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State Register

Judicial Notice Shall Be Taken of Material Published in the *State Register*

The *State Register* is the official publication of the State of Minnesota, containing executive and commissioners' orders, proposed and adopted rules, official and revenue notices, professional-technical-consulting contracts, non-state bids and public contracts and grants.

Printing Schedule and Submission Deadlines

Vol. 22 Issue Number	PUBLISH DATE	Deadline for both Adopted and Proposed RULES	Deadline for: Emergency Rules, Executive and Commissioner's Orders, Revenue and Official Notices, State Grants, Professional-Technical-Consulting Contracts, Non-State Bids and Public Contracts
# 20	Monday 17 November	Friday 31 October	Monday 10 November
# 21	Monday 24 November	Monday 10 November	Monday 17 November
# 22	Monday 1 December	Monday 17 November	Friday 21 November
# 23	Monday 8 December	Friday 21 November	Monday 1 December

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PUBLISHING NOTICES IN THE *State Register*: Submit TWO COPIES of your notice, typed double-spaced. State agency submissions must include a "State Register Printing Order" form, and a "Certification/Internal Contract Negotiation" form with contracts for professional, technical and consulting services. Non-State Agencies should submit TWO COPIES, with a letter on your letterhead stationery requesting publication and date to be published. FAXED submissions to 612-297-8260 are received to meet deadline requirements, but must be followed by originals and applicable forms or letters to be accepted. The charge is $84.00 per page, billed in tenths of a page (columns are seven inches wide). About 2-1/2 pages typed double-spaced on 8-1/2"x11" paper equal one typeset page in the ***State Register.*** Contact the editor if you have questions.

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- **Single issues** are available for a limited time: ***State Register*** $5.00, ***Contracts Supplement*** $1.00. Shipping is $3.00 per order.
- ***"Professional, Technical and Consulting Contracts Awards Reports,"*** – published each month listing the previous month's awards of contracts and RFPs that appeared in the Monday edition of the ***"State Register."*** Appears monthly in hard copy format only. Single copies are $15.00 per report, plus $3.00 shipping if applicable. Order stock # 99-43. Six-month subscriptions cost $75.00. Order stock #90-15.

FOR LEGISLATIVE NEWS

Publications containing news and information from the Minnesota Senate and House of Representatives are available free to concerned citizens and the news media. To be placed on the mailing list, write or call the offices listed below:

Contact: Senate Public Information Office (612) 296-0504
Room 231 State Capitol, St. Paul, MN 55155

Contact: House Information Office (612) 296-2146
Room 175 State Office Building, St. Paul, MN 55155

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Commodity, Service and Construction contracts are published in a bulletin, the ***State Register Contracts Supplement,*** published Tuesday, Wednesday and Friday. Award results are available from the Materials Management Helpline 612/296-2600.

Professional, Technical and Consulting contract awards are published monthly in an ***Awards Report.***

Individual copies and subscriptions for both publications are available through Minnesota's Bookstore, (612) 297-3000 or 1-800-657-3757.

Minnesota Rules: Amendments and Additions

NOTICE: How to Follow State Agency Rulemaking in the State Register

The *State Register* is the official source, and only complete listing, for all state agency rulemaking in its various stages. State agencies are required to publish notice of their rulemaking action in the *State Register*. Published every Monday, the *State Register* makes it easy to follow and participate in the important rulemaking process. Approximately 80 state agencies have the authority to issue rules. Each agency is assigned specific **Minnesota Rule** chapter numbers. Every odd-numbered year the **Minnesota Rules** are published. The current 1995 set is a 13-volume bound collection of all adopted rules in effect at the time. Supplements are published to update this set of rules. Generally speaking, proposed and adopted exempt rules do not appear in this set because of their short-term nature, but are published in the *State Register*.

An agency must first solicit **Comments on Planned Rules** or **Comments on Planned Rule Amendments** from the public on the subject matter of a possible rulemaking proposal under active consideration within the agency (*Minnesota Statutes* §§ 14.101). It does this by publishing a notice in the *State Register* at least 60 days before publication of a notice to adopt or a notice of hearing, or within 60 days of the effective date of any new statutory grant of required rulemaking.

When rules are first drafted, state agencies publish them as **Proposed Rules,** along with a notice of hearing, or a notice of intent to adopt rules without a hearing in the case of noncontroversial rules. This notice asks for comment on the rules as proposed. Proposed emergency rules and withdrawn proposed rules are also published in the *State Register*. After proposed rules have gone through the comment period, and have been rewritten into their final form, they again appear in the *State Register* as **Adopted Rules.** These final adopted rules are not printed in their entirety in the *State Register*, only the changes made since their publication as Proposed Rules. To see the full rule, as adopted and in effect, a person simply needs two issues of the *State Register*, the issue the rule appeared in as proposed, and later as adopted. For a more detailed description of the rulemaking process, see the most current edition of the *Minnesota Guidebook to State Agency Services.*

The *State Register* features partial and cumulative listings of rules in this section on the following schedule: isues #1-13 inclusive; issues #14-25 inclusive; issue #26 cumulative for issues #1-26; issues #27-38 inclusive; issue #39, cumulative for issues #1-39; issues #40-51 inclusive; and issues #1-52 (or 53 in some years), cumulative for issues #1-52 (or 53). An annual subject matter index for rules was separately printed usually in August, but starting with Volume 19 now appears in the final issue of each volume. For copies or subscriptions to the *State Register*, contact Minnesota's Bookstore, 117 University Avenue, St. Paul, MN 55155 (612) 297-3000, or toll-free 1-800-657-3757.

Volume 22, issues #14-20

Proposed Rules

Comments on Planned Rules or Rule Amendments

An agency must first solicit **Comments on Planned Rules** or **Comments on Planned Rule Amendments** from the public on the subject matter of a possible rulemaking proposal under active consideration within the agency (*Minnesota Statutes* §§ 14.101). It does this by publishing a notice in the *State Register* at least 60 days before publication of a notice to adopt or a notice of hearing, and within 60 days of the effective date of any new statutory grant of required rulemaking.

Rules to be Adopted After a Hearing

After receiving comments and deciding to hold a public hearing on the rule, an agency drafts its rule. It then publishes its rules with a notice of hearing. All persons wishing to make a statement must register at the hearing. Anyone who wishes to submit written comments may do so at the hearing, or within five working days of the close of the hearing. Administrative law judges may, during the hearing, extend the period for receiving comments up to 20 calendar days. For five business days after the submission period the agency and interested persons may respond to any new information submitted during the written submission period and the record then is closed. The administrative law judge prepares a report within 30 days, stating findings of fact, conclusions and recommendations. After receiving the report, the agency decides whether to adopt, withdraw or modify the proposed rule based on consideration of the comments made during the rule hearing procedure and the report of the administrative law judge. The agency must wait five days after receiving the report before taking any action.

Rules to be Adopted Without a Hearing

Pursuant to *Minnesota Statutes* § 14.22, an agency may propose to adopt, amend, suspend or repeal rules without first holding a public hearing. An agency must first solicit **Comments on Planned Rules** or **Comments on Planned Rule Amendments** from the public. The agency then publishes a notice of intent to adopt rules without a public hearing, together with the proposed rules, in the *State Register*. If, during the 30-day comment period, 25 or more persons submit to the agency a written request for a hearing of the proposed rules, the agency must proceed under the provisions of §§ 14.14-14.20, which state that if an agency decides to hold a public hearing, it must publish a notice of intent in the *State Register*.

Higher Education Services Office

Proposed Permanent Rules Relating to Student Educational Loan Fund Program

DUAL NOTICE: Notice of Intent to Adopt Rules Without a Public Hearing Unless 25 or More Persons Request a Hearing, and Notice of Hearing if 25 or More Requests for Hearing Are Received

Proposed Amendment to Rules Governing the Student Educational Loan Fund [SELF] Program, *Minnesota Rules*, 4850.0010-4850.0018.

Introduction. The Minnesota Higher Education Services Office intends to adopt rules without a public hearing following the procedures set forth in the Administrative Procedure Act, *Minnesota Statutes*, sections 14.22 to 14.28, and rules of the Office of Administrative Hearings, *Minnesota Rules*, parts 1400.2300 to 1400.2310. If, however, 25 or more persons submit a written request for a hearing on the rules within 30 days or by 4:30 p.m. on December 18, 1997, a public hearing will be held in the 5th Floor Conference Room, Veterans Services Building, 20 West 12th Street, St. Paul, Minnesota 55155, starting at 9:00 a.m. on January 13, 1998. To find out whether the rules will be adopted without a hearing or if the hearing will be held, you should contact the agency contact person after December 18, 1997 and before January 13, 1998.

Agency Contact Person. Comments or questions on the rules and written requests for a public hearing on the rules must be submitted to the agency contact person. The agency contact person is:

Mary Lou Dresbach
Minnesota Higher Education Services Office
400 Capitol Square Building
550 Cedar Street
St. Paul, Minnesota 55101
(612) 296-3974 (ext. 3036)
Fax: (612) 297-8880

TTY users should contact the Minnesota Relay Service at 1-800-627-3529 and request assistance in contacting the Higher Education Services Office.

Subject of Rules and Statutory Authority. The proposed rules are about the annual and maximum loan amounts for the Student Educational Loan Fund [SELF] Program and disbursement requirements applicable to borrowers receiving loan fund checks. The

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statutory authority to adopt the rules is *Minnesota Statutes*, section 136A.01, Subd. 2(8). A copy of the proposed rules is published in the *State Register* and attached to this notice as mailed.

Comments. You have until 4:30 p.m. on December 18, 1997, to submit written comment in support of or in opposition to the proposed rules or any part or subpart of the rules. Your comment must be in writing and received by the agency contact person by the due date. Comment is encouraged. Your comments should identify the portion of the proposed rules addressed, the reason for the comment, and any change proposed. You are encouraged to propose any change desired. Any comments that you would like to make on the legality of the proposed rules must also be made during this comment period.

Request for a Hearing. In addition to submitting comments, you may also request that a hearing be held on the rules. Your request for a public hearing must be in writing and must be received by the agency contact person by 4:30 p.m. on December 18, 1997. Your written request for a public hearing must include your name and address. You must identify the portion of the proposed rules to which you object or state that you oppose the entire set of rules. Any request that does not comply with these requirements is not valid and cannot be counted by the agency for determining whether a public hearing must be held. You are also encouraged to state the reason for the request and any changes you want made to the proposed rules.

Withdrawal of Requests. If 25 or more persons submit a written request for a hearing, a public hearing will be held unless a sufficient number withdraw their requests in writing. If enough requests for hearing are withdrawn to reduce the number below 25, the agency must give written notice of this to all persons who requested a hearing, explain the actions the agency took to effect the withdrawal, and ask for written comments on this action. If a public hearing is required, the agency will follow the procedures in *Minnesota Statutes*, sections 14.131 to 14.20.

Alternative Format/Accommodation. Upon request, this Notice can be made available in an alternative format, such as large print, Braille, or cassette tape. To make such a request or if you need an accommodation to make this hearing accessible, please contact the agency contact person at the address or telephone number listed above.

Modifications. The proposed rules may be modified, either as a result of public comment or as a result of the rule hearing process. Modifications must be supported by data and views submitted to the agency or presented at the hearing and the adopted rules may not be substantially different than these proposed rules. If the proposed rules affect you in any way, you are encouraged to participate in the rulemaking process.

Cancellation of Hearing. The hearing scheduled for January 13, 1998, will be canceled if the agency does not receive requests from 25 or more persons that a hearing be held on the rules. If you requested a public hearing, the agency will notify you before the scheduled hearing whether or not the hearing will be held. You may also call the agency contact person at (612) 296-3974 (ext. 3036) after December 18, 1997 to find out whether the hearing will be held.

Notice of Hearing. If 25 or more persons submit written requests for a public hearing on the rules, a hearing will be held following the procedures in *Minnesota Statutes*, sections 14.131 to 14.20. The hearing will be held on the date and at the time and place listed above. The hearing will continue until all interested persons have been heard. Administrative Law Judge Bruce H. Johnson is assigned to conduct the hearing. Judge Johnson can be reached at the Office of Administrative Hearings, 100 Washington Square, Suite 1700, Minneapolis, Minnesota 55401-2138, telephone: (612) 341-7666, and fax: (612) 349-2665.

Hearing Procedure. If a hearing is held, you and all interested or affected persons, including representatives of associations or other interested groups, will have an opportunity to participate. You may present your views either orally at the hearing or in writing at any time before the close of the hearing record. All evidence presented should relate to the proposed rules. You may also submit written material to the Administrative Law Judge to be recorded in the hearing record for five working days after the public hearing ends. This five-day comment period may be extended for a longer period not to exceed 20 calendar days if ordered by the Administrative Law Judge at the hearing. Following the comment period, there is a five-working-day response period during which the agency and any interested person may respond in writing to any new information submitted. No additional evidence may be submitted during the five-day response period. All comments and responses submitted to the Administrative Law Judge must be received at the Office of Administrative Hearings no later than 4:30 p.m. on the due date. All comments or responses received will be available for review at the Office of Administrative Hearings. This rule hearing procedure is governed by *Minnesota Rules*, parts 1400.2000 to 1400.2240, and *Minnesota Statutes*, sections 14.131 to 14.20. Questions about procedure may be directed to the Administrative Law Judge.

The agency requests that any person submitting written views or data to the Administrative Law Judge prior to the hearing or during the comment or response period also submit a copy of the written views or data to the agency contact person at the address stated above.

Statement of Need and Reasonableness. A statement of need and reasonableness is now available from the agency contact person. This statement contains a summary of the justification for the proposed rules, including a description of who will be affected by the proposed rules and an estimate of the probable cost of the proposed rules. The statement may also be reviewed and copies obtained at the cost of reproduction from either the agency or the Office of Administrative Hearings.

Lobbyist Registration. *Minnesota Statutes*, chapter 10A, requires each lobbyist to register with the State Ethical Practices Board. Questions regarding this requirement may be directed to the Ethical Practices Board at: First Floor South, Centennial Building, 658 Cedar Street, St. Paul, Minnesota 55155, telephone: (612) 296-5148 or 1-800-657-3889.

Adoption Procedure if No Hearing. If no hearing is required, the agency may adopt the rules after the end of the comment period. The rules and supporting documents will then be submitted to the Office of Administrative Hearings for review for legality. You may ask to be notified of the date the rules are submitted to the office. If you want to be so notified, or want to receive a copy of the adopted rules, or want to register with the agency to receive notice of future rule proceedings, submit your request to the agency contact person listed above.

Adoption Procedure After a Hearing. If a hearing is held, after the close of the hearing record, the Administrative Law Judge will issue a report on the proposed rules. You may ask to be notified of the date when the Administrative Law Judge's report will become available, and can make this request at the hearing or in writing to the Administrative Law Judge. You may also ask to be notified of the date on which the agency adopts the rules and files them with the Secretary of State, and can make this request at the hearing or in writing to the agency contact person stated above.

Order. I order that the rulemaking hearing be held at the date, time, and location listed above.

Dated: 30 October 1997

Robert K. Poch
Director

4850.0014 AMOUNT AND TERMS.

Subpart 1. **Loan amounts.** The minimum loan amount from the student educational loan fund is $500.

The annual and maximum loan amounts for:

A. an undergraduate student are those prescribed in this part, not to exceed the limits specified in *Minnesota Statutes*, section 136A.1701, subdivisions 4 and 5. The loan must not exceed the annual SELF borrowing maximums of $4,500 for grade levels one and two, and $6,000 for grade levels three, four, and five or the cost of attendance less all other financial aid (including PLUS loans or other similar federal parent loans borrowed on the student's behalf); and the cumulative ~~student~~ SELF loan debt ~~(excluding PLUS loans or other similar federal parent loans borrowed on the student's behalf)~~ must not exceed the aggregate SELF borrowing maximums by grade level indicated in this subpart. The cumulative undergraduate borrowing maximums for SELF loans are:

(1) grade level 1, $ 4,500;

(2) grade level 2, $ 9,000;

(3) grade level 3, $15,000;

(4) grade level 4, $21,000; and

(5) grade level 5, $25,000.

B. a graduate student are those prescribed in *Minnesota Statutes*, section 136A.1701. The loan must not exceed the annual graduate student borrowing maximum of $9,000 for grade levels 6 through 9 or the cost of attendance less all other financial aid (including PLUS loans borrowed on the student's behalf); and the cumulative SELF student loan debt of the graduate student ~~(excluding PLUS loans borrowed on the student's behalf)~~ does not exceed $40,000 for both undergraduate and graduate educations combined.

Subp. 2. **Two loans in one year.**

A. A student may borrow more than once in the same academic year as long as:

(1) eligibility remains;

(2) the annual borrowing maximum is not exceeded; and

(3) the amount approved is at least $500.

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B. A student may borrow the annual maximum twice in the same grade level, as long as:

(1) a total of 11 months elapses from the beginning of the first loan period to the beginning of the second loan period; and

(2) the cumulative SELF loan debt maximum for that grade level is not exceeded.

C. A student who advances a grade level in the middle of an academic year may borrow at that new grade level, as long as~~:~~

~~(1) there is no more than one month overlap of loan period; and~~

~~(2)~~ the cumulative SELF loan debt maximum for that new grade level is not exceeded.

[For text of subp 3, see M.R.]

4850.0015 LOAN DISBURSEMENTS.

Subpart 1. **Disbursement scheduling.** ~~Checks~~ If loan proceeds are in the form of an individual check, the check must be jointly payable to the borrower and the eligible school. If the loan period covers more than one academic or payment period, the loan must be disbursed in installments during each academic or payment period. (For example, if an eligible school's academic year is divided by quarters, the student's loan amount may be disbursed in three installments, once each quarter.) Disbursements must be made at the beginning of each academic term, unless the director requires or the school suggests other more appropriate dates.

Subp. 2. **Disbursement when loan proceeds arrive before loan period.** Loan proceeds must not be disbursed to the student before the start of the loan period. The school must verify the student's enrollment and that the student meets satisfactory academic progress requirements. If the loan proceeds are in the form of ~~a~~ an individual check, the school must deliver the check to the student for endorsement. The check must then be endorsed by the school. ~~If the loan proceeds have been transferred to the school by electronic funds transfer, the school must have the student sign a document indicating that the loan proceeds have been received and accepted by the student.~~ In the case of either a check or an electronic funds transfer, the school must next subtract from the loan proceeds the amount owed to it for the payment period, and make arrangements with the student for the use of any remaining proceeds. The remaining proceeds may be returned to the student or retained on account at the election of the student. The school may not keep on account any more money than it charges for that payment period without the written permission of the student.

Subp. 3. **Disbursement when loan proceeds arrive during loan period.** When the loan proceeds arrive during the loan period, the school must verify the student's enrollment and that the student meets satisfactory academic progress requirements. If the loan proceeds are in the form of ~~a~~ an individual check, the school shall endorse the check along with the student, subtract from the proceeds that amount owed to it for the payment period, and make arrangements with the student for the use of any remaining proceeds. ~~If the loan proceeds arrive at the school by electronic funds transfer, the school must have the student sign a document indicating that the loan proceeds have been received and accepted by the student.~~ The school must next subtract from the proceeds the amount owed to it for the payment period and make arrangements with the student for the use of any remaining proceeds. In either case, the student has the same options for receiving any remaining proceeds as described in subpart 2. If the student is on a school approved leave of absence when the loan proceeds arrive and is scheduled to return within 30 days from the date on the check or the date of the electronic funds transfer, the school may hold the loan proceeds until the student returns. If the student fails to return or does not show up for disbursement, the loan proceeds must be returned to the director within 30 days from the date on the check or the date of the electronic funds transfer, whichever is applicable.

Subp. 4. **Disbursement when loan proceeds arrive after loan period.** When the loan proceeds arrive after the loan period, the school must verify the student's enrollment and that the student meets satisfactory academic progress requirements. If the loan proceeds are in the form of ~~a~~ an individual check, the school may endorse the check along with the student within 30 days from the end of the loan period, subtract from the proceeds that amount owed to it for the payment period, and make arrangements with the student for use of any remaining proceeds. ~~If the loan proceeds arrive at the school by electronic funds transfer, the school must have the student sign a document indicating that the loan proceeds have been received within 30 days of the end of the loan period and accepted by the student.~~ The school must next subtract from the proceeds the amount owed to it for the payment period and make arrangements with the student for the use of any remaining proceeds. In either case, the student has the same options for receiving any remaining proceeds as described in subpart 2. If the loan proceeds arrive more than 30 days after the end of the loan period, the school must return the loan proceeds to the director.

Pollution Control Agency

Proposed Permanent Rules Relating to Municipal Waste Combustors

DUAL NOTICE: Notice of Intent to Adopt Rules Without a Public Hearing Unless 25 or More Persons Request a Hearing, and Notice of Hearing if 25 or More Requests for Hearing Are Received

Proposed Amendments to Rules Governing Waste Combustors, *Minnesota Rules* Chapters 7007 and 7011.

Introduction. The Minnesota Pollution Control Agency (MPCA) intends to adopt rules without a public hearing following the procedures set forth in the Administrative Procedure Act, *Minnesota Statutes* §§ 14.22 to 14.28, and rules of the Office of Administrative Hearings, *Minnesota Rules* 1400.2300 to 1400.2310. If, however, 25 or more persons submit a written request for a hearing on the rules within 30 days or by 4:30 p.m. on December 18, 1997, a public hearing will be held in the MPCA Boardroom, 520 Lafayette Road North, St. Paul, Minnesota 55155-4197, starting at 9:00 a.m. on January 21, 1998, and continuing until all public testimony is heard. To find out whether the rules will be adopted without a hearing or if the hearing will be held, you should contact the agency contact person after December 18, 1997, and before January 21, 1998.

MPCA Contact Person. Comments or questions on the rule and written requests for a public hearing on the rule must be submitted to:

Susan Mitchell
Air Quality Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194
(612) 297-3082
FAX (612) 297-8701

Subject of Rule and Statutory Authority. Minnesota's current waste combustor rule became effective June 20, 1994. The rule was promulgated to address the impact on Minnesota's environment from the combustion of wastes. The rule also incorporated federal standards for municipal waste combustors (MWCs) that were promulgated by the U.S. Environmental Protection Agency (EPA) in 1991.

The EPA promulgated revised MWC standards on December 19, 1995 (60 FR 65382). These revised standards require that Minnesota also revise its state standards because the 1994 Minnesota standards are not as stringent as the 1995 EPA standards. The MPCA is proposing amendments to its existing rules governing MWCs that would impose emission limits, operating requirements, and monitoring, recordkeeping and reporting requirements in line with the new federal standards. In addition, the proposed rule incorporates standards of performance for existing MWCs and incorporates by reference the new source performance standards for new MWCs. The amendments do not impose any new emission limits for small waste combustor units, which are defined as:

facilities at which the design capacity for all waste combustor units is 15 x 10

Btu/hr or more and less than 93.75 x 10 Btu/hr.

The statutory authority to adopt the rule is *Minnesota Statutes* § 116.07, subd. 4. A free copy of the proposed rule amendments is available upon request from the MPCA contact person listed above. A copy of the proposed rule amendments is published immediately after this notice.

Comments. You have until 4:30 p.m. on December 18, 1997, to submit written comment in support of or in opposition to the proposed rule or any part or subpart of the rule. Your comment must be in writing and received by the MPCA contact person by the due date. Comment is encouraged. Your comment should identify the portion of the proposed rule addressed, the reason for the comment, and any change proposed. You are encouraged to propose any change desired. Any comments that you would like to make on the legality of the proposed rule must also be made during this comment period.

Request for Hearing. In addition to submitting comments, you may also request that a hearing be held on the rule. Your request for a public hearing must be in writing and must be received by the MPCA contact person by 4:30 p.m. on December 18, 1997. Your written request for a public hearing must include your name and address. You must identify the portion of the proposed rule

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to which you object or state that you oppose the entire rule. Any request that does not comply with these requirements is not valid and cannot be counted by the MPCA for determining whether a public hearing must be held. You are also encouraged to state the reason for the request and any changes you want made to the proposed rule.

Withdrawal of Requests. If 25 or more persons submit a written request for hearing, a public hearing will be held unless a sufficient number withdraw their requests in writing. If enough requests for hearing are withdrawn to reduce the number below 25, the MPCA must give written notice of this to all persons who requested a hearing, explain the actions the MPCA took to effect the withdrawal, and ask for written comments on this action. If a public hearing is required, the MPCA will follow the procedures in *Minnesota Statutes* §§ 14.131 to 14.20.

Accommodation. If you need an accommodation to make this hearing accessible, please contact the MPCA contact person at the address or telephone number listed above.

Modifications. The proposed rule may be modified, either as a result of public comment or as a result of the rule hearing process. Modifications must be supported by data and views submitted to the MPCA or presented at the hearing and the adopted rule may not be substantially different than this proposed rule. If the proposed rule affects you in any way, you are encouraged to participate in the rulemaking process.

Cancellation of Hearing. The hearing scheduled for January 21, 1998, will be canceled if the MPCA does not receive requests from 25 or more persons that a hearing be held on the rule. If you requested a public hearing, the MPCA will notify you before the scheduled hearing whether or not the hearing will be held. You may also call the MPCA contact person after December 18, 1997 (date comment period ends), to find out whether the hearing will be held.

Notice of Hearing. If 25 or more persons submit written requests for a public hearing on the rule, a hearing will be held following the procedures in *Minnesota Statutes* §§ 14.14 to 14.20. The hearing will be held on the date and at the time and place listed above. The hearing will continue until all interested persons have been heard. An Administrative Law Judge is assigned to conduct the hearing. The judge can be reached at:

Allan W. Klein
Administrative Law Judge
Office of Administrative Hearings
100 Washington Square, Suite 1700
100 Washington Avenue South
Minneapolis, Minnesota 55401-2138
(612) 341-7609
FAX (612) 349-2665

Hearing Procedure. If a hearing is held, you and all interested or affected persons including representatives of associations or other interested groups, will have an opportunity to participate. You may present your views either orally at the hearing or in writing at any time before the close of the hearing record. All evidence presented should relate to the proposed rule. You may also submit written material to the Administrative Law Judge to be recorded in the hearing record for five working days after the public hearing ends. This five-day comment period may be extended for a longer period not to exceed 20 calendar days if ordered by the Administrative Law Judge at the hearing. Following the comment period, there is a five-working-day response period during which the MPCA and any interested person may respond in writing to any new information submitted. No additional evidence may be submitted during the five-day response period. All comments and responses submitted to the Administrative Law Judge must be received at the Office of Administrative Hearings no later than 4:30 p.m. on the due date. All comments or responses received will be available for review at the Office of Administrative Hearings. This rule hearing procedure is governed by *Minnesota Rules* 1400.2000 to 1400.2240, and *Minnesota Statutes* §§ 14.14 to 14.20. Questions about procedure may be directed to the Administrative Law Judge.

The MPCA requests that any person submitting written views or data to the Administrative Law Judge prior to the hearing or during the comment or response period also submit a copy of the written views or data to the MPCA contact person at the address stated above.

Statement of Need and Reasonableness. A statement of need and reasonableness (SONAR) is now available from the MPCA contact person. This statement contains a summary of the justification for the proposed rule, including a description of who will be affected by the proposed rule and an estimate of the probable cost of the proposed rule. The statement may also be reviewed and copies obtained at the cost of reproduction from either the MPCA or the Office of Administrative Hearing.

Consideration of Economic Factors. *Minnesota Statutes* § 116.07, subd. 6 requires the MPCA to give due consideration to economic factors in exercising its powers. This rulemaking is not expected to have significant economic impact. Even if local consumers bear all new costs associated with implementation of the proposed rules, the proportions of household income and economic input involved do not seem large enough to cause significant change in either the whole regional economy or in the industrial sector (public utilities) most heavily affected.

Additional information regarding the MPCA's consideration of economic factors is discussed in greater detail in Sections V. and VI., Items B, C and E in the SONAR.

Impact on Farming Operations. *Minnesota Statutes* § 14.111 requires that if an agency adopts or repeals rules that affect farming operations, the agency must provide a copy of the proposed rule change to the Commissioner of Agriculture, no later than 30 days prior to publication of the proposed rule in the *State Register*. The proposed rules regulate solid waste incineration. They will have no effect on agricultural lands or farming operations, except to the extent that better emission control protects farmland from contamination.

Review by the Commissioner of Transportation. *Minnesota Statutes* § 174.05 requires the MPCA to inform the Commissioner of Transportation of all rulemakings that concern transportation, and requires the Commissioner of Transportation to prepare a written review of the rules. The requirements of *Minnesota Statutes* § 174.05 are not applicable.

Departmental Charges Imposed by the Rule. *Minnesota Statutes* § 16A.1285 is inapplicable because the proposed rules do not impose any departmental charges or fees.

Section 111(d) Plan Submittal to EPA. The federal regulations promulgated on December 19, 1995, require states to submit a Section 111(d) plan to EPA demonstrating how states will comply with the emission guidelines for existing MWCs set forth in the federal regulations. Once the rule is adopted, it will be submitted to EPA as part of the 111(d) plan. The entire 111(d) plan will consist of the rule plus permits for the following Class A waste combustors: Northern States Power Company refuse derived fuel combustion facility in Mankato; Norther States Power Company refuse derived fuel combustion facility in Red Wing; United Power Association refuse derived fuel combustion facility in Elk River.

You have until 4:30 p.m. on December 18, 1997 to submit your opposition to the rule being submitted to the EPA as a 111 (d) plan.

Lobbyist Registration. *Minnesota Statutes* chapter 10A, requires each lobbyist to register with the Ethical Practices Board. Questions regarding this requirement may be directed to the Ethical Practices Board at: First Floor South, Centennial Building, 658 Cedar Street, St. Paul, Minnesota 55155, telephone 612-296-5148 or 1-800-657-3889.

Request to Have MPCA Citizens' Board Make Decision on Rule if No Hearing is Required. If a hearing is required, the MPCA Citizens' Board will make the final decision on whether to adopt the rule. However, even if no hearing is required, you may submit a request to the MPCA Commissioner or a MPCA Citizens' Board member to have the MPCA Citizens' Board make the decision on whether to adopt the proposed rule. Your request must be in writing, must state to whom it is directed and must be received by the MPCA contact person by 4:30 p.m. on December 18, 1997. Under *Minnesota Statutes* § 116.02, where a hearing is not required the MPCA Citizens' Board will only make the decision on the rule if the MPCA Commissioner grants your request or if a MPCA Citizens' Board member makes a timely request that the decision be made by the MPCA Citizens' Board.

