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# **Sound Transmission Control for R - occupancies**

### **Purpose:**

To develop a Standard Operating Procedures (SOP) for Sound Transmission Control installations, plan review and inspection

### **Scope:**

The requirements of the International Building Code Chapter 12, Section 1207 is applicable to Group R-1 and R-2 Occupancies and the International Residential Code Appendix Chapter K is applicable to Group R-3 Occupancies that have wall and/or floor ceiling assemblies separating units from each other and/or from public space such as interior corridors. These requirements are applicable to all buildings where permits are applied for on or after July 1, 1975.

### **Definitions:**

- STC (Sound Insulation Class) – A rating based on a standardized test performance, for evaluating the effectiveness of assemblies in isolating airborne sound transmission.
- IIC (Impact Insulation Class) – A whole, positive number rating, based on standardized test performance, for evaluating the effectiveness in isolating impact sound transmission.

### **General:**

- Acceptable sound-rated assemblies shall have a rating by an approved National Recognized Testing Laboratory. The STC and/or IIC rating shall be a minimum of 50 or better. A project may elect to test a completed sound assembly, in a completed unit, at the construction site. The field test shall achieve a minimum STC and/or IIC rating of 45.
- Figures 1 - 2 on DSD – STC - 05 and Figures 1 – 4 on DSD – STC - 06 are examples of wall and floor/ceiling assemblies that are acceptable as listed assemblies when constructed as shown.
- Where a wall joint contacts dissimilar materials the joints shall be caulked with a listed acoustical caulk.
- The carpet shown in Figures 1 – 4 on DSD – STC - 06 shall be 72 oz. or heavier installed over 15 lb. felt or 4 m polyethylene padding. Vinyl floor covering with a minimum 1/8 inch resilient backing may be substituted for carpeting in kitchen, bathroom or laundry room areas.
- Alternate methods of providing the required sound insulation may be accepted by submitting details and specifications with substantiating test data to the building official. See the Tempe Administrative Code, Table 2-A, for the associated fees for reviewing Alternate Materials and Methods of Construction.

### General (continued):

- Where floor-ceiling assemblies require carpet and pad or resilient coverings to meet IIC ratings, the requirements shall be shown on the approved plans and be installed and inspected prior to issuance of the Certificate of Occupancy.
- Where sound-rated assemblies are also required to be of fire-resistive construction, the assemblies shall be designed and constructed to meet both the STC/IIC and fire-resistive requirements.
- Install approved barriers and airtight sealants to avoid possible “flanking”. Completely surface the separating (party) walls from floor to ceiling prior to framing soffits or suspended ceiling perimeter; and before the installation of tubs, shower units or case work against the rated assembly. Avoid mounting the following on or in separating walls: toilets, telephone outlets, TV outlets, electrical panels, medicine cabinets, door chimes, speakers, intercoms, vacuum systems, motorized appliances or ventilating systems.

### Doors:

- Dwelling entrance/exit doors from interior corridors shall be solid and tight fitting to the frame and sill with perimeter seals.
- No door knockers, gongs, mail slots, chutes or through perforations are allowed on dwelling unit entrance/exit doors common to interior corridors.
- Acceptable door seals and thresholds are shown on Figures 1 – 7 on DSD – STC - 03.

### Penetrations:

- Penetrations or openings in wall or floor-ceiling sound assemblies for piping, electrical device boxes, recessed cabinets, panels, or boxes, bathtubs, showers, soffits, or heating, ventilation or exhaust ducts shall be sealed, lined, insulated, or otherwise treated to maintain the required ratings.
- Outlets installed for telephones, television, computer, or similar media shall be installed in an appropriate box. The boxes for such devices shall be installed as required for electrical outlet boxes.
- See Figures 1 - 3 on DSD – STC - 04.

### Electrical outlet boxes:

- In sound rated assemblies, standard electrical outlet boxes (metal or plastic) may be mounted without a resilient pad. See Figures 1 – 3 on DSD – STC - 04. The exterior of a box will not require any additional treatment to limit sound transmission through the box provided:

