# Tax Deduction Qualified Software

## TRNSYS version 17.01.0016 and TESS Libraries version 17.1.01

On this page you'll find information about the TRNSYS version 17.01.0016 and TESS Libraries version 17.1.01 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.

Date Documentation Received by DOE: 21 February 2013

*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. | |
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| (1) The name, address, and (if applicable) web site of the software developer; | The University of Wisconsin-Madison Solar Energy Laboratory<br>1500 Engineering Drive<br>Madison, WI 53706-1687<br>http://sel.me.wisc.edu/trnsys/ |
| (2) The name, email address, and telephone number of the person to contact for further information regarding the software; | Matt Duffy<br>duffy@tess-inc.com<br>608.274.2577 |
| (3) The name, version, or other identifier of the software as it will appear on the list; | TRNSYS version 17.01.0016 and TESS Libraries version 17.1.01 |
| (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— | "On behalf of the TRNSYS and TESS Libraries development team I certify the following:" |
| (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— | "The TRNSYS and TESS Libraries software is fully compliant with ASHRAE 90.1-2001 and meets all of the below requirements." |
| (i) 8,760 hours per year; | "The TRNSYS and TESS Libraries software complies." |
| (ii) Calculation methodologies for the building components being modeled; | "The TRNSYS and TESS Libraries software complies." |
| (iii) Hourly variations in occupancy, lighting | "The TRNSYS and TESS Libraries software complies." |

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| power, miscellaneous equipment power, thermostat setpoints, and HVAC system operation, defined separately for each day of the week and holidays; | |
| (iv) Thermal mass effects; | "The TRNSYS and TESS Libraries software complies." |
| (v) Ten or more thermal zones; | "The TRNSYS and TESS Libraries software complies." |
| (vi) Part-load performance curves for mechanical equipment; | "The TRNSYS and TESS Libraries software complies." |
| (vii) Capacity and efficiency correction curves for mechanical heating and cooling equipment; and | "The TRNSYS and TESS Libraries software complies." |
| (viii) Air-side and water-side economizers with integrated control. | "The TRNSYS and TESS Libraries software 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. | "The TRNSYS and TESS Libraries 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 TRNSYS and TESS Libraries 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 TRNSYS and TESS Libraries 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 TRNSYS and TESS Libraries 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 TRNSYS and TESS Libraries software and the TESS Type1271 VAV Component 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 TRNSYS and TESS Libraries software and the TESS Type1271 VAV Component 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 TRNSYS and TESS Libraries software and the TESS Type1271 VAV Component models this system." |

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| (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 TRNSYS and TESS Libraries software and the TESS Type1271 VAV Component 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 TRNSYS and TESS Libraries software complies." |
| (ii) Design load calculations to determine required HVAC equipment capacities and air and water flow rates. | "The TRNSYS and TESS Libraries software complies." |
| (e) The software can explicitly model: | |
| (i) Natural ventilation. | "The TRNSYS and TESS Libraries software models natural ventilation." |
| (ii) Mixed mode (natural and mechanical) ventilation. | "The TRNSYS and TESS Libraries software models mixed mode ventilation." |
| (iii) Earth tempering of outdoor air. | "The TRNSYS and TESS Libraries software with the add-on Type460 Hypocaust models earth tempering of outdoor air." |
| (iv) Displacement ventilation. | "The TRNSYS and TESS Libraries software models displacement ventilation." |
| (v) Evaporative cooling. | "The TRNSYS and TESS Libraries software models evaporative cooling." |
| (vi) Water use by occupants for cooking, cleaning or other domestic uses. | "The TRNSYS and TESS Libraries software models water use by occupants." |
| (vii) Water use by heating, cooling, or other equipment, or for on-site landscaping. | "The TRNSYS and TESS Libraries software models water use by heating, cooling, and other equipment as well as for on-site landscaping." |
| (viii) Automatic interior or exterior lighting controls (such as occupancy, photocells, or time-clocks). | "The TRNSYS and TESS Libraries software models automatic interior and exterior lighting controls." |
| (ix) Daylighting (sidelighting, skylights, or tubular daylight devices). | "The TRNSYS and TESS Libraries software cannot model daylighting but can be linked to daylight programs like Radiance, DaySim, and Diva" |
| (x) Improved fan system efficiency through static pressure reset. | "The TRNSYS and TESS Libraries software cannot model improved fan system efficiency through static pressure reset but can model improved efficiency via other methods." |

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| (xi) Radiant heating or cooling (low or high temperature). | "The TRNSYS and TESS Libraries software models low and high temperature radiant heating and cooling." |
| (xii) Multiple or variable-speed control for fans, cooling equipment, or cooling towers. | "The TRNSYS and TESS Libraries software models multiple and 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 TRNSYS and TESS Libraries software models on-site energy systems including combined heat and power systems, fuel cells, solar photovoltaic, solar thermal, and wind." |

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