



ENGINEERED AIR

SERIES FW-EC
PACKAGED AIR CONDITIONERS
WITH EVAPORATIVE CONDENSERS

EVAPORATIVE CONDENSER SPECIFICATION

(To be inserted into the specification for the FWB or FWD series of packaged air conditioners, in lieu of the specification for the air-cooled condenser).

General: the unit shall be complete with an Evaporative Condenser, factory wired and piped, and complete as follows:

Capacity: the capacity of the units shall be as indicated in the Equipment Schedules which include the operating conditions and the kilowatt input at the design conditions, i.e., compressors, condenser fan motor, condenser pump, and control circuit. The MBH per kW, (EER) shown must be met or exceeded.

Construction: the sump shall be constructed of heavy gauge stainless steel. The fans and fan section shall be constructed of epoxy painted galvanized steel. The compressor section shall incorporate a non-skid floor surface and a lockable access door.

Condenser Fans: shall be blow through forward curved double inlet centrifugal type, with common shaft and driven by a single motor. Shaft and bearing sizes shall be selected to operate at no more than 90% of the first critical speed. Motors shall be totally enclosed type, and be protected by a rain hood.

Receivers: each compressor or tandem/triple set shall serve its own refrigerant circuit in both the condenser and evaporator, and be complete with a liquid receiver for pumped down storage. Each receiver shall be equipped with inlet and outlet valves, and ASME approved pressure relief device.

Coil Section: condensing surface shall be of type L copper throughout with type M copper headers. Multiple passes shall be adequately supported to eliminate droop and vibration.

Condenser Water Distribution System: water shall be sprayed uniformly over the coil section through multiple low pressure drop spray nozzles made of non-corroding ABS. Water piping shall be of schedule 80 PVC with socket type fittings secured with adhesive. Nozzles shall be easily removable for flushing and cleaning.

Eliminators: shall be constructed of PVC with three directional brakes to minimize drift. Eliminators shall be easily removable in sections.

Water Pump: close-coupled bronze fitted centrifugal pump with mechanical seal shall be mounted and piped. Suction shall be equipped with a stainless steel mesh strainer, removable for cleaning. Motor size as indicated in the schedules.

Water Treatment: refer to the water treatment section of the specification for water treatment requirements.

Electrical: the evaporative condensing section shall be complete with all necessary wiring, compressor contactors and protection modules, fan and pump contactors and thermal overloads, automatic water level and drain control all mounted in a control panel located in the compressor section. Control panel shall be equipped with a non-fused disconnect switch.

Optional Equipment:

Insulation: the compressor section shall be complete with 2" thick, 3lb/ft³ insulation, lined with 22 gauge solid or 24 gauge perforated galvanized metal.

Remote Sump: provide a storage tank for indoor storage of recirculation water. Tank shall be equipped with overflow connection, drain/bleed connection, suction connection – size of pump inlet, liquid return connection, vent connection, 3/4" liquid return connection (to receive water standing in the pump discharge line), electronic liquid level controller and solenoid in makeup water connection.

Pump for Remote Sump: provide a water recirculation pump sized for the required flow rate and the head created by the spray nozzles, the piping, and the static head of the system.

Electric Immersion Heater: provide three phase electric immersion heater mounted through the wall of the condenser sump sized to maintain the sump temperature at 40°F as sensed by an immersion thermostat.

Head Pressure Control System: (1) provide condenser fan inlet dampers and operators controlled from the lead compressor discharge pressure. An end switch will shut fans off before the dampers are fully closed. (2) provide a variable speed controller on the condenser fan to control head pressure. This may be either a magnetic coupled or variable frequency drive. (3) provide 2 speed condenser fan motor to control head pressure.