- Outlet box penetrations shall be limited to a maximum 16 square inches in area, provided the aggregate area of such openings is not more than 100 square inches for any 100 square feet of wall area;
  - Outlet box penetrations shall be sealed at the wall finish material with a resilient caulk;
  - Walls shall be completely insulated with a minimum 1½ inch mineral fiber or 3½ inch glass fiber insulation, unless a greater thickness or specific type of insulation is specified in the listed sound assembly, which shall be installed between the back of the box and the wall;
  - In single stud wall sound assemblies, outlet box penetrations located on opposite surfaces shall not be installed so the boxes are back to back. Boxes installed in the same stud bays shall be offset a minimum of 24 inches vertically. Boxes installed in the same stud bays on the same horizontal plane shall be separated a minimum of 12 inches horizontally;
  - In double or staggered stud wall sound assemblies, outlet box penetrations located on opposite surfaces may be mounted closer than 24 inches vertically; 12 inches horizontally or back to back provided the required insulation is installed between such boxes.
- Outlet boxes installed in sound rated floor-ceiling assemblies are permitted if the boxes are treated as required for wall assemblies.
  - Outlet boxes installed in sound rated walls or floor-ceiling assemblies that are required to be fire-rated and where protection of openings are required shall comply with the Building Code, Section 712 or the listing of the electrical box for such penetrations in addition to the sound transmission requirements.

### **Plumbing piping:**

- Plumbing piping in and fixtures mounted against sound-rated assemblies shall be treated in the following manner:
  - Water lines shall be resiliently supported (isolated from the structure) with penetrations sealed airtight;
  - Drain, waste and vent pipe and fittings shall be resiliently supported with penetrations sealed airtight;
  - Toilets or similar floor mounted fixtures shall be set on a permanent resilient mounting. Toilet waste lines may rigidly attached where they penetrate the floor;
  - Where any waste line penetrates the floor assembly, completely fill the joist space with insulation to a point 12 inches beyond the waste line. When the waste line is contained within a stud space of a rated assembly, extend the insulation fill for the entire stud space where the line is located.
- See Figures 1 – 2 on DSD – STC - 01.

### Heating, ventilating and air conditioning:

- Heating, ventilating and air conditioning ducts within sound-rated assemblies shall be:
  - Resiliently supported with penetrations isolated from the structure;
  - Plant-on registers and diverters shall be caulked;
  - Blowers shall be isolated from plenums and ductwork;
  - Ductwork shall be decoupled from equipment with boots or similar methods;
  - Exhaust fans and ducts may be located in framed assemblies of kitchen or bath ceilings provided the entire joist space in which the fan and duct are located is filled with mineral fiber insulation;
  - Exhaust fans shall be provided with individual exhaust ducts;
  - Structure supported equipment shall be of a resilient type.
- See Figure 1 on DSD – STC - 02.

### Other penetrating boxes, panels or cabinets:

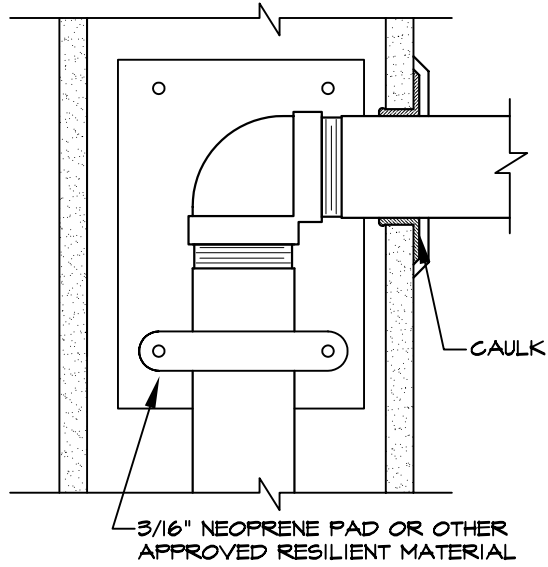
- All elements of the sound assembly shall be installed behind and around any wall box, panel, or cabinet recessed into sound insulated walls.
- See Figure 2 on DSD – STC - 02.

### Bathtubs or shower stalls:

- All elements of the sound assemblies must extend behind and under the tub or shower for the full depth, width and height of the fixture.
- See Figure 3 on DSD – STC - 02.

