Problem Solver: Excessive Energy Use in a Hydrocooler

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The Problem

A packinghouse operator wants to reduce the electrical energy use of shower-type, continuous-flow hydrocooler designed for bins of stonefruit. The hydro cooler is permanently installed in an un-shaded receiving area. It has uninsulated concrete block walls and the top of cooler is open, allowing solar radiation directly on the top-mounted heat exchanger and the water distribution pan.

Recommendations

Option 1: Cover the top of the cooler with an insulated enclosure and insulate the walls. Insulation will need to be waterproof or installed on the outside of the cooler and protected from weather.
Option 2: Install the cooler in an insulated building.

Outcome

The operator chose to build an insulated building around the hydrocooler. Product entered the cooler through a flap-covered opening in wall of the building. The building was large enough for temporary storage of fruit before packing and cooled product was stacked inside the storage. The operator did not attempt to measure energy savings but the entire temporary storage building was kept cool without an additional refrigeration system.

Comments

Previous research on hydrocoolers indicates that 25% to 30% of the refrigeration load is due to heat conducted across uninsulated surfaces and air infiltration. All of this heat load was converted to useful cooling of the storage room and represents the energy savings achieved.

Hydrocoolers are difficult to insulate because the insulation is subject to wetting and most insulation loses its effectiveness if it is wet. Operators also do not like to enclose the top of the cooler because they need to regularly clean the water distribution pan.

The room was cooled by contact with cold fruit leaving the cooler and contact with cold water in the cooler. This would probably keep the room temperature in the range of 40° to 50°F (5° - 10°C). This is low enough for temporary storage of stonefruit before packing but not cool enough for longer-term storage.