C-7013

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 1 Hr
	FTH Rating — 0 Hr



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5-1/4 in. (133 mm).
   B. Wood Joist* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5-1/4 in. (133 mm).
1.1 Chase Wall — (Not shown, Optional) The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) lumber or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 5-1/4 in.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates tightly butted. Max diam of opening is 5-1/4 in. (133 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Steel Duct — Nom 4 in. (102 mm) diam (or smaller) No. 28 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min of 1/4 in. (6 mm) to max 3/4 in. (19 mm). Steel duct to be rigidly supported on both sides of floor-ceiling assembly.
3. Fill, Void or Cavity Materials*-Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annular space, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within annular space, flush with bottom surface of gypsum board or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

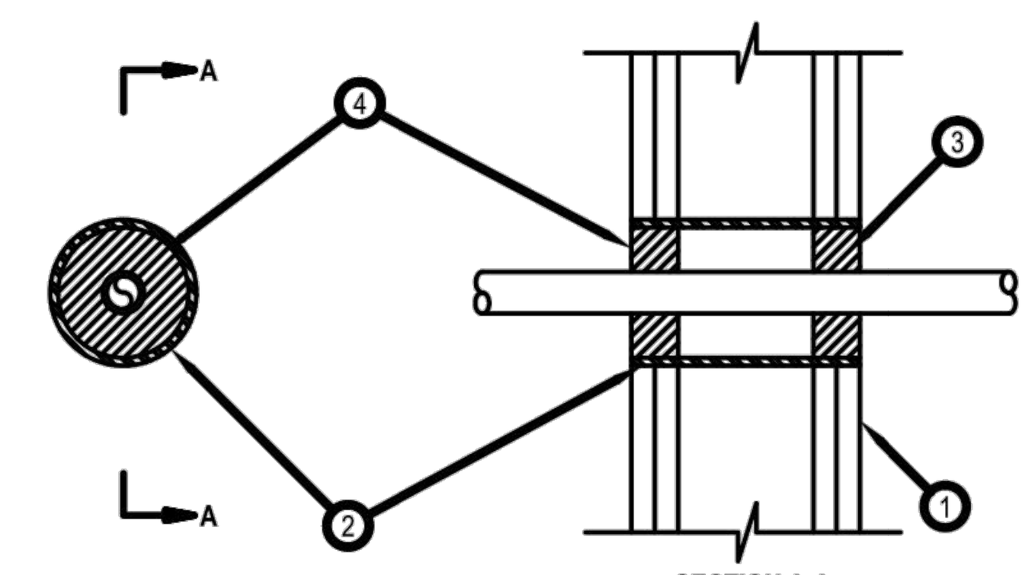
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. W-L-2186

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

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) . Steel studs to be min 2-1/2 in. .(64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — For 1 hr assembly, one layer of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. For 2 hr assembly, two layers of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. Max diam of opening is 3 in. (76 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Sleeve — (Optional) - Max 3 in. (76 mm) diam Schedule 40 (or heavier) steel pipe sleeve friction-fit into circular opening core drilled through wall. Length of steel sleeve to be equal to thickness of wall.
3. Through Penetrant — One nom 1 in. (25 mm) diam (or smaller) SDR 9 cross-linked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. The tubing installed concentrically or eccentrically within the opening. The annular space between the tube and the steel sleeve or wall opening shall be min 1/2 in. (13 mm) to max 1-3/8 in. (35 mm). Tube to be rigidly supported on both sides of wall assembly. When steel sleeve (Item 2) is not provided, tube may be installed at an angle not greater than 45 degrees from perpendicular.
   The hourly T Rating is 1/2 Hr and 1 Hr for 1 Hr and 2 Hr fire rated wall assemblies, respectively.
4. Fill, Void or Cavity Material*-Sealant — Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 and 2 hr rated walls, respectively. When a steel sleeve (Item 2) is provided for assemblies with L Ratings, sealant shall be applied around periphery of opening to cover the exposed ends of the sleeve and to lap min 1/4 in. (6 mm) onto gypsum board on each side of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

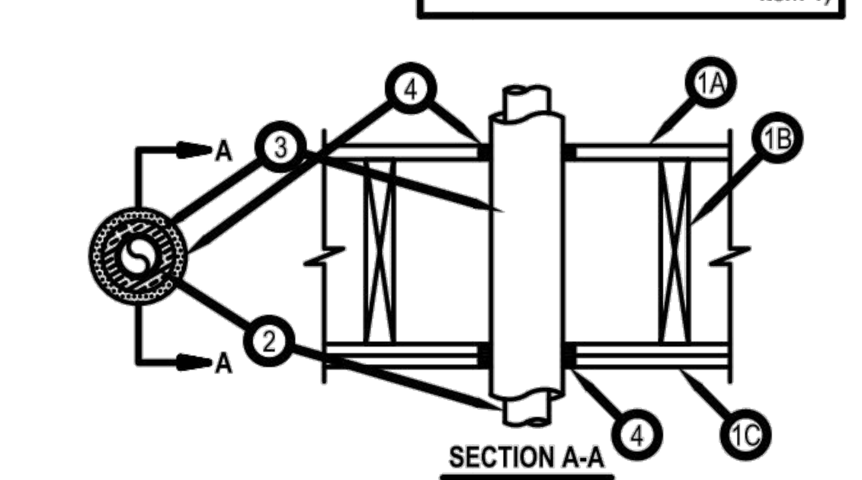
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

