

Evaporative cooling systems (sometimes called swamp coolers) are popular in hot, dry areas such as the Southwest of the USA. Evaporative coolers consist of evaporator pads or screens, a means to wet them, an air blower, and a water reservoir with a drain and float-operated water supply valve. A fan is used to draw outside air through **wet filter pads**. As dry air moves over the wet pad, water evaporates, and the air gives up its heat. At 10-20% relative humidity, the indoor-air cools by about 25 degrees as it absorbs the moisture. The indoor warm air is discharged through open windows and doors. If the windows are not opened, the house becomes pressurized and inadequate cooling occurs.

**Single stage or direct coolers** – are the most common and come in three different pad types:

**Fixed fiber pads** – a small pump moves water from a catch sump at the bottom of the cooler up to the top of the pads (made from shredded aspen wood fibers packed in a plastic net – called *aspen* or *excelsior*). The pads are wetted by water dripping onto it from the top. In a **spray** (or **slinger**) coolers, a spray wets the pads. Typically 1 to 2 inches (2.5 to 5 cm) thick, the pads are replaced every year or two.

**Rotating pads** – the pads are made of a rough polyester material sewn into a wide belt shape. The belt or drum is rotated by a pad motor through a trough of water at the bottom of the cooler.

**Rigid-sheet pads** – similar in operation to fiber pads type. The pad, usually 8 to 12 inches (20 to 30 cm) thick, is a stack of corrugated sheet material that allows air to flow through at a higher rate than an aspen pad. These types of pad are far more expensive than fiber pads, but can last much longer.

**Two stage or direct/indirect coolers** – use an **air-to-water heat exchanger/pre-cooler** which reduces the incoming air temperature without raising the relative humidity, then puts the incoming air through a direct evaporation stage, further reducing its temperature. Because of their expense, direct/indirect units are typically only used where daytime temperatures consistently exceed 100° F (37° C).

## **INSTALLATION OF EVAPORATIVE COOLERS:**

- PROVIDE A WATER SHUT-OFF VALVE AT GROUND LEVEL (KEEP DRY WHEN NOT IN USE)
- AIR INTAKES SHOULD BE 10 FT (3 M) AWAY FROM OR 3 FT (1 M) BELOW A PLUMBING VENT, GAS FLUE, OR BATHROOM, KITCHEN, OR LAUNDRY EXHAUST
- PROVIDE AN ELECTRICAL DISCONNECT NEAR THE COOLER (ESPECIALLY ON ROOFTOP UNITS)
- PROVIDE A MINIMUM 3 FT (1 M) CLEARANCE TO ANY SIDE OF THE COOLER FOR MAINTENANCE
- PROVIDE DISCHARGE (FROM SUMPS AND BLEED-OFF) AND OVERFLOW AWAY FROM THE ROOFTOP

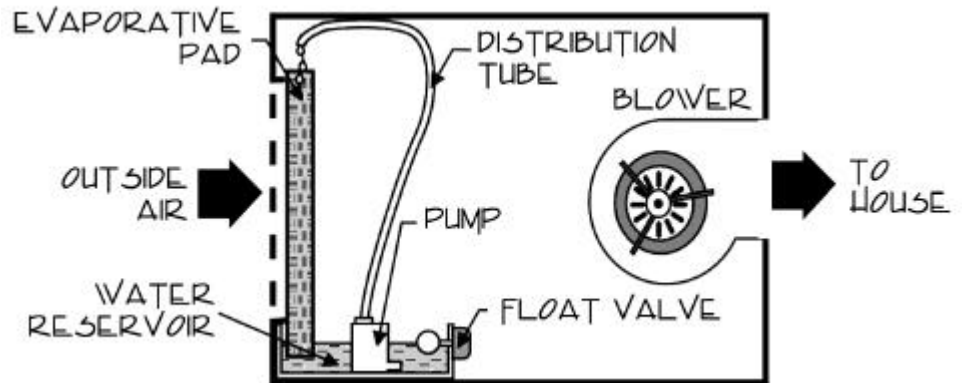
A **continuous bleed-off** system often is used on the water circulation system, constantly dumping part of the water and allowing the refill valve to replace it with fresh water. This decreases the accumulation of minerals (as the water evaporates), dirt and growth of bacteria, algae and molds on the pads and inside the unit. Other coolers have a **sump dump** or **blow-down system** that periodically dumps the water from the sump while the cooler is being operated (the continuous wetting of the pads flushes the trapped particulates into the sump which may block the pump or water distribution system). A **blow-down** system is preferred, especially in dusty areas, because it will clean the sump of filtered dirt and particulates. If sedimentation, "swampy" odor or other water quality problems become evident, more frequent cleaning is required.

