

**Answer:** Mobile homes are a bit of a different animal when it comes to weatherization. Sound building science tells us that our thermal and pressure boundaries need to be continuous and in alignment. We do our best to achieve this goal in every site-built home we work on. However, there are a couple of caveats to these principles when it comes to mobile homes. First, between the frame rails in mobile homes where the floor joists run widthwise. And second, mobile homes that have a water heater closet that is accessed from the exterior.

The thermal and pressure boundaries on mobile homes will always be continuous upon completion of weatherization, but in these instances, they will not necessarily be in alignment. Here is some further information on these unique situations.

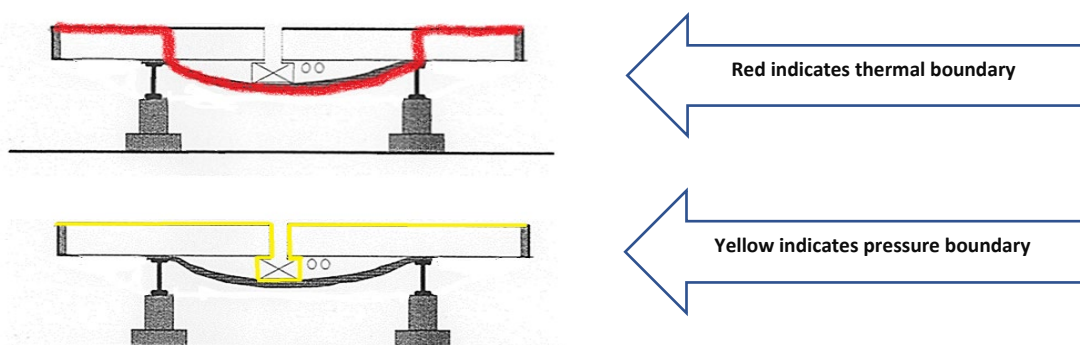
### **Between the frame rails in mobile homes where the floor joists run widthwise:**

In this style of mobile home, the forced air supply system, or trunk line, is attached to the underside of the floor joists. The belly material and insulation are located under that in what is known as the swag area of the belly. Again, this is in the middle of the home between the frame rails. The reason mobile home manufacturers design the belly and insulation system this way is to ensure that the trunk line and plumbing are not isolated outside of the thermal boundary. Think of this as an engineered chase way for the mechanical systems to run through.

In this style mobile home, the pressure boundary is the sub floor plus the inside on the trunk line and boots with the thermal boundary below that. It is worth noting that the wings, or areas between the frame rail and the outside wall of the belly will have the pressure and thermal boundary in alignment. Naturally, most belly materials are breathable and cannot be considered our pressure boundary, although it is crucial to make sure that the belly material is complete.

As we know, duct sealing is a mandatory measure for all mobile homes where pressure pan readings are greater than 1.0 Pa. The intent is to make the inside of the duct system an extension of the subfloor, thus creating a continuous pressure boundary. Proper duct sealing also ensures that the expensive forced air from the furnace is now completely entering the conditioned space with none entering the intermediate zone between the pressure boundary and the insulated belly material.

See diagram below for a visual of this detail:



### **Mobile homes that have a water heater closet that is accessed from the exterior:**

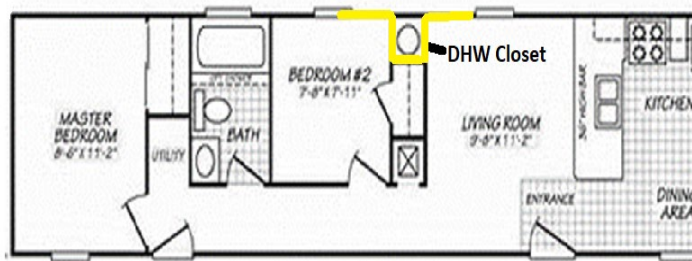
Exterior water heater closets are a very common feature to many older mobile homes. These mobile home water heater closets will sometimes require special attention. When properly addressed, the closet will be outside the pressure boundary but inside the thermal boundary. What we are looking to do is air seal, as effectively as possible, the three inner walls of the closet. Keep in mind that these walls should be fire rated so

be sure to use the appropriate fire stop rated foam or sealant when sealing the edges, corners or penetrations in these walls. As a safety measure, always disable the water heater prior to air sealing, as some sealants off-gas flammable vapors.

The three factory closet walls will not be insulated. As part of weatherization, we will want to insulate the door to the water heater closet. Again, our thermal and pressure boundaries will be slightly out of alignment, while still both being continuous. Since we have isolated the water heater from the pressure boundary, the reason for the door insulation is not only to keep our thermal boundary continuous but also to protect the plumbing in the closet from freezing by the heat coming off the tank during normal use. This is why it may not be a great candidate for retrofit tank insulation.

One last thing to keep in mind on this detail is that different styles of water heaters get combustion air from different locations. Exterior DHW closet door configuration will be based on fuel type and draft style. Here it is important to know if a vented or unvented door is needed, and to make sure that when installing rigid foam, or similar, to the back side of the door that any air grilles do not become obstructed. We will also want to ensure that the installed door insulation does not come into contact with any operating mechanisms of the hot water tank itself. If the water heater has a combustion air inlet from beneath the closet, we will also want to ensure that it is not patched over and remains free of any obstructions.

See diagram below for a visual of this detail:



The thermal boundary will follow the exterior wall, and the pressure boundary will follow the three walls inside the water heater closet as shown in yellow