Adoption Procedure if No Hearing. If no hearing is required, and if the decision is not required to be made by the MPCA Citizens' Board, the MPCA Commissioner may adopt the rule after the end of the comment period. The rule and supporting documents will then be submitted to the Office of Administrative Hearings for review for legality. You may ask to be notified of the date the rule is submitted to the office. If you want to be so notified, or want to receive a copy of the adopted rule, or want to register with the MPCA to receive notice of future rule proceedings, submit your request to the MPCA contact person listed above.

Adoption Procedure After the Hearing. If a hearing is held, after the close of the hearing record, the Administrative Law Judge will issue a report on the proposed rule. You may ask to be notified of the date when the judge's report will become available, and can make this request at the hearing or in writing to the Administrative Law Judge. After the report is issued, the MPCA Citizens' Board will make the final decision on whether to adopt the rule. You may also ask to be notified of the date on which the MPCA adopts the rule and files it with the Secretary of State, and can make this request at the hearing or in writing to the MPCA contact person stated above.

Order. I order that the rulemaking hearing be held at the date, time and location listed above.

Peder A. Larson
Commissioner

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7007.0501 ADDITIONAL CONTENTS REQUIRED IN A PERMIT APPLICATION FOR A WASTE COMBUSTOR.

Subpart 1. **Additional requirements.** In addition to the information required by part 7007.0500, a person who requests an air emission permit for a waste combustor subject to parts 7011.1201 to ~~7011.1285~~ 7011.1290 shall submit to the commissioner the information required by subparts 2 to 7.

[For text of subps 2 to 8, see M.R.]

7007.0801 CONDITIONS FOR AIR EMISSION PERMITS FOR WASTE COMBUSTORS.

Subpart 1. **Additional permit conditions.** In addition to the conditions in part 7007.0800, an air emission permit for a waste combustor shall contain conditions as specified in subpart 2 or 3. In amending, modifying, or reissuing a waste combustor's air emissions permit which contains a provision that restricts mercury emissions from the facility, the commission shall, at a minimum, continue that permit restriction at the same level unless the applicant demonstrates that no good cause exists to do so.

Subp. 2. **Mixed municipal solid waste or refuse-derived fuel waste combustors.** An air emissions permit for a waste combustor combusting mixed municipal solid waste or refuse-derived fuel shall:

[For text of items A to D, see M.R.]

E. require the implementation of an industrial waste management plan as described in part 7011.1250; ~~and~~

F. for Class C, D, III, and IV waste combustors, require the implementation of a plan as described in part 7011.1255 to identify, separate, and collect solid wastes which contain mercury before the mercury is combusted~~.~~; and

G. include operating conditions that ensure that the facility will continue to emit mercury emissions less than 50 percent of the applicable standard if the waste combustor elects to conduct annual mercury emissions testing as allowed in part 7011.1270 and *Minnesota Statutes*, section 116.85. If the permit must be amended in order to include these conditions, the procedures of part 7007.1400 shall be used.

Subp. 3. **Waste combustors of nonmixed municipal solid waste.** An air emissions permit for a waste combustor which does not combust mixed municipal solid waste or refuse-derived fuel shall:

A. prohibit initiation of operation of the waste combustor unless the permittee has an ash management plan approved by the commissioner;

B. provide a schedule for testing of waste combustor ash;

C. require the implementation of an industrial waste management plan as described in part 7011.1250;

D. require the implementation of a plan as described in part 7011.1255 to identify, separate, and collect solid wastes which contain mercury before the mercury is combusted; ~~and~~

E. for Class IV waste combustors, require the installation and operation of equipment necessary to achieve ambient pollutant concentrations that would have been achieved with the use of the minimum stack height required in part 7011.1235, subpart 1~~.~~; and

F. include operating conditions that ensure that the facility will continue to emit mercury emissions less than 50 percent of the applicable standard if the waste combustor elects to conduct annual mercury emissions testing as allowed in part 7011.1270 and *Minnesota Statutes*, section 116.85. If the permit must be amended in order to include these conditions, the procedures of part 7007.1400 shall be used.

7007.1400 ADMINISTRATIVE PERMIT AMENDMENTS.

Subpart 1. **Administrative amendments allowed.** The agency may make the permit amendments described in this subpart through the administrative permit amendment process described in this part. An owner or operator of a stationary source shall request an administrative amendment if changes are to be made under item B or E:

[For text of items A to F, see M.R.]

G. an amendment to clarify a permit term; ~~and~~

H. an amendment to extend a deadline in a permit by no more than 120 days, provided that the agency may only extend a deadline established by an applicable requirement described in part 7007.0100, subpart 7, items A to K, if the agency has been delegated authority to make such extensions by the administrator.Notwithstanding the previous sentence, the agency may do an administrative amendment to extend a testing deadline in a permit up to 365 days if the agency finds that the extension is needed to allow the permittee to test at worst case conditions as required by part 7017.2025, subpart 2; and

I. an amendment to include operating conditions that ensure that waste combustors emit mercury at less than 50 percent of the applicable standard.

[For text of subps 2 to 7, see M.R.]

7011.0551 RECORDKEEPING AND REPORTING FOR INDIRECT HEATING UNITS ~~INDIRECTLY~~ COMBUSTING SOLID WASTE.

Subpart 1. **Application.** The owner or operator of indirect heating equipment combusting mixed municipal solid waste ~~or,~~ refuse-derived fuel, or industrial solid waste which makes up 30 percent or less by weight of total fuel input, as determined by subpart 2, shall comply with the conditions of *Minnesota Statutes*, section 116.90, and the conditions of this part. If the unit combusts more than 30 percent of mixed municipal solid waste ~~or,~~ refuse-derived fuel, or industrial solid waste, parts 7011.1201 to ~~7011.1285~~ 7011.1290 apply.

Subp. 2. **Calculation.** The fuel feed stream composition calculation shall be the ratio of the weights of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste to mixed municipal solid waste, refuse-derived fuel, industrial solid waste, and all other fuels delivered to the combustion chamber. The calculation shall be made for each 24-hour period that the equipment is operated.

Subp. 3. **Log.** The owner or operator shall maintain an operating log where the date, weights of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste combusted, weight of each other fuel combusted, and the result of the calculation made in subpart 2 is recorded daily.

Subp. 4. **Report.** The owner or operator shall submit to the commissioner a quarterly report containing the date, weights of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste, and the weight of each other fuel combusted during the quarter. The reports shall be submitted within 30 days following December 30, March 30, June 30, and September 30 of each year.

7011.0625 RECORDKEEPING AND REPORTING FOR DIRECT HEATING UNITS ~~DIRECTLY~~ COMBUSTING SOLID WASTE.

Subpart 1. **Application.** The owner or operator of direct heating equipment combusting mixed municipal solid waste ~~or,~~ refuse-derived fuel, or industrial solid waste which makes up 30 percent or less by weight of total fuel weight input, as determined by subpart 2, shall comply with the conditions of *Minnesota Statutes*, section 116.90, and subparts 3 and 4. If the unit combusts more than 30 percent of mixed municipal solid waste ~~or,~~ refuse-derived fuel, or industrial solid waste, parts 7011.1201 to ~~7011.1285~~ 7011.1290 apply.

Subp. 2. **Calculation.** The fuel feed stream composition calculation shall be the ratio of the weights of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste to mixed municipal solid waste, refuse-derived fuel, industrial solid waste, and all other fuels delivered to the combustion chamber. The calculation shall be made for each 24-hour period that the equipment is operated.

Subp. 3. **Log.** The owner or operator shall maintain an operating log where the date, weight of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste combusted, weight of each other fuel combusted, and the result of the calculation made in subpart 2 is recorded daily.

Subp. 4. **Reports.** The owner or operator shall submit to the commissioner a quarterly report containing the date, weight of mixed municipal solid waste ~~and,~~ refuse-derived fuel, and industrial solid waste, and weight of each other fuel combusted during the quarter. The reports shall be submitted within 30 days following December 30, March 30, June 30, and September 30 of each year.

7011.1201 DEFINITIONS.

Subpart 1. **Scope.** As used in parts 7007.0200, 7007.0250, 7007.0501, 7007.0801, and 7011.1201 to ~~7011.1285~~ 7011.1290 the following words have the meanings defined in this part.

Subp. 1a. **Statutes and other rules.** The definitions in *Minnesota Statutes*, section 116.06, and in part 7001.0010 and chapters 7005, 7007, 7009, 7011, 7017, and 7019 apply to terms in parts 7011.1201 to ~~7011.1285~~ 7011.1290, unless the terms are specifically otherwise defined in this part.

[For text of subps 5 and 6, see M.R.]

Subp. 7. [See repealer].

[For text of subp 8, see M.R.]

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Subp. 9. **Class A waste combustor.** "Class A waste combustor" means that the total of the design capacities for all waste combustor units at a stationary source is ~~400 x 10⁶~~ 93.75 x 10^6 Btu/hr or more, the waste combustor units combust primarily mixed municipal solid waste or RDF, and construction of the waste combustor was ~~issued a permit for construction on or before December 20, 1989~~ commenced on or before September 20, 1994.

Subp. 10. [See repealer.]

Subp. 11. **Class C waste combustor.** "Class C waste combustor" means that the total of the design capacities for all waste combustor units at a stationary source is 15 x 10^6 Btu/hr or more and less than 93.75 x 10^6 Btu/hr, the waste combustor units combust primarily mixed municipal solid waste or RDF, and construction of the waste combustor was ~~issued a permit on or before December 20, 1989~~ commenced on or before September 20, 1994.

[For text of subp 12, see M.R.]

Subp. 13. **Class I waste combustor.** "Class I waste combustor" means that the design capacity for a waste combustor unit is 93.75 x 10^6 Btu/hr or more, and ~~the waste combustor is issued a permit for construction after December 20, 1989~~ that construction of the unit is commenced after September 20, 1994, or modification or reconstruction is commenced after June 19, 1996.

Subp. 14. **Class II waste combustor.** "Class II waste combustor" means that the design capacity for a waste combustor unit is 15 x 10^6 Btu/hr or more and less than 93.75 x 10^6 Btu/hr, and ~~the waste combustor is issued a permit for construction after December 20, 1989~~ that construction of the unit is commenced after September 20, 1994, or modification or reconstruction is commenced after June 19, 1996.

[For text of subps 15 and 16, see M.R.]

Subp. 17. **Cofired unit.** "Cofired unit" means an emissions unit which combusts mixed municipal solid waste or RDF with a fuel that is not mixed municipal solid waste or RDF and 30 percent or less by weight of the total fuel input is comprised in aggregate of mixed municipal solid waste or RDF as measured on a 24-hour basis. The fuel feed stream composition calculation shall be the ratio of the weights of mixed municipal solid waste and RDF to mixed municipal solid waste, RDF, and all other fuels delivered to the combustion chamber.

[For text of subps 18 to 20, see M.R.]

Subp. 21. **Energy recovery facility.** "Energy recovery facility" means an emissions unit or emission facility used to capture the heat value of solid waste for conversion to steam, electricity, or immediate heat value by direct combustion or by burning an intermediate fuel product derived from solid waste. For the purposes of parts 7011.1201 to ~~7011.1285~~ 7011.1290, this definition does not include landfill facilities that recover methane gases, or facilities processing solid waste to convert the solid waste to an intermediate fuel product.

[For text of subps 22 to 29, see M.R.]

Subp. 30. **Initial start-up.** "Initial start-up" means the date on which solid waste is first fired in a new, modified, retrofitted, or reconstructed emissions unit.

[For text of subp 31, see M.R.]

Subp. 32. **Maximum demonstrated capacity.** For waste combustors with heat recovery, "maximum demonstrated capacity" means the maximum four-hour integrated average load for each waste combustor unit achieved during four consecutive hours during the most recent test during which compliance with the PCDD/PCDF limit in part 7011.1225 is achieved, as measured by steam flow or alternative method as approved by the commissioner. For waste combustors without heat recovery, "maximum demonstrated capacity" means the maximum four-hour arithmetic average input rate for each waste combustor unit achieved during the most recent test during which compliance with the PCDD/PCDF limit was achieved. If PCDD/PCDF testing is not required to be conducted, the maximum demonstrated capacity is the capacity achieved during the conduct of the most recent test for which compliance with particulate matter standards and carbon monoxide in part 7011.1225 is demonstrated.

[For text of subps 33 and 34, see M.R.]

Subp. 34a. **Modification or modified municipal waste combustor unit.** "Modification" or "modified municipal waste combustor unit" means a municipal waste combustor unit to which changes have been made after June 19, 1996, if the cumulative cost of the changes, over the life of the unit, exceed 50 percent of the original cost of construction and installation of the unit (not including the cost of any land purchased in connection with such construction or installation) updated to current costs; or any physical change in the municipal waste combustor unit or change in the method of operation of the municipal waste combustor which increases the amount of any air pollutant emitted by the unit for which standards have been established under section 129 or section 111 of the Clean Air Act. Increases in the amount of any air pollutant emitted by the municipal waste combustor unit are determined at 100 percent physical load capability and downstream of all air pollution control devices, with no consideration given for load restrictions based on permits or other nonphysical operational restrictions.

[For text of subp 35, see M.R.]

Subp. 36. **Normal start-up.** "Normal start-up" means the period of time between the initial start-up of a new, modified, retrofitted, or reconstructed emissions unit of a waste combustor, or emissions unit of a waste combustor that is modified, retrofitted, or reconstructed to meet the requirements of parts 7011.1201 to ~~7011.1285~~ 7011.1290, and the lesser of 60 days after achieving the maximum production rate at which the emissions unit will operate or 180 days after initial start-up.

If no modification, retrofit, or reconstruction of a Class D or IV waste combustor is necessary to meet the requirements of parts 7011.1201 to ~~7011.1285~~ 7011.1290, then normal start-up means the period of time between June 20, 1994, and the applicable date in part 7011.1215, subpart ~~5 or~~ 6.

If no modification, retrofit, or reconstruction of a Class A or C waste combustor is necessary to meet the requirements of parts 7011.1201 to 7011.1290, then normal start-up means the period of time between the effective date of this part and the date by which the waste combustor must demonstrate compliance with waste combustor emission standards of part 7011.1225, as allowed in part 7011.1215, subparts 5 and 5a.

[For text of subps 37 to 42, see M.R.]

Subp. 42a. **Reconstruction.** "Reconstruction" means rebuilding a municipal waste combustor unit for which the reconstruction commenced after June 19, 1996, and the cumulative costs of the construction over the life of the unit exceed 50 percent of the original cost of construction and installation of the unit (not including any cost of land purchased in connection with the construction or installation) updated to current costs (current dollars).

[For text of subp 43, see M.R.]

Subp. 43a. **Retrofit.** "Retrofit" means the installation of air pollution control, combustion, or monitoring equipment to a waste combustor for purposes of reducing air pollution emissions. If installing air pollution control equipment, combustion equipment, or monitoring equipment would be a modification as defined in subpart 34a, or reconstruction as defined in subpart 42a, then the activity is not a retrofit.

[For text of subps 44 and 45, see M.R.]

Subp. 45a. **Tires.** "Tires" has the meaning given in *Minnesota Statutes*, section 115A.90, subdivision 7.

Subp. 46. **Waste combustor.** "Waste combustor" means any emissions unit or emission facility where mixed municipal solid waste, solid waste, or refuse-derived fuel is combusted, and includes incinerators, energy recovery facilities, or other combustion devices. A metals recovery incinerator is a waste combustor. A combustion device combusting ~~primarily wood, or~~ at least 70 percent fossil fuel and wood in combination with up to 30 percent papermill wastewater treatment plant sludge~~,~~ is not a waste combustor. A soil treatment facility, paint burn-off oven, wood heater, or residential fireplace is not a waste combustor.

Subp. 47. [See repealer.]

[For text of subps 48 to 50, see M.R.]

7011.1205 INCORPORATIONS BY REFERENCE.

For the purpose of parts 7007.0501, 7007.0801, and 7011.1201 to ~~7011.1285~~ 7011.1290, the documents in items A to C are incorporated by reference. These documents are subject to frequent change.

[For text of items A to C, see M.R.]

7011.1210 NOTIFICATION REQUIRED OF CLASS IV WASTE COMBUSTORS.

[For text of subpart 1, see M.R.]

Subp. 2. **Waste combustors at hospitals.** The owner or operator of a Class IV waste combustor located at a hospital and installed after June 20, 1994, shall notify the commissioner 90 days prior to the installation of the waste combustor. The notice submitted by the owner or operator of this Class IV waste combustor shall contain the information in items A to H.

[For text of items A to G, see M.R.]

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H. The signature of the owner or operator with the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, the waste combustor complies with the design, installation, and operating requirements of *Minnesota Rules*, parts 7011.1201 to ~~7011.1285~~ 7011.1290, applicable to a Class IV waste combustor."

7011.1215 APPLICABILITY OF STANDARDS OF PERFORMANCE FOR WASTE COMBUSTORS.

Subpart 1. **Waste combustors.** A person who constructs, modifies, reconstructs, or operates a waste combustor shall comply with parts 7011.1201 to ~~7011.1285~~ 7011.1290, except as provided in subparts 2, 2a, and 3.

[For text of subp 2, see M.R.]

Subp. 2a. **Units combusting tires or fuel derived from tires.** A waste combustor burning a single-item waste stream of tires or fuel derived from tires is not subject to parts 7011.1201 to 7011.1290 if the owner or operator notifies the commissioner in writing of its intent to combust only tires, and provides data documenting that the unit qualifies for this exemption.

Subp. 2b. **Units combusting industrial solid waste.** A waste combustor burning up to 30 percent industrial solid waste is not subject to parts 7011.1201 to 7011.1290, and shall comply with the applicable requirements of parts 7011.0500 to 7011.0551 or 7011.0600 to 7011.0625.

Subp. 3. **Exemptions from standards of performance.** Crematoria, pathological waste combustors, and waste combustors used solely for the disposal of animal carcasses are exempt from the requirements of parts 7011.1210 to ~~7011.1285~~ 7011.1290, and shall meet the conditions of this subpart.

[For text of items A to C, see M.R.]

Subp. 4. **Standards.** The standards of parts 7011.1227, 7011.1228, 7011.1229, 7011.1231, 7011.1233, ~~and~~ 7011.1240, ~~subparts~~ subpart 2, and ~~6~~ 7011.1272, subpart 2, apply at all times when waste is being ~~combusted~~ continuously burned, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction does not exceed three hours. Fugitive emissions standards applicable to ash conveying systems do not apply during maintenance and repair of ash conveying systems. "Malfunction" means any sudden and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner. Failures that are caused entirely or in part by poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown are not considered malfunctions.

The start-up period commences when the waste combustor begins the continuous burning of solid waste and does not include any warm-up period when the waste combustor is combusting fossil fuel or other solid fuel.

Continuous burning is the continuous, semicontinuous, or batch feeding of solid waste for purposes of waste disposal, energy production, or providing heat to the combustion system in preparation for waste disposal or energy production. The use of solid waste solely to provide thermal protection of the grate or hearth during the start-up period when municipal solid waste is not being fed to the grate is not considered to be continuous burning.

Subp. 5. **Transition for Class A~~, B, or C~~ waste combustors.** ~~Notwithstanding subpart 1, a Class A, B, or C waste combustor holding a permit on June 20, 1994, shall comply with the requirements of parts 7011.1201 to 7011.1285 by June 20, 1997.~~ The application of the waste combustor standards to Class A waste combustors are described in this subpart.

A. Class A waste combustors shall demonstrate compliance with parts 7011.1201 to 7011.1290 by 60 days after the effective date of this part, except that the conditions of part 7011.1240, subpart 1, shall be met according to the schedule in part 7011.1240, subpart 1a.

B. If the Class A waste combustor cannot comply with these waste combustor standards by 60 days after the effective date of this part, the waste combustor shall cease operating 60 days after the effective date of this part. If the waste combustor cannot comply by 60 days after the effective date of this part, and elects to continue operating, the waste combustor owner or operator shall submit to the commissioner by 30 days after the effective date of this part a schedule that contains the following items:

(1) a compliance schedule that contains the following milestones:

(a) a final control plan;

(b) the date that the owner or operator will award contracts for emission control systems or for process modifications, or issue orders for the purchase of component parts to accomplish emission control or process modifications described in the final control plan;

(c) the date that the owner or operator will initiate on-site construction or installation of emissions control or process changes;

(d) the date that the owner or operator will complete on-site construction or installation of emissions control or process changes; and

(e) the date that the owner or operator will demonstrate compliance with the emissions limitations and monitoring requirements of parts 7011.1201 to 7011.1290. This date shall not be any later than December 19, 2000; and

(2) for each waste combustor whose compliance schedule shows that the unit will not achieve the emission limits of part 7011.1225 by 60 days after the effective date of this part, the results of a performance test for PCDD/PCDF emissions from each waste combustor unit. If a facility contains identical waste combustor units, only one of the identical units needs to be tested. The owner or operator shall provide an explanation with the submittal of why the units can be assumed to be identical. The performance test shall have been conducted during or after the year 1990. The performance test shall be conducted according to the procedures of part 7011.1265.

C. Physical or operational changes made to a Class A waste combustor unit primarily for the purpose of complying with the emission limits in parts 7011.1201 to 7011.1290 prior to December 19, 2000, are not considered in determining whether the unit is a modified or reconstructed waste combustor subject to the requirements of *Code of Federal Regulations*, title 40, part 60, subpart Ea or Eb.

Subp. 5a. **Transition for Class C waste combustors.** A Class C waste combustor shall demonstrate compliance with parts 7011.1201 to 7011.1290 by 60 days from the effective date of this rule.

[For text of subp 6, see M.R.]

7011.1220 PROHIBITIONS.

[For text of subpart 1, see M.R.]

Subp. 2. **Solid wastes requiring special approval.** No waste combustor shall combust yard waste or ~~waste~~ tires unless specifically allowed to do so in the air emission permit for the waste combustor.

7011.1225 STANDARDS OF PERFORMANCE FOR WASTE COMBUSTORS.

Subpart 1. **~~Permit in existence for~~ Class A~~, B,~~ or C waste combustor.**

A. No owner or operator of a Class A~~, B,~~ or C waste combustor shall cause to be emitted into the atmosphere from each waste combustor unit gases ~~which contain particulate matter, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF), mercury, carbon monoxide, sulfur dioxide, or hydrogen chloride~~ in excess of the applicable standards of performance shown in ~~part~~ parts 7011.1227 and 7011.1228. Emissions, except opacity, shall be calculated under standard conditions corrected to seven percent oxygen on a dry volume basis. An owner or operator of a mixed municipal solid waste or RDF waste combustor may determine compliance with the emission limitations using carbon dioxide measurements corrected to an equivalent of seven percent oxygen. ~~The relationship between carbon dioxide and oxygen shall be established at each compliance test.~~

B. No owner or operator of a Class A or C waste combustor shall cause to be emitted into the atmosphere visible emissions of combustion ash from an ash conveying system, or buildings or enclosures of ash conveying systems, including conveyor transfer points, in excess of five percent of the observation period (i.e. 9 minutes per three-hour period), as determined by *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 22, as amended. This limit does not apply to visible emissions discharged inside buildings or enclosures of ash conveying systems.

Subp. 2. **Class I or II waste combustors.** No owner or operator of a Class I or II waste combustor shall cause to be emitted into the atmosphere from each waste combustor unit gases ~~that contain particulate matter, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF), mercury, carbon monoxide, nitrogen oxides, sulfur dioxide, or hydrogen chloride~~ in excess of the standards of performance shown in part ~~7011.1229~~ 7011.1230. ~~Emissions shall be calculated under standard conditions, corrected to seven percent oxygen on a dry volume basis. An owner or operator of a mixed municipal solid waste or RDF waste combustor may determine compliance with the emission limitations using carbon dioxide measurements corrected to an equivalent of seven percent oxygen. The relationship between carbon dioxide and oxygen shall be established at each compliance test.~~

[For text of subps 3 to 5, see M.R.]

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7011.1227 TABLE 1.

The table in this part governs emission limitations for Class A~~, B,~~ and C waste ~~combustors~~ combustor units. For acid gas limitations, either the applicable percent reduction or the parts per million by volume emission limitation, whichever is less stringent, is the emission limitation for the waste combustor.

		Class C	~~Class B~~	Class A
Particulate Matter				
Front-half			~~0.015 gr/dscf~~	~~0.015 gr/dscf~~ 0.012 gr/dscf
Total		0.020 gr/dscf	~~0.020 gr/dscf~~	0.020 gr/dscf
PCDD/PCDF				
Total		500 ng/dscm	~~30 ng/dscm~~	30 ng/dscm
Acid Gases:	~~HCl~~	NA	~~90% control~~	~~90%~~ 95%
Hydrogen chloride			~~or 25 ppm~~	control or ~~25~~ 29 ppm
	~~SO_2~~	NA	~~70% control~~	~~70%~~ 75%
Sulfur dioxide			~~or 30 ppm~~	control or ~~30~~ 29 ppm
Carbon Monoxide				
~~Modular Mass burn, or fluidized bed~~		~~50 ppm~~	~~50 ppm~~	~~50 ppm~~
		~~100 ppm~~	~~100 ppm~~	~~100 ppm~~
~~RDF stoker~~		~~150 ppm~~	~~200 ppm~~	~~200 ppm~~
Modular starved air		50 ppm		50 ppm
Modular excess air		50 ppm		50 ppm
Mass burn waterwall		100 ppm		100 ppm
Mass burn refractory		100 ppm		100 ppm
Mass burn rotary refractory		100 ppm		100 ppm
Mass burn rotary waterwall		250 ppm		250 ppm
Bubbling fluidized bed		100 ppm		100 ppm
Circulating fluidized bed		100 ppm		100 ppm
Pulverized coal/ refuse-derived fuel mixed fuel-fired combustor		NA		150 ppm
Spreader stoker coal/refuse-derived fuel mixed fuel-fired combustor		NA		200 ppm
RDF stoker		150 ppm		200 ppm

Opacity	10%	~~10%~~	10%
Mercury (short-term)			
Modular with ESP	1,000 µg/dscm	~~NA~~	NA
Mass burn	1,000 µg/dscm	~~100 µg/dscm or 85% removal~~	~~100 µg/dscm or 85% removal~~ NA
~~RDF (90-day test interval)~~		~~50 µg/dscm or 85% removal~~	~~50 µg/dscm or 85% removal~~
Modular, mass burn, or fluidized bed with wet or dry scrubber	100 µg/dscm or 85% removal	~~100 µg/dscm or 85% removal~~	~~100 µg/dscm or 85% removal~~ NA
For all waste combustors except those combusting RDF in spreader stokers	NA		80 µg/dscm or 85% removal
Waste combustor units combusting RDF in spreader stokers (90-day test interval)	NA		50 µg/dscm or 85% removal
Mercury (long-term)			
Modular with ESP	600 µg/dscm		NA
Mass burn	600 µg/dscm	~~60 µg/dscm or 85% removal~~	~~60 µg/dscm or 85% removal~~
~~RDF (90-day test interval)~~		~~30 µg/dscm or 85% removal~~	~~30 µg/dscm or 85% removal~~
Modular, mass burn, or fluidized bed with wet or dry scrubber	60 µg/dscm or 85% removal		NA
~~RDF (15-month test interval)~~		~~30 µg/dscm or 85% removal~~	~~30 µg/dscm or 85% removal~~
For all waste combustors except those combusting RDF in spreader stokers	NA		60 µg/dscm or 85% removal

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Waste combustor units combusting RDF in spreader stokers (90-day test interval)	NA	30 µg/dscm or 85% removal
Waste combustor units combusting RDF in spreader stokers (12-month test interval)	NA	30 µg/dscm or 85% removal
Cadmium	NA	40 µg/dscm
Lead	NA	440 µg/dscm

7011.1228 NITROGEN OXIDES LIMITS FOR CLASS A WASTE COMBUSTORS.

The nitrogen oxides emission limits in Table A apply to each waste combustor unit at a Class A waste combustor facility. The owner or operator shall use the procedures of part 7011.1260 for determining compliance with the nitrogen oxides emission limits of Table A.

Alternatively, an owner or operator may average nitrogen oxide emissions across the waste combustor facility according to the procedures in *Code of Federal Regulations*, title 40, section 60.33b(d)(1), as amended. Waste combustor units for which emissions averaging is used shall not exceed the nitrogen oxide emission limits in Table B.

TABLE A

Municipal Waste Combustor Technology	Nitrogen Oxides Emission Limit (parts per million by volume)
Mass burn waterwall	205
Refuse-derived fuel combustor	250
Fluidized bed combustor	180

TABLE B

Municipal Waste Combustor Technology	Nitrogen Oxides Emission Limit (parts per million by volume)
Mass burn waterwall	180
Refuse-derived fuel combustor	230
Fluidized bed combustor	220

Before a waste combustor owner or operator may implement emissions averaging, the owner or operator shall identify units that are included in the nitrogen oxides emissions averaging plan in either the compliance report required by part 7017.2035 that contains the results of the units' initial performance tests required by part 7011.1270, item A, subitem (1), or in the annual report required in part 7011.1285, as applicable prior to implementing the averaging plan. The units being included in the averaging plan may be redesignated every calendar year. Partial year averaging is allowable upon written commissioner approval.

7011.1229 TABLE 2.

The table in this part governs emission limitations for a Class ~~I and~~ II waste ~~combustors~~ combustor. For acid gas limitations, either the applicable percent reduction or the parts per million by volume emission limitation, whichever is less stringent, is the emission limitation for the waste combustor.

Size	Class II	~~Class I~~
Particulate Matter		
Front-half	0.015 gr/dscf	~~0.015 gr/dscf~~
Total	0.020 gr/dscf	~~0.020 gr/dscf~~
PCDD/PCDF		
(total)	30 ng/dscm	~~30 ng/dscm~~
Acid Gases		
HC1	90% control or 25 ppm	~~95% control or 25 ppm~~
SO_2	80% control or 30 ppm	~~80% control or 30 ppm~~
Carbon monoxide		
Modular	50 ppm	~~50 ppm~~
Mass burn or fluidized bed	100 ppm	~~100 ppm~~
RDF stoker	150 ppm	~~150 ppm~~
Opacity	10%	~~10%~~
NO_x	NA	~~180 ppm~~
Mercury (short-term)		
Modular	100 µg/dscm or 85% removal	~~100 µg/dscm or 85% removal~~
Mass Burn	100 µg/dscm or 85% removal	~~100 µg/dscm or 85% removal~~
RDF (90-day test interval)	50 µg/dscm or 85% removal	~~50 µg/dscm or 85% removal~~
FBC	100 µg/dscm or 85% removal	~~100 µg/dscm or 85% removal~~
Mercury (long-term)		
Modular	60 µg/dscm or 85% removal	~~60 µg/dscm or 85% removal~~
Mass burn	60 µg/dscm or 85% removal	~~60 µg/dscm or 85% removal~~
RDF (90-day test interval)	30 µg/dscm or 85% removal	~~30 µg/dscm or 85% removal~~
FBC	60 µg/dscm or 85% removal	~~60 µg/dscm or 85% removal~~
RDF (~~15~~12-month test interval)	30 µg/dscm or 85% removal	~~30 µg/dscm or 85% removal~~

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7011.1230 STANDARDS OF PERFORMANCE FOR CLASS I MUNICIPAL WASTE COMBUSTORS.

