

PROPERTY AND BUILDING INSPECTION MODULE II
TREC Course 39926

Chapter 2
Cooling Systems

Section 4
A/C Inspection



OBJECTIVES: At the completion of this section, the Inspector candidate will:

- 1. Understand the principles of A/C inspection.**
- 2. Be capable of identifying the BTUs of heat removed;**
- 3. Be capable of identifying the manufactured date;**
- 4. Be capable of identifying the condenser components;**
- 5. Understand the principles of inspecting the A/C condenser.**

TREC Standards of Practice (SOP)

535.230 (b) Cooling Equipment.

(1) Requirements for cooling units other than evaporative coolers.

(A) the inspector shall:

(i) report the type of systems;

(ii) measure and report the temperature difference between the supply air and the returned air or report industry-accepted method used to determine performance; and

(iii) generally report extraneous factors or conditions, present on the day of the inspection, that would adversely impact the temperature differential of an otherwise performing unit; and

(B) the inspector shall report as Deficient:

(i) inoperative units;

(ii) deficiencies in the performance of the cooling system that:

(I) fails to achieve a 15 degrees Fahrenheit to 22 degrees Fahrenheit temperature differential; or

(II) fails to cool adequately as determined by other industry-accepted methods;

- (iii) the absence of an opening that would allow access to equipment for inspection, service, repair or replacement without removing permanent construction or building finish;*
- (iv) when applicable; a floored passageway and service platform that would allow access for equipment inspection, service, repair or replacement;*
- (v) noticeable vibration of blowers or fans;*
- (vi) water in the auxiliary/secondary drain pan;*
- (vii) a primary drain pipe that discharges in a sewer vent;*
- (viii) missing or deficient refrigerant pipe insulation;*
- (ix) dirty coils, where accessible;*
- (x) condensing units lacking adequate clearances or air circulation or that has deficiencies in the fins, location, levelness, or elevation above grade surfaces; and*
- (xi) deficiencies in:*
 - (I) the condensate drain and auxiliary/secondary pan and drain system;*
 - (II) mounting and performance of window or wall units; and*
 - (III) thermostats.*

(2) Requirements for evaporative coolers.

(A) the inspector shall report:

- (i) type of systems; and*
 - (ii) the type of water supply line; and*
- (B) the inspector shall report as Deficient:***

- (i) inoperative units;*
- (ii) inadequate access and clearances;*
- (iii) deficiencies in performance or mounting;*
- (iv) missing or damaged components;*
- (v) the presence of active water leaks; and*
- (vi) the absence of backflow prevention.*

The inspector does not have to operate cooling equipment when the outdoor temperature is less than 60 degrees Fahrenheit

TREC Standards of Practice (SOP)

For heating, ventilation, and air conditioning systems inspected under this section, the inspector is not required to perform the following actions:

- 1. program digital thermostats or controls;***
- 2. inspect:***
 - 1. for pressure of the system refrigerant, type of refrigerant, or refrigerant leaks;***
 - 2. winterized or decommissioned equipment; or***
- 3. duct fans, humidifiers, dehumidifiers, air purifiers, motorized dampers, electronic air filters, multi-stage controllers, sequencers, heat reclaimers, wood***

burning stoves, boilers, oil-fired units, supplemental heating appliances, de-icing provisions, or reversing valves;

3. operate:

1. setback features on thermostats or controls;

2. radiant heaters, steam heat systems, or unvented gas-fired heating appliances; or

3. cooling or heating systems when weather conditions or other circumstances may cause equipment damage, including:

1. cooling equipment when the outdoor temperature is less than 60 degrees Fahrenheit; and

2. heat pumps, in the heat pump mode, when the outdoor temperature is above 70 degrees Fahrenheit;

4. verify:

1. compatibility of components;

2. tonnage and manufacturer match of indoor coils and outside coils or condensing units;

3. the accuracy of thermostats; or

4. the integrity of the heat exchanger; or

5. determine:

1. sizing, efficiency, or adequacy of the system;

2. balanced air flow of the conditioned air to the various parts of the building; or

3. types of materials contained in insulation.