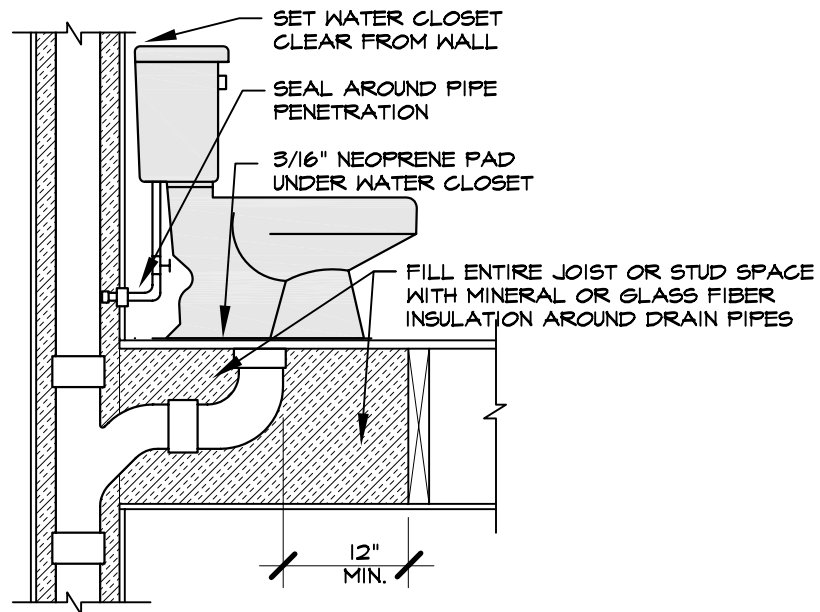
### Masonry walls:

- Since separation walls of unit masonry require a fill to achieve a STC rating of 50 or better, using cavities for pipe or conduit is permissible only when approved loose fill is used and the pipe and conduit is isolated from the masonry by the fill and caulked at penetrations through the unit face.



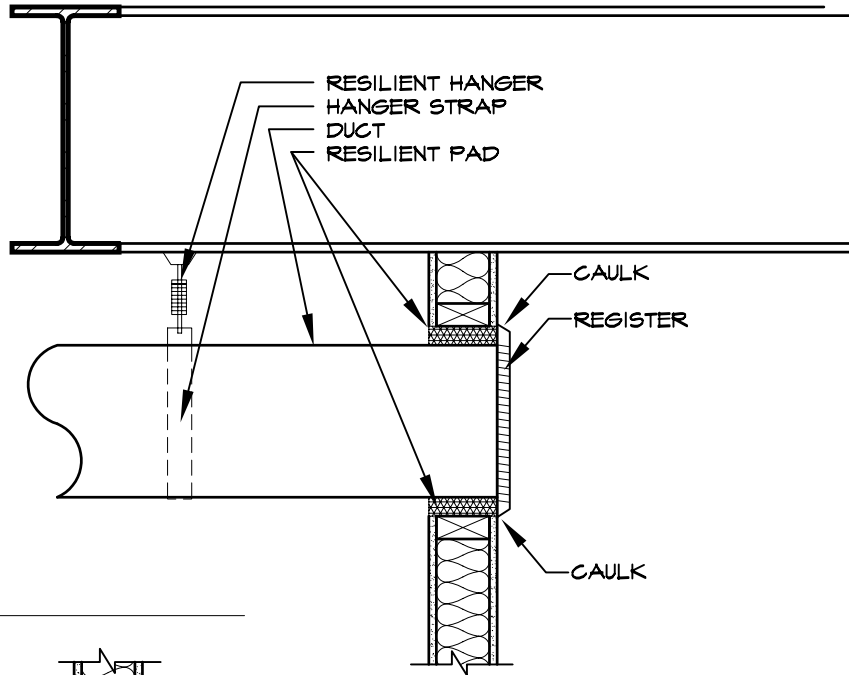
Pipe Support Isolation & Penetration Seal

