

1/6/92

STATE OF MINNESOTA  
DEPARTMENT OF PUBLIC SERVICE

In the Matter of the Proposed Amendments  
to Rules of the Minnesota Department of  
Public Service amending the State Building  
Code regarding Heat Loss, Illumination, and  
Climate Control (Minn. Rules ch. 7670).

STATEMENT OF NEED  
AND REASONABLENESS

December 1991

I. INTRODUCTION

The Commissioner of the Minnesota Department of Public Service (department) proposes to adopt amendments to Minn. Rules Chapter 7670, rules known as the Minnesota Energy Code.

The principal rule changes proposed include new requirements for heating, ventilation and air conditioning (HVAC) equipment and systems, changes and added requirements for building envelopes and modifications to the lighting power budget standards. Reorganization and grammatical changes are proposed to improve clarity and to conform with current style requirements.

The department began the present rule notification process on 20 May 1991, by publishing a note in the State Register (15 S.R. 2498) soliciting opinions and information from the public on the rules regarding the Minnesota Energy Code. The notice was subsequently amended on 24 June 1991 (15 S.R. 2758) to reference new legislation and amend the date within which facts and opinions were being solicited.

II. STATEMENT OF DEPARTMENT'S STATUTORY AUTHORITY

The Commissioner's authority to adopt the rule amendments is set forth in Minnesota Statute § 216C.19, subd. 8 which provides:

In recognition of the compelling need for energy conservation in order to safeguard the public health, safety, and welfare, it is necessary to provide building design and construction standards consistent with the most efficient use of energy. Therefore, the commissioner shall, pursuant to chapter 14, adopt rules governing building design and construction standards regarding heat loss control, illumination and climate control. To the maximum extent practicable, the rules providing for the energy portions of the building code shall be based on and conform to model codes generally accepted throughout the United States. The rules shall apply to all new buildings and remodeling affecting heat loss control, illumination and climate control. The rules shall be economically feasible in that the resultant savings in energy procurement shall exceed the cost of the energy conserving

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requirements amortized over the life of the building. The rules adopted pursuant to this subdivision, shall be part of the state building code. Notwithstanding the provisions of this subdivision, all applications for approval of building specifications and plans may be submitted to the state building inspector as provided in section 16B.66.

In addition, Laws of Minn. 1991 Chapter No. 235 (H.F. 1246) Article 1, Section 6 requires adoption of ASHRAE/IES standard 90.1 by September 1, 1992. Laws of Minn. 1991 Chapter No. 149 (H.F. 132) Section 4 requires, in part, that the Minnesota energy code equal or exceed the most energy-conserving codes adopted by any other state in the Nation. The proposed rule amendments are a logical progression toward meeting the goals set by the 1991 statutes.

Minn. Stat. chapter 14 requires the department to make an affirmative presentation of facts establishing the reasonableness of the proposed rules. This means that the department must set forth the reasons for its proposal, and the reasons must not be arbitrary or capricious. However, to the extent that need and reasonableness are separate, need has come to mean that a problem exists which requires administrative attention, and reasonableness means that the solution proposed by the department is appropriate. The need and reasonableness for the proposed rule amendments are discussed below.

### III. STATEMENT OF NEED

Minnesota rules governing the Minnesota Energy Code were last modified effective May 11, 1991. Shortly after that date, two Minnesota statutes providing specific directives for the department regarding the State energy code were enacted:

Laws of Minn. 1991 Chapter No. 149 (H.F. 132) Section 4 provides:

Subd 1. [ENERGY EFFICIENCY.] By August 1, 1991, the commissioner of public service, in consultation with the commissioner of administration, shall solicit outside information under Minnesota Statutes, section 14.10, on proposed amendments to the Minnesota building code. The commissioner shall begin rulemaking to adopt the amendments by February 1, 1993. So far as is compatible with interests of public health and safety, the amendments must be designed to equal or exceed the most energy-conserving codes adopted by any other state. To the extent practicable, the codes must equal or exceed the model conservation standards proposed by the Pacific Northwest Power Planning Council for climate zones having 8,000 to 10,000 heating degree days.