Subpart 1. **Scope.** The owner or operator of a Class I waste combustor shall comply with the emission limits, notification, monitoring, testing, recordkeeping, and reporting requirements of the new source performance standards incorporated in part 7011.1290, except as provided in subpart 2. In addition, the owner or operator shall comply with the following limitations:

A. if the owner or operator chooses to comply with the operator certification requirements of *Code of Federal Regulations*, title 40, section 60.54b, as amended, by obtaining certification through the Minnesota Pollution Control Agency, then the owner or operator shall comply with parts 7011.1240, subpart 1; 7011.1281; 7011.1282; 7011.1283; and 7011.1284;

B. the general waste combustor facility requirements of part 7011.1245;

C. industrial solid waste management plan requirements of part 7011.1250;

D. the reporting and response requirements to exceedance of continuously monitored emissions in part 7011.1260, subpart 7;

E. the reporting and response requirements in part 7011.1265, subpart 11, if an exceedance is measured during the conduct of a performance test; and

F. the test or monitoring frequency for a waste composition study of part 7011.1270, item E.

Subp. 2. **Mercury emission limitations.** Instead of the mercury emission limits contained in *Code of Federal Regulations*, title 40, sections 60.52b(a)(5), 60.58b(d)(2)(ix), and 60.58b(d)(2)(x), as amended, the owner or operator of a Class I waste combustor shall comply with the mercury emission limits described in this subpart and the testing and reporting requirements of parts 7011.1265, subpart 2; and 7011.1270, item E.

	Class I
Mercury (short-term)	
For all waste combustors except those combusting RDF in spreader stokers	80 µg/dscm or 85% removal
Waste combustor units combusting RDF in spreader stokers (90-day test interval)	50 µg/dscm or 85% removal
Mercury (long-term)	
For all waste combustors except those combusting RDF in spreader stokers	60 µg/dscm or 85% removal
Waste combustor units combusting RDF in spreader stokers (90-day test interval)	30 µg/dscm or 85% removal
Waste combustor units combusting RDF in spreader stokers (12-month test interval)	30 µg/dscm or 85% removal

7011.1235 REQUIREMENTS OF CLASS IV WASTE COMBUSTORS.

[For text of subps 1 and 2, see M.R.]

Subp. 2a. **Use of auxiliary fuel.** Auxiliary fuel shall be used to maintain the operating temperatures required in subpart 2 from the time the solid waste feed has been discontinued until the combustion chamber is clear of combustible material or active combustion ceases to exist in the combustion chamber.

[For text of subp 3, see M.R.]

7011.1240 OPERATING REQUIREMENTS.

Subpart 1. **Presence of certified operator.** ~~A certified operator who holds an appropriate certificate as~~ The person described ~~by part 7011.1280~~ in this subpart shall be present at the waste combustor facility at all times when solid waste is being combusted~~. The certification shall be appropriate to the waste combustor class,~~ except as provided in subpart 1a.

A. For Class A, C, I, or II waste combustors, either a chief facility operator or shift supervisor who holds a certificate as described in part 7011.1281, subpart 1.

B. For Class D and III waste combustors, either a chief facility operator or shift supervisor who holds a certificate as described in part 7011.1280.

C. For Class IV waste combustors, the operator supervisor shall hold a certificate as described in part 7011.1280.

Subp. 1a. **Transition period for certifying operators.** Notwithstanding subpart 1, operators shall be certified within the time frames described in items A to C.

A. For Class A and C waste combustors:

(1) on the effective date of this part or until the conditions of subitems (2) to (4) are met, chief facility operators, shift supervisors, and control room operators shall hold a certificate as described in part 7011.1280;

(2) within 12 months of the effective date of this part, all chief facility operators and shift supervisors shall have obtained full certification as described in part 7011.1281;

(3) notwithstanding subitem (2), within six months of the initial start-up of a waste combustor unit or associated air pollution control equipment, all chief facility operators and shift supervisors shall have obtained full certification as described in part 7011.1281; and

(4) notwithstanding subitem (2) or (3), individuals, if assuming the duties of chief facility operator or shift supervisor after the effective date of this part, shall have obtained full certification as described in part 7011.1281.

B. For Class I and II waste combustors, within six months of the initial start-up of a waste combustor unit, all chief facility operators and shift supervisors shall have obtained full certification, or have scheduled the exam appropriate to the certification being sought as described in part 7011.1281.

Subp. 2. **Particulate matter control device operating temperature.** The inlet gas stream to ~~the most efficient~~ each particulate matter control device on a waste combustor as measured by part 7011.1260, subpart 4, item A, shall have a temperature of no greater than 30 degrees Fahrenheit above the highest four-hour arithmetic mean temperature measured during four consecutive hours for this gas stream during the most recent performance test for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans that demonstrated compliance at all times when solid waste is being combusted, except as allowed in items A and B.

A. For Class A, C, and II waste combustors, during the annual PCDD/PCDF performance test and the two weeks preceding the annual PCDD/PCDF performance test, no particulate matter control device temperature limitations are applicable.

B. For Class A, C, and II waste combustors, the commissioner shall waive the particulate matter control device temperature limits for the purpose of evaluating system performance, testing new technology or control technologies, diagnostic testing, or related activities for the purpose of improving facility performance or advancing the state-of-the-art for controlling facility emissions, provided a written notification is submitted to the commissioner 30 days prior to undertaking any of the activities identified in this item, with the following information:

(1) a description of the proposed project, and the outcome the project is designed to evaluate;

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(2) how the project conforms with the activities described in this subpart for which the temperature limit can be waived; and

(3) the length of time the project will take to complete.

The commissioner shall approve the waiving of the particulate matter control device operating temperature limits provided that the project conforms with the activities described in this subpart for which the temperature limit can be waived, and the project can be accomplished within 14 days.

Subp. 3. **Start-up on waste prohibited.** During start-up from a cold furnace, auxiliary fuels shall be used to achieve combustion chamber operating temperature. The use of solid waste solely to provide thermal protection of the grate or hearth during the start-up period when solid waste is not being fed to the grate is not considered to be continuous burning.

Subp. 4. [See repealer.]

Subp. 5. **Range of operation.** No owner or operator of a waste combustor shall operate the waste combustor while combusting solid waste at a level above 110 percent of the maximum demonstrated capacity of the combustion system, except as allowed in items A and B, without conducting a performance test under part 7011.1265, which demonstrates compliance with the emission limitations of part 7011.1225 at greater than 110 percent of the maximum demonstrated capacity.

A. For Class A, C, and II waste combustors, during the annual PCDD/PCDF performance test and the two weeks preceding the annual PCDD/PCDF performance test, no waste combustor maximum demonstrated capacity is applicable.

B. For Class A, C, and II waste combustors, the commissioner shall waive the maximum demonstrated capacity limit for the purpose of evaluating system performance, testing new technology or control technologies, diagnostic testing, or related activities for the purpose of improving facility performance or advancing the state-of-the-art for controlling facility emissions, provided a written notification is submitted to the commissioner 30 days prior to undertaking any of the activities identified in this item, with the following information:

(1) a description of the proposed project, and the outcome the project is designed to evaluate;

(2) how the project conforms with the activities described in this subpart for which the maximum demonstrated capacity limit can be waived; and

(3) the length of time the project will take to complete.

The commissioner shall approve the waiving of the maximum demonstrated capacity limits provided that the project conforms with the activities described in this subpart for which the operating capacity limit can be waived, and the project can be accomplished within 14 days.

Subp. 6. [See repealer.]

[For text of subps 7 to 9, see M.R.]

7011.1260 CONTINUOUS MONITORING.

Subpart 1. **Combustion chamber temperature monitor.** The owner or operator of a Class D, III, or IV waste combustor shall install and operate at all times temperature monitors that continuously read and record the temperature at the point in the combustion unit one second downstream of the entrance of the last overfire or secondary air injection. The owner or operator may elect to place temperature monitors at another point downstream from the entrance of the last overfire or secondary air injection, provided that the owner or operator conducts mapping of the operating combustion chambers to develop temperature isopleths and correlates these temperatures to the downstream temperature monitors. The averaging period for combustion chamber temperatures shall be four-hour arithmetic block averages calculated from four one-hour arithmetic averages. Each one-hour arithmetic average shall consist of at least ten data points equally spaced in time.

Subp. 2. **Particulate matter control device temperature monitors.** The owner or operator of a waste combustor shall install, calibrate, maintain, and operate at all times temperature monitors that continuously read and record the temperatures of the flue gas at the inlet of ~~the most efficient~~ each particulate matter control device.

Subp. 3. **Continuous monitors.** The owner or operator of a waste combustor shall install and operate a continuous monitoring system when burning solid waste. Monitoring systems that continuously read and record the following outputs shall be installed:

A. in Class ~~I, II,~~ III, A, ~~B,~~ C, or D waste combustors:

[For text of subitems (1) to (3), see M.R.]

(4) for oxygen or carbon dioxide at each location where carbon monoxide, sulfur dioxide, or nitrogen oxides emissions are monitored, to report corrected concentrations of regulated pollutants;

[For text of items B and C, see M.R.]

Subp. 4. **Averaging periods.** Except as provided in this subpart and subpart 5, the requirements of part 7017.1000 apply to continuous monitoring data collection, reduction, and averaging periods.

A. For ~~combustion chamber temperature monitoring and~~ particulate matter control device inlet temperature monitoring, four-hour arithmetic block averages calculated from four continuous one-hour arithmetic averages. ~~Each one-hour arithmetic average shall consist of at least ten data points equally spaced in time.~~

[For text of item B, see M.R.]

C. At waste combustors other than mass burn rotary waterwall combustors or RDF waste combustors for carbon monoxide, a four-hour block average. For mass burn rotary waterwall combustors or RDF stokers, the averaging period for carbon monoxide shall be a daily 24-hour arithmetic average measured between 12 midnight and the following midnight. The four-hour and 24-hour average shall be calculated from one-hour arithmetic averages. At least four points equally spaced in time shall be used to calculate each one-hour average. Each one-hour average shall be corrected to seven percent oxygen on an hourly basis using the one-hour arithmetic average of the oxygen or carbon dioxide continuous emissions monitoring system.

D. For sulfur dioxide, the geometric average of the one-hour arithmetic average emission ~~rates~~ concentration during each 24-hour daily period measured from midnight to midnight. At least four data points equally spaced in time shall be used to calculate each one-hour arithmetic average. Each one-hour average shall be corrected to seven percent oxygen on an hourly basis using the one-hour arithmetic average of the oxygen or carbon dioxide continuous emissions monitoring system.

E. For nitrogen oxides, the arithmetic average of the one-hour arithmetic average emission ~~rates~~ concentration during each 24-hour daily period measured from midnight to midnight. At least four data points equally spaced in time shall be used to calculate each one-hour arithmetic average. Each one-hour average shall be corrected to seven percent oxygen on an hourly basis using the one-hour arithmetic average of the oxygen or carbon dioxide continuous emissions monitoring system.

[For text of item F, see M.R.]

G. For oxygen or carbon dioxide, a one-hour average.

Subp. 5. **Operation of continuous monitors.** The owner or operator of a waste combustor with continuous monitors shall comply with the requirements of part 7017.1000, except as provided in items A to H.

[For text of item A, see M.R.]

B. Continuous monitors shall be operated so as to measure and record data for ~~at least 90 percent of the hours the emission unit is operated each calendar quarter. Valid monitoring data shall be obtained for~~ at least 75 percent of the hours per day for ~~75~~ 90 percent of the days ~~per month~~ of the calendar quarter that the waste combustor is operating and combusting solid waste.

[For text of item C, see M.R.]

D. When continuous emissions data for sulfur dioxide removal efficiency ~~or~~, sulfur dioxide or nitrogen oxide emission rates, or carbon monoxide are not obtained because of monitor breakdowns, repairs, calibration checks, and zero and span adjustments, emission data calculations to determine compliance shall be made using the following methods:

(1) for sulfur dioxide removal efficiency or sulfur dioxide or nitrogen oxide emission rates, other monitoring systems or other data collection methods as approved by the commissioner or *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 19, as amended, to provide valid emission data in order to meet the requirements of item B~~.~~; and

(2) for carbon monoxide, other monitoring systems or other data collection methods as approved by the commissioner or *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 10, as amended, to provide valid emission data in order to meet the requirements of item B.

E. Zero drift and span drift checks of emission monitoring systems shall be conducted in accordance with *Code of Federal Regulations*, title 40, section 60.13, as amended.

F. Span values for continuous monitors shall be as described in subitems (1) to (4).

(1) The span value of the sulfur dioxide continuous monitors at the inlet to the sulfur dioxide control device is 125 percent of the maximum estimated hourly potential sulfur dioxide emissions of the waste combustor unit, and the span value of the monitor at the outlet of the sulfur dioxide control device is 50 percent of the maximum estimated hourly potential sulfur dioxide emissions of the waste combustor unit.

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(2) The span value of the nitrogen oxides continuous monitors shall be 125 percent of the maximum estimated hourly potential nitrogen oxides emissions of the waste combustor unit.

(3) The span value of the oxygen or carbon dioxide monitor shall be 25 percent oxygen or carbon dioxide.

(4) The span value of the carbon monoxide monitor shall be 125 percent of the maximum estimated hourly potential carbon monoxide emissions of the waste combustor unit.

G. Quarterly accuracy determinations ~~and,~~ daily calibration drift tests, and annual relative accuracy test audits shall be performed in accordance with procedures in *Code of Federal Regulations*, title 40, part 60, Appendix F, as amended, for sulfur dioxide, nitrogen oxides, ~~and~~ carbon monoxide, and oxygen or carbon dioxide, except that section 5.1.1 (relative accuracy test audit) shall not apply to the oxygen monitor.

H. The procedures under *Code of Federal Regulations*, title 40, section 60.13, as amended, shall be followed for installation, evaluation, and operation of continuous emissions monitoring systems for sulfur dioxide, nitrogen oxides, opacity, and oxygen or carbon dioxide.

I. The oxygen or carbon dioxide monitor shall conform to Performance Specification 3 in *Code of Federal Regulations*, title 40, part 60, Appendix B, as amended, except that section 2.3 shall not apply.

Subp. 6. **Recording data from continuous monitoring.** The owner or operator of a waste combustor shall maintain a record of the information contained in this subpart. Waste combustors shall maintain a permanent record of continuously measured ~~emissions~~ parameters. The record of monitoring shall contain:

A. the calendar date;

B. the following measurements recorded in ~~computer-readable format and on paper~~ a manner that allows the data to be immediately accessed upon inspection by the commissioner:

(1) all six-minute opacity readings;

(2) all one-hour average sulfur dioxide emission ~~rates~~ concentrations at the inlet and outlet of the acid gas control device if compliance is based on a percent reduction, or at the outlet only if compliance is based on the outlet emission limit; and

(3) all one-hour average carbon monoxide and nitrogen oxide emission ~~rates~~ concentrations, steam flow or alternative unit load measurement parameter as described in part 7011.1265, subpart 4a, combustion chamber temperature, and particulate matter control device temperatures; and

C. the following ~~average rates~~ parameters:

(1) all 24-hour daily geometric average percent reductions in sulfur dioxide emissions ~~and~~ or all 24-hour daily geometric average sulfur dioxide emission ~~rates~~ concentrations, as applicable;

(2) all 24-hour daily arithmetic average nitrogen oxides emission ~~rates~~ concentrations;

(3) all four-hour block or 24-hour daily arithmetic average carbon monoxide emission ~~rates~~ concentrations, as applicable; and

(4) all four-hour block arithmetic average unit load levels and particulate matter control device inlet temperatures.

[For text of subp 7, see M.R.]

7011.1265 REQUIRED PERFORMANCE TESTS, METHODS, AND PROCEDURES.

Subpart 1. **Performance test methods and procedures.** An owner or operator of a waste combustor required to conduct performance tests for a waste combustor shall use the performance test methods and procedures specified in ~~part 7017.2000~~ parts 7017.2001 to 7017.2060 except as modified in this part. Not operating a sorbent injection system for the sole purpose of testing in order to demonstrate compliance with the percent reduction standards for sulfur dioxide and hydrogen chloride is not a modification under part 7007.0100, subpart 14~~, as proposed at 17 SR 3008, and subsequently adopted~~.

Subp. 2. **Performance test methods for criteria pollutants.** An owner or operator of a waste combustor required to conduct performance tests for particulate matter, sulfur dioxide, or nitrogen oxides shall use test methods as described in items A to ~~E~~ F.

A. Part 7011.0725 shall apply to tests for particulate matter, except that for Class I, II, A, ~~B,~~ and C waste combustors, the minimum sample volume shall be 1.7 dscm ~~(60 dscf)~~. For Class III, IV, and D waste combustors, the minimum sample volume shall be 0.85 dscm ~~(30 dscf)~~. Smaller sampling times or sample volumes shall be approved by the commissioner, when the commissioner determines that they are necessitated by process variables or other factors. An oxygen or carbon dioxide measurement

shall be obtained simultaneously with each Method 5 test run for particulate matter. Particulate matter emissions, expressed in gr/dscf, shall be corrected to seven percent oxygen by using the following formula:

$$c_7 = \frac{14c}{(21-\%O_2)}$$

where: c_7 is the concentration of particulate matter corrected to seven percent oxygen;

c is the concentration of particulate matter as measured by *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 5, as amended, or in part 7011.0725; and

$\%O_2$ is the percentage of oxygen as measured by *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 3, as amended.

[For text of subitems (1) and (2), see M.R.]

B. For sulfur dioxide emissions, *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 19, section 5.4, as amended, shall be used to determine the daily geometric average percent reduction in the potential sulfur dioxide emission ~~rate~~ concentration. Method 19, section 4.3, as amended, shall be used to determine the daily geometric average sulfur dioxide emission ~~rate~~ concentration. Compliance with the sulfur dioxide emission limit and percent reduction shall be determined by using a continuous emission monitor to measure sulfur dioxide and calculating a 24-hour daily geometric mean emission ~~rate~~ concentration and daily geometric mean percent reduction using Method 19, sections 4.3 and 5.4, as amended, as applicable. For waste combustors which do not operate continuously, compliance shall be determined using a daily geometric mean of all hourly average values for the hours during the day that the facility is operated.

C. For nitrogen oxides emissions, *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 19, section 4.1, as amended, shall be used for determining the daily arithmetic average nitrogen oxides emission ~~rate~~ concentration. Compliance with the nitrogen oxides emission standards shall be determined by using a continuous emission monitor for measuring nitrogen oxides and calculating a 24-hour daily arithmetic average emission ~~rate~~ concentration using Method 19, section 4.1, as amended. For waste combustors which do not operate continuously, compliance shall be determined using an arithmetic mean of all hourly average values for the hours during the day that the facility is operated.

[For text of items D and E, see M.R.]

F. For fugitive ash emissions, *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 22, as amended, shall be used. The minimum observation time shall be a series of three one-hour observations. The observation period shall include times when the facility is transferring ash from the waste combustor unit to the area where ash is stored or loaded into containers or trucks. The average duration of visible emissions per hour shall be calculated from the three one-hour observations. The average shall be used to determine compliance with the emission limit.

Subp. 3. **Performance test methods for other air contaminants.** If not specified in this subpart, the owner or operator shall use test methods in *Code of Federal Regulations*, title 40, part 60, Appendix A, or part 61, Appendix B, as amended, or other methods determined by the commissioner in writing to be equivalent.

A. For hydrogen chloride, the percentage reduction in the potential hydrogen chloride emissions ($\%P_{HCl}$) is computed using the following formula:

$$\%P_{HCl} = \frac{(E_i - E_o)}{E_i}$$

where E_i is the potential hydrogen chloride emission rate measured at the control device inlet, corrected to seven percent O_2; and E_o is the hydrogen chloride emission rate ~~measure~~ measured at the outlet of the acid gas control device, corrected to seven percent O_2.

Code of Federal Regulations, title 40, part 60, Appendix A, Method 26 or 26A, as amended, shall be used for determining the hydrogen chloride emission rate. The minimum sampling time ~~for Method 26~~ shall be one hour. An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 26 test run for hydrogen chloride. The average of the hydrogen chloride emission concentration or percent reduction is used to determine compliance.

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B. For PCDD/PCDF emissions, *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 23, as amended, shall be used for determining compliance with the PCDD/PCDF emission limits. For Class ~~I,~~ II~~,~~ and A~~, and B~~ facilities, the minimum sample time shall be four hours per test run. For Class III, C, and D facilities, the minimum sample time shall be three hours per test run. An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 23 test run for PCDD/PCDF. The average of the PCDD/PCDF test runs is used to determine compliance.

C. For ~~metal~~ mercury, lead, and cadmium emissions, *Code of Federal Regulations*, title 40, part ~~266, Appendix IX, section 3.1, as amended, shall be used for measuring metal emissions, except that in lieu of paragraph 3.1.1.1, the following shall apply: Applicability. This method is applicable to the determination of total chromium (Cr), cadmium (Cd), arsenic (As), nickel (Ni), manganese (Mn), beryllium (Be), copper (Cu), zinc (Zn), lead (Pb), selenium (Se), phosphorus (P), thallium (Tl), silver (Ag), antimony (Sb), barium (Ba), and mercury (Hg) emissions from stationary sources. This method may not be used for determining particulate emissions when performing a mercury analysis because changes in the procedures to further facilitate particulate determination may affect the front-half mercury determination.~~ 60, Appendix A, Method 29, as amended, shall be used for measuring emissions of lead, cadmium, and mercury. The minimum sample volume shall be 1.7 dscm. An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 29 test run for lead and cadmium. The average of the lead or cadmium emission concentrations from three test runs or more shall be used to determine compliance. The procedures in item D shall be used to determine compliance with the mercury emission limits.

D. To determine the mercury concentration, the arithmetic average of three or more samples at the outlet of the air pollution control device shall be used. The minimum sample volume shall be ~~30 dscf~~ 1.7 dscm. The maximum sample run time shall be two hours. An oxygen or carbon dioxide measurement shall be obtained simultaneously with each Method 29 test run for mercury.

To determine the percent reduction of mercury, concurrent sampling for mercury at the inlet and outlet of the air pollution control system shall be performed at each occurrence of mercury emissions performance testing.

Owners and operators of RDF combustors may choose to conduct mercury emissions testing either every 90 days or every ~~15~~ 12 months. If the owner or operator of an RDF combustor chooses to conduct testing every 90 days, the requirements of subitems (1) and (2) apply. If the RDF combustor chooses to test every ~~15~~ 12 months, the requirements of subitem (3) apply.

[For text of subitems (1) and (2), see M.R.]

(3) Owners or operators of waste combustors combusting RDF who choose to conduct mercury emission testing every 15 months shall use the procedures in this subitem to determine compliance with mercury emission limits.

(a) The waste combustor is in compliance with the ~~15-month~~ 12-month mercury emission concentration limit if the arithmetic average of three or more samples is less than the ~~15-month~~ 12-month test interval mercury emission concentration limit.

(b) If the average computed in unit (a) exceeds the ~~15-month~~ 12-month mercury emission concentration limit, the removal efficiency for each run shall be computed by the equation in subitem (1), unit (b). The waste combustor is in compliance with the ~~15-month~~ 12-month mercury emission limit if the arithmetic average of the removal efficiencies is greater than 85 percent.

Subp. 4. **Steam flow measurement method.** The method contained in ASME Power Test Codes: Test Codes for Steam Generating Units, PTC 4.1 (1972), section 4, incorporated by reference in part 7011.1205, shall be used for calculating the steam flow required under part 7011.1260, subpart 3, item A, subitem (2). The recommendations of Instruments and Apparatus: Measurement of Quantity of Materials, Interim Supplement 19.5 (1971), chapter 4, incorporated by reference in part 7011.1205, shall be followed for design, construction, installation, calibration, and use of nozzles and orifices, except that measurement devices such as flow nozzles and orifices are not required to be recalibrated after they are installed. All signal conversion elements associated with steam flow measurements must be calibrated according to the manufacturer's instructions before each PCDD/PCDF test, and at least once per year. This annual calibration shall be recorded in the daily operating record as described in part 7011.1285, subpart 2.

[For text of subp 4a, see M.R.]

Subp. 4b. **Procedures for correlating carbon dioxide and oxygen concentrations.** If carbon dioxide is selected for use in diluent corrections, the relationship between oxygen and carbon dioxide levels shall be established during the initial performance test according to the procedures and methods specified as described in items A to E.

A. The emission rate correction factor and the integrated bag sampling and analysis procedure of *Code of Federal Regulations*, title 40, part 60, Appendix A, Method 3B, as amended, shall be used to determine the oxygen concentration at the same location as the carbon dioxide monitor.

B. Samples shall be taken for at least 30 minutes in each hour.

C. Each sample shall represent a one-hour average.

D. A minimum of three runs shall be performed.

E. The relationship between carbon dioxide and oxygen concentrations that is established shall be submitted as part of the initial performance test report.

Subp. 5. **Performance tests required.** Performance tests shall be conducted on waste combustors to determine the emission ~~rates~~ concentrations of the following air contaminants:

A. lead;

B. cadmium;

C. mercury; and

D. any other air contaminant for which an emission limitation applies to the waste combustor, except for opacity and those contaminants for which compliance is demonstrated by the use of a continuous monitor.

[For text of subp 6, see M.R.]

Subp. 7. **Maximum demonstrated capacity.** For Class I, II, III, A, ~~B,~~ C, and D waste combustors, maximum demonstrated capacity of each waste combustor unit shall be determined during the initial performance test for PCDD/PCDF and each subsequent performance test during which compliance with the PCDD/PCDF emission limit in part 7011.1225 is achieved. For Class IV waste combustors, maximum demonstrated capacity shall be determined during the initial performance test and each subsequent performance test during which compliance with emission limits is demonstrated.

Subp. 8. **Particulate matter control device temperature.** The owner or operator of a waste combustor with postcombustion particulate matter control shall determine and record the four-hour arithmetic average gas stream temperature as measured at the inlet to ~~the most efficient~~ each particulate matter control device during the initial and each subsequent performance test for ~~polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans~~ PCDD/PCDF's demonstrating compliance with the PCDD/PCDF emission limit in part 7011.1225.

Subp. 9. [See repealer.]

[For text of subps 10 and 11, see M.R.]

7011.1270 PERFORMANCE TEST, WASTE COMPOSITION STUDY, AND ASH SAMPLING FREQUENCY.

The owner or operator of a waste combustor shall conduct the performance tests required in part 7011.1265, subpart 5, based on the schedules in items A to ~~D~~ E.

A. Class ~~I,~~ A~~, and B~~ waste combustors shall conduct performance tests~~:~~ as described in subitems (1) to (6).

(1) Once within the normal start-up~~;~~.

(2) Once annually after the test in subitem (1), but not more than 12 months following the initial performance test~~;~~, except that fugitive emissions from ash handling need only to be tested once within normal start-up as required in subitem (1).

(3) If all PCDD/PCDF performance tests for all units for a two-year period indicate that PCDD/PCDF emissions are less than or equal to 15 ng/dscm corrected to seven percent O_2 from each unit, then the owner or operator may choose to test one unit for PCDD/PCDF once annually after the test in subitem (2), but not more than 12 months following the previous performance test. Thereafter, the owner or operator may continue to test a different unit for PCDD/PCDF each year, in sequence (e.g. unit 1, unit 2, etc.). If any annual performance test demonstrates a PCDD/PCDF concentration greater than 15 ng/dscm corrected to seven percent O_2, performance tests thereafter shall be conducted annually on all units until all annual performance tests for all units for a two-year period indicate a PCDD/PCDF emission concentration less than or equal to 15 ng/dscm.

(4) The owner or operator will specify what the PCDD/PCDF performance testing schedule is each time a pretest notification is given under the conditions of part 7017.2030.

(5) From Class A waste combustors that are not burning RDF, for mercury emissions every ~~90 days~~ three months.

The facility may implement testing for mercury not less than once every 12 months under the following conditions: the facility has demonstrated that mercury emissions have been below 50 percent of the facility's permitted long-term limit for three consecutive years; and the owner or operator has submitted a request for an administrative amendment according to the procedures of part 7007.1400.

Waste combustors combusting RDF may choose to conduct performance tests for mercury every ~~15~~ 12 months. If a test shows that an emission limit for mercury from a waste combustor combusting RDF is exceeded, the commissioner shall require testing every ~~90 days~~ three months thereafter~~; and~~ until compliance with the standard is demonstrated.

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~~(4)~~ (6) A ~~current~~ waste composition study every five years.

B. Class II and C waste combustors shall conduct performance tests~~:~~ as described in subitems (1) to (4).

(1) Once within the normal start-up, except as provided in subitem (3)(b)~~;~~.

(2) Once annually after the test in subitem (1), but not more than 12 months following the initial performance test, except as provided in subitem (3). Also, fugitive emissions from ash handling do not need to be tested more frequently that the initial test required in subitem (1). If ~~all~~ three annual performance tests for a three-year period show compliance with ~~the particulate matter and PCDD/PCDF~~ standards in part ~~7011.1215~~ 7011.1225, the owner or operator may continue to conduct annual testing, or may choose to conduct performance tests every 2-1/2 years, except as required by subitem (3). At a minimum, a performance test ~~for particulate matter and PCDD/PCDF~~ shall be conducted every 2-1/2 years, but no more than 30 months following the previous compliance test. If a performance test indicates noncompliance with ~~the particulate matter and PCDD/PCDF~~ applicable standards, the owner or operator shall resume annual testing for three years for that pollutant for which noncompliance was demonstrated. If ~~all~~ three annual performance tests for the three-year period show compliance with ~~particulate matter and PCDD/PCDF~~ standards in part ~~7011.1215~~ 7011.1225, the owner or operator may again conduct performance testing every 2-1/2 years~~;~~.

(3) For mercury emissions~~:~~,

~~(a) Class II waste combustors shall test every 90 days. Waste combustors combusting RDF may choose to conduct performance tests for mercury emissions every 15 months. If a test shows that an emission limit for mercury from a waste combustor combusting RDF is exceeded, the commissioner shall require performance testing every 90 days; and~~

~~(b)~~ Class C waste combustors shall commence testing June 20, 1995, and continue testing every 90 days ~~thereafter~~ until August 1, 1997. Thereafter, Class C waste combustors that are not burning RDF shall conduct mercury emissions testing every three months.

