Construction Code Interpretation 2018-SBC

CCI 2018-SBC §714.5
Membrane Penetrations of Horizontal Assemblies

Release Date: Apr 19, 2023

The following interpretation is intended to provide guidance to staff for consistency of review and is subject to change without notice. Application of this interpretation to specific projects may vary.

Code Issue: Under the Seattle Building Code penetrations of horizontal fire-resistance-rated floor/ceiling or roof/ceiling assemblies, not requiring shaft enclosure by Section 712.1 (Vertical Openings), need the protection required in Sections 714.5.1 through 714.5.4. These sections identify how to protect horizontal membranes penetrated by steel, ferrous or copper conduits, pipes, tubes, vents, electrical boxes, fire sprinklers or something similar. **However, the code is not clear about how to protect membrane penetrations by recessed lighting, ceiling exhaust fans or diffusers, and associated duct work.**

Code Interpretation: The details shown in Tables I and 2 below are prescriptive solutions to satisfy the requirements of Section 714.5.2 for 1-hour horizontal assemblies. A similar approach may be used for membrane penetrations of 2-hour assemblies, but will require an approved Code Alternate Request.

Table 1- Protection for membrane penetration (less than 100 square inches)

Use this table when **aggregate area of penetrations** is: 100 square inches or less **and** 100 square inches or less in any 100 square feet.

The specified materials provide draftstopping.

Opening Type	Framing Type: Solid Sawn	Framing Type: Plywood Web joists	Framing Type: Metal Plate Connected Wood Trusses
Recessed Light[b]	**Floor joists:** *Select method # 1 or #2 below:* **1. Box the light**. Protect four sides and top with (choose one)**:** ○ 3½ inch fiberglass ○ 1½ inch high-density mineral fiber insulation. **2. Solid block** each side of light with (choose one): ○ 2-inch framing ○ 5/8-inch gypsum wallboard **Dropped soffits:** Pre-rock bottom of floor joists above with 5/8-inch gypsum wallboard. **Note: See Figure A.**	**Box the light**. Protect four sides and top with (choose one)**:** ○ 3½ inch fiberglass ○ 1½ inch high-density mineral fiber insulation ○ 5/8-inch gypsum wallboard **Dropped soffits:** Pre-rock bottom of floor joists above with (2) layers of 5/8-inch gypsum wallboard. **Note: See Figure C.**	**Box the light.** Protect four sides and top with (choose one)**:** ○ 3½ inch fiberglass ○ 1½ inch high-density mineral fiber insulation ○ 5/8-inch gypsum wallboard **Dropped soffits:** Pre-rock bottom of floor joists above with (2) layers of 5/8-inch gypsum wallboard. **Note: See Figure E.**
HVAC[a,b]	*Select method #1 or #2 below:* **1. Box the fan or diffuser.** Protect four sides and top) *pick one:* ○ 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber. **2. Solid block each side** of fan or diffuser. *Pick one*: ○ with 2-inch framing or ○ 5/8-inch gypsum wallboard, **and** **3. Wrap duct completely** *(choose one)* ○ with 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber insulation ○ line joist cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure B.**	**Box the fan or diffuser.** Protect four sides and top (choose one): ○ 5/8-inch gypsum wallboard ○ 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber**,** **and** **Wrap duct completely** *(choose one)* ○ 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber insulation ○ line joist cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure D**.	**Box the fan or diffuser.** Protect four sides and top (choose one): ○ 5/8-inch gypsum wallboard, ○ 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber, **and** **Wrap duct completely** *(choose one)* ○ with 3-inch (0.75 PCF) fiberglass duct wrap ○ 1 ½ inch high-density mineral fiber insulation ○ line cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure F.**

Table 2- Protection for membrane penetration (more than 100 square inches)

Use this table when **aggregate area of penetrations** is: more than 100 square inches, or the aggregate area of openings exceeds 100 square inches in any 100 square feet.

Note: The specified materials maintain the fire-resistance-rating of the assembly.