Subd. 2. [ENERGY EFFICIENCY; COMMERCIAL HEATING, VENTILATION, AND AIR CONDITIONING.] By August 1, 1991, the commissioner of public service shall solicit outside information under Minnesota Statutes, section 14.10, on proposed codes or standards for commercial heating, ventilation, and air conditioning systems and installations to assure that new and remodeled commercial development in Minnesota is as energy efficient as practicable and compatible with public health and safety. The commissioner shall begin rulemaking to adopt the codes by February 1, 1993.

Laws of Minn. 1991 Chapter No. 235 (H.F.1246) Section 5 provides:

Subd. 1. [COMMISSIONER TO ADOPT.] Not later than September 1, 1992, the commissioner of public service shall adopt amendments to the energy code portion of the Minnesota building code to implement energy-efficient standards for new commercial buildings.

Subd. 2. [ADOPTION OF ASHRAE/IES 90.1 STANDARD.] The standards adopted under subdivision 1 must require energy efficiency at least as stringent as:  
(1) the "minimum performance" standards for opaque building envelopes; and  
(2) the January 1, 1992, standards for heating, ventilating and air conditioning, and water heating as proposed in ASHRAE/IES standard 90.1.

Subd. 3. [LIGHTING STANDARDS.] The standards adopted under subdivision 1 must be at least as stringent as lighting standards for new federal buildings (for 1993) in Code of Federal Regulations, title 10, section 435.103.

While all changes proposed by the department are needed for a variety of reasons detailed below, they are also needed to satisfy the 1991 statutes just cited. The present rulemaking is expected to be completed well before either of the dates cited in the statutes (1 September 1991 and 1 February 1993). The department is proceeding to "phase in" the changes to allow the building designers and code officials to absorb the changes.

In the present proposed changes, the department proposes to adopt higher efficiency requirements for heating, ventilation and air conditioning (HVAC) and service water heating equipment. The proposed requirements will save substantial energy and are cost-effective. Proposed changes to envelope requirements will save energy and protect the installed thermal insulation by reducing air leakage into insulated cavities. Additions and changes are proposed for lighting and other electrical equipment are needed because they would cost-effectively reduce consumption of electrical energy in buildings.

#### IV. STATEMENT OF REASONABLENESS

Minnesota Statutes Ch. 14 requires the department to make an affirmative presentation of facts establishing the reasonableness of the proposed rules. This means that the department must set forth the reasons for its proposal, and the reasons must not be arbitrary or capricious. However, to the extent that need and reasonableness are separate, need has come to mean that a problem exists which requires administrative attention, and reasonableness means that the solution proposed by the department is appropriate. Discussion of the need and reasonableness for the proposed rule amendments follows.

##### A. Part 7670.0100, AUTHORITY; SCOPE; APPLICABILITY

###### subp. 3. Applicability

The department proposes to amend this subpart to include, for the purposes of this part, driveways, walkways, entrances, parking lots, and grounds.

Part 7670.0800, subp. 2 (lighting power budget) specifically sets standards for lighting energy use in the areas listed in the proposed amended language. Part 7670.0100, subp. 2 acknowledges that chapter 7670 is part of the State Building Code, yet the listed areas are not within the scope of the State Building Code. Therefore, the proposed addition is needed to expand the scope of chapter 7670 to include areas for which part 7670.0800, subp. 2 sets standards.

The proposed change is reasonable because it extends coverage of the chapter to areas for which this chapter already sets standards. Furthermore, the existence of the energy budget approach (Chapter 4 of the Model Energy Code) allows a building to be designed in any manner as long as the total energy use does not exceed the annual energy that would be used if the building were designed in conformance with the prescriptive requirements of the code. Thus, if a design uses more lighting power for the areas listed above than is allowed by the prescriptive language in the Model Energy Code permits, the energy budget approach could be employed to accommodate the design.

##### B. Part 7670.0130, INCORPERATIONS BY REFERENCE

###### Subp. 1, Incorporated items, item I.

The department proposes to delete incorporation of the WINDOW computer program, and

in its stead incorporates NFRC Standard 100-91: Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values).

This change is needed to maintain reference to industry standards commonly in use. The National Fenestration Rating Council published Standard 100-91 in response to a lack of a widely accepted, uniform and accurate window thermal performance measurement standard. It is anticipated that this standard will become widely used by window manufacturers.

This change is reasonable because the WINDOW computer program is referenced within Standard 100-91 as an acceptable method of determining window thermal performance. This change is further reasonable because it merely adds one additional option to the list of acceptable methods for determining window thermal performance.