Exterior HVAC Components – Most often found on a home's exterior. (A/C condenser or HVAC package unit).

The inspector should first inspect the condenser unit for proper insulation, proper CB in service panel, 120-volt receptacle near the condenser, and a "disconnect" source. Check inside to ensure there is no water in the pan.

If the temperature is above 65 degrees (TREC SOP uses 60 degrees), turn on the A/C system at the thermostat by decreasing the desired temperature. The most effective way for an inspector to check on the system's efficiency is to take the temperature drop across the coil (discussed previously). Should get between 15 - 22 degrees.

A/C Unit/Condenser Unit – (take a photo)

- ⦿ **Output (Tons)** **(36,000 BTUs of heat removed per hour or 3 tons)**
- ⦿ **Year Manufactured** (19th week of 2009)
- ⦿ **Model #**
- ⦿ **Running Amps**
- ⦿ **Max Circuit breaker** – Check CB size in panel

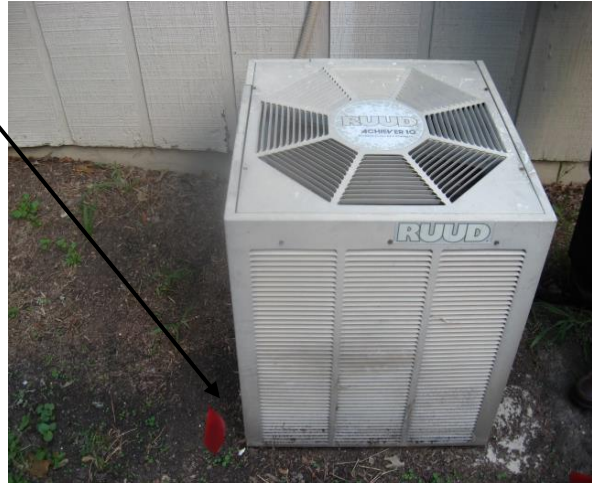
Condenser Unit Plate



Condenser Unit - Height Above Ground

Ground clearance. Equipment and appliances supported from the ground shall be level and firmly supported on a concrete slab or other approved material extending not less than 3 inches above the adjoining ground. Such support shall be in accordance with the manufacturer's installation instructions.

Not 3" above ground level



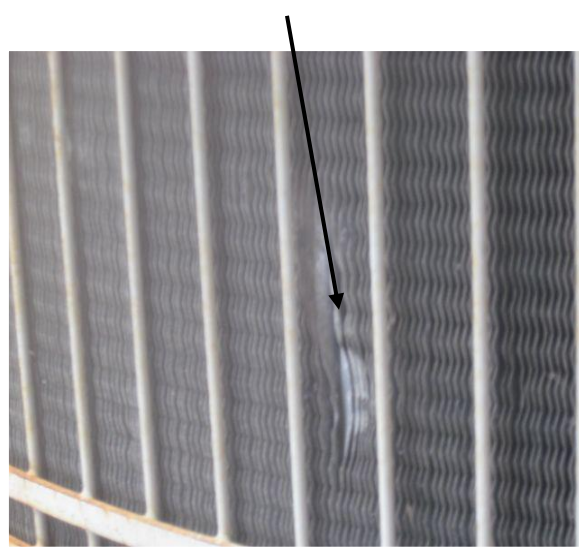
Proper elevation and must also be level



Lines need new insulation



Condenser Damage



Condenser insulation may need to be replaced.
Opening needs to be sealed.



No insulation. Condenser not
elevated.



Condenser not elevated and vegetation
should be removed from condenser



Protective covering of electric
Wire needs repair



Insulation should be replaced

Condenser - Access Caps (Next IRC will remove this requirement)

Locking Key & Cap



These caps are safety features that prevent unauthorized personnel from accessing the refrigerant. There is a problem today with people loosening the lines and sniffing the refrigerant. These safety caps require a special key to remove. If caps are not present, contact a licensed HVAC contractor.