Opening Type	Framing Type		
	Solid Sawn	**Plywood Web joists**	**Metal Plate Connected Wood Trusses**
Recessed Light[b,c]	**Floor joists:** *Select method # 1 or #2 below:* **Box the light**. Protect four sides and top. ○ For floor joists, box the light with 5/8 gypsum wall board ○ In dropped soffits, pre-rock bottom of floor joists above with 5/8-inch gypsum wallboard. **Note: See Figure A.**	**Box the light**. Protect four sides and top with 5/8-inch gypsum wallboard. **Note: See Figure C.**	**Box the light.** Protect four sides and top with 5/8-inch gypsum wallboard. **Note: See Figure E.**
HVAC[a,b,c]	*Select method #1 or #2 below:* **Box the fan or diffuser.** ○ Protect four sides and top with 5/8-inch gypsum wallboard, **and** ○ Wrap duct completely with 1 ½ inch high-density duct fire wrap**, or** **Line joist cavity.** Line joist cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure B**	**Box the fan or diffuser.** ○ Protect four sides and top with 5/8-inch gypsum wallboard, **and** ○ Wrap duct completely with 1 ½ inch high-density duct fire wrap**, or** **Line joist cavity.** Line joist cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure D**.	**Box the fan or diffuser.** ○ Protect four sides and top with 5/8-inch gypsum wallboard, **and** ○ Wrap duct completely with 1 ½ inch (6 PCF) high-density duct fire wrap, **or** **Line joist cavity.** Line joist cavity with 5/8-inch fire-taped gypsum wallboard **Note: See Figure F.**

Footnotes

a. Ventilation fan box or diffuser grill and associated metal duct.
b. See additional requirements for recessed light and HVAC penetrations.
c. Opening protection shall match the type, and number of layers of gypsum wallboard as the ceiling.

Additional Considerations for Recessed Light and HVAC Penetrations

Installation, listings, and manufacturer's specifications

1. Install fixtures and equipment according to their listing
2. Install HVAC systems under permit and according to plan (if plans are required).
3. Fixtures protected with insulation are required to be steel and IC rated.

Size of openings

4. Openings for ducts through framing members or blocking are limited to the diameter of the duct plus 2 inches, to a maximum opening diameter of 8 inches. Maximum size and location of openings through engineered wood products must also comply with the product listing.

Blocking and Boxing

5. Where there are penetrations of both the floor and ceiling membranes within the same joist cavity, solid block between the openings with 2-inch framing or 5/8-inch gypsum wallboard.
6. Energy code complying fiberglass insulation may be used to box recessed lights, fans, or diffusers at roof/ceiling penetrations.

Wrapping ducting

7. Where dryer exhausts enter directly into ceilings, completely wrap the duct in the same manner as HVAC penetrations.
8. Ventilation ducts in attics shall be wrapped completely with 1 ½ inch high-density mineral fiber insulation.
9. In buildings equipped with fire sprinkler systems, protect ducts a minimum of 10 feet from the opening.