### C. Part 7670.0260 MATERIALS AND EQUIPMENT

The department proposes to amend this part by adding stipulation that insulation materials must achieve stated performance at 75°F mean temperature and at winter design conditions. An exception is made to the proposed requirement for thermal insulation designed to reduce summer cooling load only.

This change is needed to assure that consumers will not be misled about the performance of thermal insulation installed in buildings. Thermal insulation materials generally perform better at lower mean temperatures, and establishing a 75°F mean temperature will assure that the performance of a particular product will not be inflated. For example, Type I polystyrene has a nominal R-value of 3.60 per inch at 75°F mean temperature and 4.00 per inch at 40°F mean temperature.

This change is also needed to prohibit installation of thermal insulation materials that fail to provide rated performance at Minnesota winter design temperatures. The envelope U-value calculations performed to demonstrate compliance with this chapter assume the thermal insulation will perform as it is rated (at 75°F). The thermal insulation should perform as rated at the winter design temperature, or the building's heating equipment may be undersized and the building's annual energy consumption will rise.

The change is reasonable because the performance of thermal insulation at 75°F mean temperature is established as a national standard by the Code of Federal Regulations, title 16, part 460, known as the "Federal Trade Commission R-value rule." It is reasonable to expect that installed thermal insulation will perform at its rated value

at winter design conditions because the building heating system sizing procedure assumes this value.

The exception noted is both needed and reasonable because certain thermal insulation products (i.e., radiant barriers and radiation control coatings) may only be effective for reducing summer heat gain. Therefore, these products must be excepted from the requirement to achieve their rated performance at winter design conditions.

#### **D. Part 7670.0325, DEFINITIONS**

##### **subp. 4, Window area**

The department proposed to delete the existing language defining window or glazing area, and replace it with the phrase "rough opening less installation clearances."

The change is needed because it is a much better definition. In addition, the department expects this definition to be soon adopted as a standard term used by the window manufacturing industry.

The change is reasonable because this definition has been adopted by the National Fenestration Council in standard NFRC 100-91, which is proposed to be adopted by reference in the present rulemaking.

##### **subp 5, Advanced framing**

The department proposes to add a definition for "Advanced framing." The definition specifically describes framing techniques used to minimize the amount of uninsulated area that is required for structural support.

This new definition is needed because it is used in the proposed amendment to part 7670.0470, subp. 3. It is available as a component of several options to meet wall U-value by alternative compliance method. In addition, the definition and use of this term is needed for the department's phased adoption of energy standards at least as stringent as the Model Conservation Standards, as required by the above cited legislative mandate.

The adoption of this definition as proposed is reasonable because it is taken from the Model Conservation Standards and the Oregon Energy Conservation Code (which itself is based on the Model Conservation Standards). The department is currently printing an edition of the Home Builders' Energy Update to feature advanced framing techniques. It will be distributed to home builders and building officials in Minnesota before the adoption of this proposed rule amendment. The department's effort to inform users

of this chapter of the meaning of "advanced framing" adds to the reasonableness of including this definition.

**E. Part 7670.0470 AMENDMENT TO SECTION 502: ENVELOPE THERMAL TRANSMITTANCE**

**Subp. 2. Window area and skylight elements.**

The department proposes to delete language stating design conditions to be used from item number 4 in the list of alternate methods of determining thermal transmittance for windows and skylights. Reference standard RS-29 (the WINDOW computer program in existing rule) is amended to be the National Fenestration Rating Council Standard 100-91 in this rulemaking.

The change is both needed and reasonable because the NFRC Standard 100-91 already states the design conditions. To have the design conditions repeated in ch. 7670 would be an unnecessary duplication.

**Subp. 3. Alternative compliance.**

The department proposes to amend the alternative compliance method (commonly referred to as the "cook-book approach") for one- and two-family dwellings. The amendment expands the choices from a single choice to forty combinations of wall systems.

This change is need for several reasons. One is that the proposed language more accurately describes the requirements than does the existing language. For example, it has always been unclear whether the R-value proscribed for the "insulated cavity" was for the cross-section of the entire insulated cavity portion of the wall, or was the R-value of the insulation within the wall. The proposed change is needed because the language describing the requirement is much clearer.

