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# WHEN IS A ROOF LEAK *NOT* A ROOF LEAK?

## WHEN IT'S AN HVAC LEAK !

When a building occupant spots water dripping from the ceiling, he doesn't know or even care what the source of that water is. To him, it's a roof leak.

We would like to address one common source of so called "roof leaks": HVAC units mounted on the rooftop.

### **Bottom discharge vs. side discharge:**

Bottom discharge HVAC units typically are mounted on a raised curb on the rooftop, and the ducting is mounted to the bottom of the unit and penetrates down through the curb. No ductwork is exposed to the weather in this situation. Side discharge units are usually mounted on wooden sleepers, with the ductwork exiting the side of the unit and continuing some distance along the rooftop until it penetrates the building.



***Bottom discharge-no exposed ductwork***



***Side discharge with exposed ductwork***

### **How HVAC systems work:**

A greatly simplified example of how an HVAC unit works will eliminate a discussion on how the refrigerant cycle works and concentrate on air flow. This starts when warm air from the interior is drawn into the *return plenum*, which then proceeds to the unit itself. At this point, the warm air flows through the filters and condenser coil, which looks like a car radiator and serves a similar function in cooling the air that flows through it. Air then flows through the blower fan, and finally down the *supply plenum* and from there through the supply ducts to provide cool air to the interior of the building. Since the return and supply sides of the unit are on opposite sides of the blower fan, the air pressure will be lower on the return side and higher on the supply side. What this means for us is that the return (lower pressure) side wants to suck in air (and any adjacent moisture), while the supply (higher pressure) side wants to blow air out. That is why most leaks occur on the return side.

### **Investigating leaks:**

Investigating leaks at HVAC units will start just like any other leak investigation, by visually checking conditions at the leak location inside the building. If the leak is at an HVAC unit, the return and supply plenums should be readily evident. The first step should be to determine exactly where the water is coming from. For example, is the water dripping down the outside of the plenum from where it penetrates the roof deck? This may indicate that the leak is coming from the roof itself, but it is still possible the unit is the source. On the other hand, if water is dripping out of the bottom of the plenum, and there is no water on the outside of the plenum, the source will almost certainly be the unit. Many times this investigation can be done while the unit is not actively leaking by following water stains. If the entry point cannot be determined by following stains, a water test may be needed. If the unit is suspected of being the source of the leak, it would be a good idea to get the HVAC service tech involved, so he can shut the unit down and the inside of the unit can be safely accessed. This will also prevent any disputes about the findings of the investigation. A cooperative approach, without placing blame, is the way to go. After all, even if the HVAC unit is leaking, it's usually not the service tech's fault. His priority is that the unit heats and/or cools as it is designed to do.



*Interior view of leak under return air plenum*



*Filter access panel opened*

At this point, the investigation will proceed onto the roof. Of course, this is the time to check the roofing components, flashings etc. When checking the unit, the place to start is the return section. This will usually mean opening the filter access panel, and may involve removing the filters to get a clear view. A common source of leaks is the seal at the access panel, and many times water is evident as soon as the panel is opened. It may be necessary to check the return plenum itself; however this can be difficult on smaller units that don't have enough room to physically access the plenum.



**Water inside HVAC**

Reaching into the unit with a digital camera and taking pictures will sometimes address this issue. If the exposed ducts on a side discharge unit are suspected, simply wrapping them with plastic sheeting (visqueen) will temporarily seal them. This can address two issues: if the leak stops you have confirmed the source as the duct and not the roof, and at the same time the building is protected from water entry until the weather improves enough to permanently repair the duct.

### **Making repairs:**

Once the source of water entry has been determined decisions will need to be made on what to repair and who will do that repair. As a rule, if the leak is coming from *inside* the HVAC unit, i.e. from a bottom discharge unit, we prefer that the HVAC contractor perform the repair as he has more experience with the mechanics of the unit. However, if the leak is coming from exposed ductwork *outside* the unit, then we recommend the roofing contractor perform the repair as he will be more experienced in traditional waterproofing techniques.



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