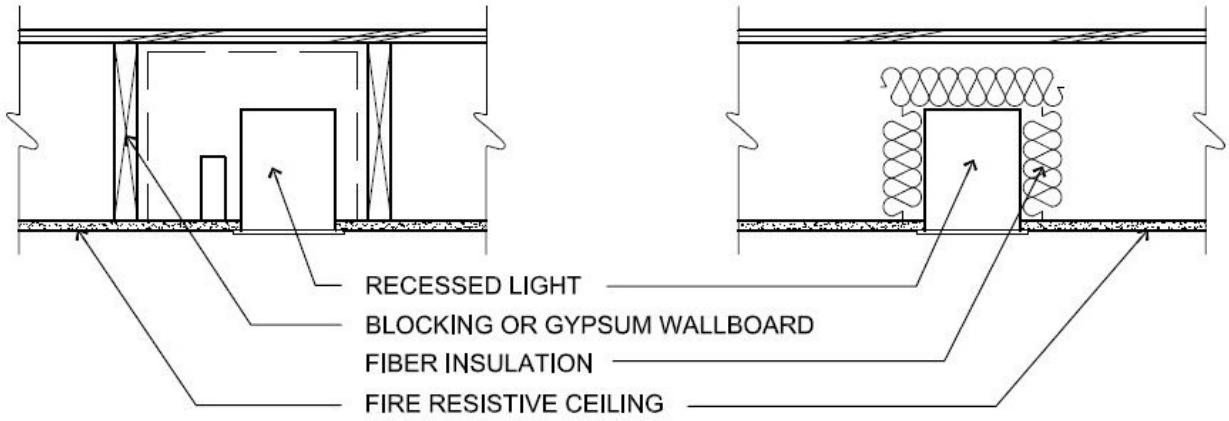
Tight fit

10. Fit duct insulation tight against the framing members or blocking at duct penetrations through framing.
11. Securely fit and fasten all materials in place. No adhesive.

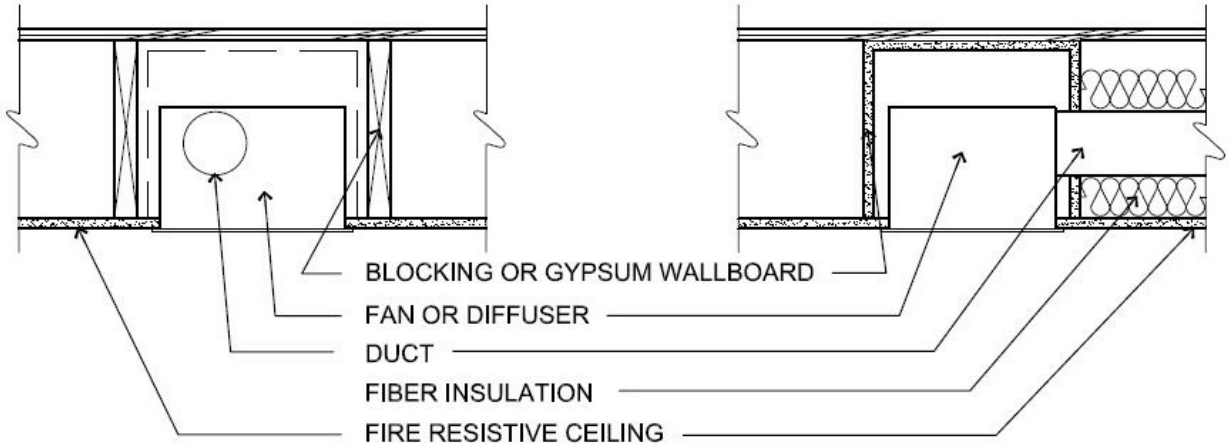
For questions about whether this code interpretation applies to your project:

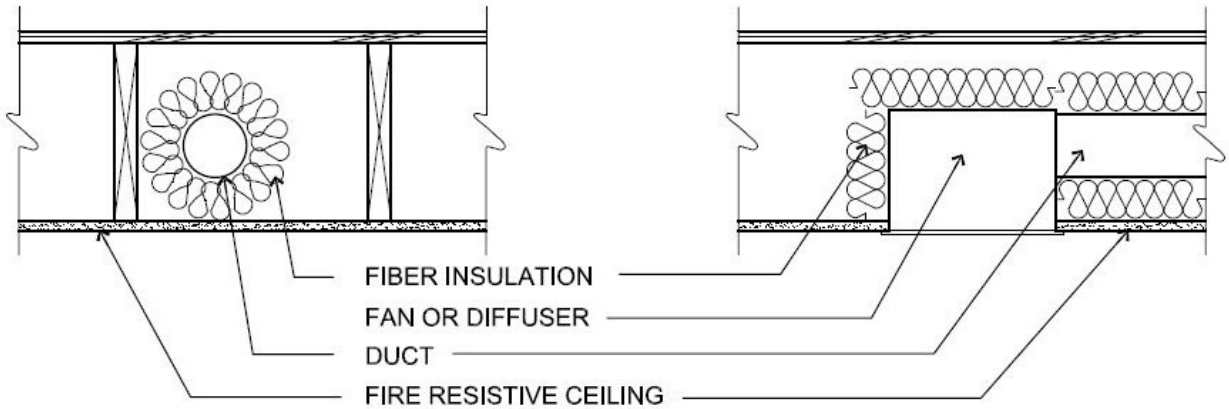
- If you have submitted a permit application, contact the Building Code plan reviewer assigned to your application
- If you have not submitted an application, send us a question through the SDCI website http://www.seattle.gov/sdci/resources/send-us-a-question or in person at the Applicant Services Center. Visit the Applicant Services Center website for more information about hours and location. http://www.seattle.gov/sdci/about-us/who-we-are/applicant-services-center