Another reason the proposed change is needed is that the single window U-value of 0.49 is very restrictive. Most window manufacturers carry window models that far exceed this standard. The change is needed to allow use of higher performing (i.e., lower U-value) windows in this "cookbook" method.

The change is reasonable because it merely gives additional options. A builder can still use the component performance approach to use whatever of window, wall and roof that achieves the overall building thermal performance. The department has published other wall combinations that can be used to meet the required wall thermal performance of U-0.11 overall.

The proposed change is also reasonable because the department has informed users of this chapter that the values proposed here do achieve a wall U-value of 0.110. The information was published in the Home Builders Energy Update (Attachment A) mailed to 5,000 builders and building officials in Minnesota in October 1991.

The reference to R-15 and R-21 cavity insulation cavity is reasonable because all fiberglass batt manufactures now make these two higher performing batts (Attachment B).

**F. Part 7670.0480 AMENDMENT TO SECTION 502: EFFECTIVENESS OF REQUIRED THERMAL INSULATION**

The department proposes to renumber the paragraphs amended in this part (e.g., 502.1) to make the requirements applicable to all buildings. The present numbering (e.g., 502.2) means that the requirements are only applicable to single and multi-family buildings three stories and less.

This change is needed because consistent with ASHRAE 90.1-1989 Additional evidence for need of this change is provided by a 16 September 1991 letter from Legend Technical Services, Inc. (Attachment C).

This change is reasonable because generally (but not always) it is the practice to provide protection for thermal insulation as described in these paragraphs.

The department proposes to additionally amend this part by deleting the requirement that the vapor retarder be continuous.

This change is needed because the existing requirement is not necessary to protect insulation from condensation. Because water vapor diffusion is a function of the surface area covered by the vapor retarder, small discontinuities in the vapor retarder do not allow a significant amount of water vapor transmission. The change is further needed to permit the use of foil-backed drywall as a vapor retarder.

The change is reasonable because the narrow gap in the vapor retarder (about 1/2-inch) formed when sheets of foil-backed drywall are butted is over solid blocking (i.e., the stud) and does not significantly reduce the effectiveness of the vapor retarder.

**G. Part 7670.0500 SLAB ON GRADE FLOORS**

The department proposes an editorial change to this part to reference the correct table in the Model Energy Code, 1989 Edition.



This change is both needed and reasonable because it simply makes this existing requirement consistent with the table numbering system of the 1989 edition of the Model Energy Code. The need for this change was overlooked when the 1989 Edition of the Model Energy Code was first adopted in May 1991.

#### **H. Part 7670.0510 AMENDMENT TO SECTION 502: FOUNDATION WALLS**

The department proposes to combine Model Energy Code section 502.2.1.6 with 502.2.1.5 without changing any of the requirements of this section.

The paragraphs in Model Energy Code that are combined in this proposed change relate to basement walls and crawl space walls, respectively. The change is needed to clarify the applicability of the requirement, since both crawl space walls and basement walls are in fact foundation walls.

The change is reasonable because it merely clarifies this part without changing the requirement.

#### **I. Part 7670.0550 AMENDMENT TO SECTION 502: AIR LEAKAGE**

##### **Subp. 3. Air leakage.**

The department proposes to add sections 502.4.5 and 502.4.6 to the Model Energy Code requiring blockage of air movement through rim joists and the top of interior partition walls that join insulated ceilings.

These new requirements are needed to assure that these two locations in buildings are sealed to prevent air leakage and resulting energy loss and moisture damage. Both the needs for these measures and techniques for accomplishing them are discussed in the Home Builders' Energy Update Summer 1987 and Summer 1988 editions (Attachments D and E). The fact that rim joists are not sealed in Minnesota buildings was demonstrated in a 1985 research project conducted by the department (Attachment F). The department has seen no evidence that construction practice has changed since 1980 when the buildings investigated in the project were built.

The need for air sealing the rim/band joist (and where floor joists or trusses intersect the building envelope) is further illustrated in a letter received from Advanced Certified Thermography dated 6 November 1991 (Attachment G).

These additions are needed to give added emphasis and clarity to this requirement. Even though section 502.4.3 of the Model Energy Code requires that "Exterior joints in the building envelope that are sources of air leakage ... must be sealed in an

approved manner," the department believes that this is not routinely being done at areas addressed by the proposed amendment.