1

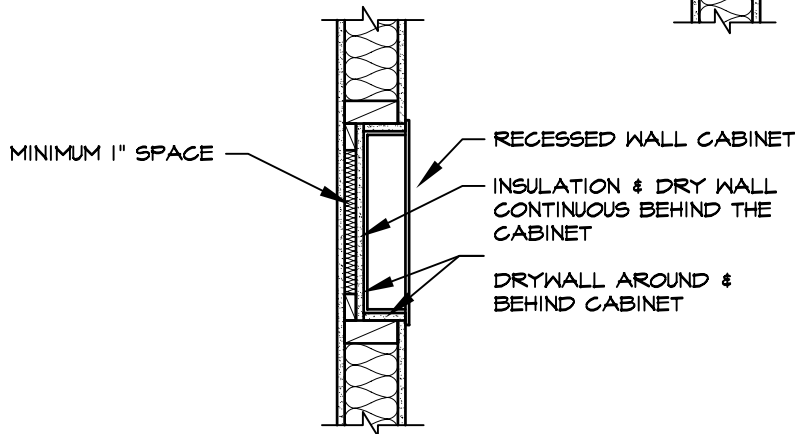


DWV Piping when within Ceiling or Walls of Adjacent Units

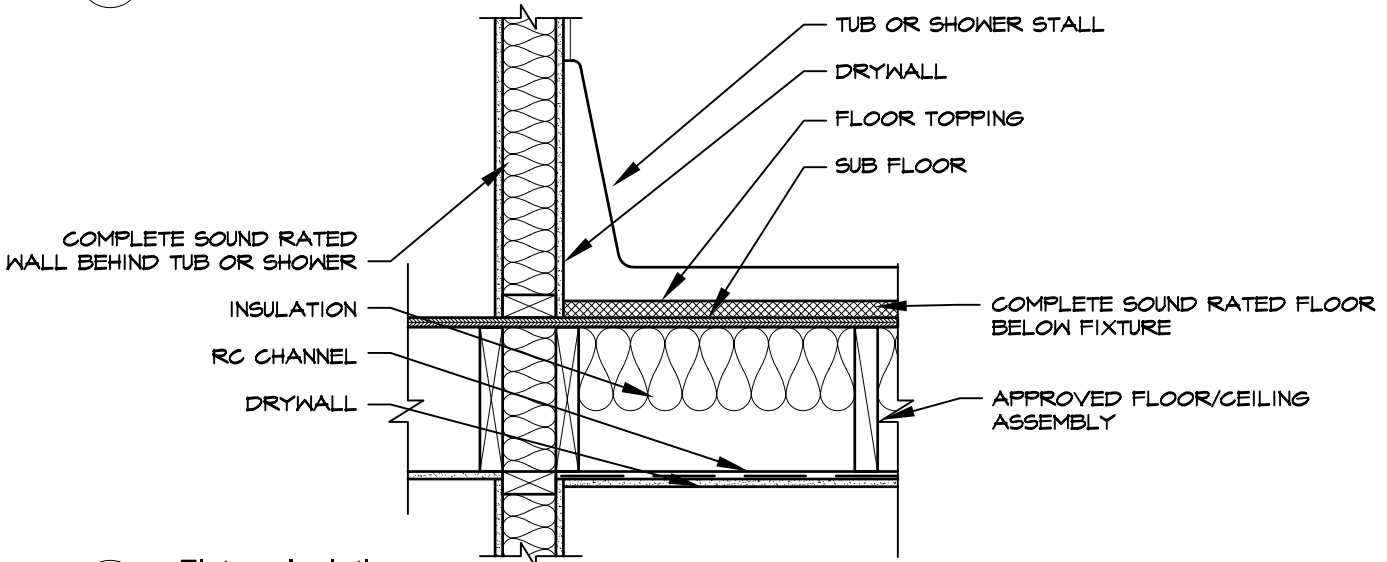
2



1 Duct Penetration



2 Recessed Wall Cabinet



3 Fixture Isolation

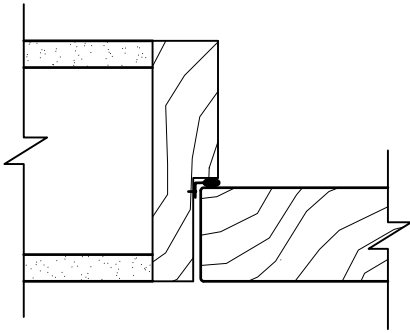
For Reference Only

# Sound Transmission Control

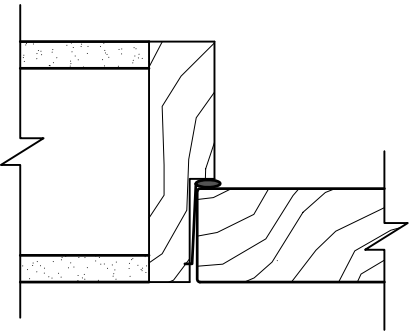
Title  
**Penetrations 2**

Sheet No.  
**DSD - STC - 02**

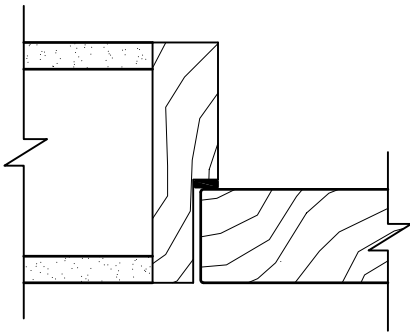
## Typical Perimeter Seals



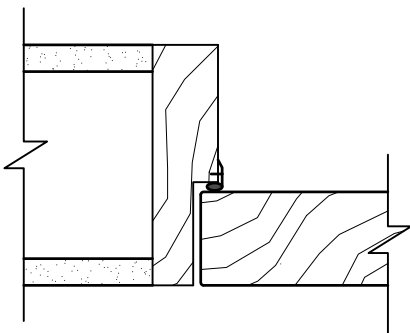