System No. F-C-5037

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/4 and 1-3/4 Hr (See Item 1)	FT Ratings — 1/4 and 1-3/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/4 and 1-3/4 Hr (See Item 1)



SECTION A-A

1. Floor-Ceiling Assembly — The 1 and 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F and FH Rating are dependent on the hourly rating of the floor ceiling assembly. The T, FT and FTH Rating are 1/4 hr for 1 hr rated floor ceiling assemblies and 1-3/4 hr for 2 hr rated floor ceiling assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 5-1/8 in. (130 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels (Not Shown) — Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard (Item 1D). Furring channels spaced max 24 in. (610 mm).
   D. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw-attached to furring channels. Max diam of ceiling opening is 5-1/8 in. (130 mm).
1.1 Chase Wall — (Not Shown, Optional) The through penetrants (Item 2) may be routed through fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) lumber or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 5-1/8 in.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates tightly butted. Max diam of opening is 5-1/8 in. (130 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One metallic tube or pipe to be installed within the firestop system. Tube or pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic tubes or pipes may be used:
   A. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   B. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
3. Tube Insulation-Plastics+ — Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space shall be min 3/8 in. (10 mm) to max 1 in. (25 mm).
   See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-5VA may be used.
4. Fill, Void or Cavity Materials*-Sealant — Fill material forced into annular space to fill space to max extent possible. Sealant shall be installed flush with top surface of floor or sole plate and bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Notes:

1. Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.
2. Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:
   * Minimum and maximum Width of Joints
   * Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.
3. If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.
4. References:
   * 2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2
   * NFPA 101 Life Safety Code
   * All governing local and regional building codes
5. Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.
6. All rated through-penetrations shall be prominently labeled with the following information:
   * ATTENTION: Fire Rated Assembly
   * UL System #
   * Product(s) used
   * Hourly Rating (F-Rating)
   * Installation Date

1 / P7.05 UL PIPING DETAILS
SCALE: DETAIL

YBA architects
123 NW 2ND AVE SUITE 204 - PORTLAND, OR 97209
T: 971.888.5107 - E-MAIL: INFO@YB-A.COM

MFIA INC. Consulting Engineers
2007 S.E. Ash St.
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FAX: (503) 234-0677
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CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER 54,607 OREGON JULY 11, 2000 MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

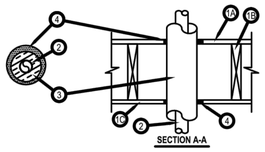
FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P705

System No. F-C-5036

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



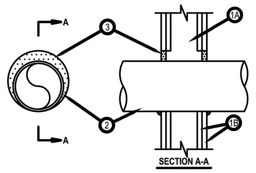
1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 6-7/8 in. (175 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 6-7/8 in. (175 mm).
1.1 Chase Wall — (Not Shown, Optional) The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 8 (51 by 203 mm) lumber or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 8 in. (51 by 203 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 6-7/8 in. (175 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 8 in. (51 by 203 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 6-7/8 in. (175 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One metallic tube or pipe to be installed within the firestop system. Tube or pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic tubes or pipes may be used:
   A. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   B. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
3. Pipe Covering — Nom 1-1/2 in. (38 mm) thick hollow cylindrical heavy density (min 3.5 pcf (56 kg/m3)) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing tape. Traverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space shall be min 1/2 in. (13 mm) and max 1 in. (25 mm).
   See Pipe and Equipment Covering Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Material* - Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within annular space, flush with top surface of subfloor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within the annular space, flush with bottom surface of gypsum wallboard or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-CNE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 20, 2015

System No. W-L-1054

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings —1 and 2 Hr (See Items 1 and 3)	F Ratings — 1 and 2 Hr (See Items 1 and 3)
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings —1 and 2 Hr (See Items 1 and 3)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	FTH Rating — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft L Rating at 400 F — Less Than 1 CFM/sq ft



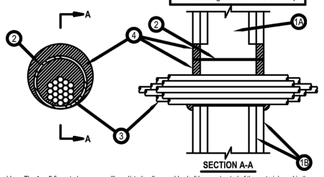
1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. (102 to 152 mm) wider and 4 to 6 in. (102 to 152 mm) higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. (51 to 76 mm) clearance is present between the penetrating item and the framing on all four sides.
   B. Gypsum Board* — 5/8 in. (16 mm) thick, 4 ft (122 cm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 32-1/4 in. (819 mm) for steel stud walls. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls.
   The F and FH Ratings of the firestop system are equal to the fire rating of the wall assembly.
2. Through-Penetrants — One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 0 in. to max 2-1/4 in. (57 mm). Pipe may be installed with continuous joint contact. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or 6 in. (152 mm) . diam steel conduit.
   D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe.
3. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe wall interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-CNE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 23, 2015

System No. W-L-3065

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 and 3/4 Hr (See Item 3)	FT Rating — 0 and 3/4 Hr (See Item 3)
L Rating At Ambient — 15 CFM/sq ft	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — 8 CFM/sq ft	FTH Rating — 0 and 3/4 Hr (See Item 3)
	L Rating At Ambient — 15 CFM/sq ft
	L Rating At 400 F — 8 CFM/sq ft