The facility may implement testing for mercury not less than once every three years or according to federal applicable requirements, whichever is more stringent, under the following conditions: the facility has demonstrated that mercury emissions have been below 50 percent of the facility's permitted long-term limit for three consecutive years; and the owner or operator has submitted a request for an administrative amendment according to the procedures of part 7007.1400.

If a facility is granted testing for mercury not less than once every three years or according to federal applicable requirements, whichever is more stringent, and a mercury performance test shows mercury emissions greater than 50 percent of the facility's permitted mercury limit, the facility shall conduct annual mercury stack sampling until emissions are below 50 percent of the facility's permitted mercury limit. Once the facility demonstrates that mercury emissions are again below 50 percent of the facility's permitted limit, the facility may resume testing every three years, upon notifying the commissioner in writing.

Waste combustors combusting RDF may choose to conduct performance tests for mercury emissions every ~~15~~ 12 months. If a test shows that emission limits for mercury from a waste combustor combusting RDF are exceeded, the commissioner shall require performance testing every ~~90 days; and~~ three months until compliance is demonstrated.

(4) A ~~current~~ waste composition study every five years.

C. Class III and D waste combustors shall conduct performance tests~~:~~ as described in subitems (1) to (6).

(1) Once within the normal start-up~~;~~.

(2) Every 2-1/2 years after the test in subitem (1), but not more than 30 months following the initial performance test~~;~~.

(3) For Class III waste combustors, emissions of mercury, every ~~90 days;~~ three months.

The facility may implement testing for mercury not less than once every three years or according to federal applicable requirements, whichever is more stringent, under the following conditions: the facility has demonstrated that mercury emissions have been below 50 percent of the facility's permitted long-term limit for three consecutive years; and the owner or operator has submitted a request for an administrative amendment according to the procedures of part 7007.1400.

If a facility is granted testing for mercury not less than once every three years or according to federal applicable requirements, whichever is more stringent, and mercury performance test shows mercury emissions greater than 50 percent of the facility's permitted mercury limit, the facility shall conduct annual mercury stack sampling until emissions are below 50 percent of the facility's permitted mercury limit. Once the facility demonstrates that mercury emissions are again below 50 percent of the facility's permitted limit, the facility may resume testing every three years, upon notifying the commissioner in writing.

(4) For Class D waste combustors, emissions of mercury every 2-1/2 years~~;~~.

(5) For ash, in accordance with part 7045.0131 every 30 months for toxicity by toxic characteristic leach procedure for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and nickel~~; and~~.

(6) A ~~current~~ waste composition study every five years.

[For text of item D, see M.R.]

E. Class I waste combustors shall conduct performance tests for mercury emissions every three months for waste combustors that are not burning RDF.

The facility may implement testing for mercury not less than once every 12 months under the following conditions: the facility has demonstrated that mercury emissions have been below 50 percent of the facility's permitted long-term limit for three consecutive years; and the owner or operator has submitted a request for an administrative amendment according to the procedures of part 7007.1400.

Waste combustors combusting RDF may choose to conduct performance tests for mercury every 12 months. If a test shows that an emission limit for mercury from a waste combusting RDF is exceeded, the commissioner shall require testing every three months thereafter until compliance with the standard is demonstrated.

Class I waste combustors shall conduct a waste composition study every five years.

7011.1272 MERCURY OR PCDD/PCDF ADDITIVE EQUIPMENT OPERATION, MONITORING, AND REPORTING.

Subpart 1. **Mercury or PCDD/PCDF removal equipment operation.** The owner or operator of a waste combustor using additives for the control of mercury or PCDD/PCDF shall determine and record the average additive mass feed rate, in pounds-per-hour, during the initial and at each subsequent performance test for mercury or PCDD/PCDF. The owner or operator shall correlate this feed rate to an operating parameter of the additive injection system.

The owner or operator shall submit the calculations supporting the correlation with the results of the mercury or PCDD/PCDF performance test.

Subp. 2. **Mercury or PCDD/PCDF additive feed rate monitor.** The owner or operator of a waste combustor using additives for the control of mercury or PCDD/PCDF shall install, maintain, and operate at all times a system for monitoring the additive injection system's operating parameter that is the primary indicator of the additive's mass feed rate, as determined by the requirements of subpart 1.

The monitored condition must equal or exceed that determined during the most recent mercury or PCDD/PCDF performance test that demonstrated compliance with the emission limit.

Subp. 3. **Recordkeeping and recording of additive use.**

A. The owner or operator shall maintain a record of the average additive mass feed rate for each hour of operation, as measured by the operating parameter required in subpart 2. If the operating parameter is not a direct measurement of the mass feed rate of the additive, then the record shall contain the calculations supporting the correlation between the mass feed rate and the measured operating parameter.

The record shall be maintained on site in a form suitable for immediate inspection.

B. During each calendar quarter, the owner or operator shall estimate the total additive used at the waste combustor in pounds or kilograms by two independent means as described in subitems (1) and (2):

(1) the weight of additive delivered to the plant; and

(2) estimate the average additive mass feed rate in pounds per hour, or kilograms per hour, for each hour of operation for each unit, based on the parameters measured in subpart 2. Sum the results of the mass feed rates for all waste combustor units at the plant for the total number of hours of operation during the calendar quarter.

7011.1275 PERSONNEL TRAINING.

Subpart 1. **General.** Waste combustor facility personnel described in subpart 2 must complete a program of instruction and on-the-job training based on the operating manual described in subpart 3. The program must train facility personnel to maintain compliance with parts 7011.1201 to ~~7011.1285~~ 7011.1290. Individual training shall be specific to the position held and shall, at a minimum, address the items in subpart 3.

For personnel described in subpart 2, the training program shall require:

[For text of items A and B, see M.R.]

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C. that those without waste combustor or boiler operation experience, initially review the operating manual and work under the direct supervision of a certified operator or a certified operator's designee before assumption of job-related activities affecting air emissions for the following duration:

(1) for Class I, II, III, A, ~~B,~~ C, or D waste combustor personnel, 40 hours; and

(2) for Class IV waste combustor personnel, 12 hours; and

[For text of item D, see M.R.]

[For text of subp 2, see M.R.]

Subp. 3. **Operating manual requirements.** The owner or operator of a waste combustor shall develop and update on a yearly basis a site specific operating manual that shall, at a minimum, address the following elements of waste combustor unit operation:

[For text of items A to E, see M.R.]

F. procedures for operating the waste combustor within the standards established in parts 7011.1201 to ~~7011.1285~~ 7011.1290;

[For text of items G to O, see M.R.]

[For text of subp 4, see M.R.]

7011.1280 OPERATOR CERTIFICATION.

[For text of subpart 1, see M.R.]

Subp. 2. **Personnel who shall be certified.** The following personnel shall be certified through the process established in this part:

A. for Class I, II, III, A, ~~B,~~ C, or D waste combustors, the chief facility operator and shift supervisors; and

B. for Class IV waste combustors, the operator supervisor.

Subp. 3. **Requirements for operator certification.** To be certified, a person must demonstrate the skill, knowledge, and experience necessary to operate a waste combustor, by meeting the criteria of item A or B.

[For text of item A, see M.R.]

B. A certified operator of a Class I, II, III, A, ~~B,~~ C, or D waste combustor shall comply with the requirements in ~~subitems~~ subitem (1) ~~and~~ or (2).

(1) Persons who possess a Minnesota Department of Labor and Industry boiler license of at least second class engineer, Grade B, shall:

(a) have one year of experience operating a steam generation plant or Class I, II, III, A, ~~B,~~ C, or D waste combustor at the licensure level of at least second class engineer, Grade B, and complete at least 24 hours of training approved by the commissioner which are designed to ensure competency to operate a Class I, II, III, A, ~~B,~~ C, or D waste combustor;

(b) complete the certification process described in subpart 4; and

(c) pass the examination described in subpart 5.

(2) Persons who do not meet the qualifications of subitem (1), unit (a), shall:

(a) have three years of experience operating a Class I, II, III, A, ~~B,~~ C, or D waste combustor or in power generation and complete at least 24 hours of training approved by the commissioner which are designed to ensure competency to operate a Class I, II, III, A, ~~B,~~ C, or D waste combustor;

(b) complete the certification process described in subpart 4; and

(c) pass the examination described in subpart 5.

[For text of subp 4, see M.R.]

Subp. 5. **Examinations.**

[For text of item A, see M.R.]

B. For certification of a person to operate a Class I, II, III, A, ~~B,~~ C, or D waste combustor, the examination shall be in three areas, divided as follows:

[For text of subitems (1) to (3), see M.R.]

[For text of items C to E, see M.R.]

[For text of subp 6, see M.R.]

Subp. 7. **Renewal.**

A. A certified individual shall apply for certificate renewal 30 days prior to certificate expiration. Renewal certificates shall be issued by the commissioner when the commissioner receives the application, along with evidence that the person has, during the preceding three years, earned credit for attending training courses offered by the agency or other training courses approved by the commissioner as described in subpart 8, including personnel training described in part ~~7011.1265~~ 7011.1275, for the number of hours as identified as follows:

(1) Class I, II, III, A, ~~B,~~ C, or D, 24 hours; and

[For text of subitem (2), see M.R.]

[For text of items B and C, see M.R.]

[For text of subps 8 and 9, see M.R.]

Subp. 10. **Certification deadlines.** ~~Individuals requiring certification who are employed as a chief facility operator or shift supervisor of a Class A or B waste combustor shall obtain certification by February 11, 1993.~~ All ~~other~~ individuals employed on June 20, 1994, who require certification as described in this part shall obtain certification by June 20, 1996, or on completion of the normal start-up of a waste combustor, whichever is later.

7011.1281 FULL OPERATOR CERTIFICATION.

Subpart 1. **Fully certified operator defined.** A "fully certified operator" means:

A. a person who has obtained "certified municipal waste combustor examiner" certification as described in part 7011.1282;

B. a person who has obtained both "provisional certification" and "operator certification" according to ASME QRO-1-1989, incorporated by reference in part 7011.1205; or

C. a person who is a "fully certified operator" as described in part 7011.1284.

Subp. 2. **Changes at a facility.** If changes are made in equipment and/or operating procedures which the initial certification did not address, certificate holders shall demonstrate detailed knowledge of these changes according to the conditions of the certificate held. A change in the name or ownership of a facility shall not invalidate the operator certificate.

7011.1282 CERTIFIED MUNICIPAL WASTE COMBUSTOR EXAMINER CERTIFICATE.

Subpart 1. **Criteria for a certified municipal waste combustor examiner.** To be certified as a certified municipal waste combustor examiner, employment claimed on the individual's application for certification must be verified by the individual's supervisor or personnel officer and the individual must:

A. hold a current certificate as defined in part 7011.1280, subpart 1;

B. document a total of 60 months satisfactory employment experience in general industry, of which 36 months were at the level of a chief facility operator or shift supervisor, as defined in part 7011.1201, subparts 8 and 44, at a municipal waste combustor;

C. be currently employed by a municipal waste combustor owner;

D. possess a bachelor degree in engineering or a related field, or a Minnesota Department of Labor and Industry boiler license of chief engineer, Grade A or B;

E. pass an oral examination as described in subpart 3; and

F. identify the waste combustor facility for which the applicant seeks certification as a certified municipal waste combustor examiner.

Subp. 2. **Certification process for a certified municipal waste combustor examiner.**

A. The commissioner shall review the application for certified municipal waste combustor examiner and determine the adequacy of information included in the application. If the commissioner determines that additional information or documentation is necessary to assess the eligibility of the applicant, the commissioner shall notify the applicant. The application shall be considered incomplete until the applicant provides the required information. When the commissioner determines that the applicant has submitted a complete application, and has determined that the applicant has demonstrated a satisfactory compliance history as an operator at a municipal waste combustor, the commissioner shall schedule an oral examination of the applicant.

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B. The commissioner shall issue a certificate to the applicant who successfully completes the examination process of subpart 3. The certified municipal waste combustor examiner's certificate is site-specific, and is not transportable. The certificate shall expire five years after its issue date unless renewed. Each certificate shall contain the following information:

(1) identification as a certified municipal waste combustor examiner certificate;

(2) the certified individual's full name; and

(3) the name and location of the facility for which certification is given.

Subp. 3. **Examination for certified municipal waste combustor examiner.**

A. The commissioner shall convene a board of examiners to conduct an oral examination of a certified municipal waste combustor examiner applicant.

B. The examination for certified municipal waste combustor examiner shall:

(1) test understanding of the content and procedures described in the waste combustor's operating manual that is required to be prepared for the facility by part 7011.1275, subpart 3;

(2) test comprehensive understanding of the duties of a certified examiner described in part 7011.1283 and how the applicant is prepared to carry out these duties; and

(3) require the applicant to describe the waste combustor facility's program for examining and awarding full certification, and describe how this program incorporates the requirements of parts 7011.1283 and 7011.1284.

The board of examiners shall evaluate applicants for certified municipal waste combustor examiner based on the applicant's technical knowledge and understanding of integrated plant operations. An applicant's responses shall be graded as pass or fail. All members of the board of examiners must pass the applicant if the certification is to be granted.

C. The board of examiners shall consist of at least three members. The three members shall be a member of the Pollution Control Agency, a member of the municipal waste combustor industry, and a member who is or has been employed at a power operation facility using combustion and/or air pollution control technologies comparable to the facility where the applicant is employed.

The commissioner may appoint additional board members if the facility for which the applicant seeks certification is complex and the commissioner determines that additional examiners will help the board determine the applicant's technical knowledge, problem-solving ability, and understanding of plant operations.

Additional Pollution Control Agency representatives, a representative from the facility, a representative of an industry trade group, and a member of the public shall be allowed by the commissioner to observe the examination.

Subp. 4. **Renewal.** The commissioner shall issue renewal certified examiner certificates when an individual submits a written request to renew the certificate at least 30 days before the expiration of the certificate.

If changes are made in equipment and/or operating procedures which the initial certification did not address, the individual shall submit written evidence that the change has been made, the individual has been trained, and the on-site certification program has been amended to include the changes. The individual shall also submit evidence that the individual has, during the life of the certified municipal waste combustor operator certificate, maintained the individual's certification as required in part 7011.1280. If the individual applies for certificate renewal after the certified municipal waste combustor examiner certificate has expired, the commissioner shall schedule an examination according to part 7011.1282, subpart 3.

Subp. 5. **Sanctions.** The conditions of part 7011.1280, subpart 9, apply to any sanctions taken by the commissioner.

7011.1283 DUTIES OF A CERTIFIED MUNICIPAL WASTE COMBUSTOR EXAMINER.

A certified municipal waste combustor examiner shall be responsible for the development, implementation, monitoring, and updating of an operator certification program specific to the municipal waste combustor for which the examiner has been certified. The operator certification program shall be designed as a system of training and written and/or oral examination on the duties, knowledge, and responsibilities of municipal waste combustor unit operations, as described in the operating manual required in part 7011.1275, subpart 3. The certified examiner shall administer the examination of full operator candidates.

7011.1284 FULLY CERTIFIED OPERATOR.

Subpart 1. **Scope.** A certified municipal waste combustor examiner may award the status of fully certified operator to an individual at a municipal waste combustor facility, provided the conditions of this part are met.

Subp. 2. **Criteria for a fully certified operator.** To be eligible as a fully certified operator, an individual must maintain a provisional certificate from ASME or a certificate described in part 7011.1280, and pass an examination administered by the waste combustor's certified municipal waste combustor examiner.

The examination shall test comprehensive understanding of the content and procedures described in the waste combustor's operating manual that is required to be prepared for the facility by part 7011.1275, subpart 3.

If changes are made in equipment and/or operating procedures which the initial certification did not address, certificate holders shall demonstrate to the facility's certified examiner detailed knowledge of these changes within six months after the change is made. If the demonstration of knowledge has not been made within six months, the certificate shall expire.

Subp. 3. **Record of certified operators.** The waste combustor owner or operator shall maintain at the waste combustor facility for five years a record of the names of all personnel that the examiner has certified.

This record shall contain the examination dates, the nature or content of the examination, the full name of the individual certified, the date of certification, and the signature of the certified examiner for that facility with the following certification:

"I certify under penalty of law that, based on my examination of these persons, these persons have demonstrated the knowledge and skills that qualify these persons to be fully certified operators at (name of waste combustor facility) in accordance with the procedures of *Minnesota Rules*, parts 7011.1280 to 7011.1284."

Subp. 4. **Inspection of records.** The owner or operator shall allow the commissioner to review all records related to the certification of operators, including the facility's program for the examination and certification of operators, the record required in subpart 3, the content of examinations, and the results of an individual's examination.

7011.1285 OPERATING RECORDS AND REPORTS.

Subpart 1. **Scope.** The owner or operator of a waste combustor shall maintain records and submit reports as required in this part. The owner or operator of a waste combustor required to obtain a permit under part 7007.0200, subpart 4, or 7007.0250, subpart 5, are also subject to the recordkeeping and reporting requirements in part 7007.0800, subparts 5 and 6. Class A, C, I, and II waste combustors shall maintain on site all submittals required by this part as paper copies for five years. All other waste combustors shall retain records ~~shall be retained~~ for a minimum of five years.

Subp. 2. **Daily operating record.** The owner or operator shall maintain a daily record of the operation of the waste combustor. The record shall contain:

[For text of items A to I, see M.R.]

J. the reasons for exceeding any of the average emission rates, percent reductions, or operating parameters specified under part 7011.1260, subpart 6, item C, or the opacity limit and a description of corrective actions taken; ~~and~~

K. reasons for not obtaining the minimum number of hours of sulfur dioxide or nitrogen oxides emissions or operational data (carbon monoxide emissions, steam flow or alternative unit load measurement parameter as described in part 7011.1265, subpart 4a, particulate matter control device temperature) and a description of corrective actions taken~~.~~;

L. the date of the calibration of all signal conversion elements associated with steam flow monitoring as required in part 7011.1265, subpart 4; and

M. for waste combustors using an additive to comply with mercury or PCDD/PCDF emission limits, reasons for not maintaining the additive system operating parameter as determined in part 7011.1272, subpart 2, and descriptions of corrective actions taken.

Subp. 3. **Quarterly reports.** The owner or operator of a Class I, II, III, A, ~~B,~~ C, or D waste combustor shall submit quarterly reports to the commissioner within 30 days after the quarter ending December 30, March 30, June 30, and September 30 of each year. The report shall contain the following items:

[For text of item A, see M.R.]

B. sulfur dioxide, nitrogen oxide, and carbon monoxide emissions, ~~and~~ the maximum or minimum waste combustor unit load level and particulate matter control device ~~temperature~~ temperatures as ~~required~~ recorded by part 7011.1260, subpart 6, item C~~;~~, and the daily maximum opacity readings as recorded by part 7011.1260, subpart 6, item B, subitem (1). The facility may choose to provide this information in tabular or graphic form. The graphs shall be prepared as follows:

(1) the graph shall represent one operating parameter or pollutant;

(2) the applicable limit of the parameter or pollutant shall be indicated on the graph; and

(3) data shall be expressed in the same units as the applicable operating parameter or emissions limit;

KEY: PROPOSED RULES SECTION — Underlining indicates additions to existing rule language. ~~Strike~~ ~~outs~~ indicate deletions from existing rule language. If a proposed rule is totally new, it is designated "all new material." **ADOPTED RULES SECTION** — Underlining indicates additions to proposed rule language. ~~Strike~~ ~~outs~~ indicate deletions from proposed rule language.

[For text of item C, see M.R.]

D. the identification of operating days when any of the average emission ~~rates~~ concentrations, percent reductions, ~~or~~ operating parameters specified under part 7011.1260, subpart 6, item C, or 7011.1272, subpart 2, or the opacity level exceeded the applicable limits~~, with the~~. The report shall include the emission levels recorded during the exceedance, reasons for such exceedances as well as a description of corrective actions taken;

[For text of item E, see M.R.]

F. the identification of operating days for which the minimum number of hours ~~of sulfur dioxide or nitrogen oxides emissions or operational data (carbon monoxide emissions, steam flow or alternative unit load measurement parameter as described in part 7011.1265, subpart 4a, particulate matter control device temperature)~~ that emission concentrations, percent reductions, operating parameters specified under part 7011.1260, subpart 6, item C, or 7011.1272, subpart 2, or the opacity level have not been obtained, including reasons for not obtaining sufficient data and a description of corrective actions taken;

[For text of item G, see M.R.]

H. the information required in subpart 2, items C, D, and E, summarized to reflect quarterly totals; ~~and~~

I. a compliance certification as required in part 7007.0800, subpart 6, item C; and

J. if an additive is used to comply with mercury or PCDD/PCDF emission limits, the total additive used during the calendar quarter, as specified in part 7011.1272, subpart 3, item B, with supporting calculations.

[For text of subp 4, see M.R.]

Subp. 4a. [See repealer.]

[For text of subp 5, see M.R.]

Subp. 6. **Performance test reports.** The owner or operator shall submit a report containing the results of performance tests conducted to determine compliance with waste combustor unit emission limits whenever performance testing is conducted. The report shall be submitted ~~within 14 days of the owner's or operator's receipt of the results of the performance test~~ according to the conditions of part 7017.2035.

7011.1290 INCORPORATION OF NEW SOURCE PERFORMANCE STANDARD BY REFERENCE.

Code of Federal Regulations, title 40, part 60, subpart Eb, as amended, entitled "Standards of Performance for Municipal Waste Combustors for Which Construction is Commenced After September 20, 1994" is adopted and incorporated by reference.

REPEALER. *Minnesota Rules*, parts 7011.1201, subparts 7, 10, and 47; 7011.1240, subparts 4 and 6; 7011.1265, subpart 9; and 7011.1285, subpart 4a, are repealed.

Board of Pharmacy

Proposed Permanent Rules Relating to Fee Changes

Notice of Intent to Adopt Rules Without a Public Hearing

In the Matter of the Proposed Rule Amendments Relating to the Fees for Licensure of Pharmacists and Pharmacies, License Renewals, Reciprocity, and Examinations, and Accepting Canadian Graduates as Candidates for Licensure.

NOTICE IS HEREBY GIVEN that the Minnesota Board of Pharmacy (hereinafter "Board") proposes to amend *Minnesota Rules* pts. 6800.0400, 6800.1150, 6800.1250, and 6800.1300 relating to fees and examinations.

Introduction. The Board of Pharmacy intends to adopt permanent rules without a public hearing following the procedures set forth in the Administrative Procedure Act, *Minnesota Statutes*, sections 14.22 to 14.28. You have 30 days to submit written comments on the proposed rule and may also submit a written request that a hearing be held on the rules.

Agency Contact Person. Comments or questions on the rule and written requests for a public hearing on the rule must be submitted to:

David E. Holmstrom, Executive Director
Minnesota Board of Pharmacy
2829 University Ave. SE, Suite 530
Minneapolis, MN 55414-3251

Subject of Rule and Statutory Authority. The proposed rules are about pharmacist, pharmacy, and examination fees, and accepting Canadian graduates as candidates for licensure. The statutory authority to adopt these rules is *Minnesota Statutes* 151.06, 151.07, 151.12, 151.13, 151.19, 214.06, and 16A.128. A copy of the proposed rules are published in the *State Register* and attached to this notice as mailed.

Comments. You have until 4:30 p.m. on December 17, 1997, to submit written comments in support of or in opposition to the proposed rule and any part or subpart of the rules. Your comment must be in writing and received by the agency contact person by the due date. Comment is encouraged. Your comments should identify the portion of the proposed rule addressed and the reason for the comment. You are encouraged to propose any change desired. Any comments that you would like to make on the legality of the proposed rules must also be made during this comment period.

Request for a Hearing. In addition to submitting comments, you may also request that a hearing be held on the rules. Your request for a public hearing must be in writing and must be received by the agency contact person by 4:30 p.m. on December 17, 1997. Your request for a public hearing must include your name and address. You must identify the portion of the proposed rules to which you object or state that you oppose the entire rule. Any request that does not comply with these requirements is not valid and cannot be counted by the agency for determining whether a public hearing must be held. You are also encouraged to state the reason for the request and any changes you want made to the proposed rules.

Withdrawal of Requests. If 25 or more persons submit a written request for a hearing, a public hearing will be held unless a sufficient number withdraw their requests in writing. If enough requests for hearing are withdrawn to reduce the number below 25, the agency must give written notice of this to all persons who requested a hearing, explain the actions the agency took to effect the withdrawal, and ask for written comments on this action. If a public hearing is required, the agency will follow the procedures in *Minnesota Statutes*, sections 141.131 to 14.20.

Modifications. The proposed rules may be modified as a result of public comment. The modifications must be supported by comments and information submitted to the agency, and the adopted rules may not be substantially different than these proposed rules. If the proposed rule affects you in any way, you are encouraged to participate in the rulemaking process.

Statement of Need and Reasonableness. A statement of need and reasonableness is now available from the agency contact person. This statement contains a summary of the justification for the proposed rules, including a description of who will be affected by the proposed rules and an estimate of the probable cost of the proposed rules.

KEY: PROPOSED RULES SECTION — Underlining indicates additions to existing rule language. ~~Strike~~ ~~outs~~ indicate deletions from existing rule language. If a proposed rule is totally new, it is designated "all new material." **ADOPTED RULES SECTION** — Underlining indicates additions to proposed rule language. ~~Strike~~ ~~outs~~ indicate deletions from proposed rule language.

Approval of Commissioner of Finance. The approval of the Commissioner of Finance for adoption of rules relating to fees is required by *Minnesota Statutes* Section 214.06, subd. 1. A document entitled "Commissioner of Finance Approval" in which the Commissioner has approved the proposed rules is available. Anyone wishing to receive a copy of this document may contact Mr. Holmstrom at the above address.

Adoption and Review of Rule. If no hearing is required, the agency may adopt the rules after the end of the comment period. The rules and supporting documents will then be submitted to the Office of Administrative Hearings for review for legality. You may ask to be notified of the date the rules are submitted to the office. If you want to be so notified, or want to receive copy of the adopted rules, or want to register with the agency to receive notice of future rule proceedings, submit your request to the agency contact person listed above.

6800.0400 ANNUAL LICENSE RENEWAL DATE AND FEES.

Each pharmacy license shall expire on June 30 of each year and shall be renewed annually by filing an application for license renewal, on or before June 1 of each year, together with a fee of ~~$100~~ $150. Renewal applications received on or after July 1 are subject to a late filing fee of ~~$50~~ $75 in addition to the renewal fee.

6800.1150 ANNUAL RENEWAL, FEES, AND POSTING.

A pharmacist license expires on March 1 of each year and shall be renewed annually by filing an application for license renewal on or before February 1 of each year, together with a fee of ~~$75~~ $95. A pharmacist license renewal application received after March 1 is subject to a late filing fee of an amount equal to 50 percent of the renewal fee in addition to the renewal fee.

A pharmacist shall post the license or renewal most recently issued by the board or a copy of it in a conspicuous place within the pharmacy in which the pharmacist is practicing. For community pharmacies, this place shall be a place which is readily visible to the public.

6800.1250 APPLICATIONS FOR LICENSURE.

Subpart 1. **Submitting.** An applicant for licensure by examination shall submit a completed application for examination including affidavits of internship, a copy of applicant's birth certificate, and a recent photograph. An applicant shall show evidence of graduation with a bachelor of science degree or doctor of pharmacy degree, as the first professional undergraduate degree in pharmacy, from a college of pharmacy or a department of pharmacy of a university approved by the board ~~and meeting~~. The college or department of pharmacy must meet at least the minimum standards set by the American Council on Pharmaceutical Education in the current edition of its accreditation manual or, for Canadian graduates, must meet at least the minimum standards set by the Canadian Council for Accreditation of Pharmacy Programs and must conduct its instruction in English. The evidence shall be shown by submitting an official final transcript showing the date on which degree was conferred. The above listed documents together with a check for ~~$250~~ $125 payable to the Minnesota Board of Pharmacy must be received by the board at least 45 days prior to the examination. Applicants participating in the North American Pharmacy Licensing Exam (NAPLEX) and the Multistate Pharmacy Jurisprudence Exam (MPJE) must complete a separate application for these exams and submit such applications to the board. A certified check or money order for these exams made payable to the National Association of Boards of Pharmacy (NABP) must be submitted to NABP after the applications for examination have been approved by the board. An applicant who is a graduate of a school or college of pharmacy located outside the United States or Canada, which has not been recognized and approved by the board, but who is otherwise qualified to apply for a license to practice pharmacy in this state, is considered to have satisfied the requirements of graduation if the applicant verifies to the board the applicant's academic record and the applicant's graduation. Before taking the licensing examination, a foreign graduate applicant shall pass the Foreign Pharmacy Graduate Equivalency Examination, which is recognized and approved by the board, given by the Foreign Pharmacy Graduate Examination Commission and demonstrate proficiency in the English language by passing the Test of English as a Foreign Language, which is recognized and approved by the board, given by the Educational Testing Service as a prerequisite to taking the licensure examination.

Subp. 1a. **Authorization to practice.** An applicant who obtains a passing score on the examination is authorized to practice pharmacy only after paying an original licensure fee of $95 to the board.

Subp. 2. **Retaking exam.** Any applicant who has failed to pass the examination required by *Minnesota Statutes*, section 151.06, 151.07, 151.10, or 151.12, may retake the examination within the next ensuing 14 months, provided that no applicant who has failed in three examinations shall be permitted to take a further examination, except upon petition setting forth facts acceptable to the board. The applicant shall, at least 45 days before an examination, notify the board in writing of the intention to retake the examination, certifying that information furnished on the original application remains true and correct, or reporting any changes therein, including additional education and experience, and shall submit a fee ~~of $250 payable to the Minnesota Board of Pharmacy,~~ as described in subpart 1. The board reserves the right to request a full and complete application.

Subp. 3. **Fees not refunded.** Examination or license fees paid to the board shall not be returned or refunded.

6800.1300 RECIPROCITY.

Subpart 1. **Applications.** An application for reciprocal licensure (licensure as a pharmacist on the basis of licensure as a pharmacist in another state) together with a fee of ~~$175~~ $195 shall be filed with the director of the board at least 30 days before the date the application is to be considered by the board. The board will consider applications for reciprocity in at least January and June of each calendar year.

[For text of subps 2 to 4, see M.R.]

Subp. 5. **Written and oral examination.** Applicants for reciprocal licensure shall be required to display their familiarity with the laws regulating the practice of pharmacy in Minnesota by submitting to ~~a written and oral~~ an examination on the *Minnesota laws* and rules and the federal laws and regulations governing the practice of pharmacy.

[For text of subp 6, see M.R.]

Department of Public Service

Proposed Permanent Rules Relating to the Energy Code

Notice of Hearing

Proposed Amendment to *Minnesota Rules*, chapter 7670, and Adoption of New *Minnesota Rules*, Chapters 7672, 7674, 7676, and 7678, in Combination Known as the Minnesota Energy Code.