The proposed additions are reasonable because they simply restate requirements already in section 502.4.3 of the Model Energy Code. There may be concern expressed that these requirements (even though they are not new) may not be reasonable because residential buildings may, when these requirements are implemented, be insufficient ventilation to provide acceptable indoor air quality. However, no basis exists for the assumption in the aforementioned concern that leakage at rim joists and tops of partition walls will provide sufficient ventilation air to buildings. Furthermore, air leakage at the top of interior walls may actually compete for air used by exhaust appliances during cold weather because of the stack effect of the house.

#### **J. Part 7670.0610 AMENDMENTS TO SECTION 503: BUILDING MECHANICAL SYSTEMS**

The department proposes to add several requirements (subparts 3 through 10) for HVAC systems in buildings. These requirements are based on ASHRAE Standard 90.1-1989.

All the new requirements in this part are needed as part of the department's phase-in of ASHRAE Standard 90.1-1989 discussed above. Another reason the changes in this part are needed is to adopt national consensus standards as given in the Commissioner's authority to adopt rules cited above: "To the maximum extent practicable, the rules providing for the energy portions of the building code shall be based on and conform to model codes generally accepted throughout the United States." Additional reasons for the need of each subpart are given below.

All the requirements are reasonable because they were developed as part of the ASHRAE consensus standard process. In addition, representatives of the department met with the codes committee Consulting Engineers Council of Minnesota on 22 October 1991 to discuss these provisions, and the consensus of that meeting was that changes were needed and reasonable. Additional reasons for the reasonableness of each subpart are given below.

#### **Subp. 3 Air-systems**

The department proposes to amend the air distribution efficiency standard in the Model Energy Code to replace the "air transport factor" criteria with requirements for maximum power at design conditions.

This amendment is both needed because the "air transport factor" is a confusing

term, and for that reason has generally been generally ignored by both designers and building officials. The specification of watts per cfm (cubic feet per minute air flow) is a meaningful criterion, and much better compliance is expected. The two different criteria for constant air volume and variable air volume (VAV) systems are needed because, while VAV systems are more efficient, they do have increase fan power requirements at design conditons.

**Subp. 4 Piping system design criteria.**

The department proposes to amend the Model Energy Code piping system design criteria to include a maximum permitted piping friction loss at specified design criteria.

This amendment is needed because the existing criterion in the Model Energy Code calls for piping system transport factor of no more than an equivalent air transport factor (see comments on air transport factor above). The specification of friction pressure loss is a meaningful criterion, and much better compliance is therefore expected.

**Subp. 5. Variable flow pumping.**

The department proposes to amend the Model Energy Code to require variable flow pumping for systems serving control valves, with two exceptions noted.

This addition is needed because variable flow pumping is a substantially more efficient system that is rapidly replacing constant flow pumping in all applications of HVAC systems. Design engineers have told the department that variable flow pumping is always a cost-effective energy conservation strategy, with the exception of the two cases noted.

**Subp. 6. Balancing**

The department proposes to add requirements to provide for and to perform balancing of air and hydronic HVAC systems. The proposed section further requires that (with exceptions for smaller motors) to meet system flow conditions, fan and pump speed be adjusted, or pump impellers be trimmed.

The need and specific language of this proposed change were extensively discussed with design engineers and building officials. The consensus was that the requirement as proposed is needed, will result in substantial cost-effective energy conservation and is enforceable. The exceptions (taken from Standard 90.1-1989) are also needed

because the energy conserved for applying this requirement to smaller motors would not be substantial and the cost would be high.

### Subp. 7. Controls

The department proposes to add three requirements for controls: for variable air volume systems, supplementary heater systems, and that control systems be tested.

These three requirements are needed because each would result in substantial cost-effective energy savings, yet they do not exist in the Model Energy Code. The requirement that HVAC control systems be tested to assure proper working condition (current installation practice does not always include this step) will benefit building owners by increasing the probability that equipment they have paid to be installed is indeed working.

### Subp. 8. Air-handling duct system insulation

The department proposes to modify the note defining delta T within section 503.9.1 of the Model Energy Code. The proposed modification replaces the words "duct surface" with "ambient temperature outside of the duct."