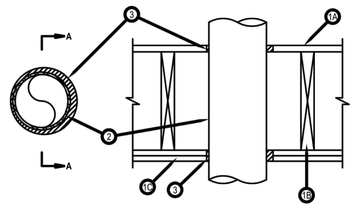
1. Wall Assembly — The 1 or 2 fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300; U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max diam of opening is 5-1/2 in. (138 mm) when sleeve (Item 2) is employed. Max diam of opening is 4 in. (102 mm) when sleeve (Item 2) is not employed.
   The F, FH Ratings of the firestop system are equal to the fire rating of the wall assembly.
2. Metallic Sleeve — (Optional) - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or Schedule 5 (or heavier) steel pipe or min 0.016 in. thick (0.41 mm, No. 28 ga) galv steel sleeve installed flush with wall surfaces. The annular space between steel sleeve and periphery of opening shall be min 0 in. (0 mm, point contact) to max 1 in. (25mm). When Schedule 5 steel pipe or EMT is used, sleeve may extend up to 18 in. (457 mm) beyond the wall surfaces. As an option when Schedule 5 steel pipe or EMT is used, sleeve may extend continuously beyond one wall surface. When cable bundle penetrates wall assembly at an angle of 45 degrees, no metallic sleeve is used.
3. Cables — Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between the cable bundle and the periphery of the opening to be min 0 in. (point contact) to max 1 in. (25 mm). When sleeve is continuous on one side of wall (see Item 2), the cable fill may be 0 to 45% and the max annular space is not limited. Cables to be rigidly supported on both sides of the wall assembly. Cable bundle, using cables described below, may penetrate the wall at an angle not greater than 45 degrees. Any combination of the following types and sizes of copper conductor cables may be used:
   A. Max 7/C No. 12 AWG with polyvinyl chloride (PVC) insulation and jacket.
   B. Max 25 pair No. 24 AWG telephone cable with PVC insulation and jacket.
   B1. Max 4 pr No. 22 AWG Cat 5 or Cat 6 computer cables.
   C. Type RG/U coaxial cable with polyethylene (PE) insulation and PVC jacket having a max outside diameter of ½ in. (13 mm).
   C1. Max RG 6U coaxial cable with fluorinated ethylene insulation and jacketing.
   D. Multiple fiber optical communication cable jacketed with PVC and having a max OD of 5/8 in. (16 mm).
   E. Through Penetrating Products* — Max three copper conductor No. 8 AWG .Metal-Clad Cable+.
   AFC CABLE SYSTEMS INC
   F. Max 3/C (with ground)(or smaller) No. 8 AWG copper conductor cable with PVC insulation and jacketing.
   G. Max 3/4 in. (19 mm) diam copper ground cable with or without a PVC jacket.
   H. Fire Resistive Cables* - Max 1-1/4 in. (32 mm) diam single conductor or multi conductor Type MI cable. A min 1/8 in. (3 mm) separation shall be maintained between MI cables and any other types of cable.
   I. Max 4/C with ground 300 kcmil (or smaller) aluminum SER cable with PVC insulation and jacket.
   J. Through Penetrating Product* - Any cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.
   K. Maximum 3/C No. 8 AWG metal-clad cable.
   L. Maximum 5/8 diam fiber-optic cable with PVC jacket.
   For cable bundle penetrating the wall assembly at an angle of 45 degrees, the T, FT, FTH Ratings are 0 hr and 3/4 hr for 1 and 2 hr wall assemblies, respectively.
   See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.
4. Fill, Void or Cavity Material* — Sealant or Putty — Fill material applied within the annulus, flush with each end of the steel sleeve or wall surface. Fill material installed symmetrically on both sides of the wall. A min 5/8 in. (16 mm) thickness of sealant is required for the 1 or 2 hr F Rating . An additional 1/2 in. (13 mm) diam bead of fill material shall be applied at the interface of sleeve with gypsum board.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S, CP606, FS-One Sealants or FS-ONE MAX Intumescent Sealantor or CP618 Putty
5. Packing Material — (Optional, Not Shown) — Mineral wool forming material may be used as a backer for the fill material (Item 4). When used, it shall be firmly packed into annular space within the sleeve as a permanent form and recessed from end of sleeve to accommodate the required thickness of fill material.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
+Bearing the UL Listing Mark

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 23, 2015

System No. F-C-1059

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr	F Rating — 1 and 2 Hr
T Rating — 1 and 2 Hr	FT Rating — 1 and 2 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 1 and 2 Hr
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 1 and 2 Hr
W Rating — Class 1 (See Item 4)	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



