BSR/ASHRAE Addendum f to
ANSI/ASHRAE Standard 140-2023

First Public Review Draft

Proposed Addendum f to Standard 140-2023, Method of Test for Evaluating Building Performance Simulation Software

First Public Review Draft (November 2026)
(Draft shows Proposed Changes to Current Standard)

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ASHRAE, 180 Technology Parkway, Peachtree Corners GA 30092

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

Foreword to Addendum F

This addendum provides referencing codes and standards a simple reference to 140 instead of the multiple paragraph reference now required. To do this, default requirements for Section 4.5 are provided, which can be overwritten by the adopting organization. In addition, other requirements from the 90.1 and IECC reference have been added, such as posting results to a publicly available website. This is packaged in a new section called "4.1.5 Compliance." References can be made in the following format:

"The simulation program shall be tested according to ASHRAE Standard 140 with D3 and H2 of Section 4.1.5."

This is just an example; the options for letters A through H should be carefully considered by the adopting authority.

For later reference, the sections of Standard 140 containing test suites are:

6. Weather Drivers Tests
7. Building Thermal Envelope and Fabric Load Tests (Class I)
8. Ground-Coupled Slab-on-Grade Analytical Verification Tests
9. Space-Cooling Equipment Performance Tests
10. Space-Heating Equipment Performance Tests
11. Air-Side HVAC Equipment Performance Tests
12. Building Thermal Envelope and Fabric Load Tests (Class II)
13. Thermal Fabric Empirical Validation Tests (added in Addendum b)

[***Note to Reviewers:*** This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and strikethrough (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum *f* to Standard 140-2023

Add the following new term to Section 3.1.

authority having jurisdiction: the agency, agent, building official, code official, governmental entity, or designated authority responsible for administering and enforcing this standard.

Revise Section 4.1 as follows.

4.1 General. The test procedures shall be applied as specified in Normative Sections 5 through 13. Content of the normative sections and organization of the test procedures are described in Sections 4.1.1 and 4.1.2 and in greater detail in Informative Section 4.3. The software shall meet the requirements of 4.1.5 ~~Normative Annex A3, "Software Acceptance Criteria," includes tables of numerical ranges for test cases applied for establishing acceptable software and describes results submission.~~

~~Codes and standards that reference Standard 140 shall be permitted to call out specific sections within Standard 140 to require individual test cases or groups of test cases. Where specific sections are not called out for acceptance criteria, all test groups of Normative Annex A3 shall apply.~~

Insert the following as an entirely new section 4.1.5.

4.1.5 Compliance

Class I software shall meet the requirements of Normative Annex A3, "Software Acceptance Criteria," which includes tables of numerical ranges for test cases applied for establishing acceptable software and describes results submission. The software test results shall meet or exceed the values for "Minimum Number of Range Cases within the Test Group to Pass" in Table A3-11. Codes and standards that reference Standard 140 shall be permitted to require or exclude specific sections within Standard 140. The software shall meet the requirements of Table 4-1 for specified options. If options for Table 4-1 are not included in the citation, then the options indicated as the default item in the "Default" column shall be used. Citations are permitted to describe additional options not shown in Table 4-1. Class I software shall meet the requirements of Sections 4.1.5.1, 4.1.5.2, and 4.1.5.3.

Exception: Software intended for Class II tests.

Informative note: When organizations cite any non-default options in parts c, d, or e of Table 4-1, they should also include how modelers or automated software should report what algorithms or settings were used in their simulations.

Table 4-1 Options and Corresponding Requirements for Compliance

Option	Default	Requirements	Informative Reference
a. Sections of Standard 140 to be completed			
A1	X	Sections 6 through 11 and 13	4.5 (a)
A2		Section 7 only	4.5 (a)
A3		Section 7, 9 through 11, and 13	4.5 (a)
A4		Sections 6 through 8 and 13 only	4.5 (a)
A5		Sections 9 through 11 only	4.5 (a)
b. Acceptance criteria test groups applicability			
B1	X	All Test Groups in Table A3-11	4.5 (b)
B2		Selected Test Groups in Table A3-11: Thermal Fabric High Mass, Thermal Fabric Empirical Validation, Cooling Equipment, Heating Equipment, Air-Side Equipment	4.5 (b)
B3		Selected Test Groups in Table A3-11: Thermal Fabric Low Mass, Thermal Fabric Empirical Validation, Cooling Equipment, Heating Equipment, Air-Side Equipment	4.5 (b)
B4		Selected Test Groups in Table A3-11: Thermal Fabric Low Mass, Thermal Fabric High Mass, Thermal Fabric Empirical Validation	4.5 (b)

