



ASHRAE 90.1-2019 Standard Review

Includes recommendations of the Technical Advisory Group

July 2021

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Introduction

In 2019 and early 2020, the Minnesota Department of Labor and Industry (DLI) and the Minnesota Department of Commerce (Commerce), convened an informal short-term workgroup to examine the potential for allowing local units of government to voluntarily promote or prescribe greater energy efficiency measures for commercial and large multifamily buildings.¹ The workgroup concluded that improving building energy efficiency would have a greater energy savings impact if code improvements were adopted and enforced statewide in the base energy code. The workgroup recommended adoption of the ANSI/ASHRAE/ IES Standard 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings (ASHRAE 90.1) standard every three years, beginning with the adoption of the 2019 edition (ASHRAE 90.1-2019).

Currently, the Minnesota Energy Code adopts the commercial provisions of the 2018 International Energy Conservation Code (IECC), with amendments, which permits the use of the 2016 edition of ASHRAE 90.1 as an alternative compliance path. The workgroup recommended the adoption of ASHRAE 90.1 for three main reasons.

1. ASHRAE 90.1 is the basis for the IECC;
2. With amendments to provide additional energy efficiency performance requirements, Minnesota will achieve the goal of net zero buildings by 2036; and
3. Adoption minimizes complexity and maintains uniform and predictable enforcement of the Minnesota Energy Code for commercial buildings.

Because of the workgroup's recommendation, the Commissioner of Labor and Industry consulted with the Construction Codes Advisory Council (CCAC) about the potential adoption of ASHRAE 90.1-2019.² The CCAC reviews new model codes and provides recommendations regarding their adoption and any recommended revisions to current Minnesota Rules to the Commissioner.³ The CCAC appointed a Technical Advisory Group (TAG) to review the standard and compare it to the existing Minnesota Energy Code and report its findings. A list of TAG members and the organizations they represent is attached as Appendix A. This report contains their findings.

The TAG conducted open meetings to allow the public to attend and participate in the review and discussion of possible modifications to ASHRAE 90.1-2019 for use in Minnesota. As a result, TAG members and the public identified concerns, drafted code change proposals to address these concerns and identified significant issues raised by those proposals.

Many of the code change proposals were editorial, such as renumbering existing Minnesota rule parts to align with the numbering and organizational structure of ASHRAE 90.1-2019 or repealing existing rule parts because

¹ See a copy of the workgroup's report [here](#).

² See [Minnesota Statutes Section 326B.106, subdivision 1](#).

³ See [Minnesota Statutes Section 326B.07](#).

ASHRAE 90.1-2019 has adopted similar language. These types of changes recommended by TAG members do not present meaningful or substantive changes to the provisions of ASHRAE 90.1-2019 or current rules.

This report highlights the significant code change proposals that TAG members recommend to the CCAC.

Commercial Energy Code (Chapter 1323)

The Commercial Energy Code TAG met seven times to review ASHRAE 90.1-2019 and Minnesota Rules, chapter 1323, which adopts the 2018 IECC with amendments. TAG members received 42 code change proposals. The Commercial Energy Code TAG members recommend adopting ASHRAE 90.1-2019 with the following significant proposed changes.

Recommended code changes

1. Amend Minnesota Rules, part 1323.0010, to incorporate by reference ASHRAE 90.1-2019 so it is the only commercial energy compliance path. Currently, the rule adopts the 2018 IECC which permits the use of ASHRAE 90.1-2016 as an alternate compliance path. The 2018 IECC is based on ASHRAE 90.1-2016 and largely duplicates the requirements of that standard, resulting in confusion for designers and inspectors when determining a compliance path. Adoption of only ASHRAE 90.1-2019 will be a more uniform code resulting in Minnesota adopting the latest improvements in energy efficiency more quickly.
2. Modify section 2.1 to require all historical buildings, including low-rise residential historical buildings, to comply with the Minnesota Commercial Energy Code. Minnesota Rules, chapter 1322, the Minnesota Residential Energy Code, does not include requirements for historical buildings. The current Minnesota Commercial Energy Code allows more flexibility which is necessary when addressing historic buildings and should apply to all historical buildings for better energy efficiency.
3. Modify section 4.2.1.3 to clarify that alterations to existing buildings shall comply with the current energy code requirements with an exception for specific components, elements or features determined to be historic by the historic authority having jurisdiction.
4. Modify section 5.1.2.3 to require building official approval before a building can be classified as semi-heated. A requirement is added for fire sprinkler systems installed in semi-heated spaces to be designed to operate in below-freezing temperatures.
5. Modify exception 9 to section 5.1.3 to allow relaxation of the R-value requirements for insulation located completely above the roof deck when technically infeasible due to existing drainage conditions and the maximum insulation thickness is utilized with the insulation type having the highest R-value per inch available.
6. Modify section 5.1.4 so the following counties are in Climate Zone 6A instead of Climate Zone 7: Becker, Clay, Grant, Kanabec, Mille Lacs, Otter Tail, and Wilkin.
7. Modify section 5.5.3.1 to require both skylight curbs and mechanical curbs to have an R-value not less than R-10 instead of the current R-5 requirement.
8. Modify section 5.5.3.3 to no longer permit insulation on the interior side of below grade walls and require insulation to be either integral or located on the exterior side of below grade walls. This modification will make below grade walls warmer and reduce condensation on the interior side of the