FW-EC

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FEATURES:

- MEETS OR EXCEEDS ASHRAE 90.1 EFFICIENCIES
- SUPPLY AIR TEMPERATURES AS LOW AS 44°F
- WALK-IN COMPRESSOR SECTION
- EXCELLENT SERVICEABILITY
- FULL RANGE OF HEATING ACCESSORIES
- FULL RANGE OF FILTRATION ACCESSORIES
- MINIMIZED UNIT FOOTPRINT



ENGINEERED AIR



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Sales Offices throughout North America

Manufacturing Facilities:

DESOTO, KANSAS

CALGARY AND EDMONTON, ALBERTA

NEWMARKET, ONTARIO



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APPLICATIONS

Engineered Air has developed the FW/EC line of packaged air conditioners to meet the demands for lower air supply temperatures, in the 44 - 50°F range, while meeting the operating efficiencies of ASHRAE Standard 90.1.

Most commercial packaged air conditioners are designed to operate with 360 to 450 CFM per ton, which results in leaving air temperatures in the order of 55 to 62°F. For duct system size optimization, designers often prefer to deliver air at 50°F or cooler, to a minimum of 44°F. Standard air cooled units that must operate at lower suction temperatures to meet this need, cannot operate at the Energy Efficiency Ratios (EER) required by the energy standards of today. The condenser heat transfer surface and/or air volume requirements are too great to be practical, particularly in areas of 100°F dry bulb ambient or greater.

The FW/EC series of air conditioners utilizes the benefits of evaporative cooling in the condenser, allowing condensing temperatures in the range of 100°F to 110°F, even with ambient dry bulb temperatures at 100°F or over, as long as the wet bulb temperature of the outside air is at 80°F or lower.

Lower condensing temperatures with the resulting higher EER's mean lower operating costs for the owner. Even when operating cost is not a concern, (seldom the case), building code authorities may impose electrical energy input limits on the air conditioning system, most often along the lines laid out in the ASHRAE Standard 90.1.

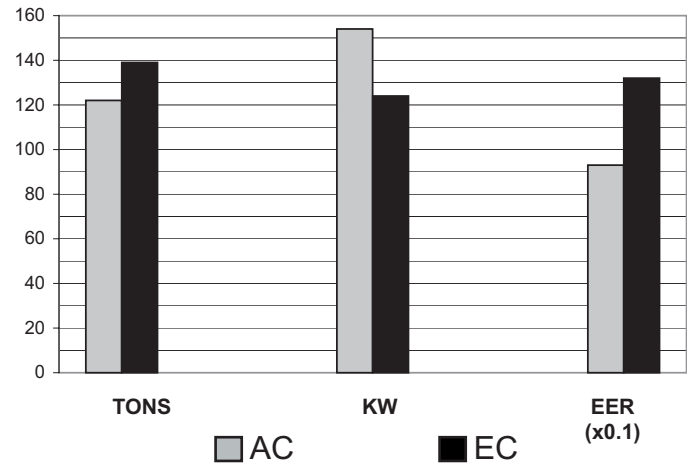
The use of FW/EC's provides compressor EER's in the order of 14.0 to 16.0, (compared to 9.5 to 11.5 for conventional air cooled units), which allows for much more flexibility in component selection, (i.e., multi-stage, high efficiency, high pressure drop filters may be used without driving the fan BHP so high as to exceed the allowable energy requirements).

Consult your local electrical utility company regarding available rebate incentive programs when using such equipment.

The FW/EC series is compatible with all of the options offered by Engineered Air:

- B (hermetic) or D (semi-hermetic) compressors.
- CU series of split system condensing units (CU- EC).
- DJ gas-fired heat exchanger with 15:1 turndown, 100 MBH to 1400 MBH input.