## **MAINTENANCE AND CLEANING:**

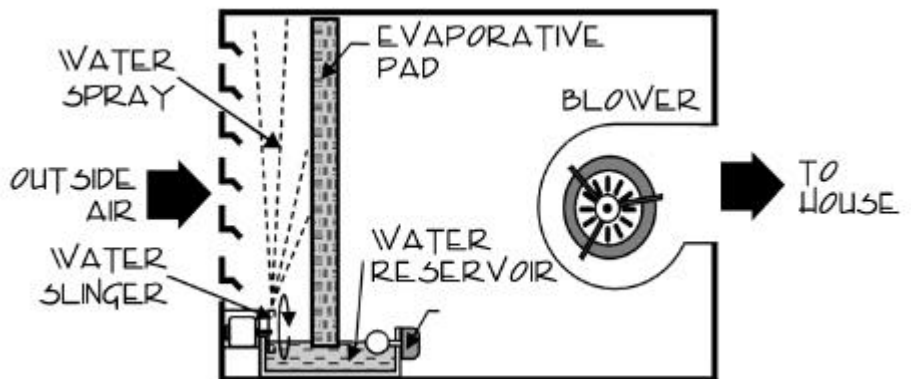
- DISCONNECT POWER TO THE COOLER BEFORE MAINTAINING IT
- CHECK THE FAN BELT FOR WEAR AND CORRECT TENSION (SHOULD DEPRESS ABOUT ½ AN INCH WHEN PRESSED)
- CHECK THE OPERATION AND CLEAN THE WATER RESERVOIR, FLOAT-OPERATED SUPPLY VALVE, WATER PUMP GUARD AND ALL WATERWAYS, INCLUDING THE BLEED-OFF SYSTEM AND SUMP
- REMOVE THE FILTER PADS AND THOROUGHLY CLEAN BY HOSE WITH WATER (REPLACE DETERIORATING FILTER)
- LOOSEN ALL SEDIMENT AND SLIME WITH A BRUSH – DRAIN ALL WATER IN THE UNIT FROM THE TANK AND PIPES
- WITH THE FAN ISOLATED AND THE PUMP CIRCULATING WATER, ADD 1 TSP. (5 ML) OF HOUSEHOLD BLEACH TO 2 GALLONS (10 L) OF CIRCULATING WATER AND ALLOW THE DISINFECTED WATER TO CIRCULATE FOR 30 MINUTES
- RUN THE WATER TO WASTE AND REFILL WITH FRESH WATER, CIRCULATE FOR 5 MINUTES
- REPEAT THE FRESH WATER RINSE AND DUMPING AND THEN REFILL THE COOLER WITH WATER.

For further information contact your local public utilities office, a licensed HVAC contractor or the America Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) or the Heating, Refrigerating and Air conditioning Institute of Canada (HRAI).

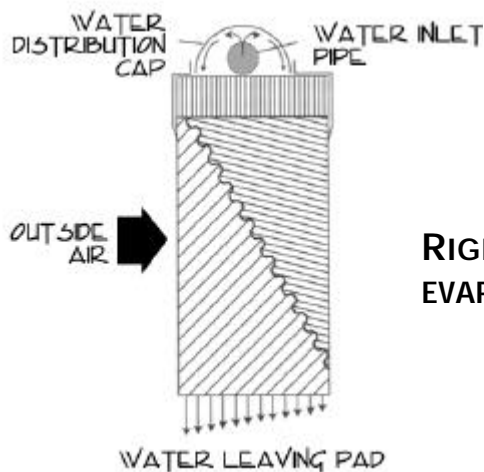
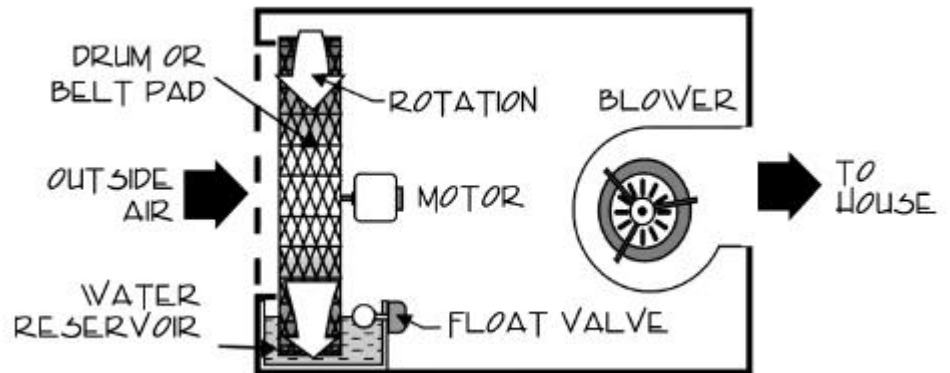
**DRIP TYPE  
 EVAPORATIVE  
 COOLER**



**SPRAY OR SLINGER  
 TYPE EVAPORATIVE  
 COOLER**



**ROTARY TYPE  
 EVAPORATIVE  
 COOLER**



**RIGID PAD IN A DRIP TYPE  
 EVAPORATIVE COOLER**