



## Building Technologies Program

### Tax Deduction Qualified Software

#### DOE-2.2 v47d

On this page you'll find information about the DOE-2.2 version 47d [qualified computer software](http://www.buildings.energy.gov/qualified_software.html) ([www.buildings.energy.gov/qualified\\_software.html](http://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;	James J. Hirsch & Associates 12185 Presilla Road Camarillo, California 93012-9243
(2) The name, email address, and telephone number of the person to contact for further information regarding the software;	Jeff Hirsch James J. Hirsch & Associates <a href="mailto:Jeff.Hirsch@DOE2.com">Jeff.Hirsch@DOE2.com</a> +1 (805) 553-9000 (phone) +1 (805) 532-2401 (fax)
(3) The name, version, or other identifier of the software as it will appear on the list;	DOE-2.2 v47d.
(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 Computers Programs."
(b) The software can model explicitly—	
(i) 8,760 hours per year;	"The DOE-2.2 v47d software complies."
(ii) Calculation methodologies for the building components being modeled;	"The DOE-2.2 v47d software 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;	"The DOE-2.2 v47d software complies."
(iv) Thermal mass effects;	"The DOE-2.2 v47d software complies."

(v) Ten or more thermal zones;	"The DOE-2.2 v47d software complies."
(vi) Part-load performance curves for mechanical equipment;	"The DOE-2.2 v47d software complies."
(vii) Capacity and efficiency correction curves for mechanical heating and cooling equipment; and	"The DOE-2.2 v47d software complies."
(viii) Air-side and water-side economizers with integrated control.	"The DOE-2.2 v47d software complies with the air-side economizer requirements and with two forms of water-side economizers (WSE): dedicated WSE coils in air handlers and 'parallel' (i.e., non-integrated) WSE such as a strainer cycle. The DOE-2.2 v47d software cannot model 'parallel' WSE (i.e., with integrated control) and shall not be used for projects with that technology."
(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.	"The DOE-2.2 v47d software models this system."
(ii) Packaged Terminal Heat Pump (PTHP) (air source), single-zone package (through the wall), air-to-air DX coil heat/cool.	"The DOE-2.2 v47d software 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.	"The DOE-2.2 v47d software models this system."
(iv) Packaged Single Zone Heat Pump (PSZ-HP), single-zone air, air-to-air DX coil cool/heat, constant-speed fan.	"The DOE-2.2 v47d software 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.	"The DOE-2.2 v47d software 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.	"The DOE-2.2 v47d software 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.	"The DOE-2.2 v47d software 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.	"The DOE-2.2 v47d software 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	"The DOE-2.2 v47d software complies."
(ii) Design load calculations to determine required HVAC equipment capacities and air and water flow rates.	"The DOE-2.2 v47d software complies."

(e) The software can explicitly model:	
(i) Natural ventilation.	"The DOE-2.2 v47d software can model simple single-zone natural ventilation using air changes per hour (user-defined) or Sherman-Grimsrud (calculated)."
(ii) Mixed mode (natural and mechanical) ventilation.	"The DOE-2.2 v47 software cannot model mixed mode ventilation."
(iii) Earth tempering of outdoor air.	"The DOE-2.2 v47 software cannot model earth tempering of outdoor air."
(iv) Displacement ventilation.	"The DOE-2.2 v47 software cannot model displacement ventilation."
(v) Evaporative cooling.	"The DOE-2.2 v47d software can model evaporative cooling."
(vi) Water use by occupants for cooking, cleaning or other domestic uses.	"The DOE-2.2 v47d software cannot model water use by occupants."
(vii) Water use by heating, cooling, or other equipment, or for on-site landscaping.	"The DOE-2.2 v47d software cannot model water use for equipment or for landscaping."
(viii) Automatic interior or exterior lighting controls (such as occupancy, photocells, or time-clocks).	"The DOE-2.2 v47d software can explicitly model automatic interior or exterior lighting controls such as occupancy sensors or time-clocks, but cannot model photocells."
(ix) Daylighting (sidelighting, skylights, or tubular daylight devices).	"The DOE-2.2 v47d software can explicitly model sidelighting and skylights, but cannot model tubular daylight devices."
(x) Improved fan system efficiency through static pressure reset.	"The DOE-2.2 v47d software cannot model static pressure reset."
(xi) Radiant heating or cooling (low or high temperature).	"The DOE-2.2 v47d software can model low temperature radiant systems but cannot model radiant cooling systems or high temperature radiant heating systems."
(xii) Multiple or variable-speed control for fans, cooling equipment, or cooling towers.	"The DOE-2.2 v47d software can model multiple or variable-speed control for fans, cooling equipment and cooling towers."
(xiii) On-site energy systems (such as combined heat and power systems, fuel cells, solar photovoltaic, solar thermal, or wind).	"The DOE-2.2 v47d software can model on-site energy systems including engines, gas turbines, steam turbine generators and photovoltaic arrays. DOE-2.2 v47d cannot model fuel cells, solar thermal, or wind systems."

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