1 Neoprene Tube Gasket



2 Metal Spring & Bumpers

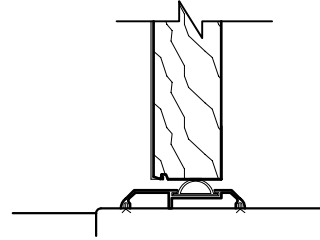


3 Solid rubber/ neoprene

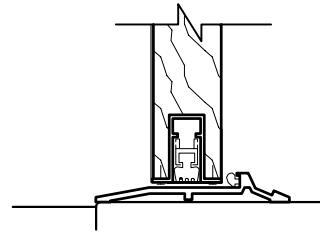


4 Metal with neoprene or vinyl bead

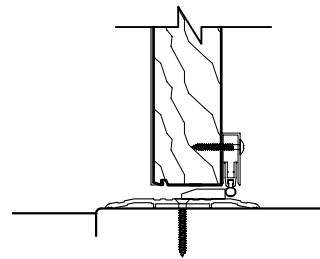
## Typical Thresholds & Seals



5 Vinyl Insert



6 Automatic Drop closure



7 Metal Interlock plus Vinyl bead

For Reference Only

# Sound Transmission Control

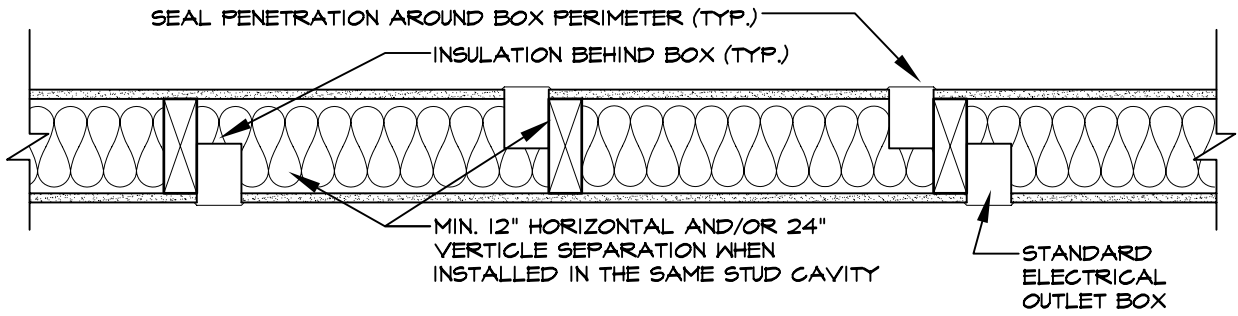
Title

Doors

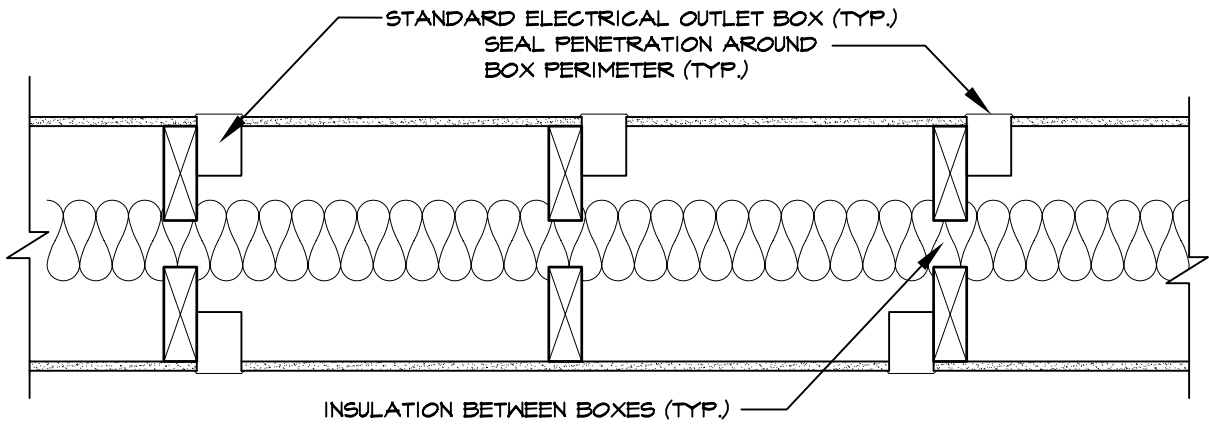
Sheet No.

