



# **SOFTWARE CERTIFICATION CONSENSUS**

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## **Certification Scope**

Develop a software certification program for software meeting the requirements of (A) Chapter 11 – Energy Cost Budget Method (ECB); (B) Appendix G – Performance Rating Method (PRM); or (C) Both Chapter 11 and Appendix G of ASHRAE Standard 90.1-2016, 90.1-2019, and 90.1-2022 that include by reference ASHRAE Standard 140-2014, 140-2017, and 140-2020, respectively. Include ASHRAE Standard 140-2023 with acceptance criteria in anticipation of its requirement in the future. When investigating the Standard 90.1 software requirements determine if certifications could be backwards compatible (i.e., if a software certified for Standard 90.1-2022 it would be considered certified for earlier versions of Standard 90.1). The program should be called the IBPSA-USA Software Certification Program v1.0 for referencing purposes.

## **Software Submission Process**

Develop a web portal that allows for the submission of the required documentation for certifying a software versus the requirements of a specific version of 90.1. The web portal should start with a manual upload of files but be programmed to allow expansion in the future for linking to repositories or including an API for file uploads. Since IBPSA-USA has other software specific information, like the BEST directory, specific web accounts should be developed that allow software vendors to maintain all of their IBPSA-USA information in one place. This account could take the form of a single login that the vendor allows multiple people to use or a list of individual accounts that are authorized to act on behalf of the software vendor. Safeguards should be in place to ensure that people requesting software accounts are true representatives of the software owner. The documentation submission should include the required files from the appropriate version of Standard 140 and a form documenting that the software meets the software requirements

of the specific version of Standard 90.1. This form should be based on the form used in the 179D submittals after it has been reviewed and modified as needed to include all of the Standard 90.1 software requirements for each version of Standard 90.1. In the interest of buy-in to the process by software vendors, the form should only be modified as needed for the Standard 90.1 requirements.

## **Submittal Review Process**

Develop a process where a basic check if all forms are submitted and filled out is done manually by a person. Eventually include this check automatically as part of the submission portal.

For a check of the correctness of the submitted information, develop a process where the submission includes a signed statement of correctness and certify software based on this self-certification. Along with the self-certification, develop a transparent and robust system for challenges of the correctness of submissions (see below).

## **Submittal Challenges and Appeals**

Develop a process to challenge the information on any software submission for certification. The challenge form should require both what information is being challenged and supporting documentation of why the challenger believes the information is incorrect. (A submission just saying “I think XYZ is wrong” with no other information would not be a valid challenge.) Once a challenge is received and confirmed as complete, it will be sent to the appropriate software vendor anonymously to allow for a response to the information in the challenge. Without a response from the software vendor, the challenge will be considered as valid and the certification removed. Once the software vendor has responded, the Software Certification Review Committee will review the challenge and the response. If the response is that

the issue is due to a typo or now fixed bug in the software, a review may not be needed. The Software Certification Review Committee will consist of 5 IBPSA-USA members that are not connected to any software vendors, through direct/indirect distribution of software licenses, direct/indirect software development, or direct/indirect delivery of public software training courses or educational material. The committee will review both the challenge and response asking for clarifications of either as needed and then decide if the challenge is upheld or rejected. At least 3 members of the committee must vote for either upholding or rejecting the challenge. The committee should issue a written explanation of the decision if appropriate. The challenge, the response, the decision, and any written explanation of the decision will be posted on the same website where the list of certified software is posted and be linked to the challenged software. If either the challenger or software vendor wishes to appeal the decision, the appeal is submitted to the Board of Directors for consideration. The details of the challenge and review process shall be posted and linked from the web page that lists the certified software.

## **Publishing the List of Certified Software**

Develop a publicly available website that lists all of the certified software with the name and version of the software and the versions of 90.1 that it is certified for, noting the applicable Methods of Standard 90.1 (PRM and/or ECB), and the date of the certification. Also included should be links to the documentation of any challenges of the certification. A link from the software's profile on the BEST directory to the list of certified software should be provided. Developing a software vendor user account and consolidated webpage including the BEST directory and list of certified software should be investigated. Another possibility to raise awareness of the certification program is to provide a IBPSA-USA "badge" of certification that the software vendor can display on their website if they have been certified. As a phase 2,

posting of all Standard 140 files required by 90.1 should be added to the website.

## **Certifications for New Versions**

Develop a policy that new versions of a software require recertification if they are a) a major release of the software, b) result in changes to the Standard 140 test results, or c) result in any change of the information on the certification submittal form.

## **Outreach to Software Vendors and AHJs**

For a software certification program to be successful it must have uptake by both software vendors and AHJs. Develop outreach materials to promote and advertise the existence and importance of the program. This outreach could take the form of webinars, stakeholder meetings, and presentations. In addition, there is a real cost for the software vendors to complete the certification process. They may not be inclined to participate in the program if there is not a demand for the certification and the cost is too high. There is a possibility here for IBPSA-USA to provide a stipend for early adopters of the certification to defer some of the cost of participating.