Public Hearing. The Department of Public Service intends to adopt rules after a public hearing following the procedures set forth in the Administrative Procedure Act, *Minnesota Statutes*, sections 14.131 to 14.20. The agency will hold a public hearing on the above-entitled rules in Suite 500 South, State Office Building, 100 Constitution Avenue, Saint Paul, Minnesota 55155, starting at 9 a.m. on Friday, December 19, 1997, and continuing until the hearing is completed. Additional days of hearing will be scheduled if necessary. All interested or affected persons will have an opportunity to participate by submitting either oral or written data, statements, or arguments. Statements may be submitted without appearing at the hearing.

Administrative Law Judge. The hearing will be conducted by Administrative Law Judge Richard C. Luis, who can be reached at the Office of Administrative Hearings, 100 Washington Square, Suite 1700, Minneapolis, Minnesota 55401-2138, telephone 612-349-2542, and fax 612-349-2665. The rule hearing procedure is governed by *Minnesota Statutes*, Sections 14.131 to 14.20, and by the rules of the Office of Administrative Hearings, *Minnesota Rules*, Parts 1400.2000 to 1400.2240. Questions concerning the rule hearing procedure should be directed to the Administrative Law Judge.

Subject of Rules, Statutory Authority, and Agency Contact Person. The subject of the hearing will be the proposed revisions to the Minnesota Energy Code, *Minnesota Rules*, Chapter 7670. The proposed Energy Code will be divided into several chapters. Chapter 7672 covers one-family and two-family residential buildings. Chapter 7674 covers low-rise multi-family residential building of three stories and less. Chapter 7676 covers all other buildings. chapter 7678 includes calculations and tables. The Department proposes, as one of the most significant changes to the Energy Code, a requirement to install a mechanical ventilation system in all new residences. Additionally, in Chapters 7672, 7674, and 7676, the Department proposes a new part addressing additions and alterations.

The proposed rules are authorized by *Minnesota Statutes*, Section 216C.19, Subdivision 8. A copy of the proposed rules is published in the *State Register*. A free copy of the rules is available upon request from the agency contact person. The agency contact person is: Bruce Nelson, Senior Engineer at Minnesota Department of Public Service, 121 7th Place East, Suite 200, Saint Paul, MN 55101-2145, telephone 612-297-2313, fax 612-297-1959, or email bnelson@dpsv.state.mn.us. TTY users may call the Department of Public Service at 612-296-3067.

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Statement of Need and Reasonableness. A Statement of Need and Reasonableness is now available for review at the agency offices and at the Office of Administrative Hearings. This statement contains a summary of the justification for the proposed rules, including a description of who will be affected by the proposed rules and an estimate of the probable cost of the proposed rules. The statement may be reviewed and copies obtained at the cost of reproduction from either the agency or the Office of Administrative Hearings.

Public Comment. You and all interested or affected persons, including representatives of associations and other interested groups, will have an opportunity to participate. You may present your views either orally at the hearing or in writing at any time before the close of the hearing record. All evidence presented should relate to the proposed rules. You may also submit written material to the Administrative Law Judge to be recorded in the hearing record for five working days after the public hearing ends. This five-day comment period may be extended for a longer period not to exceed 20 calendar days if ordered by the Administrative Law Judge at the hearing. Following the comment period, there is a five-working-day response period during which the agency and any interested person may respond in writing to any new information submitted. No additional evidence may be submitted during the five-day response period. All comments and responses submitted to the Administrative Law Judge must be received at the Office of Administrative Hearings no later than 4:30 p.m. on the due date. All comments or responses received will be available for review at the Office of Administrative Hearings.

The agency requests that any person submitting written views or data to the Administrative Law Judge prior to the hearing or during the comment period also submit a copy of the written views or data to the agency contact person at the address stated above.

Alternative Format/Accommodation. Upon request, this Notice can be made available in an alternative format, such as large print, Braille, or cassette tape. To make such a request or if you need an accommodation to make this hearing accessible, please contact the agency contact person at the address or telephone number listed above.

Modifications. The proposed rules may be modified as a result of the rule hearing process. Modifications must be supported by data and views presented during the rule hearing process, and the adopted rules may not be substantially different than these proposed rules. If the proposed rules affect you in any way, you are encouraged to participate.

Adoption Procedure After The Hearing. After the close of the hearing record, the Administrative Law Judge will issue a report on the proposed rules. You may ask to be notified of the date when the judge's report will become available, and can make this request at the hearing or in writing to the Administrative Law Judge. You may also ask to be notified of the date on which the agency adopts the rules and files them with the Secretary of State, or ask to register with the agency to receive notice of future rule proceedings, and can make these requests at the hearing or in writing to the agency contact person stated above.

Lobbyist Registration. *Minnesota Statutes*, Chapter 10A, requires each lobbyist to register with the State Ethical Practices Board. Questions regarding this requirement may be directed to the Ethical Practices Board at: First Floor South, Centennial Building, 658 Cedar Street, St. Paul, Minnesota 55155, telephone 612-296-5148 or 1-800-657-3889.

Order. I order that the rulemaking hearing be held at the date, time, and location listed above.

Dated: 3 November 1997

Krista L. Sanda, Commissioner
Department of Public Service

7670.0100 AUTHORITY; SCOPE; APPLICABILITY.

[For text of subps 1 and 2, see M.R.]

Subp. 3. **Applicability.** This chapter applies to one- and two-family residential buildings and multifamily residential buildings of three stories and less in height. Buildings covered by this chapter must comply with parts 7670.0260 to 7670.0800. ~~This chapter also applies to driveways, walkways, entrances, parking lots, and grounds.~~ Enforcement of this chapter ~~shall~~ must not abridge safety, health, or environmental requirements under other applicable codes or ordinances.

[For text of subps 4 to 7, see M.R.]

7670.0325 DEFINITIONS.

[For text of subps 1 to 40, see M.R.]

Subp. 41. **Renewable energy sources.** "Renewable energy sources" means sources of energy, excluding minerals, derived from incoming solar radiation, including natural daylighting and photosynthetic processes, including biomass; from phenomena resulting therefrom, including wind, waves and tides, lake or pond thermal differences; and energy derived from the internal heat of the earth, including nocturnal thermal exchanges.

[For text of subps 42 to 47, see M.R.]

Subp. 48. **Thermal transmittance (U).** "Thermal transmittance (U)" means the coefficient of heat transmission (air-to-air). It is the time rate of heat flow per unit area and unit temperature differential between the warm side and cold side of air films (Btu/h ft^2 °F). The U-factor of an element is calculated ~~by items A to E, as appropriate~~ using the parallel heat flow method, the series-parallel heat flow method, the metal stud framing equivalent R-value method, the draped insulation effective assembly R-value method, the zone method, or the thermal measurement method. Those methods are defined in part 7678.0500.

~~A. Parallel heat flow method. The parallel heat flow U-factor is the area weighted average of the thermal transmittance of the subelements of an element, as computed with the equations below.~~

~~Equation for thermal transmittance of an element:~~

~~$U = (A_1/R_1 + A_2/R_2 + A_3/R_3 + \ldots)/A_o$~~

~~Where:~~

~~A_1, A_2, A_3, ... = the cross-sectional area of the different subelements~~

~~R_1, R_2, R_3, ... = the cross-sectional R-value of the different subelements~~

~~A_o = the gross area of the element or overall component~~

~~B. Series-parallel heat flow method. The series-parallel heat flow method is a procedure that accounts for the fact that heat does not always flow straight through a wall.~~

~~Equations for series-parallel thermal transmittance:~~

~~$U = 1/R_o$~~

~~$R_o = R_i + (R_w * R_e)/[(A_e * R_w) + (A_w * R_e)] + R_{film}$~~

~~Where:~~

~~R_i = thermal resistance of faces~~

~~R_w = thermal resistance of the web~~

~~R_e = thermal resistance of the core~~

~~A_w = fraction of the total area perpendicular to heat flow of the web (conductive)~~

~~A_e = fraction of the total area perpendicular to heat flow of the core (insulated)~~

~~C. Metal stud framing equivalent R-value method. The metal stud framing equivalent R-value method employ a table giving equivalent R-values of opaque elements containing metal stud framing. The following equations must be used to determine the thermal transmittance of the opaque element.~~

~~Equations for the thermal transmittance of the opaque element:~~

~~$U = 1/R_t$~~

~~$R_t = R_i + R_e$~~

~~Where:~~

~~R_t = the total resistance of the opaque assembly~~

~~R_i = the resistance of the series elements (for i=1 to n), excluding the insulated metal stud framed element~~

~~R_e = the equivalent R-value of the element containing the insulated metal stud framing~~

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Equivalent R-values for metal stud framed (16 gauge or thinner) insulated cavities

Size of studs	Spacing of studs, inches on center	Cavity Insulation R-value	Insulated wall cavity equivalent R-value
2 x 4	16	R-11	R-5.5
2 x 4	16	R-13	R-6.0
2 x 4	16	R-15	R-6.4
2 x 4	24	R-11	R-6.6
2 x 4	24	R-13	R-7.2
2 x 4	24	R-15	R-7.8
2 x 6	16	R-19	R-7.1
2 x 6	16	R-21	R-7.4
2 x 6	24	R-19	R-8.6
2 x 6	24	R-21	R-9.0
2 x 8	16	R-25	R-7.8
2 x 8	24	R-25	R-9.6

D. Draped insulation effective assembly R-value method. The draped insulation effective assembly R-value method employs a table of effective R-values (R_e) of metal wall or roof assemblies with insulation draped over purlins or girts where insulation is compressed between the outside skin and purlin or girt.

Equation for draped insulation effective assembly R-value thermal transmittance calculation:

$U = 1/(R_s + R_e)$

Where:

R_s = the R-values of series elements excluding the draped insulation and framing

R_e = the effective assembly R-value

Air film coefficients included in table values.

Assembly effective R-values (R_e)

Batt Insulation R-value	One Fastener Per Linear Foot of Purlin/Girt Purlin/Girt Spacing (Feet)			
	5	4	3	2
R-38	11.61	10.18	8.45	6.30
R-30	11.08	9.79	8.21	6.20
R-26	10.80	9.59	8.08	6.14
R-22	10.06	9.04	7.73	5.99
R-19	9.95	8.95	7.67	5.97

Batt Insulation R-value	Two Fasteners Per Linear Foot of Purlin/Girt Purlin/Girt Spacing in (Feet)			
	5	4	3	2
R-38	9.96	8.64	7.07	5.19
R-30	9.56	8.36	6.91	5.12
R-26	9.35	8.21	6.81	5.09
R-22	8.80	7.80	6.56	4.98
R-19	8.71	7.74	6.52	4.96

~~E. Zone method. The zone method is a procedure in which the thermal transmittance of a surface is computed by dividing the surface into its "highly conductive" and "remaining" areas. The "highly conductive" area is a function of the width or diameter of the metal heat path terminal and the distance from the panel surface to the metal. The respective thermal transmittance of the two areas are separately computed, combined, and then divided by the total cross-sectional area.~~

~~Equation for zone method thermal transmittance:~~

~~$U = (U_1A_1 + U_2A_2)/A_o$~~

~~Where:~~

~~For the highly conductive area~~

~~A_1 = the highly conductive area~~

~~U_1 = the thermal transmittance of the highly conductive area~~

~~For the remainder of the area~~

~~A_2 = the remainder of the area~~

~~U_2 = the thermal transmittance of the remaining area~~

~~A_o (cross-sectional area of the element) = $A_1 + A_2$~~

~~Equation for areas:~~

~~$A_1 = m + 2d$, $A_2 = A_o - A_1$~~

~~Where:~~

~~m = width or diameter of the metal heat path terminal~~

~~d = distance from panel surface to metal~~

[For text of subps 49 to 53, see M.R.]

7670.0610 BUILDING MECHANICAL SYSTEMS.

Subpart 1. **General.**

~~A. Scope.~~ Building mechanical systems must be designed and constructed in accordance with this part. Standards and definitions for building mechanical systems (including, but not limited to, service systems, sequence, system, thermostat, terminal element, and zone) are located in *Code of Federal Regulations*, title 10, parts 430 and 435, Energy Conservation Standards for Consumer Products, and Energy Conservation Voluntary Performance Standards for new buildings.

~~B. Exception. Special applications, including, but not limited to, hospitals, laboratories, thermally sensitive equipment rooms, computer rooms, and facilities with open refrigerated display cases may be exempted from certain requirements of this part when approved by the building official.~~

Subp. 2. [See repealer.]

[For text of subps 3 and 4, see M.R.]

Subp. 5. [See repealer.]

Subp. 6. [See repealer.]

[For text of subps 7 and 8, see M.R.]

Subp. 9. [See repealer.]

Subp. 10. [See repealer.]

Subp. 11. [See repealer.]

[For text of subp 12, see M.R.]

Subp. 13. [See repealer.]

Subp. 14. **Controls.**

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[For text of items A and B, see M.R.]

C. Zoning for temperature control.

[For text of subitem (1), see M.R.]

(2) Multifamily dwellings. For multifamily dwellings, each individual dwelling unit must have at least one thermostat for regulation of space temperature. A readily accessible manual or automatic means must be provided to partially restrict or shut off the heating or cooling input to each room. ~~Spaces other than living units must meet the requirements of subitem (3).~~

(3) ~~Other types of buildings or occupancies. At least one thermostat for regulation of space temperature must be provided for:~~

~~(a) each separate system; or~~

~~(b) each separate zone as defined in part 7670.0325. As a minimum, each floor of a building must be considered as a separate zone. In a multistory building where the perimeter system offsets only the transmission losses of the exterior wall, an entire side of uniform exposure may be zoned separately. A readily accessible manual or automatic means must be provided to partially restrict or shut off the heating or cooling input to each floor.~~

~~(4)~~ Control setback and shutoff.

~~(a)~~ Residential occupancy groups. One- and two-family and multifamily dwellings: the thermostat required in subitems (1) and (2) or an alternate means, including, but not limited to, a switch or a clock, must provide a readily accessible manual or automatic means for reducing the energy required for heating and cooling during periods of nonuse or reduced need including, but not limited to, unoccupied periods and sleeping hours. Lowering thermostat set points to reduce energy consumption of heating systems must not cause energy to be expended to reach the reduced setting.

~~(b) Other buildings and occupancies. Each system must be equipped with automatic controls capable of shutting off or reducing the energy used during periods of nonuse or alternate uses of the building spaces or zone served by the system.~~

~~EXCEPTIONS:~~

~~i. systems serving areas expected to operate continuously;~~

~~ii. where it can be shown that setback or shutdown will not result in a decrease in overall building energy costs; and~~

~~iii. equipment with full load demands of 2 kW (6826 Btu/h) or less may be controlled by readily accessible manual off-hour controls.~~

~~D. Variable air volume (VAV) fan controls. VAV fans with motors 75 hp and larger must provide controls for the fan motor to demand no more than 50 percent of design wattage at 50 percent of design air volume, based on manufacturer's test data.~~

~~E. Isolation of zones. Systems that serve zones which can be expected to operate nonsimultaneously for more than 750 hours per year shall include isolation devices and controls to shut off or set back the supply of heating and cooling to each zone independently. Zones may be grouped into a single isolation area provided that the total conditioned floor area does not exceed 25,000 ft² per group nor include more than one floor.~~

~~EXCEPTION: Isolation is not required for zones expected to operate continuously or expected to be inoperative only when all other zones are inoperative.~~

~~F.~~ D. HVAC control system testing. HVAC control systems must be tested to assure that control elements are calibrated, adjusted, and in proper working condition.

[For text of subps 15 to 18, see M.R.]

Subp. 19. **Equipment efficiencies.** Refer to chapter 7678 for tables of equipment efficiencies for all mechanical equipment.

7670.0800 ELECTRICAL POWER AND LIGHTING.

Subpart 1. **Electrical energy determination.**

~~A. Multifamily electrical metering.~~ In new multifamily dwellings, the electrical energy consumed by each individual dwelling unit must be separately metered with individual metering readily accessible to the individual occupants.

EXCEPTION: Motels, hotels, college dormitories, other transient facilities, and buildings intended for occupancy primarily by persons who are 62 years of age or older or handicapped, or which contain a majority of units not equipped with complete kitchen facilities.

~~B. Electrical distribution monitoring. In electrical panels of buildings other than residential buildings three stories or less in height, all feeder wiring and the panel feeder must be capable of accepting a clamp-on ampmeter.~~

[For text of subps 2 and 3, see M.R.]

Subp. 4. [See repealer.]

7670.1115 EFFECTIVE DATES.

The effective date of amendments to this chapter is ~~June 16, 1994~~ July 1, 1998.

~~EXCEPTION: Effective January 1, 1998, residential buildings (one- and two-family and other residential buildings three stories or less in height) must meet the requirements of the R-2000 Home Program Technical Requirements, Canadian Home Builders' Association, September 1992.~~

This chapter does not apply to multifamily buildings of three stories or less after the effective date of chapter 7674.

This chapter is repealed on the effective date of chapter 7672.

7672.0100 AUTHORITY AND PURPOSE.

This chapter is adopted pursuant to *Minnesota Statutes*, section 216C.19, subdivision 8. The purpose of this chapter is to establish the minimum energy code criteria necessary to construct new and remodeled elements of one- and two-family residential buildings, as well as to provide alternatives for demonstrating compliance with those minimum criteria. The intent of these criteria is to provide a means for furnishing quality indoor air, assuring building durability, and permitting energy efficient operation.

7672.0200 APPLICATION.

Subpart 1. **General.** This chapter is a part of the Minnesota State Building Code, adopted according to *Minnesota Statutes*, sections 16B.59 to 16B.73. Enforcement of this chapter must not abridge safety, health, or environmental requirements under other applicable codes or ordinances.

Subp. 2. **New and remodeled buildings.** This chapter applies to all new and remodeled elements of one- and two-family residential buildings.

Subp. 3. **Existing residences.** Additions, alterations, and repairs to existing one- and two-family residential buildings must comply with part 7672.1200.

Subp. 4. **Mixed occupancy.** If a building houses more than one occupancy, each portion of the building must conform to the requirements for the occupancy housed in that portion. If minor accessory uses occupy no more than ten percent of the area of any floor of a building, the major use is considered the building occupancy.

Subp. 5. **Historic buildings.** Alterations to historic buildings and changes of occupancy are regulated by the Minnesota State Building Code, part 1305.0010.

Subp. 6. **Exempt buildings.** This chapter does not cover buildings, structures, or portions of buildings or structures whose peak design rate of energy usage is less than 3.4 Btu per hour per square foot or 1.0 watt per square foot of floor area for all purposes.

7672.0300 MATERIALS AND EQUIPMENT.

Subpart 1. **Identification.** Materials and equipment must be identified in order to show compliance with this chapter.

Subp. 2. **Plans and specifications.** Plans, specifications, and either calculations or compliance forms must demonstrate compliance with all requirements of this chapter including, but not limited to:

A. exterior envelope component materials;

B. U-values of windows, doors, and skylights;

C. R-values of insulating materials;

D. location of interior air barrier, vapor retarder, and wind wash barrier;

E. air sealing requirements;

F. size and type of equipment;

G. equipment controls; and

H. other data needed to indicate conformance with this chapter.

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Subp. 3. **Maintenance information.** Required regular maintenance actions must be clearly stated and incorporated on a readily accessible label. The label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product. Maintenance instructions must be furnished for equipment that requires preventive maintenance for efficient operation.

Subp. 4. **Thermal insulation.** Thermal insulation used must conform to chapter 7640, Minnesota Thermal Insulation Standards, adopted by the Department of Public Service. All thermal insulation must achieve stated performance at 75 degrees Fahrenheit mean temperature and no less than stated performance at winter design conditions.

EXCEPTION: Thermal insulation designed to reduce summer cooling load only is not required to achieve stated performance at winter design conditions.

7672.0400 INCORPORATIONS BY REFERENCE.

Subpart 1. **Incorporated items.** The following standards and references are incorporated by reference:

A. ASHRAE, 1997 Handbook of Fundamentals, chapter 27;

B. ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

C. ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

D. ASTM E779-87 (1992)e1, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization;

E. CAN/CSA-439-88, Standard Methods of Test for Rating the Performance of Heat Recovery Ventilators, Canadian Standards Association;

F. CGSB Standard 51.71, The Spillage Test, Canadian General Standards Board;

G. HVI Standard 915-10/95, Procedure for Loudness Rating of Residential Fan Products, Home Ventilating Institute;

H. HVI Standard 916 (April 1995), Airflow Test Standard, Home Ventilating Institute;

I. Manual J, Load Calculation for Residential Winter and Summer Air Conditioning, 7th ed., Air Conditioning Contractors of America;

J. The Model Energy Code, 1995 Edition, Chapter 4, as published by the Council of American Building Officials, Falls Church, Virginia;

K. MNcheck, residential energy code compliance personal computer program published by the Minnesota Department of Public Service;

L. NFRC 100-91, Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), and NFRC 100, 1997 ed., Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council; and

M. UL181A, Duct Sealing for Flexible Ducts, and UL181B, Duct Sealing for Fiberglass Ducts, Underwriters Laboratories, Inc.

Subp. 2. **Availability.** All standards and documents incorporated by reference are available for public inspection at the Minnesota State Law Library and through the Minitex interlibrary loan system.

7672.0500 DEFINITIONS.

Subpart 1. **Definitions.** The terms used in this chapter have the meanings given them in this part. Additional definitions pertinent to protection against depressurization and residential ventilation systems are contained in parts 7672.0900 and 7672.1000, respectively.

Subp. 2. **Accessible.** "Accessible" means admitting close approach not guarded by locked doors, elevation, or other effective means.

Subp. 3. **Annual fuel utilization efficiency or AFUE.** "Annual fuel utilization efficiency" or "AFUE" means the efficiency descriptor for furnaces and boilers determined using test procedures prescribed in *Code of Federal Regulations*, title 10, part 430.

Subp. 4. **Attic bypass.** "Attic bypass" means a passageway where air may pass from a conditioned space to the unconditioned side of a roof or attic. Attic bypasses include, but are not limited to, utility penetrations, interior soffits, openings in top plates, fan penetrations, and light fixture penetrations.

Subp. 5. **Building envelope.** "Building envelope" means the elements of a building which enclose conditioned spaces through which thermal energy may be transferred to or from the exterior or semiconditioned spaces.

Subp. 6. **Cfm.** "Cfm" means cubic feet per minute.

Subp. 7. **Conditioned space.** "Conditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system and is capable of maintaining at least 65 degrees Fahrenheit at winter design conditions or less than 78 degrees Fahrenheit at summer design conditions identified in part 7672.0900, subpart 1.

Subp. 8. **Efficiency, thermal.** "Efficiency, thermal" means the results of a thermal efficiency test referenced in *Code of Federal Regulations*, title 10, part 430 or 435.

Subp. 9. **Energy.** "Energy" means the capacity for doing work, taking a number of forms which may be transformed from one into another such as thermal (heat), mechanical (work), electrical, and chemical, in customary units measured in kilowatt-hours (kWh) or British thermal units (Btu).

Subp. 10. **Fenestration (window, door, or skylight) area.** "Fenestration (window, door, or skylight) area" means the area of a window, door, or skylight equal to the rough opening of the window, door, or skylight, respectively, less installation clearances.

Subp. 11. **Gross wall area.** "Gross wall area" means the building envelope wall area from grade to the roof/ceiling assembly enclosing conditioned or semiconditioned space, including opaque wall, window, and door area.

For basement walls with an average below-grade area less than 50 percent of the total wall area, including openings, all walls, including the below-grade portion, are included as part of the gross wall area. Windows and doors in basement walls are also included in the gross wall area.

Subp. 12. **Heat trap.** "Heat trap" means a device for preventing convection in supply and return pipes serving service water heaters and tanks. It includes pipe loop configurations to prevent convection. For water heaters, it does not include mechanical heat traps that are not included as part of the manufacturer's testing and performance rating of the appliance.

Subp. 13. **Heated slab.** "Heated slab" means slab-on-grade construction in which the heating elements or hot air distribution system is in contact with or placed within the slab or below the slab.

Subp. 14. **HVAC.** "HVAC" means heating, ventilating, and air conditioning.

Subp. 15. **HVAC system.** "HVAC system" means a system that provides either collectively or individually the processes of comfort heating, ventilating, or air conditioning within or associated with a building.

Subp. 16. **Infiltration.** "Infiltration" means the uncontrolled air leakage through cracks and interstices in any building element and around windows and doors of a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density.

Subp. 17. **Interior air barrier.** "Interior air barrier" means a material or combination of materials which are durable and installed at the warm side of the building envelope and continuously sealed to resist the passage of air and airborne moisture from a conditioned or semiconditioned space into the building envelope. Acceptable air barrier materials include, but are not limited to, supported four mil polyethylene, gypsum board, wood products, rigid insulation, plastic, metal, sealed concrete products, and any air impermeable material that qualifies as a draft stop, fire stop, or fire block.

Subp. 18. **Manual.** "Manual" means capable of being operated by personal intervention.

Subp. 19. **Power vented appliance.** "Power vented appliance" means that the combustion air comes from inside the building and combustion products are positively conveyed to the outside by means of a dedicated sealed vent.

Subp. 20. **Readily accessible.** "Readily accessible" means capable of being reached quickly for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, or similar aids.

Subp. 21. **Renewable energy sources.** "Renewable energy sources" means sources of energy, excluding minerals, derived from incoming solar radiation, including natural daylighting and photosynthetic processes, including biomass, from resulting phenomena including wind, waves and tides, and lake or pond thermal differences, and energy derived from the internal heat of the earth, including nocturnal thermal exchanges.

Subp. 22. **Roof/ceiling assembly.** "Roof/ceiling assembly" means all components of the roof/ceiling envelope through which heat flows, thus creating a building transmission heat loss or gain, where the assembly is exposed to outdoor air and encloses a conditioned or semiconditioned space.

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The gross area of a roof/ceiling assembly consists of the total interior surface of the assembly, including skylights exposed to the conditioned or semiconditioned space.

Subp. 23. **Seal.** "Seal" means to secure at all edges, joints, openings, and penetrations of barrier materials in a permanent manner to resist the passage of air and airborne moisture.

Subp. 24. **Sealed appliance.** "Sealed appliance" means that the combustion air comes directly from the outdoors via a sealed passageway and combustion products are expelled to the outdoors through an independent sealed vent.

Subp. 25. **Service water heating.** "Service water heating" means the supply of hot water for domestic or commercial purposes other than space heating.

Subp. 26. **Semiconditioned space.** "Semiconditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system to have limited capability of maintaining less than 65 degrees Fahrenheit at winter design conditions or greater than 78 degrees Fahrenheit at summer design conditions, as identified in part 7672.0900, subpart 1.

Subp. 27. **Thermal resistance or R.** "Thermal resistance" or "R" means the reciprocal of thermal conductance (h ft^2 ° F/Btu).

Subp. 28. **Thermal transmittance, overall or U_o.** "Thermal transmittance, overall" or "U_o" means the overall thermal transmittance of an exterior building envelope component, such as a wall, floor, or roof/ceiling. The value of U_o is calculated by the parallel path heat flow method using the areas and thermal transmittance values of the various elements, such as windows, doors, and opaque surfaces that comprise the gross area of the building component.

Subp. 29. **Unconditioned space.** "Unconditioned space" means space within a building which is neither conditioned nor semiconditioned, including outdoor space and spaces within a building with uncontrolled ventilation to outdoors.

Subp 30. **UL181 or equivalent.** "UL181 or equivalent" means a duct sealing product that meets standards UL181A, UL181B, or the UL standard for metal duct sealant. It also means a duct tape with metal foil backing and acrylic or silicone adhesive. It does not mean cloth-backed tape with rubber adhesive.

Subp. 31. **Vapor retarder.** "Vapor retarder" means a material or assembly to impede water vapor passage designed to meet a maximum permeability rating of 1.0 grain per hour per square foot per inch Hg pressure differential. Polyethylene material which is used to meet the requirements of this subpart must either be designed to have a minimum thickness of four mils, be cross laminated, or be shown to have the strength and puncture resistance of not less than cross laminated polyethylene.

Subp. 32. **Warm side.** "Warm side" means the location within a building envelope element between the interior surface and the winter design condition dew point.

Subp. 33. **Wind wash barrier.** "Wind wash barrier" means a material or combination of materials to resist the passage of unconditioned air into the building envelope. Acceptable materials must be suitable for exterior conditions, and include exterior sheathing and other approved air barrier materials, and exterior wrap materials. Sealed exterior wrap materials must have a water vapor permeability of not less than five perms.

7672.0600 MINIMUM ENVELOPE CRITERIA.

Subpart 1. **General.**

A. Buildings that are heated or mechanically cooled and heated slabs must be constructed so as to provide the required thermal performance for components identified in this part.

B. Buildings must be designed and constructed to permit continuity of air barriers and thermal insulation as required in this part.

C. The minimum criteria specified in this part must be met for new buildings in all cases, and shall not be made less stringent by a trade off.

D. Where sealed materials are required, sealants must be compatible with substrate and other materials being sealed. Consideration must be given to the installation conditions, temperature, moisture, gap width, and permanence of seal required when selecting appropriate material for sealing.

Subp. 2. **Foundation walls and slabs on grade.**

A. Foundation walls enclosing conditioned or semiconditioned spaces, including exposed edges of slabs on grade, must be insulated. The insulation must be continuous except where the insulation must be interrupted for purposes such as penetrations or structural requirements, provided that the insulation is sealed or tightly abutted at the penetration or structural member.

B. Foundation wall insulation must be not less than R-5 from the top of the wall down to the top of the footing, or top of the floor if insulation is on the interior.

C. Slabs on grade, including heated aprons located outside of a building, must be insulated around the perimeter. The insulation must extend from the top of the slab downward to either the design frost line or to the top of the footing, whichever is less. The thermal insulation must be not less than R-5.

D. If foundation wall insulation is on the exterior, the portion from the top of the foundation wall to six inches below grade must be covered by an approved protective coating finish to protect the insulation from deterioration due to sunlight and physical abuse.

Subp. 3. **Wood framed components.** All buildings must be constructed in a manner that provides a continuous, durable interior air barrier on the warm side of the building envelope.

A. Insulated ceilings must have a vertical clearance of not less than 7-1/4 inches from the outside edge of the exterior wall top plate to the roof sheathing, and not less than R-19 insulation at the inside edge of the top plate.

B. Exterior corners must be framed so that insulation can be installed after the exterior sheathing is installed.

C. Intersections of interior partition walls with exterior walls must be framed so that insulation can be installed between the partition wall and exterior sheathing after the exterior sheathing is installed.

D. Gaps between framing which are less than one-half inch in width must be either eliminated by securing the framing members together, or must be insulated at the time of assembly.