The need for a change in this item is shown by examination of the present definition: "where delta T = the design temperature differential between the air in the duct and the duct surface." Since metal duct has an R-value of essentially zero, the temperature difference between the air in the duct and the duct surface will be essentially zero. Thus, the existing paragraph essentially allows metal ducts to never be insulated. The change is needed to assure that there is a requirement that ducts be insulated.

This change is reasonable because it substantially clarifies the term.

### Subp. 9. Duct construction

The department proposes to amend the Model Energy Code to include specific duct sealing requirements, depending on the duct pressure.

The Uniform Mechanical Code, 1988 edition (incorporated as part of the State Building Code by Minn. Rules ch. 1346) section 1002 (c) states "Joints of duct systems shall be made substantially airtight by means of tapes, mastic, gasketing or other means." This is a poor guideline that is not consistent with current practice. The need and reasonableness of this proposed language are substantiated by the attached

memo dated 16 December 1991 (Attachment H).

**Subp. 10 Operation and maintenance manual.**

The department proposes to add a requirement that an operation and maintenance manual, with specific minimum contents, be provided.

This addition is needed because building owners need this information to effectively and efficiently operate their facilities. Such a manual is sometimes provided in current practice, but is just as often not. Many times the owner is left with manuals for installed equipment that may be insufficient to describe operation of the system.

The requirement is reasonable because at minimum it merely calls for "basic data" relating to HVAC systems and equipment. For more advanced systems, it calls for no more information than the designer would have readily at hand.

**K. Part 7670.0660 AMENDMENTS TO SECTION 503: EQUIPMENT EFFICIENCY**

**Subpart 1 HVAC Equipment efficiency.**

The department proposes to replace existing HVAC equipment efficiency requirements in the Model Energy Code as amended by subparts 1 and 2. The replacement efficiency requirements are (with three exceptions) from the Code of Federal Regulations, title 10, part 435.108. Two of the exceptions make the proposed incorporated efficiency requirements consistent with ASHRAE Standard 90.1-1989. The third exception upgrades the efficiency requirements in table 8.3-7 (water chiller packages).

The need and reasonableness of the proposed replacement of efficiency requirements are explained in the letter from the Center for Energy and the Urban Environment dated 12 November 1991 (Attachment I). Additionally, these HVAC efficiency requirements are now in place for all new federal buildings in the U.S. The need and reasonableness for the efficiency requirements in table 8.3-7 (water chiller packages) is given in the memorandum dated 16 December 1991 (Attachment J).

**Subp. 3 Efficiency requirements** is renumbered subpart 2 for numbering consistency.

**L. Part 7670.0710 AMENDMENTS TO SECTION 504: SERVICE WATER HEATING**

**Subpart 1 Efficiency requirements**

The department proposes to add requirements for service water heating equipment efficiencies. These source of these requirements is the Code of Federal Regulations,

title 10, part 430.33, and a September 1991 (draft) analysis of service water heating efficiency standards by Pacific Northwest Laboratory.

The proposed changes are needed and reasonable to make the Minnesota requirements for service water heating equipment consistent with national standards mandatory for all federal buildings and published by ASHRAE in Standard 90.1-1989. The efficiency value and standby loss for the larger equipment is based on a September 1991 (draft) analysis of service water heating efficiency standards by Pacific Northwest Laboratory.

### **Subp. 2. Time clocks**

The department proposes to amend subpart 2 (previously subpart 1) to require time clocks on swimming pool heaters. This is consistent with ASHRAE 90.1-1989.

The Department proposes to amend subpart 2 (previously subpart 1) to require time clocks on swimming pool heaters. The proposed requirement is similar to the ASHRAE Standard 90.1-1989 requirement for swimming pool time clocks. The Department's proposed requirement, however, does not require time clocks be installed on swimming pool pumps. The proposed requirement was reviewed at a meeting on October 22, 1991 with the Minnesota Consulting Engineering Council, Energy and Codes Committee. Members in attendance concurred with the proposed requirement. According to the Minnesota Department of Health, shutting off swimming pool pumps during hours of peak utility demand may jeopardize the safety of the pool water.

### **Subp. 3. Non-recirculating systems**

The department proposes to add a paragraph pertaining to non-recirculating systems requiring that either pipe insulation for the first 8 feet or heat traps (with pipe insulation from the tank to the heat trap).

This proposed amendment acknowledges the fact that water pipes (both supply and return) are an extension of the tank and should be insulated. Attachment K substantiates the need and reasonableness of this proposed amendment.