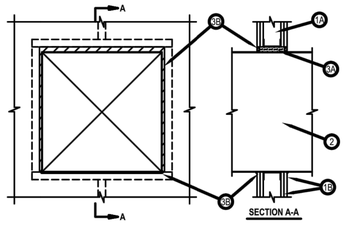
1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F, FH Rating of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The T, FT and FTH Rating of the firestop system is 0 hr for 1 hr rated floor ceiling assembly and 1/2 hr for 2 hr rated floor ceiling assembly. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 7-5/8 in. (194 mm).
   B. Wood Joists* — Nom 10 in (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 7-5/8 in. (194 mm).
   D. Furring Channels — (Not Shown) (As required) Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
1.1 Chase Wall — (Not Shown, Optional)—The through penetrants (Item 2) may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features :
   A. Studs — Nom 2 by 8 in. (51 by 203 mm) lumber or double nom 2 by 6 in. (51 by 152 mm) lumber studs.
   B. Sole Plate — Nom 2 by 8 in. (51 by 203 mm) lumber or parallel 2 by 6 in. (51 by 152 mm) lumber plates, tightly butted. Max diam of opening shall be 7-5/8 in. (194 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 8 in. (51 by 203 mm) lumber plates or two sets of nom 2 by 6 in. (51 by 152 mm) lumber plates tightly butted. Max diam of opening is 7-5/8 in. (194 mm).
   D. Gypsum Board* — Thickness, type, number or layers and fasteners shall be as specified in individual Wall and Partition Designs.
2. Through Penetrants — One metallic tubing, pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 1/4 in. (6 mm) and max 3/4 in. (19 mm). Pipe, tubing or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic pipes, tubing or conduit may be used:
   A. Steel Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. Iron Pipe — Nom 6 in. (152 mm) diam (or smaller) cast or ductile pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or nom 6 in. diam (or smaller) steel conduit.
   D. Steel Flexible Metal Conduit + — Nom 2 in. (51 mm) diam (or smaller) steel flexible metal conduit.
   See Flexible Metal Conduit (DUZ) category in the Electrical Construction Materials Directory for names of manufacturers.
3. Fill, Void or Cavity Material*—Sealant — Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of sealant applied within annular space, flush with the bottom surface of gypsum wallboard or lower top plate for 1 and 2 hr floors respectively. Min. 3/4 in. (19 mm) thickness of sealant applied within annular space, flush with top surface of floor or sole plate.
   HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
+Bearing the UL Listing Mark.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. W-L-7143

F Ratings -- 1 and 2 Hr (See Items 1 and 2)
T Ratings -- 0 and 1/2 Hr (See Item 1)



1. Wall Assembly — The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min. 3-1/2 in. (89 mm) wide steel channel studs and spaced max 24 in. (610 mm) OC. Additional 3-1/2 in. (89 mm) wide steel studs shall be used to completely frame opening.
   B. Gypsum Board — One or two layers of 5/8 in. (16 mm) thick gypsum board as specified in the individual Wall and Partition Design. Max size of opening is 625 sq in. (4032 cm2) with a max dimension of 25 in. (635 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating of the firestop system is 1/2 hr for 2 hr fire rated walls and 0 hr for 1 hr fire rated walls.
2. Steel Duct — Nom. 24 in. by 24 in. (610 by 610 mm) (or smaller) No. 24 gauge (or heavier) galv. steel duct to be installed within the firestop system. An annular space of min 1/2 in. (13 mm) to max 1 in. (25 mm) is required within the firestop system. As an option, for systems with a 2 hr F Rating only, the min annular space may be 0 in. (point contact). Steel duct to be rigidly supported on both sides of wall assembly
3. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 3-3/4 in. (95 mm) or 5 in. (127 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 and 2 hr rated assemblies, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill Void or Cavity Materials* - Sealant — Min 1/2 in. (13 mm) thickness of sealant applied within annulus, flush with both surfaces of wall assembly. Min 1/4 in. (6 mm) diam bead of sealant shall be applied at the duct/gypsum board interface at any point contact location, on both surfaces of wall assembly.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 606 Sealant

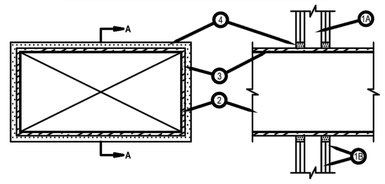
*Bearing the UL Classification Mark

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. October 12, 2012

System No. W-L-7059

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 1/2 and 3/4 Hr (See Item 1)	FT Rating - 1/2 and 3/4 Hr(See Item 1)
	FH Ratings - 1 and 2 Hr (See Item 1)
	FTH Rating - 1/2 and 3/4 Hr (See Item 1)



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of channel studs. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC. The opening in the wall to accommodate the steel duct (Item 2) shall be framed on all sides using lengths of studs installed between the vertical studs and attached to the studs at each end. The framed opening in the wall shall be a nom 6 in. (152 mm) wide and 12 in. (305 mm) higher than the width and height of the steel duct.
   B. Wallboard, Gypsum* — 5/8 in. (16 mm) thick, 4 ft (1.22 mm) wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400, V400 or W400 Series Design in the UL Fire Resistance Directory. Max area of opening is 395 sq. in. (0.25 m2)with max dimensions of 26-3/4 in. (679 mm) for steel studs. The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T, FT and FTH Ratings are 1/2 hr and 3/4 hr for 1 and 2 hr rated assemblies, respectively
2. Steel Duct — Nom 24 in. by 12 in. (610 by 305 mm) (or smaller) No. 24 gauge (or heavier) steel duct to be installed eccentrically within the framed opening. The annular space shall be min 1 in. (25 mm) to max 1-3/4 in. (45 mm) Steel duct to be rigidly supported on both sides of wall assembly.
3. Batts and Blankets* — Max 1-1/2 in. (38 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/4 in. (6 mm) to max 1 in. (25 mm).
   See Batts and Blankets - (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.
4. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. or 1-1/4 in. (16 or 32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall for 1 or 2 hr walls, respectively. If voids develop after the fill materials cures, the voids shall be sealed with additional fill material.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

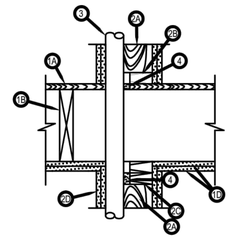
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 27, 2015

System No. F-C-2081

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F and T Ratings of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   B. Wood Joists* — For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists spaced 16 in. (406 mm) OC with nom 1 by 3 in. (25 by 76 mm) lumber bridging and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
2. Chase Wall — (Optional) - The 1 or 2 hr fire-rated single wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   D. Gypsum Board — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through-Penetrants — One nom 1 in. (25 mm) diam crosslinked polyethylene (PEX) SDR 9 tube for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Diam of opening through flooring system and through sole and top plates of chase wall to be max 1-1/2 in. (38 mm). Pipe to be rigidly supported on both sides of floor-ceiling assembly.
4. Fill, Void or Cavity Material* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate and a min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the ceiling or lower top plates.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.

