

## Ground Source Heating and Cooling with the IECC

by Peter Tavino PE, CGD

My state (Connecticut) just adopted the International Energy Conservation Code (IECC) for all new construction and major retrofit projects. Building inspectors will review construction documents, and inspect for compliance. Whether the outside ground loop falls within their purview remains to be seen, with some inspectors saying it is not within the building, and others requesting building permit fees in addition to well drilling fees. The purpose of the new code is to improve the residential building envelope, and to improve commercial building systems. The attention to code items should promote more ground source energy use. Here are highlights of interest to **WWGR** readers:

- One way it benefits drilling contractors is it ensures good design and implementation will not overload a properly-installed and grouted closed U-bend loop field. Interior problems that cause the entering water temperature to drop off dramatically in heating season, or rise rapidly in cooling, are avoided, if the code is followed. The better the heat load or loss calculation, ascertained through blower door tests, etc., the more accurate is the load on the loop field and the better its performance will be.

- Section 403.1.2 says heat pumps must have special thermostat controls, to administer backup heat by inefficient electric resistance, only if the heat pump system gets overloaded. This reduces stress on a ground loop, if it is asked to supply or receive Btus (British thermal units) beyond the design conditions.

- Table 503.2.3 (2) requires ground source air conditioners and condensing units < 135,000 Btu/hr at 77°F (25°C) entering water temperature to have an Energy Efficiency Ratio (EER) of 13.4. For heating, 32°F (0°C) entering water temperature, heat pumps need a Coefficient of Performance (COP) of 3.1. So, AHRI (Air-Conditioning, Heating, & Refrigeration Institute) approved machines attached to the loop will ensure optimum performance.

- 503.2.8: Heating and cooling pipes (through the wall to the circulator pump of interest to drilling contractors) must be insulated with 1½-inch\* or 2-inch\* thickness if <55°F (13°C) or > 105°F (40°C), but not for ground source. Insulate only for piping that "conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power."

- 506.5.1(2) recognizes the benefits of ground source by specifying HVAC

(heating, ventilating, and air conditioning) System 6 specs, which allows constant (not variable) volume fan control.

- For geothermal systems with hot water desuperheaters, an automatic switch must stop hot water circulation if no hot water is needed. Where 10% of a loop field is dedicated to hot water supply during heating, wasted heat loss is eliminated.

- The code requires other wasteful elements to be eliminated too, such as loss through ductwork in unconditioned spaces to be sealed and verified. Heat pumps must be properly sized and not unnecessarily oversized. Commercial buildings must have weather-sealed loading docks, vestibules, energy recovery ventilation, etc., and the lighting requirements assure no unforeseen heat loads by inefficient, warm incandescent bulbs.

The IECC is oriented to eight U.S. climate zones, so one size does not fit all. Outside the U.S., apply thermal criteria for comparable zones. Visit the International Code Council's Web site at [www.ICCSafe.org](http://www.ICCSafe.org) to learn more about how the 2009 IECC paves the way for more ground source energy use in our future.

\*(1 inch ≈ 2.54 centimeters)

*Peter*

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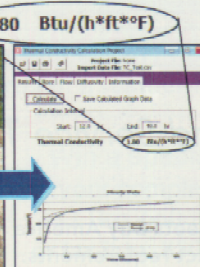
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