**Subp. 4.** is renumbered for numbering consistency.

## **M. Part 7670.0800 AMENDMENTS TO SECTION 505: ELECTRIC POWER AND LIGHTING**

### **Subpart 1. Electric energy determination.**

The department proposes to amend this subpart to add paragraph 505.2.1. This change

necessitates including language from paragraph 505.2 of the Model Energy Code into this Minnesota Rules part. Paragraph 505.2.1 is proposed to be added to require that in electrical panels of buildings other than low-rise residential, all feeder wiring and the panel feeder must be capable of accepting a clamp-on ammeter.

The addition of section 505.2.1 is needed to permit future monitoring of electrical loads in the building that would be required if an owner chose to perform an energy audit on the building. Contractors who do energy audits on buildings have informed the department that they have generally found feeder wiring in panels to meet the proposed requirement. However, they have found that the panel feeder often does not meet the proposed requirement, thus preventing gathering of information valuable to the energy audit.

The addition is reasonable because it merely requires the addition of an insignificant amount of wire to what is now common practice for the valuable benefit of being able to conduct a thorough energy audit.

#### **Subp. 2. Lighting power budget.**

The department proposes to amend the lighting requirements of the Model Energy Code to delete reference to the "1988" and "1989" requirements and add reference to the "1993" requirements in 10 CFR, Part 435.103. The proposed rule also makes numerous amendments to the incorporated reference, including style changes, errata, revision of minimum number of controls provision, and expansion of a table.

The change to "1993" numbers is needed in part because of the department's statutory requirement cited above to adopt the "1993" numbers by September 1, 1992. Another reason this change is needed is that a University of Minnesota study showed that six sample buildings constructed in Minnesota between 1980 and 1989 all easily met the "1988" and "1989" criteria. Thus, the proposed change is needed for energy savings.

The proposed change is reasonable because at a department-sponsored September 24, 1991 meeting (attach cover letter & attendance list) the issue of adopting the more stringent "1993" requirements was raised, and no objection was voiced by the broad representation of lighting industry interests present. In addition, since July 1978, the state of California has had required lighting standards for all nonresidential buildings approximately as stringent as the "1993" numbers proposed here. Adoption of the "1993" numbers will be a significant step toward improving lighting energy efficiency without causing undue hardship on the practice of lighting design.

Item 5 is the list of amendments revises the provision on minimum number of controls (e.g., switches). As written, the reference would require in a large retail store, for example, hundreds of light switches controlling relatively small segments of floor area with no conceivable energy saving benefit. The proposed language corrects this problem by relating the minimum number of controls to a 20-ampere circuit, allowing higher voltage systems to operate with fewer controls. The department has learned that the language in the referenced standard is in error. The proposed rule language achieves energy saving at a reasonable cost.

#### **Subp. 3 Internally illuminated exit lamps.**

The department proposes to add a requirement to reference recent legislation concerning internally illuminated exit signs. The illumination of such signs must be in accordance with the lighting requirements of Minnesota statute § 16B.61, subd. 3.

The statute cited specifically requires the State Building Code to be amended to contain certain requirements for this type of illumination. The department chooses at this time to simply reference lighting requirements in the statute because we anticipate the statute may soon be amended. Thus, citing the lighting requirement in the statute instead of incorporating the requirements into the code may avoid the code being in conflict with the statute, should the statute be changed.

This reference is need and reasonable for the convenience of users of ch. 7670.

#### **Subp. 4. Electric motor efficiencies.**

The department proposes to add requirements of minimum efficiencies for electric motors of size 1 horse power (hp) or more. The values in the proposed electric motor efficiency table were derived from efficiency standards effective January 1, 1992 in ASHRAE Standard 90.1-1989, and the proposed efficiency standards in ASHRAE Standard 90.1c draft addendum.

The addition of minimum efficiency standards for electric motors is needed because, according to one source, electric motors consume the most electrical power of any category of electrical devices in use in the United States. The efficiency of "standard" motors commonly installed in Minnesota buildings is less than would be required under the present proposal. Thus, the proposed requirement is needed for energy conservation.

