

11.3 MOBILE-HOME AIR SEALING

SWS Detail: 3.01 General Pressure Boundary

The location and relative importance of mobile-home air leaks was a mystery before blower doors. Some mobile homes are fairly airtight, and others are very leaky. Air leakage serves as ventilation in most mobile homes. Comply with the whole-building ventilation standards outlined in *“ASHRAE Standard 62.2–2016 Ventilation” on page 420.*

A duct airtightness tester, which pressurizes the ducts and measures their air leakage, is the best way to measure and evaluate duct air sealing. *See “Evaluating Duct Air Leakage” on page 364.* For simply locating duct leaks, the blower door used in conjunction with a pressure pan does a good job. *See “Pressure Pan Testing” on page 366.*

Most mobile-home duct sealing is performed through the belly. This work is more difficult once the belly has been re-insulated. Inspect the ductwork and seal any major leaks, such as disconnected trunk lines, before insulating the belly.



SATURN
RESOURCE MANAGEMENT

Table 11-1: Air Leakage Locations & Typical CFM₅₀ Reduction

Air Sealing Procedure	Typical CFM₅₀ Reduction
Patching large air leaks in the floor, walls and ceiling	200–900
Sealing floor cavity used as return-air plenum (<i>See “Floor return air” on page 521.</i>)	300–900
Sealing leaky water-heater closet	200–600
Sealing leaky supply ducts	100–500
Installing tight interior storm windows	100–250
Caulking and weatherstripping	50–150

Workers reduce mobile-home air leakage when they install insulation combined with proper air-sealing in roofs, walls, and belly cavities. Prioritize your efforts by performing these tasks in this order.

1. Evaluate the insulation levels. If adding insulation is cost-effective, perform the usual pre-insulation air sealing measures that also prevent spillage of insulation out of the cavity.
2. Seal ducts before you insulate the belly.
3. Install cavity insulation.
4. Re-check the air leakage rate.
5. Perform additional air sealing as needed.

11.3.1 Air-Leak Locations and Sealing

SWS Detail: 3.0102.5 MH Belly Repair - Soft Bottom Patching; 3.0102.6 MH Belly Repair - Soft Bottom Replacement; 3.0102.7 MH Belly Repair - Rigid Bottom Patching; 3.0102.8 MH Belly Repair - Rigid Bottom Replacement; 3.0102.9 Sealing Dropped Soffits/Bulkheads; 3.0102.10 Sealing Dropped Ceilings; 3.0102.11 Sealing Roof/Wall Connections

Air-Leak Locations

Blower doors have pointed out the following envelope locations as the most serious air leakage sites.

- ✓ Plumbing penetrations in floors, walls, and ceilings. Water-heater closets with exterior doors are particularly serious air leaks, with large openings between bathrooms and other areas
- ✓ Torn or missing underbelly, exposing air leaks in the floor to the ventilated crawl space
- ✓ Large gaps around furnace and water heater chimneys
- ✓ Severely deteriorated floors in water heater compartments
- ✓ Gaps around the electrical service panel box, light fixtures, and fans
- ✓ Interior or exterior wall sheeting materials loose or penetrated
- ✓ Joints between the halves of double-wide mobile homes and between the main dwelling and additions

General Air Sealing Specifications

- ✓ Select sealants that are compatible with their intended surfaces, allowing for differential expansion and contraction.
- ✓ Consider the need for ignition barriers when using significant quantities or spray foam.

- ✓ Select low volatile-organic-compound (VOC) sealants for indoor use.
- ✓ For patching, select materials that adequately support their load and function as permanent air barriers. Provide additional reinforcing materials as necessary.
- ✓ Patch fabric belly material and rigid asphalt-impregnated belly board with similar water resistive materials.

Soft Belly Patching and Air Sealing

Soft underbellies use a water-resistant tear-resistant fabric to function as an air barrier and protective layer for the floor cavity with crosswise floor joists. Because the duct runs lengthwise, it hangs down and the underbelly bulges at the duct.

- ✓ Span each belly section with an uninterrupted section of belly material, creating as few seams as possible.
- ✓ Lap any seams in the belly material at least 6 inches, seal with a continuous bead of sealant, and fasten mechanically every 2 inches.
- ✓ Attach fabric belly material at opposite ends of spanned section using rigid support material, such as wooden furring strips. Wrapping it around the rigid support 2 times and mechanically fastening every 6 inches.
- ✓ Attach fabric belly material to all available floor joists and reinforce the joint with rigid supports.

Hard Belly Patching

Hard bellies use a water-resistant rigid material such as asphalt-impregnated fiberboard. That material attaches to the floor joists of mobile homes with lengthwise floor joists. Patch the existing material with a similar material, and fasten the patch to the floor joists with mechanical fasteners.

- ✓ Remove any material from the sealing-and-patching area that could prevent full adhesion between the sealant and patch material.
- ✓ Attach continuous rigid insulation when possible to the floor joists, and install rigid supports to prevent the insulation's detachment.
- ✓ Seal joints in the rigid material and under its seams with a compatible sealant.
- ✓ Patch any hole larger than 1 square foot, by first cutting a rectangular hole in the existing material. The available floor joists should border that hole. Then mechanical fasteners attach the rectangular close-fitting patch to adjoining floor joists.
- ✓ Use mechanical fasteners with washers or integrated caps to prevent fasteners from pulling through the rigid belly material. Space the fasteners no more than 6 inches apart.

11.3.2 Duct Leak Locations

SWS Detail: 5.0105.3 Crossover Duct Repair or Replacement; 5.0105.4 Replace Return Air Systems That Use Building Cavities; 5.0105.5 Replace MH Duct Boots

Blower doors and duct testers have pointed to the following duct locations as the most serious energy problems.