wall. Additionally, these requirements will eliminate the thermal short circuit where the floor or wall system above interfaces with the foundation wall.

9. Modify section 6.1.1.3.6 to require new mechanical curbs installed within existing roof systems to be installed at such a height as to allow for future installation of roof insulation at a thickness compliant with the current Minnesota Commercial Energy Code.
10. Modify section 6.1.1.4 to add a new subsection prohibiting the heating of commercial parking facilities and clarify requirements located in existing Minnesota Rules, part 1323.0401, subpart 2. The prohibition on heated parking facilities applies to all non-private parking facilities with exceptions for 1) vehicle showrooms used for vehicle sales and 2) parking that is open to the public and accessory to private parking where the parking open to the public is less than 10 percent of the total number of spaces.
11. Modify section 6.4.2.1.1 Climatic Data Design Conditions to reference ASHRAE 169 and www.ASHRAE-meteo.info as a national standard reference for climatic data. Winter design temperatures are based upon the mean extreme annual temperature and summer conditions are the 1 percent annual cooling design conditions. Both criteria most closely approximate the existing design criteria in the current Minnesota rule.
12. Modify table 6.5.6.1.2 to eliminate the requirement for exhaust air energy recovery when the outdoor airflow rate is under 20 percent because energy recovery at these lower flow rates is not cost effective.
13. Modify section 7.1.1.3 to require heat traps on replacement water heaters and accessible hot water piping to be insulated to the current Minnesota requirements.
14. Delete section 8.4.2 Automatic Receptacle Controls. This proposal generated discussion by TAG members and the public. There was strong support for maintaining this requirement because automatic receptacle controls are required by the current code and a study performed for the Minnesota Department of Commerce indicated that receptacle controls are an effective means to reduce energy consumption.⁴ However, automatic receptacle controls add to the cost of building because a second set of circuits is required to control half of the outlets. Furthermore, building occupants typically by-pass the automatically controlled receptacles by using power strips so they provide little energy conservation benefit.
15. Modify section 9.4.5 to establish lamp efficacy requirements for agricultural lighting.
16. Modify section 11.2 to limit building envelope trade-offs when using the Performance Compliance path. The building envelope has a significant impact on building energy performance and is not readily modified after initial construction unlike equipment which is replaced with over time.
17. Adopt and modify Addendum by. Addendum by requires on-site renewable energy equipment, such as solar photovoltaic panels, on any new building or addition over 10,000 square feet and that the equipment have a production capacity equal to or greater than 0.25 watts per square foot of building area. The proposed modifications to Addendum by limits the production capacity of on-site renewable energy equipment to 40 KW where the building is not constructed in an area serviced by a public utility because net-metering requirements for non-public utilities are capped at 40 KW. An exception from on-

⁴ See a copy of the report [here](#).

site renewable energy equipment requirements when energy is contracted from a local community solar garden or community renewable energy facility was also recommended.