Comparison: Air-Cooled (AC) vs. Evaporative Condenser (EC)
4-40 HP compressors operating at 40 SST - 80/67 entering DX coil
100 DB/70 WB outdoor ambient temperature



- DG gas-fired heat exchanger with 20:1 turndown, 800 MBH to 6500 MBH input.
- K series of electric heating elements with the Engineered Air H-TRAC binary sequence controller.
- Hot water or steam heating coils, copper or steel tubes, aluminum or copper fins.
- Free cooling/economizer operation.
- Heat reclaim devices.
- Supply and return, heavy - duty forward curve blowers or optional airfoil blowers and plenum fans.
- Variable speed drives, or variable inlet vanes for volume control.
- Silencers for supply and/or return air.
- Pre-filters and after filters for particulate removal.
- HEPA filters (in blow-through configuration) for use in “clean room” applications.
- Chemical filtration for use in removing gaseous contaminants.
- Integral oxidization odor control and UV light sanitation devices.
- Casing construction standards to suit environmental conditions.
- Controls to integrate and interface with building management systems.

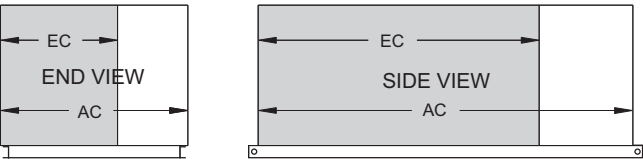


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DESIGN CONSIDERATIONS

The use of Evaporative Condensers not only offers advantages for operating economy, but also the ability to package large tonnage units in compact modules to meet shipping and hoisting limitations.

There are however, design considerations that must



Size Comparison:
Air-cooled Condenser (AC) vs. Evaporative Condenser (EC)

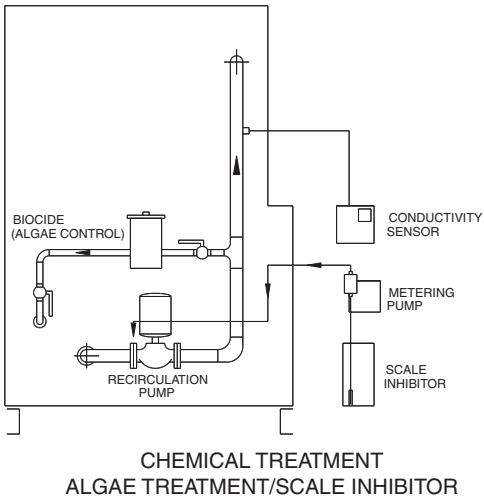
be taken into account; water is an essential element of the Evaporative Condenser and care must be taken in three areas:

- Water purity
- Water usage
- Freeze protection

WATER PURITY

Because heat transfer is accomplished primarily through the evaporation of water, the concentration of dissolved solids can increase rapidly, causing scaling and/or corrosion. In many cases, simple blowdown can be used to control the rate of scale formation. However, a local water treatment specialist should be consulted to ensure optimum operation in the long term.

Algae, fungi and bacteria can also grow in Evaporative Cooling Systems, and can cause illness and inhibit heat transfer if allowed to grow unchecked. In such cases, the common method of control is to introduce a biocide agent to the system. Consult a local water treatment provider to minimize this potential issue.



WATER USAGE

Consult the local water authority for restrictions in your area. Evaporative condensers consume water by evaporation and controlled water control bleed rates.

FREEZE PROTECTION

During the normal course of operation of the Evaporative Condenser, while the recirculation pump is functioning, there is no danger of the water freezing. During periods when no mechanical cooling is required, such as overnight, the outdoor temperature may drop below freezing. An electric immersion heater in the sump of the condenser will prevent damage by freezing, down to 0°F. The sump is usually drained in the winter if mechanical cooling is not required for long periods.

If mechanical cooling must operate at ambient temperatures below 0°F, the use of a remote sump, (and pump), mounted indoors is recommended. Alternately larger sump heaters may be used. Engineered Air can provide, where specified, a storage tank, suitably sized, complete with mounting feet, suction strainer, overflow and drain connections, makeup water connection and level controller.

When specified, Engineered Air can also supply the remote sump circulation pump sized for the required flow rate and the pump head created by the nozzle pressure, piping loss and static head of the system. Consult the Engineered Air sales office for pump motor requirements and application assistance.