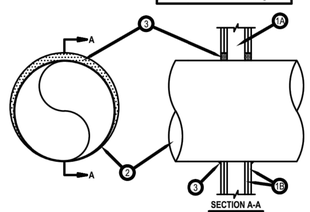
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 20, 2015

System No. W-L-7042

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Items 1 and 3)	F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Rating - 0 Hr	FT Rating - 0 Hr
	FH Ratings - 1 and 2 Hr (See Items 1 and 3)
	FTH Rating - 0 Hr



1. Wall Assembly — The 1 or 2 hr fire rated wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features.
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced 24 in. (610 mm) OC.
   B. Gypsum Board* — For 1 hr assembly, one layer of min 5/8 in. (16 mm) thick wallboard as required in the individual Wall and Partition Design. For 2 hr assembly, two layers of min 5/8 in. (16 mm) thick wallboard as required in the individual Wall and Partition Design. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls and 21-3/4 in. (552 mm) for steel stud walls.
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrant — Galv steel duct to be installed concentrically or eccentrically within the firestop system. The annular space between the duct and periphery of opening shall be 0 in. (0 mm, point contact) and max 1-1/2 in. (64 mm) Duct to be rigidly supported on both sides of wall assembly.
   A. Spiral Wound HVAC Duct — Nom 20 in. (502 mm) diam (or smaller) No. 24 MSG (or heavier) galv steel spiral wound duct.
   B. Sheet Metal Duct — Nom 12 in. (305 mm) diam (or smaller) No. 28 MSG (or heavier) galv sheet steel duct.
3. Fill, Void or Cavity Material*—Sealant — Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 or 2 hr rated walls, respectively. At the point contact location between duct and wallboard, a min 1/2 in. (13 mm) diam bead of sealant shall be applied at the wallboard/duct interface on both surfaces of wall assembly.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S Elastomeric Firestop Sealant, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP606 Flexible Firestop Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

1 P7.06 UL PIPING DETAILS
SCALE: DETAIL

YBA architects
123 NW 2ND AVE SUITE 204 - PORTLAND, OR 97209
T: 971.888.5107 - E-MAIL: INFO@YB-A.COM

MFIA Consulting Engineers
2007 S.E. Ash St.
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CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
MARK R. DENYER
54,607
OREGON
JULY 11, 2008
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

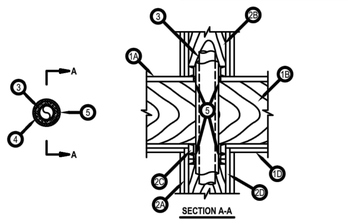
DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P706

System No. F-C-5004

Classified by Underwriters Laboratories, Inc to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 1 and 1-3/4 Hr (See Item 1)	FT Rating — 1 and 1-3/4 Hr (See Item 1)
L Rating At Ambient — 4 CFM/Sq Ft (See Item 4)	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — Less Than 1 CFM/Sq Ft (See Item 4)	FTH Rating — 1 and 1-3/4 Hr (See Item 1)
	L Rating At Ambient — 4 CFM/Sq Ft (See Item 4)
	L Rating At 400 F — Less Than 1 CFM/Sq Ft (See Item 4)



SECTION A-A

1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly. The T Rating is 1 and 1-3/4 hr for 1 and 2 hr rated assemblies, respectively. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/2 in. (89 mm).
   B. Wood Joists* — Nom 10 in (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/2 in. (89 mm).
2. Chase Wall — (Optional) - The through penetrant (Item 3) may be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 3-1/2 in. (89 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 3-1/2 in. (89 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Wall and Partition Design.
3. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   C. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
4. Pipe Covering* — Nom 1/2 in. (13 mm) thick hollow cylindrical heavy density (min 3.5 pcf (56 kg/m3)) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing tap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. A nom annular space of 1/8 in. (3 mm) is required within the firestop system. See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   4A. Tube Insulation — Plastics+ — Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. An annular space of min 1/8 in. (3 mm) to max 3/8 in. (10 mm) is required within the firestop system. See Plastics+ (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used. (Note: L Ratings apply only when glass fiber insulation is used).
5. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material also applied within the annulus, flush with bottom surface of ceiling or lower top plate. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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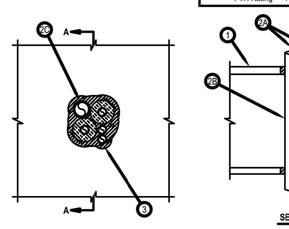
System No. F-C-8026

Classified by Underwriters Laboratories, Inc to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A-A

System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (122 cm) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board secured to wood joists or furring channels as specified in the individual Floor-Ceiling Design.