E. Whenever interior framing meets an insulated ceiling or exterior wall, a continuous interior air barrier must be installed on the ceiling or exterior wall before installation of interior framing to allow continuity with adjacent interior air barriers. This requirement applies to dropped ceilings, soffits, stairs, fire or draft stops, fireplace framing, partition walls, and similar elements.

EXCEPTION: An interior air barrier need not be installed above partition top plates if adjacent interior air barrier materials are sealed to the top plate, provided that penetrations in the top plate are sealed.

F. Prior to installing a tub, shower, or spa located at an exterior wall, a continuously sealed interior air barrier must be installed on the exterior wall to allow continuity with adjacent interior air barriers. The interior air barrier must be covered to protect against physical abuse.

G. Exterior wall intersections of wood, masonry, and other dissimilar materials must be sealed to maintain interior air barrier continuity.

H. Walls exposed to attic areas and skylight shafts must be constructed to meet the same requirements as exterior walls, including wind wash barrier, insulation, vapor retarder, and interior air barrier requirements. If sheathing is not installed, the wind wash barrier must be supported between solid blocking.

Subp. 4. **Interior air barrier.** A sealed, continuous interior air barrier must be installed on the warm side of the building envelope to resist air leakage and movement of moisture into the building envelope at ceilings, walls, and floor rim joist areas.

A. An interior air barrier must be installed on the warm side of insulated ceilings, and on walls. The interior air barrier must be sealed at all edges, joints, openings, and penetrations.

EXCEPTIONS: An interior air barrier is not required at concrete foundation wall insulation or at fenestration rough openings.

B. An interior air barrier must be installed at floor rim joist areas.

EXCEPTION: An interior air barrier is not required at floor rim joist areas if all HVAC supply and return ducts in the building are sealed according to the installation instructions of a product meeting UL181 or equivalent and penetrations in floor cavities are sealed according to subpart 5.

Subp. 5. **Interior air barrier penetrations.**

A. All penetrations installed through an interior air barrier must be sealed at the time of product installation so that a continuous interior air barrier is maintained. All penetrations made prior to framing inspection must be sealed prior to framing inspection, and no work may be covered or made inaccessible without sealing all penetrations.

B. Penetrations that must be sealed include, but are not limited to, piping and ducts, wires and equipment, and flue and chimney penetrations.

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C. Sealing for wires and equipment must include the service entrance, wires, conduit, cables, panels, recessed light fixtures, electronic equipment, heating appliances, electrical boxes, and fan housings. Recessed light fixtures must be sealed in an approved manner.

D. Penetration openings must be of appropriate dimensions to facilitate the sealing method. Penetrations in a flexible interior air barrier must be supported by rigid material or approved method to facilitate permanent air sealing.

Subp. 6. **Vapor retarder requirements.** A vapor retarder must be installed on the warm side of all walls, ceilings, floor rim joist areas, and earth floors of unvented crawl spaces.

EXCEPTION: A vapor retarder is not required at floor rim joist areas if all HVAC supply and return ducts in the building are sealed according to the installation instructions of a product meeting UL181 or equivalent and penetrations in floor cavities are sealed according to subpart 5.

Subp. 7. **Exterior wind wash barrier.** A barrier must be provided to resist wind wash. Where sealing is required, the wind wash barrier must be caulked, be gasketed, have sealed exterior wrap, or be otherwise sealed in an approved manner to provide a permanent air seal and to prevent entry of wind and wind-driven rain. In wood framing construction, wind wash barrier penetrations must occur through rigid material or approved hardware to enable effective sealing. Penetrations in the wind wash barrier must be sealed prior to covering or making inaccessible so that a continuous wind wash barrier is maintained.

A. A rigid wind wash barrier must be tightly installed at the exterior edge of the exterior wall top plate, extending vertically not less than three inches above the top plate and not less than to the bottom of the truss top chord, or for nontruss wood framing to within 3-1/2 inches of the roof deck.

B. A sealed wind wash barrier must be installed at floors, overhangs, and floor rim joist areas separating conditioned spaces from unconditioned spaces.

C. Sheathing joints which are not supported by framing and framing joints which are not covered by sheathing must be sealed at the exterior side of the joint.

D. Sheathing penetrations must be sealed.

E. A sealed wind wash barrier must be installed to prevent air leakage from garages into interior conditioned spaces.

Subp. 8. **Fenestration products; installation requirements.** Minimum clearance between rough opening framing and fenestration product frame must be maintained according to the manufacturer's instructions to facilitate insulation. When manufacturer's installation instructions require insulation between the rough opening and frame, the portion of the rough opening which is located to the exterior side of the glazing must be insulated. The required insulation must be installed at the time of fenestration product installation. A durable exterior side infiltration and weather seal must be installed at the time of fenestration product installation around the perimeter of the product frame.

Subp. 9. **Floors over unconditioned spaces.** Floors over unconditioned spaces must have a maximum overall thermal transmittance as required in this subpart. While the U-value may be increased or decreased by trade off calculations, in all cases it must have a maximum overall thermal transmittance of 0.033. Floor rim joist framing must have an interior air barrier on the warm side according to subpart 4 and sealed wind wash barrier according to subpart 7.

Subp. 10. **Thermal insulation placement and support.**

A. Thermal insulation must be installed in ceilings and walls in a permanent manner and in substantial contact with the interior air barrier.

B. When framing or equipment is installed that will restrict access to building cavities requiring insulation, those cavities must be insulated prior to restricting access.

C. All insulation in floors and walls must be supported and protected on the unconditioned side by sheathing or other approved materials to resist insulation movement and wind wash.

D. In buildings having eave ventilation and loose fill attic insulation, a barrier must be installed to prevent the insulation from entering the eave. Loose fill insulation must be installed after eave protection is installed, unless prior loose fill insulation is required to prevent cold weather freezing of interior applied building materials.

E. Where building design and code requirements allow, thermal insulation must be continuous and uninterrupted by ducts, pipes, wiring, bracing, and other elements which are capable of being installed to the interior or exterior side of the insulation.

Subp. 11. **Performance and identification of loose fill insulation.**

A. Loose fill insulation installed to meet the requirements of this chapter must provide the required performance at 75 degrees Fahrenheit mean temperature and no less than the required performance at winter design conditions.

B. Insulation must be installed according to the bag count on the manufacturer's coverage chart.

C. Identification must be placed in accordance with this item in accessible attics of all buildings with loose fill insulation.

(1) A means must be provided to verify the claimed insulation level by installing insulation thickness markers labeled with a minimum of one-inch increments at approximately ten-foot spacing throughout the attic.

(2) A completed insulation receipt attic card must be attached to the framing near the access opening in a clearly visible place. The attic card must identify the type of insulation installed, the manufacturer, the installer, the R-value, the design settled thickness, the square footage of attic coverage area, and the number of bags installed, and must be signed and dated by the installer.

(3) Notification must be posted near the building inspection card indicating the installed attic R-value and date of installation.

D. Attic access panels must be insulated to a minimum R-38 for ceiling panels and R-19 for wall panels, and must be weatherstripped.

7672.0700 FENESTRATION PRODUCTS (WINDOWS, DOORS, AND SKYLIGHTS).

Subpart 1. **Thermal performance of windows, doors, and skylights.** All windows must be labeled with their rated infiltration and overall assembly U-value according to this part.

Subp. 2. **Air infiltration.** Fenestration products (windows, doors, and skylights) must have air infiltration rates not exceeding those shown in this subpart. The manufacturer must test door infiltration rates according to ASTM E283-91 and window infiltration rates according to applicable industry standards. Infiltration rates for all fenestration products must be disclosed in product literature. A manufacturer's certification that products comply with the infiltration requirements of the 1995 Model Energy Code shall be deemed to comply with these requirements:

A. windows, 0.37 cfm per foot of operable sash crack;

B. doors, swinging, 0.50 cfm per square foot of door area; and

C. doors, sliding, 0.37 cfm per square foot of door area.

Subp. 3. **Thermal transmittance.** Thermal transmittance of fenestration products (doors, windows, and skylights) must be determined in accordance with item A or B.

A. Thermal performance (U-values) of windows, doors, and skylights must be determined according to the National Fenestration Rating Council Standard 100-91 or 100 (1997 ed.) by an accredited, independent laboratory, and labeled and certified by the manufacturer.

Such certified and labeled values shall be site verifiable and used for purposes of determining compliance with the building envelope requirements of this chapter.

B. If a manufacturer has not determined product U-value according to NFRC standards for a particular product line, compliance with the building envelope requirements of this chapter must be determined by assigning products a default U-value from the U-value default table. Product features must be verifiable for the product to qualify for the default value associated with those features. If the existence of a particular feature cannot be determined with reasonable certainty, the product must not receive credit for that feature. If a composite of materials from two different product types is used, the product U-value must be the higher U-value.

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(1) U-value default table for windows, glass doors, and skylights:

Frame/Glazing Features	Double Pane	Double Pane With Low-E Permanent Label on Glass	Triple Pane
	U-value	U-value	U-value
Metal with Thermal Break			
Operable	0.67	0.62	0.54
Fixed	0.63	0.57	0.47
Glass door	0.66	0.60	0.50
Skylight	1.13	1.06	0.93
Metal-clad Wood			
Operable	0.60	0.52	0.46
Fixed	0.58	0.52	0.41
Glass door	0.57	0.51	0.43
Skylight	0.88	0.79	0.71
Wood/vinyl			
Operable	0.56	0.56	0.43
Fixed	0.57	0.52	0.41
Glass door	0.56	0.52	0.42
Skylight	0.85	0.82	0.67
Glass Block Assemblies	0.60		

(2) U-value default table for nonglazed doors:

Steel Doors	U-value
Without foam core	0.60
With foam core	0.35

Wood Doors	Without Storm	With Storm
	U-value	U-value
Panel with 7/16 inch panels	0.54	0.36
Panel with 1-1/8 inch panels	0.39	0.28
Solid core flush	0.40	0.26

7672.0800 METHODS FOR COMPLIANCE.

Subpart 1. **Scope.** One- and two-family residential buildings must demonstrate compliance with subpart 3 and one of the methods of subpart 4, 6, 7, or 8.

Subp. 2. **Calculation of U_o.** Calculation of overall thermal transmittance values (U_o-values) must be according to chapter 7678.

Subp. 3. **Minimum R-values, maximum U-values, and other minimum requirements.** The minimum criteria specified in this subpart must be met for new buildings in all cases, and shall not be made less stringent by a trade off.

A. The average U-values for fenestration products used in the building must not exceed:

(1) U-0.37 for windows and glass doors except foundation windows 5.6 square feet and less;

(2) U-0.55 for skylights;

(3) U-0.51 for foundation windows 5.6 square feet and less.

B. Foundation wall insulation must be not less than R-5.

C. Slabs on grade insulation must not be less than R-5.

D. Floors over unconditioned spaces must have a maximum U_o-value of 0.033.

E. All other minimum criteria specified in part 7672.0600 must be met.

Subp. 4. **Cookbook method.**

A. Insulation in ceilings with attics must be R-38 minimum.

B. Insulation in floor rim joist areas must be R-13 minimum.

C. Entrance doors must be a minimum of either 1-3/4 inch solid core wood door, steel door with foam core, or NFRC-rated door with U-value not exceeding 0.40.

EXCEPTION: Swinging and sliding glass patio doors must have a U-value not greater than the window U-value for the building.

D. Floors over unconditioned spaces must be R-30 minimum.

E. Foundation windows 5.6 square feet and less must be insulated glass, one-half inch between panes and wood or vinyl frame, or not greater than U-0.51.

F. The space heating system must be not less than 90 percent AFUE.

G. The average U-value of all windows, except foundation windows 5.6 square feet and less, must not exceed the value listed in the maximum window U-value table corresponding with the maximum total window and door area as a percentage of overall exposed wall area, R-value of insulation within the insulated cavity, sheathing R-value, and foundation wall insulation. Total window and door area includes all foundation windows. Interpolations between chart values to intermediate values are permitted. Extrapolations beyond the values found in the chart shall require compliance with subpart 6, 7, or 8. Other components must meet the requirements of this subpart.

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MAXIMUM WINDOW U-VALUE WITH 90% AFUE SPACE HEATING AND WITH R-10 EXTERIOR FOUNDATION WALL INSULATION

	Maximum Total Window and Door Area as Percentage of Exposed Wall									
Percent	10	12	14	16	18	20	22	24	26	28
Wall Type	Maximum Window U-Values									
2x4, R-13 insulation, <R-5 sheathing	0.37	0.37	0.33	0.28	0.25	0.22	0.20	0.18	0.17	0.15
2x4, R-13 insulation, ≥R-5 sheathing	0.37	0.37	0.37	0.37	0.37	0.33	0.30	0.27	0.25	0.23
2x4, R-13 insulation, ≥R-7 sheathing	0.37	0.37	0.37	0.37	0.37	0.36	0.33	0.30	0.27	0.25
2x6, R-19 insulation, <R-5 sheathing	0.37	0.37	0.37	0.37	0.37	0.32	0.29	0.27	0.24	0.23
2x6, R-19 insulation, ≥R-5 sheathing	0.37	0.37	0.37	0.37	0.37	0.37	0.35	0.32	0.29	0.27
2x6, R-21 insulation, <R-5 sheathing	0.37	0.37	0.37	0.37	0.37	0.35	0.31	0.29	0.26	0.24
2x6, R-21 insulation, ≥R-5 sheathing	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.33	0.30	0.28

ADJUSTMENTS TO MAXIMUM WINDOW U-VALUE FOR R-10 FOUNDATION WALL INSULATION*

Wall Type	U-value Percentage Change for R-5 Foundation Wall Insulation	U-value Percentage Change for R-19 (or greater) Foundation Wall Insulation
2 x 4, R-13 insulation:		
<R-5 sheathing	-8%	+5%
≥R-5 sheathing	-6%	+3%
≥R-7 sheathing	-5%	+3%
2 x 6, R-19 insulation:		
<R-5 sheathing	-6%	+3%
≥R-5 sheathing	-5%	+3%
2 x 6, R-21 insulation:		
<R-5 sheathing	-5%	+3%
≥R-5 sheathing	-5%	+3%

*This table must be used in conjunction with the maximum window U-value with 90 percent AFUE space heating and the R-10 foundation wall insulation tables. To find the appropriate maximum U-value for using R-5 or R-19 (or greater) foundation wall insulation, multiply the applicable number in the adjustments table by the corresponding U-value in the R-10 table.

Subp. 5. **Total heat gain or loss for entire building.** The value of U_o for any assembly such as roof/ceiling, wall, or floor may be increased and traded off by decreasing the value of U_o for other components, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from conformance to the values of U_o specified in this chapter. Window U-value must not be greater than required in subpart 3.

Subp. 6. **Building component performance method.**

A. For the gross wall area above grade,

(1) when foundation wall insulation is R-5, maximum U_o-value is 0.100;

(2) when foundation wall insulation is R-10 or greater, maximum U_o-value is 0.110.

B. For roof/ceilings, U_o-value must not exceed 0.026.

C. For floors over unconditioned spaces, U_o-value must not exceed 0.033.

Subp. 7. **MNcheck performance method.** A building is deemed to meet the requirements of this part if the thermal envelope "passes" using the MNcheck computer program.

Subp. 8. **Building design by systems analysis method.**

A. This subpart establishes design criteria in terms of total energy use by a residential building, including all of its systems. The intent of this subpart is to allow flexibility in the design process while ensuring that the annual energy or energy cost of the proposed design is no more than is allowed under the prescriptive path.

B. Building design by systems analysis must comply with chapter 4 of the Model Energy Code, 1995 edition. Chapter 4 of the Model Energy Code is amended by:

(1) replacing references to chapter 5 or 6 with parts 7672.0100 to 7672.1300;

(2) changing the air changes per hour for the standard design to be 0.10 for calculation purposes only; and

(3) adding a requirement that if the proposed building uses an air or water source heat pump for heating or cooling, the "standard design" building must also use a heat pump with the same energy source for the comparative analysis.

Subp. 9. **Enclosed three-season porches method.**

A. This subpart may be applied to an enclosed three-season porch when heating or cooling systems for the space are either separate or separately zoned from other conditioned spaces with capability to complete shut-off.

B. Minimum requirements for the porch and wall separating the porch from conditioned spaces are contained in subitems (1) to (3).

(1) Building components separating conditioned areas of the house from the porch as well as the porch from unconditioned spaces must meet the minimum criteria of part 7672.0600 for separating, including interior air barrier and vapor retarder requirements.

(2) The thermal performance of the porch roof, floors over unconditioned spaces, and fenestration products must be not less than required in subpart 3, 4, 6, 7, or 8.

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(3) The U_o-values of the walls separating other conditioned areas of the house from the porch and the porch from unconditioned spaces must not exceed the values identified in this subitem, or a U_o-value not greater than 0.11 for the combined thermal resistance of both walls in series.

Porch wall	Separation wall
0.14	0.15
0.18	0.14
0.22	0.13
0.26	0.13
0.30	0.13
0.34	0.12

7672.0900 MECHANICAL SYSTEMS.

Subpart 1. **Equipment sizing.**

A. HVAC equipment must be sized according to the ASHRAE Handbook of Fundamentals or ACCA Manual J.

B. Design conditions must be determined from the outdoor design conditions table. Design condition adjustments may be made as determined by the building official to reflect local climates that differ from the tabulated temperatures or local weather experience.

Outdoor Design Conditions

City	Summer Db/Wb	Winter Db
Albert Lea	87/72	-17
Alexandria	88/72	-22
Bemidji	85/69	-31
Brainerd	87/71	-20
Duluth	82/68	-21
Faribault	88/72	-17
Fergus Falls	88/72	-21
International Falls	83/68	-29
Mankato	88/72	-17
Minneapolis	89/73	-16
Rochester	87/72	-17
St. Cloud	88/72	-15
St. Paul	89/73	-16
Virginia	83/68	-25
Willmar	88/72	-15
Winona	88/73	-14

Db = dry bulb temperature, degrees Fahrenheit

Wb = wet bulb temperature, degrees Fahrenheit

C. Indoor design conditions temperature must be 72 degrees Fahrenheit for heating and 74 degrees Fahrenheit for cooling.

Subp. 2. **Controls.**

A. A thermostat must provide a readily accessible manual or automatic means for controlling the temperature. A thermostat used to control both heating and cooling must be capable of being set from 55 to 85 degrees Fahrenheit and must be capable of operating the system heating and cooling in sequence.

B. Heat pumps must be provided with a control to prevent supplementary heater operation when the operating load can be met by the heat pump alone. Supplementary heater operation is permitted during transient periods of no more than 15 minutes, such as start-ups, following room thermostat set-point advance, and during defrost. A two-stage thermostat, which controls the supplementary heat on its second stage, is acceptable for meeting this requirement.

Subp. 3. **Duct construction.** Ductwork installation requirements are provided in the Minnesota State Mechanical Code, chapter 1346, adopted by the Department of Administration.

A. When sealing is required, ducts must be sealed in accordance with this subpart and in accordance with the installation instructions of a product meeting UL181 or equivalent. When sealing is not required, ducts must be made substantially airtight and permanent, including elbows, end caps, and any penetrations. Cloth-backed duct tape with rubber adhesive shall not be used to satisfy sealing requirements. Transition from rigid to flex duct must be in a permanent and substantially airtight manner with strapping.

B. According to the Minnesota State Mechanical Code, chapter 1346, return air ducts conducting air into a furnace through the same space as the furnace must be sealed. Spaces that are not separated by walls or doors must be considered the same space. Pan under floor joist spaces must be permitted to serve as return ductwork if they are sealed, including end caps and any penetrations.

C. All ducts and building cavities used as ducts with one or more surfaces adjacent to the exterior of the air barrier or vapor retarder must be sealed, including end caps and any penetrations.

D. In buildings where floor rim joist areas are not protected with air barrier and vapor retarder according to part 7672.0600, subpart 4, all HVAC supply and return ducts must be sealed, including end caps and any penetrations.

Subp. 4. **Duct insulation.**

A. Ducts in wall and floor cavities of the thermal envelope must be a minimum of R-8 between the duct and unconditioned or semiconditioned space.

B. Ducts running outside the thermal envelope, including ducts in attics and ceilings, must be a minimum of R-16 between the duct and unconditioned space.

C. Ducts within concrete or in contact with the ground must be insulated to R-5.

Subp. 5. **Pipe insulation.** HVAC pipe insulation must be according to part 7676.1000, subpart 17.

Subp. 6. **Testing and balancing.** All controls must be tested to ensure that control elements are calibrated, adjusted, and in proper working condition.

Subp. 7. **Operation and maintenance manual.** An operation and maintenance manual must be provided. The manual must include basic data relating to the operation and maintenance of HVAC systems and equipment. Required routine maintenance actions must be clearly identified. Where applicable, HVAC controls information such as diagrams, schematics, control sequence descriptions, and maintenance and calibration information must be included.

Subp. 8. **Equipment efficiency.** HVAC equipment must meet minimum requirements of chapter 7678 and the National Appliance Energy Conservation Act of 1987. Gas-fired and oil-fired furnaces, boilers, and duct furnaces must meet the requirements of this subpart.

Equipment Category	Rating Condition	Efficiency
Gas-fired furnaces	Seasonal rating	78% AFUE
Gas-fired duct furnaces	Maximum rated capacity	78% Et*
Oil-fired furnaces	Seasonal rating	78% AFUE
Gas-fired boilers	Seasonal rating	80% AFUE
Oil-fired boilers	Seasonal rating	80% AFUE

*Et = Thermal efficiency

Subp. 9. **Protection against depressurization.** Provision must be made to limit excessive depressurization in buildings with fuel burning appliances.

A. The definitions in this item apply to this subpart.

(1) "Atmospherically vented gas or oil appliance" means an appliance that is required to be vented through a chimney or vertical vent and that is not power vented.

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(2) "Closed controlled combustion wood-burning appliance" means a wood stove, pellet stove, or fireplace capable of efficient heating and controlled combustion. The appliance must include either doors with gaskets or flanges that permit tight closure, or glass or ceramic panels which are tightly sealed or gasketed at their frames. This definition includes appliances which are Environmental Protection Agency (EPA) Phase II rated, and EPA exempt appliances, with tight fitting doors.

(3) "Direct vented appliance" means an appliance constructed so that combustion air comes directly from the outdoors via a sealed passageway and combustion products are expelled to the outdoors through an independent, sealed vent.

(4) "Mechanical exhausting devices" means exhausting devices including, but not limited to, kitchen range fan, bath fan, spa and pool fans, clothes dryer, central vacuum, radon mitigation system, and power vented combustion appliances.

(5) "Power vented appliance" means an appliance where combustion air comes from inside the building and combustion products are positively conveyed, through the use of a fan or other mechanical means, to the outside by means of a dedicated, sealed vent.

(6) "Powered make-up air" means that air that must be brought in from outdoors to replace the air expelled by mechanical exhausting devices so that excessive depressurization of the house is prevented. The make-up air must be powered by means of a supply fan capable of introducing outdoor air at a rate of no less than the required amount. Powered make-up air supply fans must be wired so as to activate whenever the associated exhausting device is activated.

B. In a dwelling unit where all vented combustion appliances are direct vented, protection against excessive depressurization must be provided by powered make-up air for total exhaust capacity for all mechanical exhausting devices in excess of 650 cfm.

C. In a dwelling unit where vented combustion appliances are either power vented only or power and direct vented, protection against excessive depressurization must be provided by powered make-up air for total exhaust capacity for all mechanical exhausting devices in excess of 425 cfm.

D. In a dwelling unit in which an atmospherically vented gas or oil fueled appliance is installed, protection against excessive depressurization must be provided according to item F or G.

E. In a dwelling unit with a wood stove, fireplace, or other solid fuel appliance which is neither direct nor power vented:

(1) The wood stove, fireplace, or other solid fuel appliance must be capable of efficient heating and controlled closed combustion. The appliance must include either doors with gaskets or flanges that permit tight closure, or glass or ceramic panels which are tightly sealed or gasketed at their frames. Appliances which are Environmental Protection Agency (EPA) Phase II rated, and "EPA exempt" appliances with tight fitting doors meet this requirement.

(2) Protection against depressurization must be provided in accordance with either item F or G.

F. Unless the alternative in item G is used, protection against excessive depressurization for appliances specified in items D and E must be provided by:

(1) powered make-up air for total exhaust capacity for all mechanical exhausting devices in excess of 150 cfm; and

(2) the permanent installation, according to manufacturer's instructions, of a carbon monoxide detector which conforms to the UL2034 standard.

G. Protection against depressurization may be demonstrated according to the performance method of this item. When tested according to the requirements of subitem (1), the pressure within the dwelling unit must not decrease from atmospheric pressure by more than the values in subitem (2).

(1) The relationship between the air leakage rate of the house envelope and the pressure difference across it must be determined with the building components configured according to units (a) and (b), and conducted according to unit (c).

(a) Balancing of air flow rates to and/or from individual rooms with the system operating at minimum ventilation capacity must be carried out prior to flow measurements. If the ventilation air distribution system is used for heating or cooling, any air balancing required for heating or cooling must have been done before carrying out the air flow rate measurements. If it is used for both, any air balancing must be for the heating condition. Air circulation systems that are part of the ventilation system must be kept operating.

(b) The house set-up and system configuration shall be as given in the house set-up and system configuration table.

House Set-up and System Configuration Table

Component	Conditions During Measurement of Minimum Ventilation Capacity
Windows and exterior doors	Close
Interior doors	Open
Attic hatch	Close
Fireplace flue damper	Close
Fireplace	Seal*
Fireplace combustion air intake damper	Close
Doors on enclosed furnace rooms	Close
Vented fuel-fired appliances	Off
Fuel-fired furnace and/or stove flues	Seal*
Fuel-fired hot water system flues	Seal*
Furnace combustion air intake	Seal
Air intake and exhaust vents for make-up air or pressure relief	Normal operating mode
Floor drains	Fill
Plumbing traps	Fill
Clothes dryer	Off
Other exhaust fans not part of ventilation system	Off
Ventilation system supply and exhaust fans, including exhaust air heat recovery devices that are part of the minimum ventilation capacity system	Normal operating mode
Air intake and exhaust openings that are part of the minimum ventilation capacity system	No preparation

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Ventilation system exhaust fans designed to operate intermittently, and any associated supply fans	Off
Intake and exhaust openings for the above	No preparation
Furnace blower when part of the minimum ventilation capacity system	Operate in ventilation mode
Furnace blower when not part of the minimum ventilation capacity system	Off
Openings for future equipment	Seal

*Sealing is not required for measurements under minimum ventilation capacity conditions if there is an excess of supply air over exhaust air (resulting in a house pressure increase).

(c) The pressure difference across the house envelope shall be measured. The apparatus shall be capable of measuring pressure differences within plus or minus two pascals or plus or minus 20 percent of the pressure limit, whichever is the larger. The pressure difference shall be measured first with the system off and then under the reference exhaust flow rate condition. If a clothes dryer exhausting to outdoors or any other exhaust device that is part of the reference exhaust flow rate condition has not been installed, its effect shall be simulated by the use of alternate equipment exhausting air at 150 cfm for a clothes dryer, or at the rated capacity of other missing devices. The difference between the two sets of pressure measurements shall be taken as the increase or decrease in pressure difference across the house envelope due to operation under the reference exhaust flow rate condition.

(2) Maximum depressurization with conditions of subitem (1) for various appliances:

Appliance	Maximum Depressurization
Appliances with manufacturer certified negative pressure tolerance rating	The manufacturer-certified negative pressure tolerance rating
Direct vented appliance*	50 Pascals (0.20-inch water column)
Power vented appliance*	15 Pascals (0.06-inch water column)
Thermal mass wood-burning appliance*	15 Pascals (0.06-inch water column)
Closed controlled combustion wood-burning appliances*	7 Pascals (0.28-inch water column)
Atmospherically vented oil and gas systems*	5 Pascals (0.02-inch water column)
Atmospherically vented water heater*	2 Pascals (0.008-inch water column)

*Without manufacturer-certified negative pressure tolerance rating.

7672.1000 RESIDENTIAL VENTILATION SYSTEM.

Subpart 1. **General.** All residential ventilation systems must meet the requirements of this chapter.

A. Ventilation systems must be designed in accordance with the Minnesota State Mechanical Code, chapter 1346. Ventilation quantities must be in accordance with ASHRAE Standard 62, adopted by chapter 1305, with the exception that neither infiltration nor natural ventilation (operable windows and doors) satisfy the requirement for ventilation.

B. Exhaust requirements for kitchens and baths must be installed according to the requirements of the Minnesota State Building Code.

C. As an alternative to the requirements of subparts 3 to 6, the residential ventilation system may be designed, installed, and tested according to the alternate performance procedure in subpart 7.

Subp. 2. **Definitions.** The definitions in this subpart apply to this chapter.

A. "Air, exhaust" means air discharged from any space to the outside by the residential ventilation system.

B. "Air, outdoor" means the air that is taken from the external atmosphere and, therefore, not previously circulated through the HVAC system or the conditioned space.

C. "Forced air system" means an air heating or cooling system.

D. "Heat recovery ventilator" means a device or combination of devices applied to transfer energy from the exhaust air stream for use within the dwelling or an attached building.

E. "People ventilation" means the cfm of outdoor air needed for normal occupancy of the house. The air flow rate depends upon the number of bedrooms in the house.

F. "Supplemental ventilation" means the additional cfm of air flow needed for periods of peak occupant use. The airflow rate depends upon the square footage of the house, and is approximately equal to 0.35 air changes per hour.

G. "Ventilation design conditions" means outdoor conditions of minus 13 degrees Fahrenheit and indoor conditions of 72 degrees Fahrenheit and 40 percent relative humidity.

H. "Ventilation system, balanced" means a residential ventilation system where the design fan powered exhaust air is equal to the fan powered supply air.

I. "Ventilation system, exhaust only" means a residential ventilation system where a fan provides exhaust air and supply air is not fan powered.

J. "Ventilation system, residential" means the mechanical ventilation system, including fans, controls, and ducts, which replaces, by direct or indirect means, air from the habitable rooms with outdoor air.

Subp. 3. **Outdoor air requirements.**

A. Residential ventilation systems must be installed as required by this subpart to provide not less outdoor air than the people ventilation and supplemental ventilation air quantity. Required outdoor air quantities may be determined by either the performance option of subitem (1) or the prescriptive option of subitem (2). "Ventilation rate" means the average fan powered outdoor air ventilation rate for each one-hour time period. The total ventilation rate is the sum of the people ventilation and supplemental ventilation.

(1) The performance option has the following requirements:

(a) the people ventilation rate is 15 cfm for each bedroom plus an additional 15 cfm. The minimum people ventilation rate is 45 cfm; and

(b) the supplemental ventilation rate is the conditioned floor area of the house divided by 20 (in cfm) less the people ventilation rate. For houses with basements, the conditioned floor area includes the unfinished basement.

