

System No. F-C-2142
F Rating — 1 Hr
T Rating — 0 Hr

1. Floor-Ceiling Assembly — The fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction details 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. **Wood Joists** — 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. As an alternate to lumber 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 with ends firestopped.
C. **Furring Channels** — (Not shown) — Resilient galv steel furring installed perpendicular to wood joists (Item 1B) between wallboard (Item 1D) and wood joists as required in the individual Floor-Ceiling Design.
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. Diam of opening shall be 1 in. (25 mm) larger than the nom diam of through-penetrant (Item 3).
2. Chase Wall (Optional) - The through penetrant (Item 3) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall 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 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 4 in. (51 by 102 mm) lumber plates. 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.

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3. **Through — Penetrants** — One nonmetallic pipe to be installed either eccentrically or concentrically within the firestop system. The annular space between the through penetrant and the periphery of the opening shall be a min 0 in. (point contact) to a max of 5/8 in. (16 mm). Pipe to be rigidly supported on both sides of the floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:
A. **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.
B. **Acrylonitrile Butadiene Styrene (ABS) Pipe** — Nom 2 in. (51 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 systems.
C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** — Nom 2 in. (51 mm) diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
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 applied within the annulus, flush with and 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.

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System No. F-C-2203
F Rating — 1 Hr
T 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 floor opening is 4 in. (102 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 4 ft (1.2 m) wide as specified in the individual Floor-Ceiling Design.
2. Closet Flange — Acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) closet slab sized to accommodate drain piping. 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 (or 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 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.
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5. Water Closet (Not Shown) — Floor mounted vitreous china water closet.
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System No. F-C-2204
F Rating - 1 Hr
T Rating - 1/2 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 floor opening is 4 in. (102 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 (1.2 m) 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. (25 mm).
3. Fill Void or Cavity Material* — Min 5/8 in. (16 mm) depth of fill material applied within the annulus, flush with both surfaces of plywood or gypsum board patch.
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System No. F-C-2310
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 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 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. Max diam of opening is 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 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.

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System No. F-C-2310

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 1/4 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 ceiling or 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.
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System No. F-C-2389
F Rating — 1 Hr
T Ratings — 0, 3/4 and 1 Hr (See Item 3)

1. Floor-Ceiling Assembly — The fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction details 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 4 in. (102 mm).
B. **Wood Joists** — 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. As an alternate to lumber 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 with ends firestopped.
C. **Furring Channels** — (Not shown) — Resilient galv steel furring installed perpendicular to wood joists (Item 1B) between wallboard (Item 1D) and wood joists as required in the individual Floor-Ceiling Design.
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.

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2. Chase Wall — The through penetrant (Item No. 3) shall be routed through a single, double or staggered wood stud/gypsum board chase wall and shall include the following construction features:
A. **Studs** — Nom 2 by 4 in. (51 by 102 mm) or nom 2 by 6 in. (51 by 152 mm) lumber studs.
B. **Sole Plate** — Nom 2 by 4 in. (51 by 102 mm) or 2 by 6 in. (51 by 152 mm) lumber plates. Max diam of opening is 4 in. (102 mm) when nom 3 in. (76 mm) diam penetrants are used. Max diam of opening is 3 in. (76 mm) when nom 2 in. (51 mm) or smaller diam penetrants are used.
C. **Top Plate** — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) or 2 by 6 in. (51 by 152 mm) lumber plates. Max diam of opening is 4 in. (102 mm) when nom 3 in. (76 mm) diam penetrants are used. Max diam of opening is 3 in. (76 mm) when nom 2 in. (51 mm) penetrants are used.
D. **Gypsum Board** — Min 1/2 in. (13 mm) rated or non-rated gypsum board.
E. **Steel Straps** — (Not shown) — Steel straps to be used when top and sole plates are discontinuous and shall meet the structural requirements of the wall. Min 1-1/2 in. (38 mm) wide by 20 gauge (or heavier) galvanized steel straps used to bridge opening on both sides of wall at sole plate when sole plate is discontinuous at opening in plywood floor. Steel straps to be cut to overlap a min of 2 in. (51 mm) onto sole plate on each side of opening and secured to sole plate with a min of two nails or screws on each side of opening on both sides of wall. Min 3 in. (76 mm) wide by 20 gauge (or heavier) galvanized steel straps used to bridge opening on both sides of wall at double top plate when top plate is discontinuous at opening. Steel straps to be cut to overlap a min of 2 in. (51 mm) onto top plate on each side of opening and secured to top plates with a min of two nails or screws on each side of opening on both sides of wall.
3. Through — Penetrants — One nonmetallic pipe to be installed either eccentrically or concentrically within the firestop system. The annular space between the through penetrant and the periphery of the opening shall be a min 0 in. (point contact) to a max of 5/8 in. (16 mm) Pipe to be rigidly supported on both sides of the floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:
A. **Polyvinyl Chloride (PVC) Pipe** — Nom 3 in. (76 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 3 in. (76 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
C. **Acrylonitrile Butadiene Styrene (ABS) Pipe** — Nom 3 in. (76 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.
D. **Electrical Nonmetallic Tubing (ENT+)** — Nom 2 in. (51 mm) diam (or smaller) corrugated-wall electrical nonmetallic tubing (ENT) constructed of polyvinyl chloride (PVC) and installed in accordance with the National Electrical Code (NFPA No. 70). See Electrical Nonmetallic Tubing (ENT) category in the Electrical Construction Materials Directory for names of manufacturers. When FS-ONE MAX Sealant is used, the T Rating is 0 hr. When FS-ONE Sealant is used, the T Ratings are 3/4 hour for PVC and CPVC pipe and 1 hour for ABS pipe and ENT.
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 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate. At point contact location, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at bottom surface of lower top plate. In addition, at top of floor, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the point contact location at top of sole plate or sole floor.
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