1A. Chase Wall — (Optional, Not Shown) - The through penetrants (Item 2) may be routed through a 1 hr fire rated single, double or staggered wood stud/gypsum board chase wall. Depth of chase wall stud cavity to be min 1/2 in. (13 mm) greater than diameter of opening cut in sole and top plates to accommodate the through penetrant (Item 2). The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in., (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm), two nom 2 by 6 in., (51 by 102 mm) or two sets of parallel 2 by 4 in., (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Wall and Partition Design.
2. Through Penetrants — One or more pipes, conduits, tubing and cables to be installed concentrically or eccentrically within the opening. The space between any penetrant, except nonmetallic pipes and uninsulated metallic pipes to be min 0 in. (point contact) to max 1 in. (25 mm). The space between any penetrants and the periphery of the opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Pipes, conduits, tubing and cables to be rigidly supported on both sides of floor-ceiling assembly.
   A. Metallic Penetrants — One or more metallic pipes, conduits or tubing to be installed within the firestop system. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A1. Steel Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   A2. Conduit — Nom 3/4 in. (19 mm) diam (or smaller) steel electrical metallic tubing (EMT) or 3/4 in. (19 mm) diam galv steel conduit.
   A3. Copper Tube — Nom 3/4 in. (19 mm) diam (or smaller) Type L (or heavier) copper tube.
   A4. Copper Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Regular (or heavier) copper pipe.
   B. Tube Insulation - Plastics+ — Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. Tube insulation to be installed on one or more of the metallic pipes or tubes (Item 2A). See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   C. Nonmetallic Through Penetrants — One nonmetallic pipe to be installed within the firestop system. Pipe shall be spaced a min 1-1/2 in. (38 mm) from non-uninsulated metallic through penetrants. The following types and sizes of metallic pipes may be used:
   C1. Polyvinyl Chloride (PVC) Pipe — Nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   C2. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 1-1/4 in. (32 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   D. Cables — Max of two 4 pair No. 18 AWG (or smaller) cable with PVC insulation and jacket materials.
3. Fill, Void or Cavity Materials* - Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annulus flush with the top surface of the floor or sole plate and min 5/8 in. (16 mm) thickness of sealant applied within the annulus flush with the bottom surface of gypsum board or top plate. A min ¼ in. (6 mm) diameter bead of sealant applied at the bundle/subflooring or sole plate interface and the bundle/gypsum board or top plate interface at point contact locations.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE_MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+Bearing the UL Recognized Component Mark

Hilti Firestop Systems

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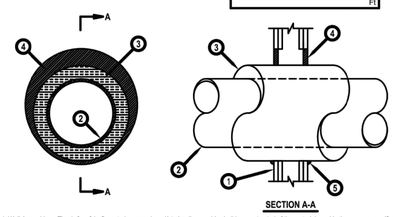
System No. W-L-5029

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)	F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft	FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4)
L Rating At 400 F — Less Than 1 CFM/Sq Ft	FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
	L Rating At Ambient — 4 CFM/Sq Ft
	L Rating At 400 F — Less Than 1 CFM/Sq Ft



SECTION A-A

1. Wall Assembly — The 1, 2 or 3 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH rating and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in. (473 mm).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper tube shall not exceed 4 in. (102 mm).
   D. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
3. Pipe Covering* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   The hourly T, FT, FTH Ratings of the firestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FTH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FTH Ratings when copper penetrants are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm).
   3A. Pipe Covering* — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in Item 3 above.
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Material* — Sealant — For 1 and 2 hr F and FH Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 3 hr F and FH Rating, min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

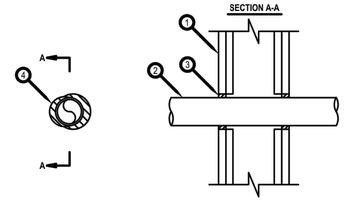
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. March 19, 2015

System No. W-L-2474

Classified by Underwriters Laboratories, Inc. to UL 1479

F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr
L Rating At Ambient - Less Than 1 CFM/Sq Ft
L Rating At 400 F - 4 CFM/Sq Ft



SECTION A-A

1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Diam of opening shall be 1 in. (25 mm) larger than the nom pipe diam.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and the periphery of the opening shall be min 0 in. (point contact) to a max 1/2 in. (13 mm). The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) cellular or solid core Schedule 40 (or heavier) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Crosslinked Polyethylene (PEX) Tubing — Nom 2 in. (51 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.
   D. Rigid Nonmetallic Conduit (RNC)+ — Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).
3. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location, a min 5/8 in. (16 mm) diam bead of fill material shall be applied to the wall/penetrant interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+ Bearing the UL Listing Mark

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 26, 2015

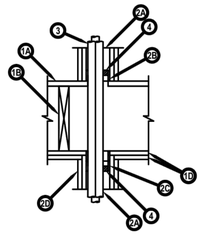
Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   - ** Minimum and maximum Width of Joints*
   - ** Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   - ** 2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   - ** NFPA 101 Life Safety Code*
   - ** All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   - ** ATTENTION: Fire Rated Assembly*
   - ** UL System #*
   - ** Product(s) used*
   - ** Hourly Rating (F-Rating)*
   - ** Installation Date*

System No. F-C-2310

Classified by Underwriters Laboratories, Inc. to UL 1479

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/2 Hr (See Item 1)