(2) The prescriptive option is subject to the following limits:

Bedroom Count	House Size Range	People Capacity	Supplemental Capacity
1	600 - 1,200 sq. ft.	45 cfm	15 cfm
2	1,000 - 1,500 sq. ft.	45 cfm	30 cfm
3	1,200 - 2,000 sq. ft.	60 cfm	40 cfm
4	1,600 - 2,400 sq. ft.	75 cfm	45 cfm
5	2,000 - 3,000 sq. ft.	90 cfm	60 cfm

B. To avoid house pressurization, the residential ventilation system fan powered outdoor cfm must not exceed the residential ventilation system fan powered exhaust air flow.

Subp. 4. **Equipment requirements.**

A. The residential ventilation system must be sized to provide no less air flow than the house capacity ventilation rate averaged for a one-hour period at ventilation design conditions. Fans and ducts must be sized according to subpart 5, item D.

B. Fans must be designed to deliver design air flow.

(1) Fans for the people capacity portion of the residential ventilation system must be designed and certified as capable of continuous operation.

(2) Fan air flow must be tested in accordance with HVI Standard 916.

(3) Single point exhaust and supply fans must be rated to provide design air flow at 0.25 inch water column.

(4) Inline fans, multiple ducted fans, and heat recovery ventilator fans must be rated to provide design air flow at 0.40 inch water column.

C. Heat recovery ventilator rated design flow rate must be the average flow rate for a one-hour period at the ventilation design conditions. The average hourly ventilation capacity must be determined in consideration of any reduction of exhaust or outdoor air intake, or both, for defrost or other equipment cycling.

(1) Performance must be tested according to CAN/CSA-439, by an approved laboratory meeting the requirements of part 7678.0500, subpart 9, item B.

EXCEPTION: As an alternative to parts 10.6 and 10.7 of CAN/CSA-439, the manufacturer must certify the heat exchanger outdoor air intake and exhaust flow rates and low temperature reduction factor at continuous conditions not less stringent than the ventilation design conditions.

(2) A label stating the manufacturer or provider of the equipment warranty, ventilation design condition average hourly ventilation capacity, and tested performance must be permanently affixed to the equipment.

(3) All energy recovery ventilation systems must be equipped with readily accessible air filters.

D. Residential ventilation system fans to provide the people capacity ventilation must have a maximum sound rating of 1.0 sones. Testing must be in accordance with HVI Standard 915.

E. Individual room outdoor air inlets must:

(1) have controllable and secure openings;

(2) be designed and installed to restrict condensation at ventilation design conditions; and

(3) provide not less than four square inches of net free area of opening for each habitable room. Any inlet or combination of inlets which provide ten cfm at ten pascals as determined by HVI Standard 916 are deemed equivalent to four square inches net free area.

F. Outdoor air inlets with net free area of opening greater than eight square inches or more than 20 cfm must be designed to temper outdoor air before entering the occupied space by either blending with house air or heating with a make-up air heater or energy recovery ventilator.

Subp. 5. **Distribution and installation requirements.**

A. Residential ventilation systems must be installed according to part 7672.0800 and the Minnesota State Mechanical Code, chapter 1346.

B. Outdoor air inlets in a habitable room or providing air to a supply duct system and with design flow greater than 20 cfm must be designed and installed to temper incoming air to at least 58 degrees Fahrenheit to avoid occupant discomfort or damage to HVAC equipment.

C. Outdoor air must be delivered to each habitable room by individual inlets, separate duct systems, or a forced air system. Where outdoor air supplies are separated from exhaust points by doors, provisions shall be made to ensure air flow by installation of distribution ducts, undercutting doors, installation of grilles, transoms, or similar means where permitted by the Minnesota State Building Code. When undercut doors are relied upon for distribution, doors must be undercut to a minimum of one-half inch above the surface of the finished floor covering.

D. Fans and ducts must be sized and installed to provide design ventilation flow rate.

(1) All ducts must be sealed with a product meeting UL181 or equivalent.

(2) Fans and ducts must be sized according to accepted duct design procedures. Design conditions which must be considered include, but are not limited to, the effects of equivalent duct length, dampers, filters, grilles, and other restraints to air flow.

(3) Fan capacity, duct diameter, length, and number of elbows for exhaust fans must be as specified in the design. Exhaust fan duct system outlet openings must have at least the equivalent net free area of the ductwork. Exhaust outlet openings for systems with multiple ducts being supplied by the same exhaust opening must be the same size as the connecting ductwork or eight inches in diameter, whichever is greater.

	With Flex Duct		With Smooth Duct		
Fan Tested CFM @ 0.25 W.G.	Minimum Diameter	Maximum Length, Ft.	Minimum Diameter	Maximum Length, Ft.	Maximum Elbows[1]
50	4 inch	25	4 inch	70	3
50	5 inch	90	5 inch	100	3
50	6 inch	150	6 inch	150	3
80	4 inch[2]	NA	4 inch	20	3
80	5 inch	15	5 inch	100	3
80	6 inch	90	6 inch	150	3
100	5 inch[2]	NA	5 inch	50	3
100	6 inch	45	6 inch	150	3
125	6 inch	15	6 inch	150	3
125	7 inch	70	7 inch	150	3

[1]For each additional elbow, subtract ten feet from length.

[2]Flex ducts of this diameter are not permitted with fans of this size.

(4) Dampers regulating flow must be adjustable without needing specialized tools and accessible without requiring the removal of fans, motors, or insulating materials.

E. Heat recovery ventilators and condensate lines are subject to subitems (1) to (3).

(1) The heat recovery ventilator and any condensate lines must be installed according to the manufacturer's instructions. Condensate lines must not be exposed to freezing temperature conditions.

(2) Exhaust air ducted to a heat recovery ventilator must not be from clothes dryers and kitchen range ventilators, unless specifically permitted by the manufacturer's installation instructions.

(3) No make-up air, for defrost or other purposes, may be drawn for reintroduction into the house from HVAC equipment rooms, kitchen, bath, or laundry rooms.

F. The fans serving the residential ventilation system must be controlled by readily accessible switches. These switches must be labeled according to item K. If the ducting for the residential ventilation system is connected to the duct system of a forced air system, it must be controlled according to item H.

G. Residential ventilation system components must be installed to minimize noise and vibration transmission. The manufacturer's installation instructions must be followed, and materials provided by the manufacturer for this purpose must be used. In the absence of specific materials or instructions, vibration dampening materials such as rubber grommets and flexible straps must be used when connecting fans and heat exchangers to the building structure, and flexible duct connectors must be used to mitigate noise transmission.

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H. Air ducts for the residential ventilation system that are connected directly to the duct system of a forced air system must be designed to circulate outdoor air to conditioned spaces.

(1) Either the residential ventilation system outdoor air duct or exhaust air duct may be connected to the forced air system, but not both.

EXCEPTION: Both may be connected to the forced air system if:

(a) controls are installed to ensure that the forced air system blower runs whenever the residential ventilation system is running; and

(b) the exhaust air duct is connected not less than three feet upstream of the outdoor air duct.

(2) Controls must be installed to ensure that whenever the residential ventilation system is running, the forced air system blower provides a minimum average hourly flow rate of 0.15 cfm per square foot of conditioned floor area.

(3) If the residential ventilation system is not designed to run whenever the forced air system is running, the residential ventilation system duct must incorporate a powered damper to prevent flow when the residential ventilation system is off.

(4) An outdoor air connection must not be connected directly into or within ten feet of a furnace cabinet, or in such a manner to cause thermal shock to the furnace heat exchanger.

I. Outdoor air intake and exhaust components must be designed to ensure effective operation.

(1) All ducts must terminate outside the building.

(2) Exterior air intakes and exhaust outlet openings must be separated by at least two feet to avoid contamination of the outdoor air by the exhaust air.

(3) Intake openings must be not less than ten feet from local sources such as automobile exhaust, exhaust from adjacent buildings, and intake from other building penetrations that are potential sources of contaminants, such as gas vents or oil fill pipes.

(4) Clearance from the bottom of an air intake opening to grade must be not less than 18 inches.

(5) Air intake openings must incorporate screens or grilles according to the Minnesota State Mechanical Code, chapter 1346.

(6) Exhaust ducts or outlets must incorporate backdraft dampers.

J. The residential ventilation system must be installed with sufficient access for cleaning and servicing all components. Exterior air intake openings must be accessible for inspection and maintenance.

K. Labeling must be provided to notify occupants of purposes and precautions for residential ventilation system components.

(1) The outdoor air intake and exhaust air outlet must include a permanent, weather-resistant label which provides proper operation and maintenance instructions and a warning regarding potential problems if it becomes blocked, obstructed, or inoperative. Additional permanent labels must be affixed to all other elements of the residential ventilation system for identification for cleaning and maintenance.

(2) Heat recovery ventilators must have a permanently affixed label identifying the manufacturer and stating the rated efficiency.

(3) Residential ventilation system controls for the people capacity required in item F must be identified with the words "VENTILATION" or "VENTILATION FAN."

(4) If the residential ventilation system fan powered exhaust exceeds the residential ventilation system fan powered outdoor air intake, then a label must be predominantly affixed to the residential ventilation system stating "THIS RESIDENTIAL VENTILATING SYSTEM REQUIRES THAT ALL VENTED COMBUSTION APPLIANCES MUST BE SEALED OR POWER VENTED APPLIANCES. THIS RESIDENTIAL VENTILATION SYSTEM MUST BE REPLACED WITH A BALANCED SYSTEM IF ANY NONSEALED OR NON-POWER VENTED APPLIANCES ARE INSTALLED."

L. Written certification must be provided ensuring that all components of the residential ventilation system are functioning in the manner intended, including, but not limited to, fans, ducts, controls, dampers, grilles, and registers. Verification must be performed by visual and physical examination of the system and must include measurement of the air flow at air intake and exhaust points with design air flow of 30 cfm and greater. Air flow for balanced ventilation systems must be balanced within ten percent.

Subp. 6. **Requirements for systems.**

A. If all vented combustion equipment is sealed or power vented, the residential ventilation system may be either balanced, exhaust only, or a combination.

B. If any furnace, water heater, fireplace, solid fuel burning appliance, or other vented combustion appliance is installed that is neither sealed nor power vented, the residential ventilation system must be balanced.

Subp. 7. **Performance path.**

A. This path applies to any building for which this chapter is applicable.

B. The ventilation air capacity specified in subpart 3 must be met.

C. Controls must be installed to provide a minimum of three operational modes: no ventilation, people capacity requirement, and supplemental capacity requirement. Required controls must be readily accessible to building occupants and labeled to indicate their function.

D. Pressures must not be less than the negative pressure limit in subitem (1), nor greater than the positive pressure limit in subitem (2).

(1) If the people capacity and supplemental capacity ventilation, clothes dryer (150 cfm default), and the next largest exhausting fan are all operating, no ventilating combustion appliance is permitted to spill combustion products into the conditioned space longer than three minutes after start-up at both winter design and summer design conditions.

(2) If the people capacity is met, the positive pressure must not exceed five pascals, unless the air has been prevented from exiting the house to areas where condensation may cause deterioration or freeze movable elements.

E. A radon detector must be installed in the lowest conditioned space.

F. Systems must be tested and balanced. Balancing results shall be posted in an accessible location.

G. Systems must include a permanent label with proper operation and maintenance instructions and a warning regarding potential problems if it should become inoperative.

7672.1100 SERVICE WATER HEATING.

Subpart 1. **Ice-making water supply.** Water supplies to ice-making machines and residential refrigerators must be taken from a cold water line of the water distribution system.

Subp. 2. **Efficiency requirements.** Service water heating equipment must meet the minimum efficiency requirements of chapter 7678.

Subp. 3. **Automatic controls.** Service water heating systems must be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use.

Subp. 4. **Shutdown.** A separate switch must be provided to permit turning off the energy supplied to electric service water heating systems. A separate valve must be provided to permit turning off the energy supplied to the main burners of all other types of service water heating systems.

Subp. 5. **Swimming pools and spas.**

A. All pool and spa heaters must be equipped with a readily accessible ON/OFF switch to allow shutting off the operation of the heater without adjusting the thermostat setting and to allow restarting without relighting the pilot light.

B. Indoor pool and spa area ventilating systems must be controlled with a humidistat. Additionally, heated indoor swimming pools and spas must be equipped with a cover or renewable energy sources must be capable of providing at least 50 percent of the heating energy required over an operating season.

C. Heated outdoor swimming pools and spas must either be provided with a cover or the heating system must use renewable energy sources to provide at least 70 percent of the heating energy required over an operating season.

Subp. 6. **Pump operation.** Circulating hot water systems must be equipped with automatic time switches or other controls so that the circulation pumps can be conveniently turned off when the use of hot water is not required.

Subp. 7. **Pipe insulation.**

A. Minimum pipe insulation for domestic and service water heating systems must comply with this subpart. Pipe insulation is assumed to have a k-value of 0.27. If the k-value of a product is less than 0.22, then the thickness must be adjusted to have an equivalent R-value.

(1) Pipes in conditioned and semiconditioned spaces must have a one-half inch minimum of insulation.

(2) Pipes in unconditioned spaces must have 1-1/2 inch minimum of insulation.

(3) Pipes in contact with high conductivity material, including, but not limited to, concrete and earth, must have a one-inch minimum of insulation.

(4) Pipe insulation is not required at support brackets. For water heaters with a draft diverter pipe insulation is not required to be closer to the draft diverter than is recommended by the manufacturer or safety codes. Pipe insulation is not required for nonrecirculating systems where the water heater is equipped with heat traps on both the supply and return.

B. For recirculating systems, the entire pipe must be insulated.

C. For nonrecirculating systems with unfired storage tank, the first eight feet of both inlet and outlet pipes from the storage tank must be insulated. Pipes between the water heater and storage tank must be insulated.

D. For nonrecirculating systems with a water heater, both supply and return piping for water heaters must be insulated for a distance of three feet from the water heater.

7672.1200 ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING RESIDENTIAL BUILDINGS.

Subpart 1. **General.** Except as provided in this part, alterations and repairs to the building must comply with the applicable requirements of this chapter for new buildings.

Subp. 2. **Affecting air leakage.** If an addition or alteration affects the air leakage characteristics or capacity of a building, and vented appliances are present that are not sealed or power vented and are without combustion air supply, then a combustion air supply must be provided according to the Minnesota State Building Code, chapter 1346.

Subp. 3. **Additions.** Compliance for an addition may be demonstrated in one of three ways:

A. the addition alone must comply with this chapter; or

B. the addition together with the entire existing building must comply with the requirements of this chapter; or

C. when taken together with the energy improvements of remodeling other components of the building as part of the same permit, the addition meets the requirements of this chapter.

Subp. 4. **Conversions.** A change in the occupancy or use of an existing building or structure constructed under this chapter which would require an increase in demand for either fossil fuel or electrical energy supply shall not be permitted unless the building or structure is made to comply with the requirements of either this chapter or chapter 7674 or 7676 as appropriate for the converted building.

Subp. 5. **Penetrations.** All penetrations resulting as part of an alteration must be sealed in accordance with part 7672.0600. This includes, but is not limited to, penetrations for telecommunication wires and equipment, electrical wires and equipment, electronic wires and equipment, fire sprinklers, plumbing and ducts, and penetrations in exterior walls and ceilings.

Subp. 6. **Roof/ceilings.**

A. Ventilation requirements for alterations to roof/ceilings are given in the Minnesota State Building Code, part 1305.0010.

B. Attic insulation may not be installed unless accessible attic bypasses have been sealed.

C. A ceiling vapor retarder is not required if the interior ceiling finish is not removed.

D. When an uninsulated attic is finished, the insulation at the sloped ceiling cavity must not be less than R-18.

E. Alterations comprising the removal of at least 50 percent of an existing membrane or a built-up roof covering must comply with this subpart.

F. Alterations to a built-up or membrane roof covering must provide for a maximum U-value of 0.033 Btu/°F h ft^2 (R-value of R-30 or greater).

Subp. 7. **Walls.**

A. Storm windows may be installed over existing glazing without meeting the additional requirements of this chapter.

B. Glazing in existing sash may be replaced without meeting the additional requirements of this chapter, provided the area-weighted U-value of the glazing will be equal to or lower than before the glazing replacement. Replaced windows must conform to parts 7672.0600 and 7672.0700.

C. Interior wall finish may not be replaced unless wall cavities have been insulated to full depth. This item shall apply whenever plaster is removed, even though lath may not have been removed.

EXCEPTIONS: Walls that are back-plastered, walls that are more than 50 percent filled with insulation, and walls without framing cavities.

D. A vapor retarder is not required if the interior wall finish is not removed.

Subp. 8. **Heating, ventilation, and air conditioning; service water heating equipment.** All equipment installed in conjunction with the alteration must comply with the equipment efficiency requirements of part 7672.1000 or chapter 7678.

7672.1300 EFFECTIVE DATES.

This chapter is effective when either item A or B is effective, whichever is later.

A. six months after *Minnesota Rules* are adopted requiring protection against depressurization; or

B. one year following publication of the adopted rule in the *State Register*.

7674.0100 AUTHORITY AND PURPOSE.

This chapter is adopted pursuant to *Minnesota Statutes*, section 216C.19, subdivision 8. The purpose of this chapter is to establish the minimum energy code criteria necessary to construct new and remodeled elements of multifamily residential buildings of three stories or less in height, as well as to provide alternatives for demonstrating compliance with those minimum criteria.

7674.0200 APPLICATION.

Subpart 1. **General.** This chapter is a part of the Minnesota State State Building Code, adopted according to *Minnesota Statutes*, sections 16B.59 to 16B.73. Enforcement of this chapter must not abridge safety, health, or environmental requirements under other applicable codes or ordinances.

Subp. 2. **New and remodeled buildings.** This chapter applies to all new and remodeled elements of multifamily residential buildings of three stories or less in height.

Subp. 3. **Existing residences.** Additions, alterations, and repairs to existing multifamily residential buildings of three stories or less in height must comply part 7674.1100.

Subp. 4. **Mixed occupancy.** If a building houses more than one occupancy, each portion of the building must conform to the requirements for the occupancy housed in that portion. If minor accessory uses occupy no more than ten percent of the area of any floor of a building, the major use is considered the building occupancy.

Subp. 5. **Historic buildings.** Alterations to historic buildings and changes of occupancy are regulated by the Minnesota State Building Code, part 1305.0010.

Subp. 6. **Exempt buildings.** This chapter does not cover buildings, structures, or portions of buildings or structures whose peak design rate of energy usage is less than 3.4 Btu per hour per square foot or 1.0 watt per square foot of floor area for all purposes.

7674.0300 MATERIALS AND EQUIPMENT.

Subpart 1. **Identification.** Materials and equipment must be identified in order to show compliance with this chapter.

Subp. 2. **Plans and specifications.** Plans, specifications, and either calculations or compliance forms must demonstrate compliance with all requirements of this chapter including, but not limited to:

A. exterior envelope component materials;

B. U-values of windows, doors, and skylights;

C. R-values of insulating materials;

D. location of interior air barrier, vapor retarder, and wind wash barrier;

E. air sealing requirements;

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F. size and type of equipment;

G. equipment controls; and

H. other data needed to indicate conformance with this chapter.

Subp. 3. **Maintenance information.** Required regular maintenance actions must be clearly stated and incorporated on a readily accessible label. The label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product. Maintenance instructions must be furnished for equipment that requires preventive maintenance for efficient operation.

Subp. 4. **Thermal insulation.** Thermal insulation used in residential buildings of three stories or less in height must conform to chapter 7640, Minnesota Thermal Insulation Standards, adopted by the Department of Public Service. All thermal insulation must achieve stated performance at 75 degrees Fahrenheit mean temperature and no less than stated performance at winter design conditions.

EXCEPTION: Thermal insulation designed to reduce summer cooling load only is not required to achieve stated performance at winter design conditions.

7674.0400 INCORPORATIONS BY REFERENCE.

Subpart 1. **Incorporated items.** The following standards and references are incorporated by reference:

A. ASHRAE, 1997 Handbook of Fundamentals, chapter 27;

B. ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

C. ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

D. Manual J: Load Calculation for Residential Winter and Summer Air Conditioning, 7th ed., Air Conditioning Contractors of America;

E. MNcheck, residential energy code compliance personal computer program published by the Minnesota Department of Public Service;

F. The Model Energy Code, chapter 4, 1995 Edition, as published by the Council of American Building Officials (Falls Church, Virginia); and

G. NFRC 100-91: Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), and NFRC 100-97: Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council.

Subp. 2. **Availability.** All standards and documents incorporated by reference are available for public inspection at the Minnesota State Law Library and through the Minitex interlibrary loan system.

7674.0500 DEFINITIONS.

Subpart 1. **Definitions.** The definitions in this part apply to this chapter.

Subp. 2. **Accessible.** "Accessible" means admitting close approach not guarded by locked doors, elevation, or other effective means.

Subp. 3. **Annual fuel utilization efficiency or AFUE.** "Annual fuel utilization efficiency" or "AFUE" means the efficiency descriptor for furnaces and boilers determined using test procedures prescribed in *Code of Federal Regulations*, title 10, part 430.

Subp. 4. **Attic bypass.** "Attic bypass" means a passageway where air may pass from a conditioned space to the unconditioned side of a roof or attic. Attic bypasses include, but are not limited to, utility penetrations, interior soffits, openings in top plates, fan penetrations, and light fixture penetrations.

Subp. 5. **Building envelope.** "Building envelope" means the elements of a building which enclose conditioned spaces through which thermal energy may be transferred to or from the exterior or semiconditioned spaces.

Subp. 6. **Conditioned space.** "Conditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system and is capable of maintaining at least 65 degrees Fahrenheit at winter design conditions or less than 78 degrees Fahrenheit at summer design conditions, identified in part 7674.0800, subpart 1.

Subp. 7. **Enclosed space.** "Enclosed space" means an area defined by ceiling height partitions when less than half the area of the common wall with the surrounding space is open or if the area of the opening is 25 square feet or less.

Subp. 8. **Energy.** "Energy" means the capacity for doing work, taking a number of forms which may be transformed from one into another such as thermal (heat), mechanical (work), electrical, and chemical, in customary units measured in kilowatt-hour (kWh) or British thermal units (Btu).

Subp. 9. **Fenestration (window, door, or skylight) area.** "Fenestration (window, door, or skylight) area" means the area of a window, door, or skylight equal to the rough opening of the window, door, or skylight, respectively, less installation clearances.

Subp. 10. **Gross wall area.** "Gross wall area" means the building envelope wall area from grade to the roof/ceiling assembly enclosing conditioned or semiconditioned space, including opaque wall, window, and door area.

For basement walls with an average below-grade area less than 50 percent of the total wall area, including openings, all walls, including the below-grade portion, are included as part of the gross wall area. Windows and doors in basement walls are also included in the gross wall area.

Subp. 11. **Heat trap.** "Heat trap" means a device for preventing convection in supply and return pipes serving service water heaters and tanks. It includes pipe loop configurations to prevent convection. For water heaters, it does not include mechanical heat traps that are not included as part of the manufacturer's testing and performance rating of the appliance.

Subp. 12. **Heated slab.** "Heated slab" means slab-on-grade construction in which the heating elements or hot air distribution system is in contact with or placed within the slab or below the slab.

Subp. 13. **HVAC.** "HVAC" means heating, ventilating, and air conditioning.

Subp. 14. **HVAC system.** "HVAC system" means a system that provides either collectively or individually the processes of comfort heating, ventilating, or air conditioning within or associated with a building.

Subp. 15. **Infiltration.** "Infiltration" means the uncontrolled air leakage through cracks and interstices in any building element and around windows and doors of a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density.

Subp. 16. **Interior air barrier.** "Interior air barrier" means a material or combination of materials which are durable and installed at the warm side of the building envelope and continuously sealed to resist the passage of air and airborne moisture from a conditioned or semiconditioned space into the building envelope. Acceptable air barrier materials include, but are not limited to, supported four mil polyethylene, gypsum board, wood products, rigid insulation, plastic, metal, sealed concrete products, and any air impermeable material that qualifies as a draft stop, fire stop, or fire block.

Subp. 17. **Manual.** "Manual" means capable of being operated by personal intervention.

Subp. 18. **Readily accessible.** "Readily accessible" means capable of being reached quickly for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, or similar aids.

Subp. 19. **Renewable energy sources.** "Renewable energy sources" means sources of energy, excluding minerals, derived from incoming solar radiation, including natural daylighting and photosynthetic processes, including biomass, from resulting phenomena including wind, waves and tides, and lake or pond thermal differences, and energy derived from the internal heat of the earth, including nocturnal thermal exchanges.

Subp. 20. **Roof/ceiling assembly.** "Roof/ceiling assembly" means all components of the roof/ceiling envelope through which heat flows, thus creating a building transmission heat loss or gain, where such assembly is exposed to outdoor air and encloses a conditioned or semiconditioned space.

The gross area of a roof/ceiling assembly consists of the total interior surface of the assembly, including skylights exposed to the conditioned or semiconditioned space.

Subp. 21. **Seal.** "Seal" means to secure at all edges, joints, openings, and penetrations of barrier materials in a permanent manner to resist the passage of air and airborne moisture.

Subp. 22. **Service water heating.** "Service water heating" means the supply of hot water for domestic or commercial purposes other than space heating.

Subp. 23. **Semiconditioned space.** "Semiconditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system to have limited capability of maintaining less than 65 degrees Fahrenheit at winter design conditions or greater than 78 degrees Fahrenheit at summer design conditions, as identified in part 7674.0800, subpart 1.

Subp. 24. **Thermal resistance or R.** "Thermal resistance" or "R" means the reciprocal of thermal conductance (h ft^2 ° F/Btu).

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Subp. 25. **Thermal transmittance, overall or U_o.** "Thermal transmittance, overall" or "U_o" means the overall thermal transmittance of an exterior building envelope component, such as a wall, floor, or roof/ceiling. The value of U_o is calculated by the parallel path heat flow method using the areas and thermal transmittance values of the various elements, such as windows, doors, and opaque surfaces that comprise the gross area of the building component.

Subp. 26. **UL181 or equivalent.** "UL181 or equivalent" means a duct sealing product that meets standards UL181A, Ul181B, or the UL standard for metal duct sealant. It also means a duct tape with metal foil backing and acrylic or silicone adhesive. It does not mean cloth-backed tape with rubber adhesive.

Subp. 27. **Unconditioned space.** "Unconditioned space" means space within a building which is neither conditioned nor semiconditioned, including outdoor space and spaces within a building with uncontrolled ventilation to outdoors.

Subp. 28. **Vapor retarder.** "Vapor retarder" means a material or assembly to impede water vapor passage designed to meet a maximum permeability rating of 1.0 grain per hour per square foot per inch Hg pressure differential. Polyethylene material which is used to meet the requirements of this subpart must either be designed to have a minimum thickness of four mils, be cross laminated, or be shown to have the strength and puncture resistance of not less than cross laminated polyethylene.

Subp. 29. **Warm side.** "Warm side" means the location within a building envelope element between the interior surface and the winter design condition dew point.

Subp. 30. **Wind wash barrier.** "Wind wash barrier" means a material or combination of materials to resist the passage of unconditioned air into the building envelope. Acceptable materials must be suitable for exterior conditions and include exterior sheathing and other approved air barrier materials and exterior wrap materials. Sealed exterior wrap materials must have a water vapor permeability of not less than five perms.

7674.0600 MINIMUM ENVELOPE CRITERIA.

Subpart 1. **General.**

A. Buildings that are heated or mechanically cooled and heated slabs must be constructed so as to provide the required thermal performance for components identified in this part.

B. Buildings must be designed and constructed to permit continuity of air barriers and thermal insulation as required in this part.

C. The minimum criteria specified in this part must be met for new buildings in all cases, and shall not be made less stringent by a trade off.

D. Where sealed materials are required, sealants must be compatible with substrate and other materials being sealed. Consideration must be given to the installation conditions, temperature, moisture, gap width, and permanence of the seal required when selecting appropriate material for sealing.

Subp. 2. **Foundation walls and slabs on grade.**

A. Foundation walls enclosing conditioned or semiconditioned spaces must be insulated, including exposed edges of slabs on grade. The insulation must be continuous except where the insulation must be interrupted for purposes such as penetrations or structural requirements, provided that the insulation is sealed or tightly abutted at the penetration or structural member.

B. Foundation wall insulation must be not less than R-5 from the top of the wall down to the top of the footing, or top of the floor if insulation is on the interior.

C. Slabs on grade, including heated aprons located outside of a building, must be insulated around the perimeter. The insulation must extend from the top of the slab downward to either the design frost line or to the top of the footing, whichever is less. The thermal insulation must be not less than R-5.

D. If foundation wall insulation is on the exterior, the portion from the top of the foundation wall to six inches below grade must be covered by an approved protective coating finish to protect the insulation from deterioration due to sunlight and physical abuse.

Subp. 3. **Framed components.**

A. Insulated ceilings must have a vertical clearance of not less than 7-1/4 inches from the outside edge of the exterior wall top plate to the roof sheathing, and not less than R-19 insulation at the inside edge of the top plate.

B. Exterior corners must be framed so that insulation can be installed after the exterior sheathing is installed.

C. Intersections of interior partition walls with exterior walls must be framed so that insulation can be installed between the partition wall and exterior sheathing after the exterior sheathing is installed.

D. Gaps between framing which are less than one-half inch in width must be either eliminated by securing the framing members together, or must be insulated at the time of assembly.

E. Fire stops, fire blocks, and draft stops separating conditioned and unconditioned spaces must be sealed. This requirement applies to dropped ceilings, soffits, fire or draft stops, fireplace framing, and similar elements.

F. Prior to installing a tub, shower, or spa located at an exterior wall, a continuously sealed interior air barrier must be installed on the exterior wall to allow continuity with adjacent interior air barrier materials. The interior air barrier must be covered to protect against physical abuse.

G. Walls exposed to attic areas and skylight shafts must be constructed to meet the same requirements as exterior walls, including wind wash barrier, insulation, vapor retarder, and interior air barrier requirements. If sheathing is not installed, the wind wash barrier must be supported between solid blocking.

H. Exterior wall plate penetrations must be sealed.

Subp. 4. **Interior air barrier.** A sealed interior air barrier must be installed on the warm side of the building envelope to resist air leakage and movement of moisture in accordance with subpart 3, items E and F.

Subp. 5. **Interior air barrier penetrations.**

A. All penetrations installed through an interior air barrier material must be sealed at the time of product installation so that a continuous interior air barrier is maintained. All penetrations made prior to framing inspection must be sealed prior to framing inspection, and no work may be covered or made inaccessible without sealing all penetrations.

