



Alamance Consulting Engineers

961-F Burlington Ave.
Gibsonville, N.C. 27249
Phone: (336) 449-4558
www.ace-nc.net
N.C. Firm License Number C-2071

BENFIELD APARTMENTS

111 E. Main St.
Gibsonville, NC 27249

DRAWING NAME
PENETRATION DETAILS



DRAWN
HLD
CHECKED
JNK
DATE
11/29/23
SCALE
AS NOTED
JOB NO.
23052
SHEET

P-3

System No. F-C-2030

ANSI/UL1479 (ASTM E814)
F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 0, 3/4, 1, 1-1/2 Hr (See Item 3)

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 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 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 1 in. (25 mm) larger than the nom diam of through-penetrant (Item 3).

B. **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. Diam of opening shall be 1 in. (25 mm) larger than the nom diam of through-penetrant (Item 3).

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.

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 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 larger) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 1 in. (25 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 6 in. (51 by 152 mm) (or larger) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 1 in. (25 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 1-1/2 in. (38 mm), 2 in. (51 mm), 3 in. (76 mm) or 4 in. (102 mm) diam nonmetallic pipe to be installed within the firestop system. Diam of opening through flooring system and through sole and top plates of chase wall to be max 2-1/8 in. (54 mm), 2-5/8 in. (67 mm), 4 in. (102 mm) or 5 in. (127 mm) for nom 1-1/2 in. (38 mm), 2 in. (51 mm), 3 in. (76 mm) or 4 in. (102 mm) diam nonmetallic pipe sizes, respectively. Pipe to be rigidly supported on both sides of the floor-ceiling assembly. The T Rating is dependent on the size of the through-penetrant. For 2 hr rated assemblies, the T Rating is 2 hr for 1-1/2 in. (38 mm) diam (and smaller) pipes and 1-1/2 hr for pipes greater than 1-1/2 in. (38 mm) diam. For 1 hr rated assemblies, the T Rating is 1 hr for 1-1/2 in. (38 mm) diam (and smaller) pipes, 3/4 hr for 2 in. (51 mm) diam pipes and 0 hr for pipes greater than 2 in. (51 mm) diam. The following types of nonmetallic pipes may be used:

A. **Polyvinyl Chloride (PVC) Pipe** - Schedule 40 solid-core 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** - SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

C. **Acrylonitrile Butadiene Styrene (ABS) Pipe** - 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** - Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

4. Firestop System - The details of the firestop system shall be as follows:

A. **Fill, Void or Cavity Material*** - Sealant - Min 3/4 in. (19 mm) thickness of fill material to be installed within the annular space between the pipe and the flooring (Item 1A) or sole plate. Min 5/8 in. (16 mm) thickness applied within the annular space, flush with the bottom surface of ceiling or lower top plate.

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

B. **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 underside of ceiling or chase wall top plate (Item 2C) using the anchor hooks provided with the collar. (Minimum 2 anchor hooks for 1-1/2 (38 mm) and 2 in. (51 mm) diam pipes and 3 anchor hooks for 3 in. (76 mm) diam pipes). The anchor hooks are to be secured to the ceiling with min 3/16 in. (5 mm) diam steel toggle bolts or to the chase wall top plate with min No. 12 by min 1 in. (25 mm) long steel wood screws in conjunction with steel washers.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC - CP 643 50/1.5"N, CP643 63/2"N, CP 643 90/3"N or CP643 110/4"N Firestop Collar.

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

SEE NOTE 22

SYSTEM NO. F-C-2030
PENETRATION DETAIL
SCALE: N.T.S.

System No. F-C-2310

ANSI/UL1479 (ASTM E814)
F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 0, 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 of 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 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.

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.

SEE NOTE 22

SYSTEM NO. F-C-2310
PENETRATION DETAIL
SCALE: N.T.S.

System No. W-L-2423

ANSI/UL1479 (ASTM E814)
F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 0, 1 and 2 Hr (See Item 2)
L Rating at Ambient - Less than 1 CFM/Opening
L Rating at 400 F - Less than 1 CFM/Opening

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

A. **Studs** - Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC.

B. **Gypsum Board*** - Thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 Series Design in the UL Fire Resistance Directory. Diam of opening to be min 1/2 in. (13 mm) to max 1 in. (25 mm) larger than outside diam of through penetrant.

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

2. Through Penetrants - One nonmetallic pipe to be installed eccentrically or concentrically within the firestop system. The annular space between the pipe and edge of through opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Nonmetallic pipe to be rigidly supported on both sides of the 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) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

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

C. **Cross-linked Polyethylene (PEX) Tubing** - Nom 2 in. (51 mm) diam (or smaller) SDR9 PEX tube for use in closed (process or supply) piping systems.

D. **Rigid Nonmetallic Conduit*** - Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

E. **Electrical Nonmetallic Tubing*** - Nom 2 in. (51 mm) diam (or smaller) PVC tubing installed in accordance with Article 331 of the National Electrical Code (NFPA No. 70). See Electrical Nonmetallic Tubing (FNHT) category in the Electrical Construction Materials Directory for names of manufacturers.

For closed piping systems, the hourly T Rating of the firestop system is equal to the hourly assembly rating of the wall assembly in which it is installed. For vented piping systems, the hourly T Rating of the firestop system is 0 Hr.

3. Fill, Void or Cavity Material* - Caulk - For 2 hr F Rating, min 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with both surfaces of the wall. For 1 hr F Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of the wall. A min 1/4 in. (6 mm) diam bead of caulk shall be applied at the pipe/gypsum board interface at the point contact location on both sides of the wall.

SPECIFIED TECHNOLOGIES INC - Type WF300 Caulk

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

SEE NOTE 22

SYSTEM NO. W-L-2423
PENETRATION DETAIL
SCALE: N.T.S.