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The T Rating of the firestop system is 1 hr for 1 hr rated floor-ceiling and wall assemblies and 1-1/2 hr for 2 hr rated floor-ceiling and wall assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Forming Material — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3 in. (76 mm).
   B. Wood Joists* — For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists spaced 16 in. OC with nom 1 by 3 in. (25 by 76 mm) lumber bridging and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm).
2. Chase Wall — (Optional) - The 1 or 2 hr fire-rated single wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U200 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates.
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening is 3 in. (76 mm).
   D. Gypsum Board — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through-Penetrants — Nom 1 in. (25 mm) diam (or smaller) SDR 9 (or heavier) cross-linked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. A max of three tubes may be installed in the opening. The annular space between the tubing and the periphery of the opening shall be a min of 3/16 in. (5 mm) to a max of 1 in. (25 mm). The space between the tubes shall be a min of 0 in. (point contact) to a max of 1/4 in. (6 mm). Tubing to be rigidly supported on both sides of the floor-ceiling assembly.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate and a min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the lower top plate. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the ceiling or lower top plate. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

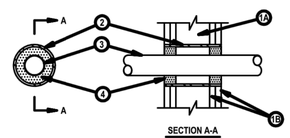
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. W-L-2075

Classified by Underwriters Laboratories, Inc. to UL 1479

F Ratings - 1 & 2 Hr (See Item 4)
T Ratings - 0 and 2 Hr (see Item 4)
L Rating At Ambient - Less Than 1 CFM/Sq Ft
L Rating At 400 F - 4 CFM/Sq Ft



SECTION A-A

1. Floor or Wall Assembly — The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum wallboard, as specified in the individual Wall and Partition Design. Max diam of opening is 4 in. (102 mm).
2. Metallic Sleeve — (Optional) — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or thinner) steel pipe cast into wall assembly with joint compound and installed flush with wall surfaces.
3. Electrical Nonmetallic Tubing+ — Nom 2 in. (51 mm) diam (or smaller) corrugated wall electrical nonmetallic tubing (ENT) constructed of polyvinyl chloride (PVC). Tubing to be rigidly supported on both sides of wall assembly. A nom annular space of 3/4 in. (19 mm) is required within the firestop system.
   See Electrical Nonmetallic Tubing (FKHU) category in the Electrical Construction Materials Directory for names of manufacturers.
4. Fill, Void or Cavity Material* — Sealant — Installed symmetrically on both sides of the wall. The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. Fill material applied within the annulus, flush with each end of the steel sleeve at the thickness shown in the table below:

F Rating Hr	T Rating Hr	Fill Mtl Depth In. (mm)
1	0	5/8 (16)
2	2	1-1/4 (32)

   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+Bearing the UL Listing Mark

*Bearing the UL Classification Marking

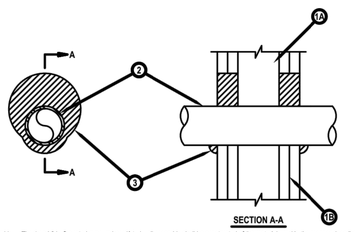
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 28, 2015

System No. W-L-2377

Classified by Underwriters Laboratories, Inc. to UL 1479

F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Ratings - 1 and 2 Hr (See Items 1 and 3)
L - Rating at Ambient - Less that 1 CFM/Sq Ft
L - Rating at 400°F - 4 CFM/Sq Ft



SECTION A-A

1. Wall Assembly — The 1 and 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 3 in. (76 mm).
   The hourly F and T Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrant — One nonmetallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min of 0 in. (point contact) to a max 1-1/4 in. (32 mm). Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) FLOWGUARD GOLD® SDR11 CPVC pipe for use in closed (process or supply) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) BLAZEMASTER® SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
3. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall for 1 and 2 hr rated assemblies, respectively. At point contact location, a min 1/2 in. (13 mm) diam bead of fill material shall be applied to the wall/penetrant interface on both surfaces of the wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

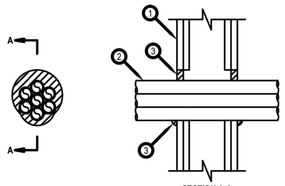
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 28, 2015

System No. W-L-2467

Classified by Underwriters Laboratories, Inc. to UL 1479

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



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 5 in. (127 mm).
   The hourly F Ratings of the firestop system isequal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrant — One max 4 in. (102 mm) diam tight bundle of tubes located eccentrically or concentrically within opening. The annular space between bundle of tubes and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Tubing to be rigidly supported on both sides of wall assembly. The following types of tubing may be used:
   A. Crosslinked Polyethylene (PEX) Tubing — Nom 1 in. (25 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with each surface of wall. Min 1/2 in. (13 mm) diam bead of caulk applied to the tubing/gypsum interface at the point contact location on both sides of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 22, 2015

1 P7.07 UL PIPING DETAILS
SCALE: DETAIL

YBA architects
123 NW 2ND AVE SUITE 204 - PORTLAND, OR 97209
T: 971.888.5107 - E-MAIL: INFO@YB-A.COM

MFIA Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
INC. WWW.MFIA-ENG.COM
CONTACT: Mark Denyer

STAMP
9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2008
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

TRUE NORTH PLAN NORTH

MERX
NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

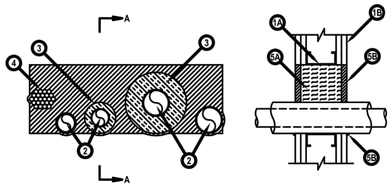
DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P707

System No. W-L-8065

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating —0 Hr	FT Rating — 0 Hr
	FH Rating — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