DSD - STC - 03

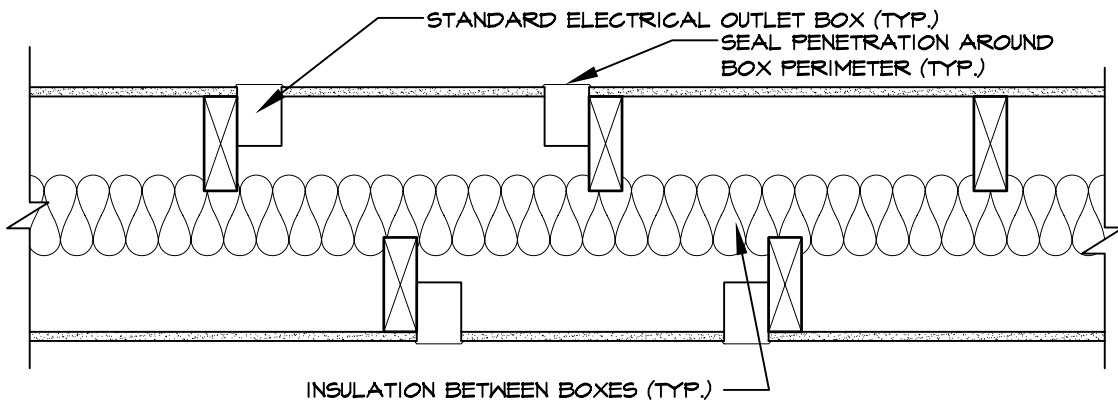




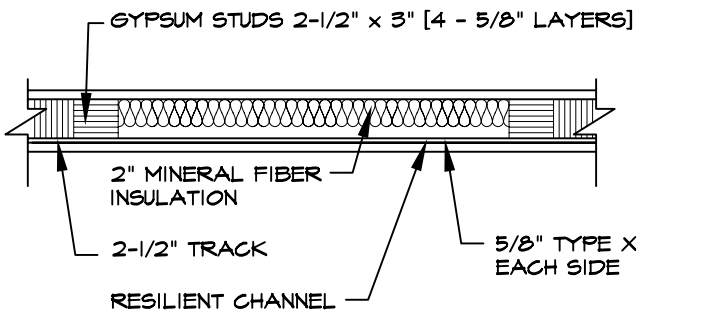
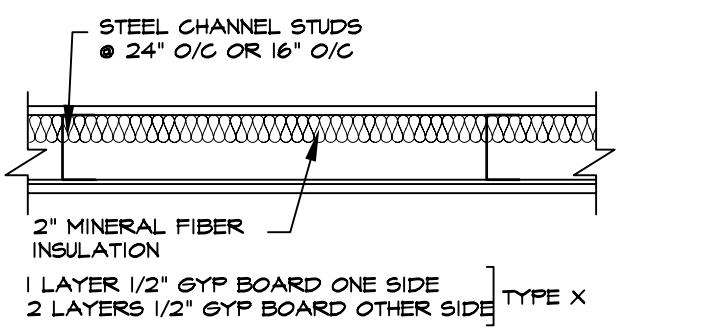
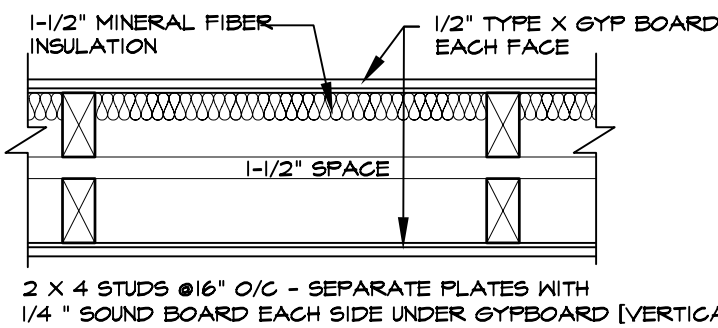
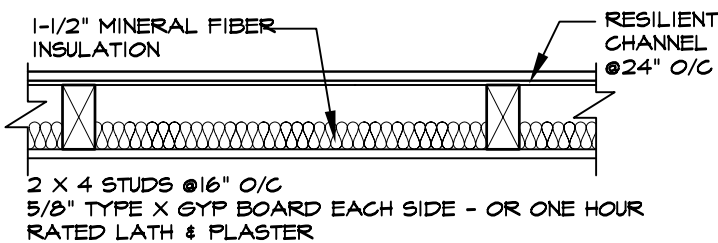
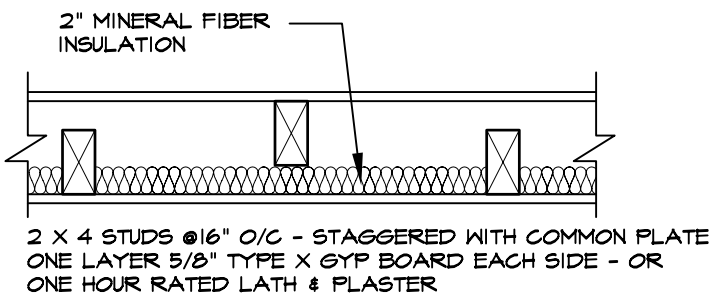
**1** Single Stud Wall (Listed assembly, min STC 50)