The proposed amendment is reasonable because it closely follows the national ASHRAE



Standard 90.1-1989. It is also reasonable because that "high efficiency" motors are available that are more efficient than would be required under the present proposal. The proposed efficiency requirements were reviewed at a meeting on October 22, 1991 with the Minnesota Consulting Engineering Council, Energy and Codes Committee. Members in attendance concurred with the proposed requirements, expressing that adding minimum required efficiencies for electric motors was a needed and reasonable amendment to the State Energy Code.

#### **N. Part 7670.1000 AMENDMENTS TO SECTION 701: STANDARDS**

The department proposed to rearrange, add and delete several reference standards consistent with changes proposed throughout ch. 7670.

The changes proposed are needed and reasonable for the convenience of users of chapter 7670.

#### **V. SMALL BUSINESS CONSIDERATIONS IN RULEMAKING**

Minnesota Statue § 14.115, subdivision 2 (1988) requires the department, when proposing rules which may affect small business, to consider the following methods for reducing the impact on small businesses:

- (a) the establishment of less stringent compliance or reporting requirements for small business;
- (b) the establishment of less stringent schedules or deadlines for compliance or reporting requirements for small business;
- (c) the consolidation or simplification of compliance or reporting requirements for small business;
- (d) the establishment of performance standards for small businesses to replace design or operational standards required in the rule;
- (e) the exemption of small businesses from any or all requirements of the rule.

The department has evaluated the effect of the proposed rules on small businesses and has considered each of the methods listed above for reducing the impact of the rules on small businesses. The adoption of these rule amendments will not affect small businesses in Minnesota.

In regard to item (a) above, a proposed new item in part 7670.0610, subp. 6 does

contain a reporting requirement for systems balancing reports. However, balancing reports are generally prepared for commercial buildings, and the new requirement simply authorizes the building official to obtain a copy if requested.

Since Chapter 7670 contains no scheduling, deadline or (other than noted above) reporting requirements, Minn. Stat. § 14.115, subd. 2(b) and (c) are not applicable.

Chapter 7670 includes several significant performance standards in conformance with Minn. Stat. § 14.115, subd. 2(d). The Model Energy Code chapter 4 (Building Design Systems Analysis) is entirely performance based. The Model Energy Code chapter 5 (Building Design by Component Performance Approach) is also performance based. Finally, the lighting criteria amended in Part 7670.0800, subpart 2 are performance based.

In regard to item (e) above, Minn. Stat. § 16B.62 establishes the scope of application of the State Building Code. To exempt small businesses would be contrary to the latter statute. It would be inappropriate for the department to usurp statutory requirements by changing the applicability to exempt small business. In the proposed rule part 7670.0100, subpart 3, the applicability of the chapter is modified to exempt relocated residential buildings in conformance with Minn. Stat. § 16B.61, subd. 3(i).

## VI. ATTACHMENTS

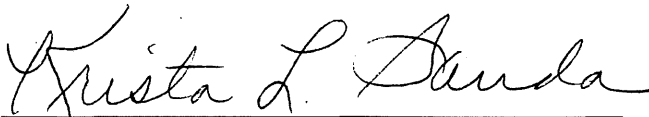
The following attachments are incorporated by reference into this Statement of Need and Reasonableness.

- A) Home Builders' Energy Update, Fall, 1991
- B) Letter from Owens-Corning Fiberglas dated 16 October 1991.
- C) Letter from Legend Technical Services dated 16 September 1991.
- D) Home Builders' Energy Update, Summer, 1988.
- E) Home Builders' Energy Update, Summer, 1989.
- F) Section 3.1.2.1 from Energy Efficient House Research Project, prepared for Oak Ridge National Laboratory by the Minnesota Department of Energy and Economic Development, St. Paul, MN, 1986.
- G) Letter from Advanced Certified Thermography dated 6 November 1991.
- H) Memorandum dated 16 December 1991 regarding duct sealing.

- I) Letter from Martha Hewett, Center for Energy and the Urban Environment to Bruce Nelson dated 12 November 1991.
- J) Memorandum dated 16 December 1991 regarding water chiller efficiency standards.
- K) Memorandum dated 16 December 1991 regarding insulation of service water heating pipes.

**VII. CONCLUSION**

Based on the foregoing, the proposed amendments to Minnesota Rules Chapter 7670 are both needed and reasonable.



Krista L. Sanda, Commissioner  
Department of Public Service

1/3/92  
Dated

