Waterside Economizers

The next set of keywords specifies the operation of a water-side economizer, if present. A water-side economizer consists of a coil attached to a condenser-water loop. The coil operates whenever a cooling load exists, and the outdoor conditions can produce condenser water colder than the mixed-air temperature.

The water-side economizer coil is assumed to be downstream of the mixed air plenum, and upstream of the cooling coil. As such, the cooling coil may supplement the operation of the water-side economizer. The air handler may also have a conventional outdoor-air economizer, in which case the outdoor-air economizer will operate first to meet the supply-air setpoint, then the water-side economizer will supplement the outdoor-air economizer, and the cooling coil will pick up the remaining load, if any.

Water-side economizers are commonly used when a more conventional outdoor-air economizer is not practical. Examples include high-rise buildings without sufficient duct access to the outdoors, and water-loop heat pumps. While some people believe that a water-side economizer can be more energy efficient than an outdoor-air economizer, this is seldom the case for several reasons:

- A water-side economizer coil increases the pressure drop on the supply fan, which results in a significant increase in annual fan energy. Coupled with the increased energy of the cooling tower and condenser water pump, these energy penalties may be considerably larger than the chiller savings.

- Chiller savings will not normally accrue if an outdoor-air economizer can be used instead of a water-side economizer. While it is always true that the outdoor wetbulb is lower than the outdoor drybulb, there is a temperature differential in the cooling tower between the wetbulb and leaving water temperature , and another differential in the economizer coil between the condenser water temperature and the leaving air temperature. To overcome these differentials, the outdoor wetbulb temperature must be 15-20F lower than the outdoor drybulb temperature to produce the same effect as an outdoor-air economizer. Compared to an outdoor air economizer operating at 60F, a water-side economizer must have a wetbulb in the range of 40-45°F, which

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Subtopic help for this Topic:

- WS-ECONO
- WS-ECONO-MIN-DT
- WS-ECONO-XEFF
- WS-ECONO-KW/FLOW
- WS-ECONO-FAN-DT
- WSE-LOOP

- WSE-COIL-DT
- WSE-VALVE-TYPE
- WSE-COIL-HEAD

WS-ECONO

Takes code-words NO and YES to indicate if a water-side economizer will be simulated. It is not necessary that the condenser be water cooled, although this is usually the case.

WS-ECONO-MIN-DT

The temperature difference between the condenser water loop supply temperature and the mixed-air temperature must be greater than this value for the water-side economizer to be activated.

WS-ECONO-XEFF

The coil design effectiveness for the economizer coil, between the condenser water loop and the mixed-air temperature.

WS-ECONO-KW/FLOW

Specifies the additional fan power per unit flow required to overcome the air pressure drop through the economizer coil. The total fan power per unit flow when using a water-side economizer is [SUPPLY-KW/FLOW] + [WS-ECONO-KW/FLOW]. If SUPPLY-KW/FLOW (and SUPPLY-DELTA-T) already take the static pressure of the economizer coil into account, then WS-ECONO-KW/FLOW should be set to zero. It is very important to account for the change in fan power associated with a water-side economizer since it can have a significant effect on the overall energy efficiency and cost effectiveness of this device.

WS-ECONO-FAN-DT

Specifies the additional fan temperature rise required to overcome the air pressure drop through the economizer coil. The total air temperature rise through the fan when using a water-side economizer is [SUPPLY-DELTA-T] + [WS-ECONO-FAN-DT]. If SUPPLY-DELTA-T already takes the static pressure of the economizer coil into account, then WS-ECONO-FAN-DT should be set to zero.

WSE-LOOP

Takes the U-name of the CIRCULATION-LOOP to which the water-side economizer coil is attached. The economizer will normally be attached to the same loop as the condenser, although they may be attached to different loops. Acceptable loop types are CW and WLHP.

WSE-COIL-DT

The temperature change of the condenser water through the water-side economizer coil at design conditions. This value is used, together with the design load and loop fluid characteristics, to determine the design coil flow. If not specified, the default is the LOOP-DESIGN-DT of the attached loop.

WSE-VALVE-TYPE

Takes a code-word that specifies the type of valve this coil has.

TWO-WAY As the load varies, the valve throttles the flow through the coil and loop to maintain the leaving air temperature. No water is bypassed.

THREE-WAY As the load varies, some of the flow is bypassed around the coil to maintain the leaving air temperature. The loop flow remains constant.

WSE-COIL-HEAD

The condenser water pressure drop through the water-side economizer coil at the design flow rate. This value should include the friction losses of the coil's control valve, trim, and any piping associated with the coil and not included in the pressure drop of the loop that serves this coil. The value should be based on the head loss of pure water. This keyword also acts as the default for the keyword of the same name in the ZONE command.