A. RECESSED LIGHT WITH SOLID SAWN

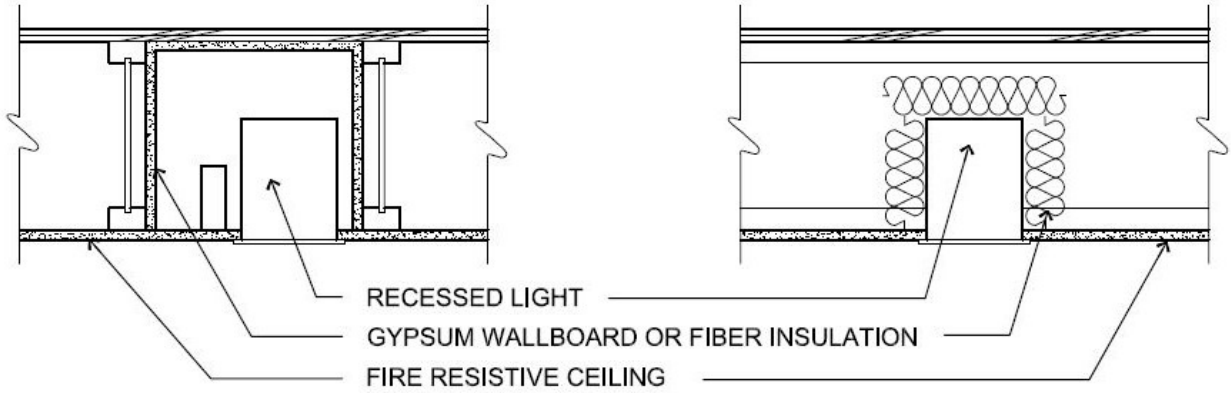


B. HVAC WITH SOLID SAWN

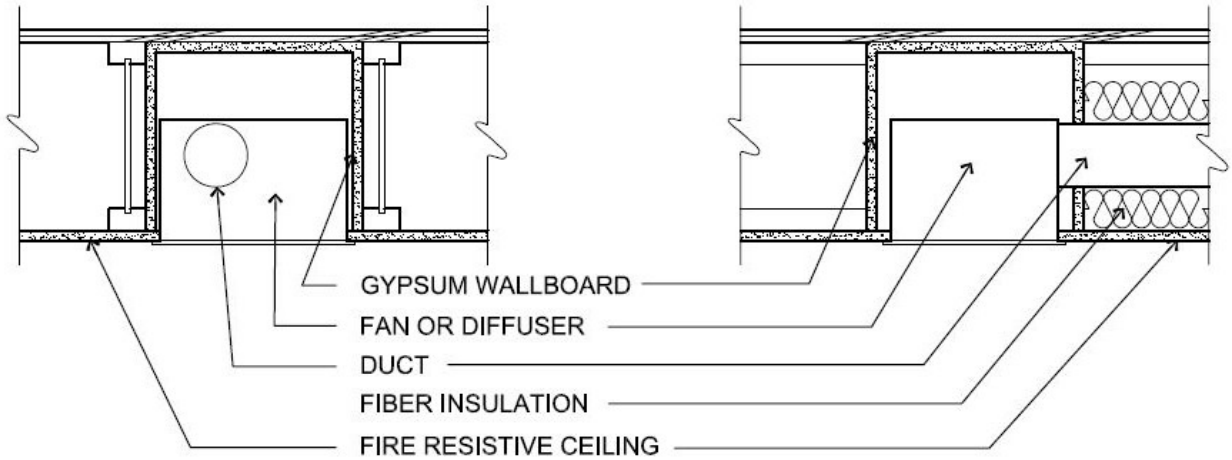


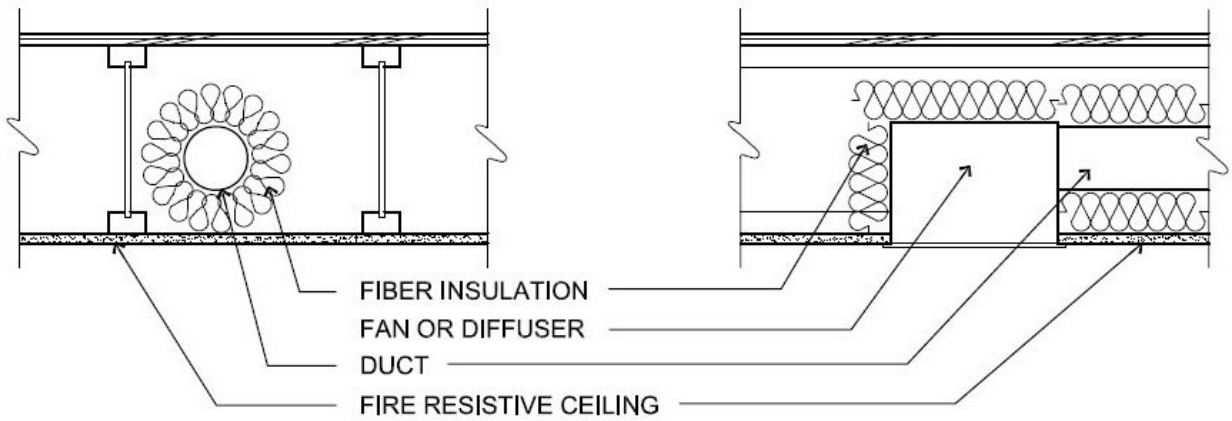