SECTION A-A

System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or channel shaped steel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be installed in stud cavity containing through-penetrating item to form a rectangular box around the penetrants.
   B. Gypsum Board* — 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Wall and Partition Design. If the through penetrants are installed in a wood stud/gypsum board assembly, the max area of opening is 116 in.2 (748 cm2), with max dimension of 14-1/2 in. (368 mm). If the through penetrants are installed in a steel stud/gypsum board assembly, max area of opening is 182 in2. (1174 cm2) with max dimension of 22-3/4 in. (578 mm) wide.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrant — One or more pipes, conduit or tubes to be installed within the opening. The total number of through-penetrants is dependent on the size of the opening and the types and sizes of the penetrants. Any combination of the penetrants described below may be used provided that the following parameters relative to the annular spaces and the spacing between the through penetrants are maintained. The separation between the penetrants shall be min 1 in. (25 mm) to max 22 in. (560 mm). The annular space between penetrants and the periphery of opening shall be min 0 in. (0 mm, point contact) to max 22 in. (560 mm). Pipes, conduit or tubes to be rigidly supported on both sides of wall assembly. The following types and sizes of pipes, conduit or tubes may be used.
   A. Copper Tubing — Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   B. Copper Pipe — Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   D. Iron Pipe — Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   E. Conduit — Nom 3 in. (76 mm) diam (or smaller) electric metallic tubing (EMT) or rigid steel conduit.
   F. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems.
   G. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   H. Rigid Nonmetallic Conduit (RNC)+ — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Articles 347 and 710 of the National Electrical Code (NFPA No. 70).
   I. Cross Linked Polyethylene Tubing — Nom 1 in. (25 mm) diam (or smaller) cross-linked polyethylene tubing for use in closed (process or supply) piping systems.
3. Pipe Insulation — One or more metallic penetrants (pipe or tubing) may be insulated with the following types of pipe coverings:
   A. Pipe Covering* — Min 1 in. (25 mm) to max 2 in. (51 mm) thick hollow cylindrical heavy density min 3.5 pcf (56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
   See Pipe and Equipment Covering - Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. Tube Insulation-Plastic+ — Min 1/2 in. (13 mm) to max 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
   See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   C. Pipe Covering Materials* — Min 1 in. (25 mm) to max 2 in. (51 mm) thick unfaced mineral fiber pipe insulation having a nom density of 3.5 pcf (56 kg/m³) or heavier and sized to fit the outside diam of pipe or tube. Pipe insulation secured with min 18 SWG steel wire spaced 12 in. (305 mm) OC.
   IIG MINWOOL L L C — High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT and High Temperature Pipe Insulation Thermaloc
   C1. Sheathing Material — (Not shown) — Optional, used in conjunction with Item 3C. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe covering material (Item 3B) with the kraft side exposed. Longitudinal joints sealed with metal fasteners.
   See Sheathing Materials (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread value of 25 or less and a Smoke Developed value of 50 or less may be used.
   The annular space between the insulated penetrants and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 5 in. (127 mm). The separation between the insulated penetrants and the other penetrants shall be a min 1 in. (25 mm) to max 22 in. (560 mm).
4. Cables — One max 3 in. (76 mm) diam bundle of cables installed within the opening and rigidly supported on both surfaces of wall. The annular space between the tightly-bundled cables and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 5 in. (127 mm). The separation between the cable bundle and the other penetrants shall be min 1 in. (25 mm) to max 22 in. (560 mm). Any combination of the following types and sizes of cables may be used:
   A. Max 25 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) insulation and jacket.
   B. Max 7/C No. 12 AWG copper conductor power and control cable with PVC or cross-linked polyethylene (XLPE) insulation and PVC jacket.
   C. Multiple fiber optical communication cable jacketed with PVC and having a max outside diam of 1/2 in. (13 mm).
   D. Max 3/C No. 8 AWG with bare aluminum ground, PVC insulated steel Metal-Clad+ Cable currently Classified under the Through Penetrating Product* (XHLY) category.
   E. Max 3/C (with ground) No. 12 AWG (or smaller) nonmetallic sheathed (Romex) cable with PVC insulation and jacket materials.
   F. RG/U coaxial cable with polyethylene (PE) insulation and polyvinyl chloride (PVC) jacket having a max outside diam of 1/2 in. (13 mm).
5. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — In 2 hr fire rated wall assemblies, min 4-3/4 in. (121 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. In 1 hr fire rated wall assemblies, min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material recessed from both surfaces of the wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrants and gypsum board, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the gypsum board/through penetrant interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+ Bearing the UL Listing Mark

Bearing the UL Recognized Component Mark

Hilti Firestop Systems

1 / P7.08 UL PIPING DETAILS
SCALE: DETAIL

Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

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9-24-20
REGISTERED PROFESSIONAL ENGINEER
54,607
OREGON
JULY 11, 2006
MARK R. DENYER
EXPIRES: 31DEC21

REVISION NO.		DATE
1	PLANCHECK #1	08.28.20
2	PLANCHECK #2	01.11.21
4	RFI	
6	IFC	04.01.22

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PLAN NORTH

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NW 19th & Pettygrove

DD Pettygrove, LLC
1339 NW 19th Ave, Portland, OR 97209

ISSUANCE
95% CD / ISSUE FOR CONSTRUCTION SET

PROJECT NUMBER
170290

DATE
04.01.2022

FULL SHEET SIZE
30 X 42

DRAWING TITLE
PLUMBING UL FIRE DETAILS

SHEET NUMBER
P708