U.S. Department of Energy
Energy Efficiency and Renewable Energy

Building Technologies Program

Tax Deduction Qualified Software

Hourly Analysis Program (HAP) version 4.50

On this page you'll find information about the HAP version 4.50 qualified computer software (www.buildings.energy.gov/qualified_software.html), which calculates energy and power cost savings that meet federal tax incentive requirements for commercial buildings.

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Statements in quotes are from the software developer.

Internal Revenue Code §179D (c)(1) and (d) Regulations Notice 2006-52, Section 6 requirements as amplified by Notice 2008-40, Section 4 requirements.	
(1) The name, address, and (if applicable) web site of the software developer;	Carrier / United Technologies Corporation Carrier Software Systems Bldg TR-4, Room 400A P. O. Box 4808 Syracuse, New York 13221
(2) The name, email address, and telephone number of the person to contact for further information regarding the software;	Carrier Software Systems Software.systems@carrier.utc.com +1 (800) 253-1794
(3) The name, version, or other identifier of the software as it will appear on the list;	Carrier HAP version 4.50
(4) All test results, input files, output files, weather data, modeler reports, and the executable version of the software with which the tests were conducted; and	Provided to DOE.
(5) A declaration by the developer of the software, made under penalties of perjury, that—	
(a) The software has been tested according to ANSI/ASHRAE Standard 140-2007 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs;	"The software has been tested according to ANSI/ASHRAE Standard 140-2007 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs."
(b) The software can model explicitly—	
(i) 8,760 hours per year;	"Carrier HAP v4.50 complies."
(ii) Calculation methodologies for the building components being modeled;	"Carrier HAP v4.50 complies."
(iii) Hourly variations in occupancy, lighting power, miscellaneous equipment power, thermostat setpoints, and HVAC system operation, defined separately for each day of the week and holidays;	"Carrier HAP v4.50 complies."
(iv) Thermal mass effects;	"Carrier HAP v4.50 complies."
(v) Ten or more thermal zones;	"Carrier HAP v4.50 complies."

(vi) Part-load performance curves for mechanical equipment;	"Carrier HAP v4.50 complies."
(vii) Capacity and efficiency correction curves for mechanical heating and cooling equipment; and	"Carrier HAP v4.50 complies."
(viii) Air-side and water-side economizers with integrated control.	"Carrier HAP v4.50 complies."
(c) The software can explicitly model each of the following HVAC systems listed in Appendix G of Standard 90.1-2004:	
(i) Packaged Terminal Air Conditioner (PTAC) (air source), single-zone package (through the wall), multi-zone hydronic loop, air-to-air DX coil cooling, central boiler, hot water coil.	"Carrier HAP v4.50 models this system."
(ii) Packaged Terminal Heat Pump (PTHP) (air source), single-zone package (through the wall), air-to-air DX coil heat/cool.	"Carrier HAP v4.50 models this system."
(iii) Packaged Single Zone Air Conditioner (PSZ-AC), single-zone air, air-to-air DX coil cool, gas coil, constant-speed fan.	"Carrier HAP v4.50 models this system."
(iv) Packaged Single Zone Heat Pump (PSZ-HP), single-zone air, air-to-air DX coil cool/heat, constant-speed fan.	"Carrier HAP v4.50 models this system."
(v) Packaged Variable-Air-Volume (PVAV) with reheat, multi-zone hydronic loop, air-to-air DX coil, VAV fan, boiler, hot water VAV terminal boxes.	"Carrier HAP v4.50 models this system."
(vi) Packaged Variable-Air-Volume with parallel fan powered boxes (PVAV with PFP boxes), multi-zone air, DX coil, VAV fan, fan-powered induction boxes, electric reheat.	"Carrier HAP v4.50 models this system."
(vii) Variable-Air-Volume (VAV) with reheat, multi-zone air; multi-zone hydronic loop, air-handling unit, chilled water coil, hot water coil, VAV fan, chiller, boiler, hot water VAV boxes.	"Carrier HAP v4.50 models this system."
(viii) Variable-Air-Volume with parallel fan powered boxes (VAV with PFP boxes), multi-zone air, air-handling unit, chilled water coil, hot water coil, VAV fan, chiller, fan-powered induction boxes, electric reheat.	"Carrier HAP v4.50 models this system."
(d) The software can—	
(i) Either directly determine energy and power costs or produce hourly reports of energy use by energy source suitable for determining energy and power costs separately; and	"Carrier HAP v4.50 complies."
(ii) Design load calculations to determine required HVAC equipment capacities and air and water flow rates.	"Carrier HAP v4.50 complies."
(e) The software can explicitly model:	
(i) Natural ventilation.	"Carrier HAP v4.50 does not explicitly model natural ventilation [and shall not be used for projects with this technology]."
(ii) Mixed mode (natural and mechanical) ventilation.	"Carrier HAP v4.50 does not explicitly model mixed mode (natural and mechanical) ventilation [and shall not be used for projects with this technology]."
(iii) Earth tempering of outdoor air.	"Carrier HAP v4.50 does not explicitly model earth tempering

	of outdoor air [and shall not be used for projects with this technology]."
(iv) Displacement ventilation.	"Carrier HAP v4.50 does not explicitly model displacement ventilation but can model by equivalent means."
(v) Evaporative cooling.	"Carrier HAP v4.50 does not explicitly model evaporative cooling [and shall not be used for projects with this technology]."
(vi) Water use by occupants for cooking, cleaning or other domestic uses.	"Carrier HAP v4.50 does not explicitly model water use by occupants for cooking, cleaning or other domestic uses [and shall not be used for projects with this technology]."
(vii) Water use by heating, cooling, or other equipment, or for on-site landscaping.	"Carrier HAP v4.50 does not explicitly model water use by heating, cooling or other equipment or for on-site landscaping [and shall not be used for projects with this technology]."
(viii) Automatic interior or exterior lighting controls (such as occupancy, photocells, or time-clocks).	"Carrier HAP v4.50 can explicitly model automatic interior and exterior lighting controls such as occupancy sensors or time clocks but cannot model photocells."
(ix) Daylighting (sidelighting, skylights, or tubular daylight devices).	"Carrier HAP v4.50 does not explicitly model daylighting (sidelighting, skylights, or tubular daylighting devices) [and shall not be used for projects with this technology]."
(x) Improved fan system efficiency through static pressure reset.	"Carrier HAP v4.50 does not explicitly model improved fan system efficiency through static pressure reset [and shall not be used for projects with this technology]."
(xi) Radiant heating or cooling (low or high temperature).	"Carrier HAP v4.50 does not explicitly model radiant heating or cooling (low or high temperature) but can model by equivalent means."
(xii) Multiple or variable-speed control for fans, cooling equipment, or cooling towers.	"Carrier HAP v4.50 explicitly models variable speed control for fans, cooling equipment and cooling towers. Carrier HAP v4.50 explicitly models multiple speed fans for cooling towers. Carrier HAP v4.50 does not explicitly model multiple speed control for indoor fans or cooling

	equipoment.”
(xiii) On-site energy systems (such as combined heat and power systems, fuel cells, solar photovoltaic, solar thermal, or wind).	“Carrier HAP v4.50 does not explicitly model on-site energy systems (such as combined heat and power systems, fuel cells, solar photovoltaics, solar thermal or wind [and shall not be used for projects with this technology].”

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