Other code changes TAG members did not agree to recommend

1. Redefine “building entrance” to require vestibules as a means of energy conservation at more exterior door locations from occupied space.
2. Modify section 5.4.3.1.1 to lower the approval threshold for air barrier testing from 0.40 cfm/ft² to 0.25 cfm/ft². TAG members determined that this is technically attainable for new construction that is more compartmentalized but large and open commercial facilities, such as warehouses, still struggle to meet the model code requirement.
3. Modify section 5.5.3.2 to require above-grade wall insulation to be either integral with the wall or installed toward the exterior side of the wall. The TAG members do not recommend this code change because it would radically change the way that single wythe masonry construction would need to be approached and result in significant cost increases for this highly cost-effective construction method.
4. Modify section 5.5.3.5 to require perimeters to be insulated on the exterior side of the slab foundation wall and all slab-on-grade floors in conditioned spaces to have insulation under the slab. The TAG members do not recommend this change due to expense.
5. Modify section 6.4 to add a section requiring certain occupancies to be equipped with dedicated outdoor air systems (DOAS). The TAG members do not recommend this code change due to costs and these systems may not provide the same energy savings in Minnesota as they do in other regions with different climatic conditions.
6. Modify exception 6 of section 6.5.6.1.2 to require more buildings to have energy recovery ventilation. The TAG members determined that none of the proposals adequately addressed the exception in a way that was clear and cost effective.
7. Modify section 8.4 to add a section requiring new buildings with combustion water heating equipment to have the electric infrastructure necessary for the future installation of heat pump water heater. The TAG members do not recommend this code change because it is premature and the heat pump water heaters are not yet the norm.
8. The TAG discussed a code change proposal to add sections 8.4 and 10.4 to mandate providing power for a minimum number of electric vehicle charging stations at parking facilities. The TAG members determined that the goal of the energy code is to improve building energy efficiency, which does not include electric vehicle charging.
9. Delete Normative Appendix G, Performance Rating Method. The TAG members do not recommend this code change because it provides an alternative path for energy compliance that is necessary for some buildings.

Statutory Requirements

Under Minnesota Statutes, section 326B.106, in consultation with the Construction Codes Advisory Council, the Commissioner has authority to establish a code of standards for the construction, reconstruction, alteration, and

repair of buildings including design and construction standards regarding heat loss control, illumination, and climate control. This code includes design and construction standards regarding heat loss control, illumination, and climate control that are regulated by the Minnesota Energy Code. The code is to conform as much as possible to the model building codes but amendments are permitted for its use in Minnesota. To ensure conformity with model codes used nationally and keep pace with advances in construction methods and technologies, the Commissioner is required to review the model building codes every six years, with the exception of energy codes for which there are special requirements.

Minnesota Statutes, section 326B.106, subdivision 1(d), includes special requirements regarding the commercial energy code. Unlike the other model building codes, the Commissioner is required to comply with federal law by acting on each new model commercial energy code for which the United States Department of Energy (DOE) has issued an affirmative determination. The federal law requires DOE to evaluate each update of ASHRAE 90.1, which occurs every three years, and issue a determination about whether the update will improve energy efficiency in commercial buildings.⁵ From two years of the date of the publication of the determination, each state must certify that it has reviewed and updated its commercial energy code as necessary to meet or exceed the updated edition. On April 21, 2021, DOE issued a preliminary determination that ASHRAE 90.1-2019 will achieve greater energy efficiency in buildings when compared to the previous edition of the standard.⁶ It is anticipated that DOE will issue a final affirmative determination, and the Commissioner will be required to act on ASHRAE 90.1-2019 in accordance with state and federal law.

⁵ See [42 U.S.C. § 6833\(b\)\(2\) \(2019\)](#).

⁶ See more information about the DOE preliminary determination, including a [technical analysis](#) here: <https://www.energycodes.gov/development/determinations>.

Appendix A – Technical Advisory Group Members

Technical Advisory Group Members			
Name	Role	Organization	Representing
Greg Metz, AIA	TAG Lead, Building Plan Review Supervisor	DLI/CCLD	N/A
Barry Greive	Building Code Specialist	Target Corp.	Building Owners and Operators
Gerhard Guth, AIA	Architect	HGA, AIA Rep	Architectural Design
Julianne Laue, PE	Director of Building Performance	Mortenson	Commercial Construction
Britt McAdamis, CBO	Municipal Building Official	City of Duluth	Plan Review and Code Enforcement
Ben Rabe	Director of Built Environment	Fresh Energy	Energy Conservation Advocacy
Chris Rosival, CBO	HVACR Code Specialist	DLI/CCLD	N/A
John Smith, PE	Building Systems Engineer	Michaud Cooley Erickson	Engineering Design