C. RECESSED LIGHT WITH PLYWOOD WEB JOISTS

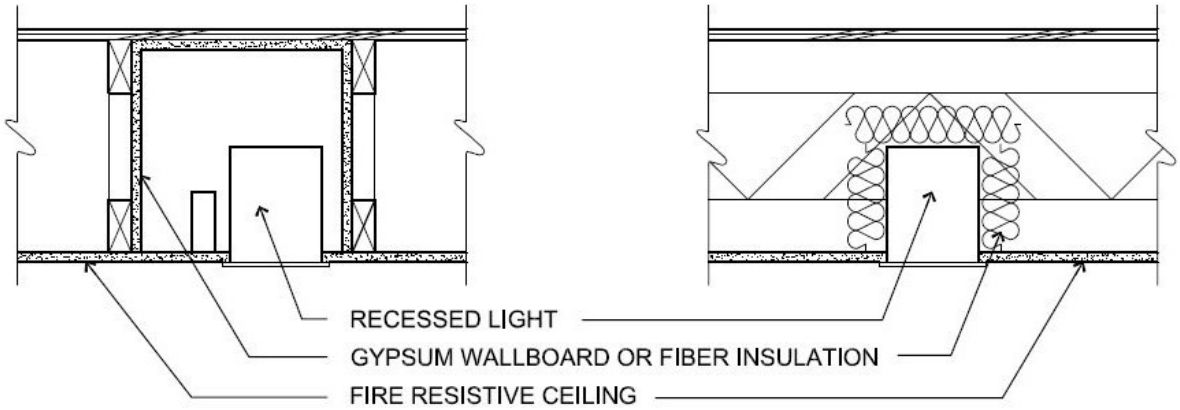


D. HVAC WITH PLYWOOD WEB JOISTS





E. RECESSED LIGHT WITH METAL PLATE CONNECTED TRUSSES



F. HVAC WITH METAL PLATE CONNECTED TRUSSES