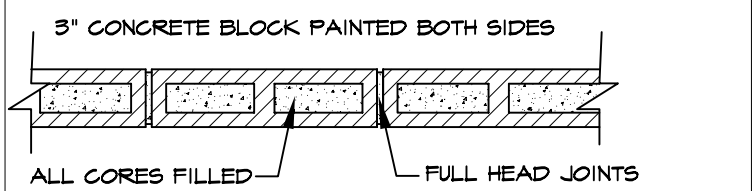
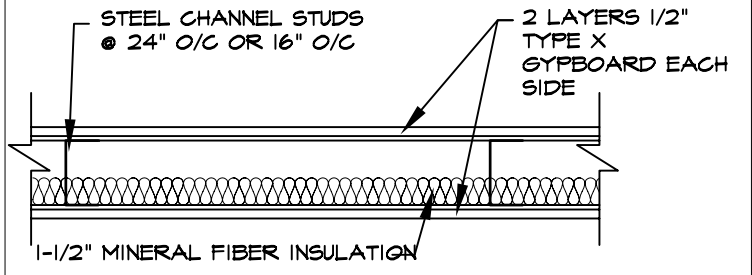
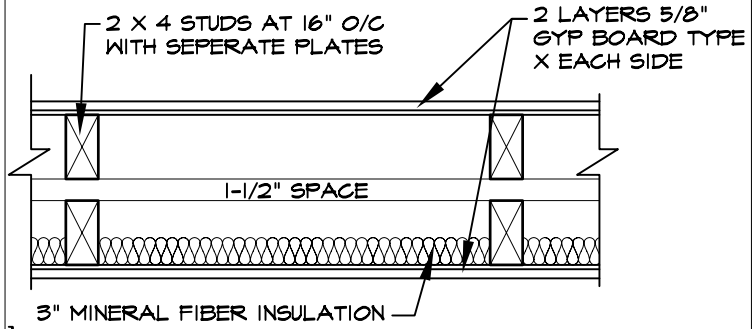
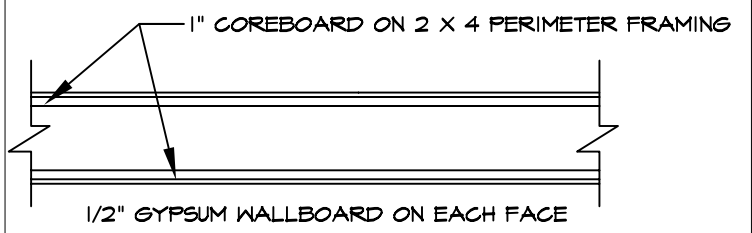
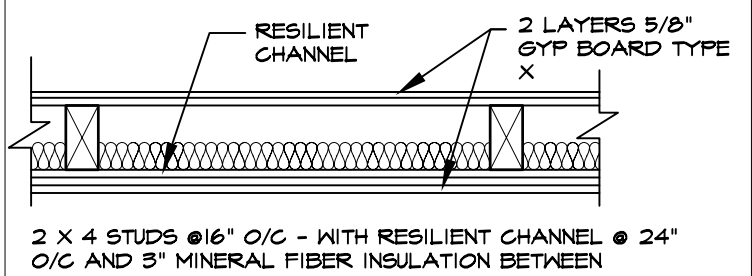
**2** Double Stud Wall (Listed assembly, min STC 50)