B5		Selected Test Groups in Table A3-11: Cooling Equipment, Heating Equipment, Air-Side Equipment	4.5 (b)
c. Untested algorithm usage in simulations performed for the organization's purposes			
C1	X	No requirement. Simulations using untested algorithms are permitted	4.5 (c)
C2		Simulations using untested algorithms are not allowed	4.5 (c)
d. Untested alternative algorithm usage in simulations performed for the organization's purposes			
D1	X	No requirement. Any alternative algorithms to those that were tested are permitted	4.5 (d)
D2		More detailed alternative algorithms than those that were tested are permitted	4.5 (d)
D3		No alternative algorithms to those that were tested are permitted	4.5 (d)
e. Untested numerical settings (for example, time steps and tolerances) usage in simulations performed for the organization's purposes			
E1	X	No requirement. Any numerical setting shall be permitted in the software	4.5 (e)
E2		Numerical settings not tested shall be permitted in the software if at the same or higher resolution than what was used during testing for thermal fabric (Section 7)	4.5 (e)
E3		Numerical settings not tested shall be permitted in the software if at the same or higher resolution than what was used during any testing	4.5 (e)
E4		Only the tested numerical setting shall be permitted in the software	4.5 (e)
f. Non-user-accessible input internal modifications for the purposes of testing in accordance with the test descriptions of this standard, but not made available to the user in the publicly available software			
F1	X	During testing, inputs that are not normally accessible to the user shall be permitted	4.5 (f)
F2		During testing, inputs that are not normally accessible to the user shall not be permitted	4.5 (f)
g. Source code changes for the purpose of running tests that are not made available in the publicly available software			
G1	X	Source code changes between the tested and publicly available	4.5 (g)

		software shall not be permitted	
G2		Source code changes between the tested and publicly available software shall be permitted	4.5 (g)
h. Untested versions of the software			
H1	X	Each major and minor release* of the software shall be tested and documented	4.5 (h)
H2		Every major release* of the software shall be tested and documented	4.5 (h)
H3		Every major, minor, or patch release* of the software shall be tested and documented	4.5 (h)
H4		Each major and minor release* of the software shall be tested and documented if it affects the calculated test results	4.5 (h)
H5		Each major and minor release* of the software shall be tested and documented if the code changes affect the tested algorithms	4.5 (h)

* Major, minor, and patch software release numbering shall be based on Semantic Versioning (https://semver.org/), Calendar Versioning (https://calver.org/), or shall be based on a framework disclosed by the vendor.

4.1.5.1 Testing Parties

Testing shall be performed by the copyright holder of the software or third party authorized by the copyright holder.

Exception: If the copyright holder has not provided results for the current major release and the previous major release, the authority having jurisdiction shall be permitted to authorize a third party to perform the testing.

4.1.5.2 Posting Results

The testing party shall publish the following on a publicly available website for each tested version of the software:

a) Standard output reports demonstrating the software was tested as required in Table 4-1, part a.
b) Standard output reports demonstrating the software meets or exceeds the values for "The Minimum Number of Range Cases within the Test Group to Pass" for all test groups in Table A3-11.
c) All Section 5.1.2 General Reporting Requirements, including all simulation input files (see Section 5.1.2.2) used for generating the test cases.
d) Test case results for the software, along with the results of the other software included in Annexes B8 and B16.
e) The modeler report in Annex A2, Attachment A2.9, Report Blocks A and G shall be completed for results exceeding the maximum or falling below the minimum of the reference values shown in Table A3-1 through Table A3-10.
f) The modeler's report in Annex A2, Attachment A2.9, Report Blocks A and E shall be completed for any omitted results.

4.1.5.3 Different Versions of the Standard

Software that complies with comparable sections of a future version of this standard shall be deemed to comply with those sections in this standard.

Informative note: This section allows the software vendor to test using the latest version of this standard and still show compliance when a citation may be to an earlier version of this standard. This section was added as an addendum to 140-2023 and may be applied to any subsequent version. Software vendors are encouraged to test using the latest version of this standard.