- ✓ Joints between the furnace and the main duct — if necessary, cut open the main duct from underneath to access and seal leaks between the furnace, duct connector, and main duct. With electric furnaces you access the duct connector by removing the resistance elements. For furnaces with empty A-coil compartments, you can simply remove the access panel to seal the duct connector.
- ✓ Floor cavities used as return-air plenums — These floor return systems should be eliminated and replaced with

return-air through the hall or a large grille in the furnace-closet door.

- ✓ Joints between the main duct and the short duct sections joining the main duct to a floor register
- ✓ Joints between register boots and floor
- ✓ The poorly sealed ends of the duct trunk, which often extend beyond the last supply register
- ✓ Disconnected, damaged or poorly joined crossover ducts
- ✓ Supply and return ducts for outdoor air conditioner units
- ✓ Holes cut in floors.
- ✓ New ductwork added to supply heat to room additions

Seal floor penetrations and ductwork before doing any belly repair. If you disturb pollutants in the crawl space such as mold and dust, these pollutants can spread to the whole home through duct leaks and holes in the floor.

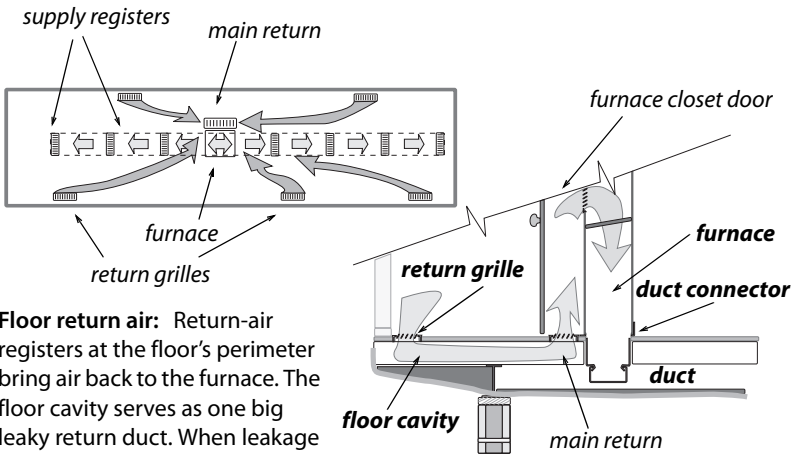
See “Pressure Pan Testing” on page 366. See “Sealing Supply Ducts” on page 377.

11.3.3 Belly Pressure Test

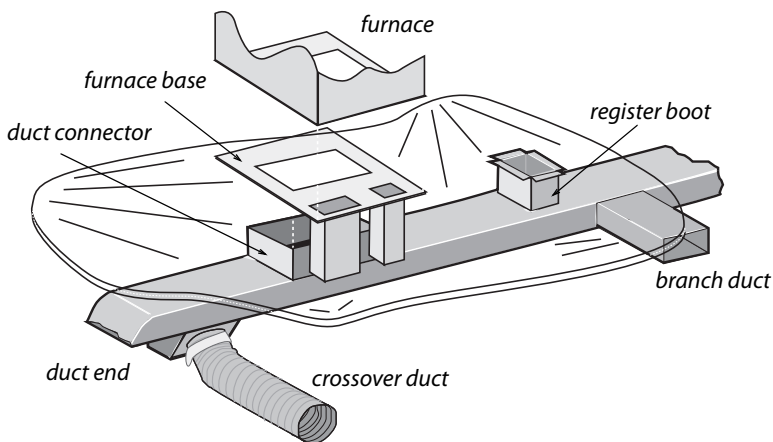
Mobile-home supply duct leaks pressurize the belly cavity. Follow these steps to perform this rough test to determine if duct leaks are present and their general location.

- ✓ Repair the rodent barrier.
- ✓ Turn on the air handler.

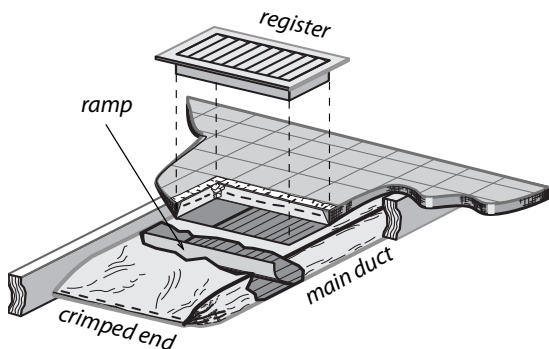
- ✓ Insert a manometer hose into the belly through the rodent barrier and test the pressure with-reference-to the out-doors.
- ✓ Start near the furnace, and work your way toward the ends alongside the trunk line. A pressure rise gives you a rough idea of the location of leaks, size of leaks, and tightness of the nearby rodent barrier.
- ✓ Repair the ducts and re-test.



Floor return air: Return-air registers at the floor's perimeter bring air back to the furnace. The floor cavity serves as one big leaky return duct. When leakage is serious, the floor return system should be eliminated.



Mobile-home ducts: Mobile-home ducts leak at their ends and joints — especially at the joints beneath the furnace. The furnace base attaches the furnace to the duct connector. Leaks occur where the duct connector meets the main duct and where it meets the furnace. Branch ducts are rare, but easy to find, because their supply register isn't in line with the others. Crossover ducts are found only in double-wide and triple-wide homes.



Sealing the end of the main duct: The main duct is usually capped or crimped loosely at each end, creating a major air leakage point. Seal this area and improve airflow by installing a sheet metal ramp, accessed through the last register, inside the duct. Seal the ramp to the ductwork with metal tape and silicone or mastic.