# Software Self Certification Form

For which ASHRAE 90.1-2019 calculation method is the software being certified:

- Chapter 11 Energy Cost Budget (ECB)
- Appendix G Performance Rating Method (PRM)
- Both ECB and PRM

Have the ability to explicitly model: (ASHRAE 90.1-2019 Section G2.2.1 (PRM) or 11.4.1.1 (ECB))

- 8760 hours per year
- Hourly variations in occupancy, lighting power, miscellaneous equipment power, thermostat set points, and HVAC system operation, defined separately for each day of the week and holidays
- Thermal mass effects
- Ten or more thermal zones
- Part-load performance curves for mechanical equipment
- Capacity and efficiency correction curves for mechanical heating and mechanical cooling equipment
- Air economizers with integrated control (PRM) and Air-side economizer and fluid economizer with integrated control (ECB)

For PRM, have the ability to either directly determine the proposed building performance and baseline building performance or produce hourly reports of energy use by an energy source suitable for determining the proposed building performance and baseline building performance using a separate calculation engine. (ASHRAE 90.1-2019 Section G2.2.2)

For ECB, have the ability to either directly determine the design energy cost and energy cost budget or produce hourly reports of energy use by energy

source suitable for determining the design energy cost and energy cost budget using a separate calculation. (ASHRAE 90.1-2019 Section 11.4.1.1)

Be capable of performing design load calculations to determine required HVAC equipment capacities and air and water flow rates in accordance with generally acceptable engineering standards and handbooks (for example, ASHRAE Handbook - Fundamentals, Chapter 18) for both the proposed design and baseline building design for PRM (ASHRAE 90.1-2019 Section G2.2.3) or in accordance with ASHRAE 90.1-2019 Section 6.4.2 for both the proposed design and the budget building design for ECB. (ASHRAE 90.1-2019 Section 11.4.1.3)

Perform the simulation using hourly values of climatic data, such as temperature and humidity from representative climatic data, for the site in which the proposed design is to be located. (ASHRAE 90.1-2019 Section G2.3 (PRM) or Section 11.4.2 (ECB))

Have the ability to explicitly model: (ASHRAE 90.1-2019 Section G2.2.1 and Table G3.1.1-4 (PRM), or Section 11.4.1.1 and Figure 11.5.2 (ECB))

- For both PRM and ECB:
  - Packaged terminal air conditioner (PTAC)
  - Packaged terminal heat pump (PTHP)
  - Packaged rooftop air conditioner (PSZ-AC)
  - Packaged rooftop heat pump (PSZ-HP)
  - Packaged rooftop VAV with reheat (Packaged VAV with reheat)
  - Packaged rooftop VAV with parallel fan power boxes and reheat (Packaged VAV with PFP boxes)
  - VAV with reheat (VAV with reheat)
  - VAV with parallel fan power boxes and reheat (VAV with PFP boxes)



- For PRM:
  - Warm air furnace, gas fired (Heating and ventilation)
  - Warm air furnace, electric (Heating and ventilation)
  - Single-zone VAV (SZ-VAV)
  - Single-zone system (SZ-CV-HW)
  - Single-zone system (SZ-CV-ER)
- For ECB:
  - Two-pipe fan coil
  - Water-source heat pump
  - Four pipe fan-coil

Have the ability to explicitly model service water-heating systems with the heating methods:

- For PRM (ASHRAE 90.1-2019 Table G3-1 – section 11 and Table G3.1.1-2)
  - Gas storage water heater
  - Electric resistance water heater
  - Electric resistance storage water heater
  - Condenser heat recovery system
- For ECB (ASHRAE 90.1-2019 Table 11.5.1 – section 11)
  - Electric table-top water heaters
  - Electric storage water heaters
  - Electric instantaneous water heaters
  - Gas storage water heaters
  - Gas instantaneous water heaters
  - Oil storage water heaters
  - Oil instantaneous water heaters
  - Hot-water supply boilers, gas and oil
  - Hot-water supply boilers, gas
  - Hot-water supply coilers, oil
  - Pool heaters, gas

- Heat pump pool heaters
- Unfired storage tanks
- Condenser heat recovery system

For PRM, have the ability to explicitly model baseline building performance requirements of ASHRAE 90.1-2019 Section G3, specifically:

- An energy recovery system with at least 50% enthalpy recovery ratio. (ASHRAE 90.1-2019 Section G3.1.2.10)
- Chilled-water supply temperature reset based on outdoor dry-bulb temperature. (ASHRAE 90.1-2019 Section G3.1.3.8)
- Primary/secondary chilled-water systems with constant-flow primary loop and variable-flow secondary loop. (ASHRAE 90.1-2019 Section G3.1.3.10)
- Axial-fan open-circuit cooling tower with variable-speed fan control heat rejection system. (ASHRAE 90.1-2019 Section G3.1.3.11)
- The effect that structures and significant vegetation or topographical features have on the amount of solar-radiation being received by a structure. (ASHRAE 90.1-2019 Table G3.1 - section 14)
- Low-voltage dry-type distribution transformers. (ASHRAE 90.1-2019 Table G3.1 - section 15)
- Adiabatic and nonadiabatic humidification systems (ASHRAE 90.1-2019 Table G3.1 - section 10)
- Infiltration adjusted at each timestep for weather conditions and HVAC system operation. (ASHRAE 90.1-2019 Table G3.1 - section 5)

For ECB, have the ability to model the budget building requirements of ASHRAE 90.1-2019 Section 11.5.