**3** Staggered Stud Wall (Listed assembly, min STC 50)



1



2

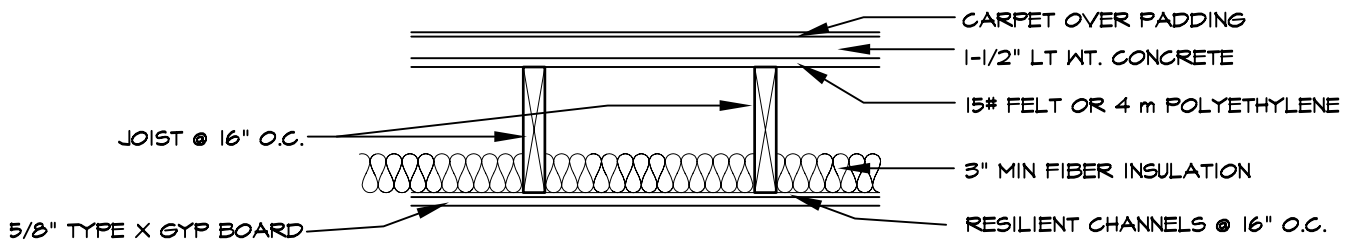
**Standard STC 50 Sound Rated Partition Assemblies**

For Reference Only

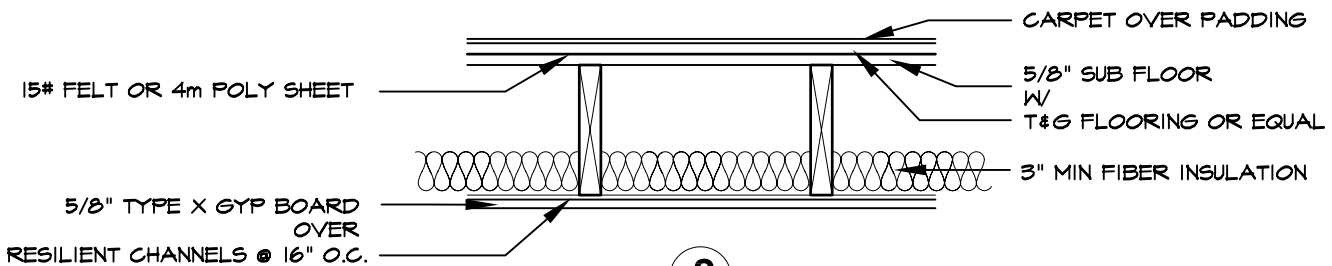
**Sound Transmission Control**

Title  
**Partition Assemblies**

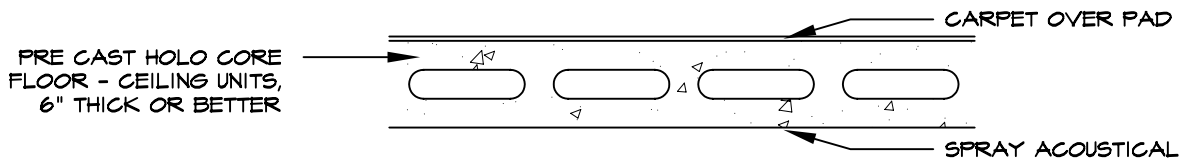
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**DSD - STC - 05**



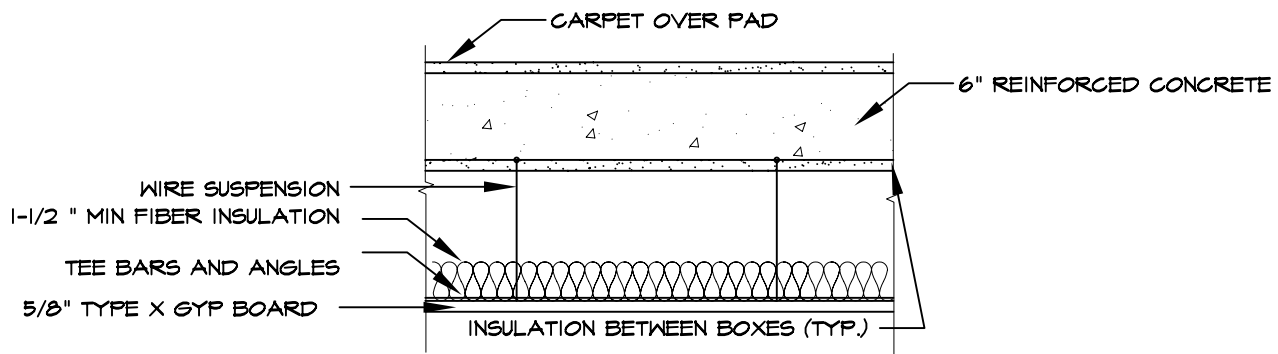
1



2



3



4

For Reference Only

# Sound Transmission Control

Title  
**Floor - Ceiling Assemblies**

Sheet No.  
**DSD - STC - 06**