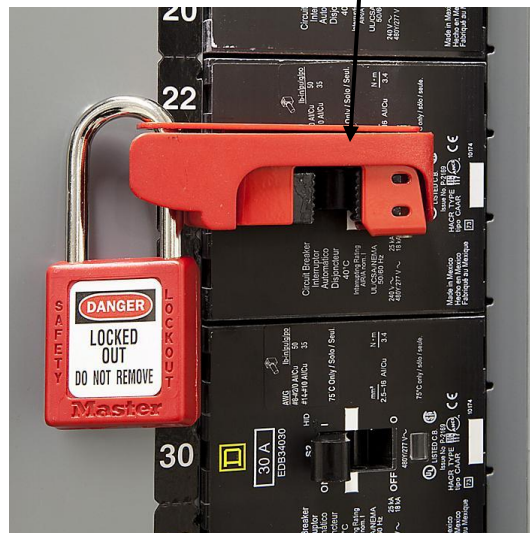
HVAC outlet. A 125-volt, single-phase, 15- or 20- ampere-rated receptacle outlet should be installed at an accessible location for the servicing of heating, air-conditioning and refrigeration equipment. The receptacle shall be located on the same level and within 25 feet of the heating, air-conditioning and refrigeration equipment. The receptacle outlet cannot be connected to the load side of the HVAC equipment disconnecting means.

Exception: A receptacle outlet is required for the servicing of evaporative coolers.

Electrical Outlet for HVAC Service



Condenser Unit requires a Disconnect or a Lockable Circuit Breaker in the service panel



It should not be directly behind the condenser. If not installed, contact a licensed electrician.

Condenser Unit - Disconnect



To repair most of the above mentioned issues contact a licensed HVAC contractor.

Condensate disposal. Condensate from cooling coils and evaporators should be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping should maintain a minimum horizontal slope in the direction of discharge of not less than 1/8 unit vertical in 12 units horizontal. Condensate shall not discharge into a street, alley, or other area where it would cause a nuisance.

Auxiliary and secondary drain systems. A secondary drain or auxiliary drain pan should be required for each cooling or evaporator coil where damage to any building components will occur as a result of overflow from the *equipment* drain pan or stoppage in the condensate drain piping. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than 1/8 unit vertical in 12 units horizontal. Drain piping shall be not less than 3/4-inch nominal pipe size. One of the following methods should be used:

1. An auxiliary drain pan with a separate drain shall be installed under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1.5 inches, shall be not less than 3 inches larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material.
2. A separate overflow drain line should be connected to the drain pan installed with the *equipment*. This overflow drain should discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
3. An auxiliary drain pan without a separate drain line should be installed under the coils on which condensation will occur. This pan will be equipped with a water level

detection device that will shut off the *equipment* served prior to overflow of the pan. The pan shall be equipped with a fitting to allow for drainage.

4. A water-level detection device can be installed that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary condensate drain line.

Primary Drain Line



Improperly Installed Secondary Drain Line



Secondary drain line cannot be plumbed into primary drain!

Secondary drain



Secondary A/C drains are in a conspicuous spot above the garage door

Looks like a version of an S Trap Pan is Littered with Trash



Should use Pressured Treated Wood if Using Wood



Dunnage is when an air conditioner is placed on wood block and then vibrates.

Many inspectors will use a thermal temperature gun to obtain the air temperature at the return grill and the air temperature at a supply register.



This is not, as many inspectors document, the temperature drop across the coil as it also takes into account temperature lost within the duct system. If you use this technique ensure you document the location where the temperatures were obtained.

A Freon leak is often seen as an oil stain.

Icing of the evaporator coil can be caused by poor airflow.

Check the filter