B. Penetrations that must be sealed include, but are not limited to, piping and ducts, wires and equipment, and flue and chimney penetrations.

C. Sealing for wires and equipment must include the service entrance, wires, conduit, cables, panels, recessed light fixtures, electronic equipment, and heating appliances. Recessed light fixtures must be sealed in an approved manner.

EXCEPTION: Electrical boxes and fan housings.

D. Penetration openings must be of appropriate dimensions to facilitate the sealing method. Penetrations in a flexible interior air barrier must be supported by rigid material or approved method to facilitate permanent air sealing.

Subp. 6. **Vapor retarder requirements.** A vapor retarder must be installed on the warm side of all walls, ceilings, and earth floors of unvented crawl spaces.

Subp. 7. **Exterior wind wash barrier.** A barrier must be provided at the locations identified in this subpart to resist wind wash. Where sealing is required, the wind wash barrier must be caulked, be gasketed, have sealed exterior wrap, or be otherwise sealed in an approved manner to provide a permanent air seal and to prevent entry of wind and wind-driven rain. In wood framing construction, wind wash barrier penetrations must occur through rigid material or approved hardware to achieve effective sealing. Penetrations in the wind wash barrier must be sealed at the time of product installation so that a continuous wind wash barrier is maintained.

A. A rigid wind wash barrier must be tightly installed at the exterior edge of the exterior wall top plate, extending vertically at least three inches above the top plate, and not less than to the bottom of the truss top chord, or for nontruss wood framing to within 3-1/2 inches of the roof deck.

B. A sealed wind wash barrier must be installed at cantilevered floors, bay windows, and overhangs separating conditioned spaces from unconditioned spaces.

C. A sealed wind wash barrier must be installed to prevent air leakage from garages into interior conditioned spaces.

D. All sheathing penetrations must be sealed.

E. Party walls constructed with an interior air space must have a sealed wind wash barrier at the intersection with the exterior wall.

Subp. 8. **Fenestration products; installation requirements.** Minimum clearance between rough opening framing and fenestration product frame must be maintained in accordance with the manufacturer's instructions to facilitate insulation. If the manufacturer's installation instructions require insulation between the rough opening and the frame, the portion of the rough opening which

is located to the exterior side of the glazing must be insulated. The required insulation must be installed by the installer at the time of the fenestration product installation. The installer must also provide a durable exterior side infiltration and weather seal around the perimeter of the product frame. Windows must be labeled with their rated infiltration and overall assembly U-value. Window labels must not be removed until after inspection of installation.

Subp. 9. **Floors over unconditioned spaces.** Floors over unconditioned spaces must have a maximum overall thermal transmittance as required for the building types identified in this chapter. While the U-value may be increased or decreased by trade off calculations, in all cases it must have a maximum overall thermal transmittance of 0.033. Floor rim joist framing must have a sealed wind wash barrier according to subpart 7, item B.

Subp. 10. **Thermal insulation placement and support.**

A. Thermal insulation must be installed in ceilings and walls in a permanent manner and in substantial contact with the interior air barrier.

B. When framing or equipment is installed that will restrict access to building cavities requiring insulation, those cavities must be insulated prior to restricting access.

C. All insulation in floors and walls must be supported and protected on the unconditioned side by sheathing or other approved materials to resist insulation movement and wind wash.

D. In buildings having eave ventilation and loose fill attic insulation, a barrier must be installed to prevent the insulation from entering the eave. Loose fill insulation must be installed after eave protection is installed, unless prior loose fill insulation is required to prevent cold weather freezing of interior applied building materials.

E. Where building designs and code requirements allow, thermal insulation must be continuous and uninterrupted by ducts, pipes, wiring, bracing, and other elements which are capable of being installed to the interior or exterior side of the insulation.

Subp. 11. **Performance and identification of loose fill insulation.**

A. Loose fill insulation installed to meet the requirements of this chapter must provide the required performance at 75 degrees Fahrenheit mean temperature and no less than the required performance at winter design conditions.

B. Insulation must be installed in accordance with the bag count on the manufacturer's coverage chart.

C. Identification must be placed in accessible attics of all buildings with loose fill insulation.

(1) A means must be provided to verify the claimed insulation level by installing insulation thickness markers labeled with a minimum of one-inch increments at approximately ten-foot spacing throughout the attic.

(2) A completed insulation receipt attic card must be attached to the framing near the access opening in a clearly visible place. The attic card must identify the type of insulation installed, the manufacturer, the installer, the R-value, the design settled thickness, the square footage of attic coverage area, and the number of bags installed, and must be signed and dated by the installer.

(3) Notification must be posted near the building inspection card indicating the installed attic R-value and date of installation.

D. Attic access panels must be installed to a minimum of R-38 for ceiling panels and R-19 for wall panels, and must be weatherstripped.

7674.0700 METHODS FOR COMPLIANCE.

Subpart 1. **Scope.** Multifamily residential buildings three stories or less in height must comply with the requirements of subpart 3 and subpart 5, 6, or 7.

Subp. 2. **Calculations.** Calculation of overall thermal transmittance values (U_o-values) must be according to chapter 7678.

Subp. 3. **Minimum R-values, maximum U-values, and other minimum requirements.** The minimum criteria specified in this subpart must be met for new buildings in all cases, and must not be made less stringent by a trade off.

A. The average U-values for fenestration products as determined by part 7678.0600 used in the building must not exceed:

(1) U-0.37 for windows and glass doors (except foundation windows 5.6 square feet and less);

(2) U-0.55 for skylights;

(3) U-0.51 for foundation windows 5.6 square feet and less.

B. Foundation wall insulation must be not less than R-5.

C. Slab on grade insulation must not be less than R-5.

D. Floors over unconditioned spaces must have a maximum U_o-value of 0.033.

E. All other minimum criteria specified in part 7674.0600 must be met.

Subp. 4. **Total heat gain or loss for entire building.** The value of U_o for any assembly such as roof/ceiling, wall, or floor may be increased and traded off by decreasing the value of U_o for other components, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from conformance to the values of U_o specified in this part.

Subp. 5. **Building component performance method.**

A. For buildings located in Minnesota climate zones as defined in part 1305.5400 of the Minnesota State Building Code, the gross exterior wall area must have an above-grade U_o-value not exceeding the values in this item.

(1) Zone I (northern Minnesota), maximum U_o-value is 0.129;

(2) Zone II (southern Minnesota), maximum U_o-value is 0.131.

B. For roof/ceilings, U_o-value must not exceed 0.026 Btu/°F h ft^2.

Subp. 6. **MNcheck performance method.** A building is deemed to comply with this part if the thermal envelope passes using the MNcheck computer program.

Subp. 7. **Building design by systems analysis method.**

A. This subpart establishes design criteria in terms of total energy use by a residential building, including all of its systems. The intent of this item is to allow flexibility in the design process while ensuring that the annual energy or energy cost of the proposed design is no more than is allowed under the prescriptive path.

B. Building design by systems analysis must comply with chapter 4 of the Model Energy Code, 1995 edition. Chapter 4 of the Model Energy Code is amended by:

(1) replacing references to chapter 5 or 6 with *Minnesota Rules*, parts 7674.0600 to 7674.1100;

(2) changing the air changes per hour for the standard design to be 0.10, for calculation purposes only; and

(3) adding a requirement that if the proposed building uses an air or water source heat pump for heating or cooling, the standard design building must also use a heat pump with the same energy source for the comparative analysis.

Subp. 8. **Enclosed three-season porches method.**

A. This subpart may be applied to an enclosed three-season porch when heating and cooling systems for the space are either separate or separately zoned from other conditioned spaces with capability of complete shut-off.

B. Minimum requirements for the porch and wall separating the porch from conditioned spaces are contained in subitems (1) to (3).

(1) Building components separating conditioned areas of the building from the porch as well as the porch from unconditioned spaces must meet the minimum criteria of part 7674.0600 for separating, including interior air barrier and vapor retarder requirements.

(2) The thermal performance of the porch roofs, floors over unconditioned spaces, and fenestration products must be not less than required in subpart 4, 5, or 6.

(3) The U_o-values of the walls separating other conditioned areas of the building from the porch and the porch from unconditioned spaces must not exceed the values identified in this subitem, or a U_o-value not greater than 0.11 for the combined thermal resistance of both walls in series.

Porch wall	Separation wall
0.14	0.15
0.18	0.14
0.22	0.13
0.26	0.13
0.30	0.13
0.34	0.12

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7674.0800 BUILDING MECHANICAL SYSTEMS.

Subpart 1. **General.** Multifamily residential buildings of three stories or less with a self-contained HVAC system must comply with this part. Multifamily residential buildings of three stories or less with a central heating system must comply with part 7676.1000, Building Mechanical Systems.

Subp. 2. **Equipment sizing.**

A. HVAC equipment must be sized according to the ASHRAE Handbook of Fundamentals or ACCA Manual J.

B. Design conditions must be determined according to the outdoor design conditions table. Design condition adjustments may be made as determined by the building official to reflect local climates that differ from the tabulated temperatures or local weather experience.

DESIGN CONDITIONS

City	Summer Db/Wb	Winter Db
Albert Lea	87/72	-17
Alexandria	88/72	-22
Bemidji	85/69	-31
Brainerd	87/71	-20
Duluth	82/68	-21
Faribault	88/72	-17
Fergus Falls	88/72	-21
International Falls	83/68	-29
Mankato	88/72	-17
Minneapolis	89/73	-16
Rochester	87/72	-17
St. Cloud	88/72	-15
St. Paul	89/73	-16
Virginia	83/68	-25
Willmar	88/72	-15
Winona	88/73	-14

Db = dry bulb temperature, degrees Fahrenheit

Wb = wet bulb temperature, degrees Fahrenheit

C. Indoor design temperature must be 72 degrees Fahrenheit for heating and 74 degrees Fahrenheit for cooling.

Subp. 3. **Controls.**

A. A thermostat must provide a readily accessible manual or automatic means for controlling the temperature. When used to control both heating and cooling, the thermostat must be capable of being set from 55 to 85 degrees Fahrenheit, and must be capable of operating the system heating and cooling in sequence.

B. Heat pumps must be provided with a control to prevent supplementary heater operation when the operating load can be met by the heat pump alone. Supplementary heater operation is permitted during transient periods of no more than 15 minutes, such as start-ups, following room thermostat set-point advance, and during defrost. A two-stage thermostat, which controls the supplementary heat on its second stage, is acceptable for meeting this requirement.

Subp. 4. **Duct construction.** Ductwork installation requirements are provided in the Minnesota State Mechanical Code, chapter 1346.

A. When sealing is required, ducts must be sealed according to this subpart and according to the installation instructions of a product meeting UL181 or equivalent. When sealing is not required, ducts must be made substantially airtight and permanent, including elbows, end caps, and any penetrations. Cloth-backed duct tape with rubber adhesive shall not be used to satisfy the requirements of this item. Transition from rigid to flex duct must be in a permanent and substantially airtight manner with strapping.

B. According to the Minnesota State Mechanical Code, chapter 1346, return air ducts conducting air into a furnace through the same space as the furnace must be sealed. Spaces that are not separated by walls or doors must be considered the same space. Pan under floor joist spaces must be permitted to serve as return ductwork, provided that they are sealed, including end caps and any penetrations.

C. All ducts and building cavities used as ducts with one or more surfaces adjacent to the exterior of the air barrier or vapor retarder must be sealed, including end caps and any penetrations.

Subp. 5. **Duct insulation.**

A. Ducts in wall and floor cavities of the thermal envelope must be a minimum of R-8 between the duct and unconditioned or semiconditioned space.

B. Ducts running outside the thermal envelope, including ducts in attics and ceilings, must be a minimum of R-16 between the duct and unconditioned space.

C. Ducts within concrete or in contact with the ground must be insulated to R-5.

Subp. 6. **Pipe insulation.** HVAC pipe insulation must be in accordance with part 7676.1000, subpart 17.

Subp. 7. **Testing and balancing.** All controls must be tested to ensure that control elements are calibrated, adjusted, and in proper working condition.

Subp. 8. **Operation and maintenance manual.** An operation and maintenance manual must be provided. The manual must include basic data relating to the operation and maintenance of HVAC systems and equipment. Required routine maintenance actions must be clearly identified. Where applicable, HVAC controls information such as diagrams, schematics, control sequence descriptions, and maintenance and calibration information must be included.

Subp. 9. **Equipment efficiency.** HVAC equipment must meet the requirements of part 7678.0700.

7674.0900 SERVICE WATER HEATING.

Subpart 1. **Ice-making water supply.** Water supplies to ice-making machines and residential refrigerators must be taken from a cold water line of the water distribution system.

Subp. 2. **Efficiency requirements.** Service water heating equipment must meet the minimum efficiency requirements of chapter 7678.

Subp. 3. **Automatic controls.** Service water heating systems must be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use.

Subp. 4. **Shutdown.** A separate switch must be provided to permit turning off the energy supplied to electric service water heating systems. A separate valve must be provided to permit turning off the energy supplied to the main burners of all other types of service water heating systems.

Subp. 5. **Swimming pools and spas.**

A. All swimming pool and spa heaters must be equipped with a readily accessible ON/OFF switch to allow shutting off the operation of the heater without adjusting the thermostat setting and to allow restarting without relighting the pilot light.

B. Indoor swimming pool and spa area ventilating systems must be controlled with a humidistat. Additionally, heated indoor swimming pools and spas must provide for energy conservation by at least one of the following methods:

(1) the pool or spa must be equipped with a cover according to part 4717.1575, the Minnesota Department of Health pool cover safety standard;

(2) the ventilating system serving the pool or spa area must provide a heat recovery of 70 percent as calculated by ASHRAE Standard 84 at winter design conditions; or

(3) renewable energy sources must be capable of providing at least 50 percent of the heating energy required for the pool or spa over an operating season.

C. Heated outdoor swimming pools and spas must either be provided with a cover according to part 4717.1575 or the heating system must use renewable energy sources to provide at least 70 percent of the heating energy required over an operating season.

Subp. 6. **Pump operation.** Circulating hot water systems must be equipped with automatic time switches or other controls so that the circulation pumps can be conveniently turned off when the use of hot water is not required.

Subp. 7. **Pipe insulation.**

A. Minimum pipe insulation for domestic and service water heating systems must comply with this subpart. Pipe insulation is assumed to have a k-value of 0.27. If the k-value of a product is less than 0.22, then the thickness must be adjusted to have an equivalent R-value.

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(1) Pipes in conditioned and semiconditioned spaces must have a one-half inch minimum of insulation.

(2) Pipes in unconditioned space must have 1-1/2 inch minimum of insulation.

(3) Pipes in contact with high conductivity material, including, but not limited to concrete and earth, must have a one inch minimum of insulation.

(4) Pipe insulation is not required at support brackets. For water heaters with a draft diverter, pipe insulation is not required to be closer to the draft diverter than is recommended by the manufacturer or safety codes. Pipe insulation is not required for nonrecirculating systems where the water heater is equipped with heat traps on both the supply and return.

B. For recirculating systems, the entire pipe must be insulated.

C. For nonrecirculating systems with unfired storage tank, the first eight feet of both inlet and outlet pipes from the storage tank must be insulated. Pipes between the water heater and storage tank must be insulated.

D. For nonrecirculating systems with a water heater, both supply and return piping for water heaters must be insulated for a distance of three feet from the water heater.

7674.1000 ELECTRICAL POWER AND LIGHTING.

Subpart 1. **Multifamily electrical metering.** In new multifamily dwellings, the electrical energy consumed by each individual dwelling unit must be separately metered with individual metering readily accessible to the individual occupants.

EXCEPTION: Motels, hotels, college dormitories, other transient facilities, and buildings intended for occupancy primarily by persons who are 62 years of age or older or handicapped, or which contain a majority of units not equipped with complete kitchen facilities.

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

A. Lighting systems in the following areas and spaces must meet the requirements of this item:

(1) interior spaces of buildings which are not dwelling units;

(2) building exteriors and exterior areas, such as entrances, exits, and loading docks; and

(3) roads, grounds, parking, and other exterior areas where lighting is energized through the building's electrical service.

EXCEPTIONS: High risk security areas or any area identified by local ordinances or regulations or by security or safety personnel as requiring additional lighting are exempt from these requirements.

B. A building must be considered in compliance with this subpart if the following conditions are met:

(1) the minimum requirements for controls and fluorescent ballasts in subparts 3 and 4 are met;

(2) the exterior lighting power to be installed is not greater than the exterior lighting power allowance required in subpart 5; and

(3) the interior connected lighting power to be installed is not greater than the interior lighting power allowance.

C. For connected lighting power calculations, ballast and luminaire wattage must be determined according to this item.

(1) The ballast wattage must be as listed in the Northern States Power Company (NSP) Lighting Efficiency Program Input Wattage Guide, or if the ballast is not listed in the NSP Lighting Efficiency Program Input Wattage Guide, then ballast wattage must be the American National Standards Institute (ANSI) value published by the manufacturer.

(2) The connected lighting power includes permanently installed lighting plus supplemental or task-related lighting provided by movable or plug-in luminaires.

(3) The connected lighting power for luminaires with incandescent medium base sockets is the higher of the following two wattages: the total lamp wattage proposed for the luminaire; or 50 percent of the listed lighting power capacity of the luminaire in watts.

(4) The connected lighting power for track lights is the higher of the total lamp wattage proposed for the track or 50 percent of the total listed power capacity of the elements proposed for the track.

D. Trade offs between interior lighting power allowance and exterior lighting power allowance are not allowed. Trade offs of the interior lighting power budgets among interior spaces are allowed.

Subp. 3. **Controls.**

A. All lighting controls must be readily accessible to personnel occupying or using the space.

EXCEPTIONS: Automatic controls, programmable controls, lighting for safety hazards and security, controls requiring trained operators, controls for spaces that must be used as a whole, and controls for spaces intended for 24-hour per day use.

B. Exterior lighting must be automatically controlled by a timer, a photocell, or a combination of a timer and photocell. Timers must be of the automatic type capable of adjustment for seven days and for seasonal daylight schedule variations. All time controllers must be equipped with back-up mechanisms to keep time during a four-hour power outage.

C. If the building is served by an energy management system, programmable controls, shared tenant services that affect interior environments, or intelligent building systems, provisions must be made to incorporate lighting controls into the system if a separate automatically controlled lighting system is not provided.

Subp. 4. **Fluorescent lamp ballasts.**

A. Fluorescent lamp ballasts must comply with *Code of Federal Regulations*, title 10, part 435, 103, section 3.3.2, Fluorescent Lamp Ballast Standards.

EXCEPTIONS: Ballasts specifically designed for use with dimming controls.

B. Single-lamp ballasts are prohibited. Tandem wiring must be used to replace single-lamp ballasts with multiple-lamp ballasts.

EXCEPTION: Single-lamp ballasts may be used where luminaire spacing or obstructions cause whip length to exceed ten feet, and odd units at the end of arrays.

C. Fluorescent lamp ballasts must have a power factor equal to or greater than 90 percent.

EXCEPTION: Ballasts for circline lamps and compact fluorescent lamps.

Subp. 5. **Exterior lighting power allowance.**

A. Building exteriors, exterior areas, roads, grounds, and parking must comply with this subpart.

EXCEPTION: Outdoor security lighting may be exempt when approved by the building official, provided the lamp efficacy is not less than 55 lumens per watt.

B. The exterior lighting power density must be determined according to the exterior lighting power density table and must not exceed the exterior lighting power allowance (ELPA). The ELPA is the sum of the allowances for each area of the building.

Exterior Lighting Unit Power Density

Area Description	Unit Power Density
Exit (with or without canopy)	25 W/Lin.ft. of door opening
Entrance (without canopy)	30 W/Lin.ft. of door opening
Entrance (with canopy)	
High traffic (retail, hotel, airport, theater, etc.)	10 W/ft^2 of canopied area
Light traffic (hospital, office, school, etc.)	4 W/ft^2 of canopied area
Loading area	0.40 W/ft^2
Loading door	20 W/Lin.ft. of door opening

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Building exterior surfaces/facades	0.25 W/ft² of surface area to be illuminated
Storage and nonmanufacturing work areas	0.20 W/ft²
Other activity areas for casual use such as picnic grounds, gardens, parks, and other landscaped areas	0.10 W/ft²
Private driveways/walkways	0.10 W/ft²
Public driveways/walkways	0.15 W/ft²
Private parking lots	0.12 W/ft²
Public parking lots	0.18 W/ft²

Subp. 6. **Interior lighting.** The total adjusted lighting power in a building must not exceed the sum of the interior lighting power allowances.

A. The lighting power budget of each interior space must be determined by:

$LPB = A_{wp} \times UPD_b \times AF$

Where:

A_{wp} = Area of the room at the horizontal lighted working plane

UPD_b = Base UPD

B. The area factor must be determined by the equation or table in this unit based on the floor area and ceiling height of the room. Rooms with identical ceiling height and activities, and with similar size, may be treated as a group. The area factor of such a group of rooms must be determined from the average area of the rooms.

The equation for area factor (AF) is as follows:

$AF = 0.2 + 0.8 \text{ EXP } - [[[10.21 \times (CH - 2.5)]/ A_r] \times 0.1054]$

Where:

CH = Ceiling height, feet

A_r = Floor area of room, square feet calculated from the inside dimensions of the room

If $AF \leq 1.0$ then $AF = 1.0$

If $AF \geq 1.8$ then $AF = 1.8$

C. The base unit power density must be selected from the table in this item. For applications to areas or activities other than those given, select values for similar areas or activities.

Performance Procedure Unit Power Density

Common Activity Areas	UPD	Note or Area Factor (AF) Required
Corridor	0.8	AF = 1.0
Food Service		
Fast Food/Cafeteria	1.3	
Leisure Dining	1.4	(a)
Bar/Lounge	2.5	(a)
Kitchen	1.4	
Recreation/Lounge	0.7	
Stairs		
Active Traffic	0.6	
Emergency Exit	0.4	
Toilet and Washroom	0.8	
Garage		
Auto/Pedestrian Circulation	0.3	(d)
Parking Area	0.2	(d)
Lobby (General)		
Reception and Waiting	1.0	
Elevator Lobbies	0.4	
Atrium (Multistory)		
First Three Floors	0.7	
Each Additional Floor	0.2	
Conference/Meeting Room	1.3	(b)
Storage and Warehouse		
Inactive Storage	0.2	
Active Storage, Bulky	0.3	
Laundry		
Washing	0.9	
Ironing and Sorting	1.3	

D. Lighting for special places and activities must comply with this item.

(1) For rooms serving multifunctions, such as hotel banquet or meeting rooms and office conference or presentation rooms, an adjustment factor of 1.5 times the base UPD may be used if a supplementary lighting system is actually installed to serve the secondary function of the room and the design meets the following conditions:

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(a) the installed power for the supplementary system must not be greater than 33 percent of the adjusted lighting power budget calculated for that room; and

(b) independent controls must be installed for the supplementary lighting system.

(2) Indoor sports and recreation areas must comply with part 7676.0800.

Subp. 7. **Internally illuminated exit signs.** New internally illuminated exit signs must not exceed seven watts per fixture.

7674.1100 ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS.

Subpart 1. **General.** Except as provided in this part, alterations and repairs to the building must comply with the applicable requirements of this chapter for new multifamily residential buildings of three stories or less.

Subp. 2. **Affecting air leakage.** If an addition or alteration affects the air leakage characteristics or capacity of a building, and vented appliances are present that are not sealed or power vented and are without combustion air supply, then a combustion air supply must be provided according to the Minnesota State Mechanical Code, chapter 1346.

Subp. 3. **Additions.** Compliance for an addition may be demonstrated in one of three ways:

A. the addition alone must comply with this chapter;

B. the addition, together with the entire existing building, must comply with this chapter; or

C. when taken together with the energy improvements of remodeling other components of the building as part of the same permit, the addition meets the requirements of this chapter.

Subp. 4. **Conversions.** A change in the occupancy or use of an existing building or structure constructed under this chapter which would require an increase in demand for either fossil fuel or electrical energy supply shall not be permitted unless the building or structure is made to comply with the requirements of either this chapter or chapter 7672 or 7676 as appropriate for the converted building.

Subp. 5. **Penetrations.** All penetrations resulting as part of an alteration must be sealed according to part 7674.0600, subpart 3. This includes, but is not limited to, penetrations for telecommunication wires and equipment, electrical wires and equipment, electronic wires and equipment, fire sprinklers, plumbing and ducts, and penetrations in exterior walls and ceilings.

Subp. 6. **Roof/ceilings.**

A. Ventilation requirements for alterations to roof/ceilings are given in the Minnesota State Building Code, chapter 1305.

B. Attic insulation must not be installed unless accessible attic bypasses have been sealed.

C. A ceiling vapor retarder is not required if the interior ceiling finish is not removed.

D. When an uninsulated attic space is finished, the insulation of the sloped ceiling cavity must be no less than R-18.

E. Alterations comprising removal of at least 50 percent of existing membrane or built-up roof covering must comply with this subpart.

F. Alterations and repairs to a built-up or membrane roof covering of a residential building of three stories or less in height must provide for a maximum U-value of 0.033 with an R-value of R-30 or greater.

Subp. 7. **Walls.**

A. Storm windows may be installed over existing glazing without meeting the additional requirements of this chapter.

B. Glazing in existing sash may be replaced without meeting the additional requirements of this chapter, provided the area-weighted U-value of the glazing will be equal to or lower than before the glazing replacement. Replaced windows must conform to parts 7674.0600 and 7674.0700.

C. Interior wall finish may not be replaced unless wall cavities have been insulated to full depth. This item shall apply whenever plaster is removed, even though lath may not have been removed.

EXCEPTIONS: Walls that are back-plastered, walls that are more than 50 percent filled with insulation, and walls without framing cavities.

D. A vapor retarder is not required if the interior wall finish is not removed.

Subp. 8. **Heating, ventilation, and air conditioning; service water heating; and electrical power equipment and controls.** All new equipment or control devices installed in conjunction with the alteration must comply with the specific requirements of this part and parts 7674.0900 and 7674.1000 applicable to that equipment or control device.

Subp. 9. **Lighting.** An enclosed space must comply with the applicable requirements of this chapter if either 50 percent of the luminaires in the enclosed space are replaced, or if the occupancy classification is changed. For alterations to a portion of an enclosed space lighting system, such as moving luminaires or installing control devices, the requirements of this part need not be met, provided that the connected lighting load within the enclosed space is not increased.

7674.1200 EFFECTIVE DATES.

This chapter is effective one year following publication of the adopted rule in the *State Register*.

7676.0100 AUTHORITY AND PURPOSE.

This chapter is adopted pursuant to *Minnesota Statutes*, section 216C.19, subdivision 8. The purpose of this chapter is to establish the minimum energy code criteria necessary to construct new and remodeled elements of all buildings except one- and two-family residential and multifamily buildings of three stories or less, as well as to provide alternatives for demonstrating compliance with those minimum criteria. The intent of these criteria is to provide a means for furnishing quality indoor air, assuring building durability, and permitting energy efficient operation.

7676.0200 APPLICATION.

Subpart 1. **General.** This chapter is a part of the Minnesota State Building Code, adopted according to *Minnesota Statutes*, sections 16B.59 to 16B.73. Enforcement of this chapter must not abridge safety, health, or environmental requirements under other applicable codes or ordinances.

Subp. 2. **New and remodeled elements of buildings.** This chapter applies to all new and remodeled elements of commercial and all other buildings.

Subp. 3. **Existing buildings.** Additions, alterations, and repairs to existing buildings or structures must comply with part 7676.1400.

Subp. 4. **Mixed occupancy.** If a building houses more than one occupancy, each portion of the building must conform to the requirements for the occupancy housed in that portion. If minor accessory uses occupy no more than ten percent of the area of any floor of the building, the major use is considered the building occupancy.

Subp. 5. **Historic buildings.** Alterations to historic buildings and changes of occupancy are regulated by the Minnesota State Building Code, part 1305.0010.

Subp. 6. **Exempt buildings.** This chapter does not cover buildings, structures, or portions of buildings or structures whose peak design rate of energy usage is less than 3.4 Btu per hour per square foot or 1.0 watt per square foot of floor area for all purposes.

Subp. 7. **Application to greenhouses, inflated structures, and processes requiring heat for cold weather protection.** Requirements for greenhouses, inflated structures, and processes requiring heat for cold weather protection are provided in part 7676.0900.

Subp. 8. **Other.** This chapter also applies to driveways, walkways, entrances, parking lots, and grounds.

7676.0300 MATERIALS, EQUIPMENT, AND SPECIFICATION.

Subpart 1. **Identification.** Materials and equipment must be identified in order to show compliance with this chapter.

Subp. 2. **Plans and specifications.** Plans, specifications, and either calculations or compliance forms must demonstrate compliance with all requirements of this chapter including, but not limited to:

A. design criteria;

B. exterior envelope component materials;

C. U-values of windows, doors, skylights, and opaque envelope components;

D. R-values of insulating materials;

E. location of interior air barrier, vapor retarder, and wind wash barrier;

F. air sealing requirements;

G. size and type of apparatus and equipment;

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H. equipment and systems controls; and

I. other data needed to indicate conformance with the requirements of this chapter.

Subp. 3. **Maintenance information.** Required regular maintenance actions must be clearly stated and incorporated on a readily accessible label. The label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product. Maintenance instructions must be furnished for equipment that requires preventive maintenance for efficient operation.

Subp. 4. **Thermal insulation.** Thermal insulation used must conform to chapter 7640, Minnesota Thermal Insulation Standards, adopted by the Department of Public Service. All thermal insulation must achieve stated performance at 75 degrees Fahrenheit mean temperature and no less than stated performance at winter design conditions.

EXCEPTION: Thermal insulation designed to reduce summer cooling load only is not required to achieve stated performance at winter design conditions.

7676.0400 INCORPORATIONS BY REFERENCE.

Subpart 1. **Incorporated items.** The following standards and references are incorporated by reference:

A. ASHRAE Standard 90.1-1989, Section 13, "Building Energy Cost Budget Method";

B. ASHRAE, 1997 Handbook of Fundamentals, Chapter 28;

C. ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

D. ASTM C236-89 (1993)e1, Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box;

E. ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

F. ASTM C976-90 (1996)e1, Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box;

G. ASTM E779-87 (1992)e1, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization;

H. *Code of Federal Regulations*, title 10, part 430, National Appliance Energy Conservation Act of 1987;

I. *Code of Federal Regulations*, title 10, part 435, Energy Conservation Voluntary Performance Standards for New Commercial and Multi-Family High Rise Residential Buildings; Mandatory for New Federal Buildings;

J. COMcheck-MN program, a computer program for energy analysis of medium to small nonresidential buildings developed by Battelle Pacific Northwest Laboratories;

K. ENVSTD, Envelope System Performance Compliance Calculation program, a computer program developed by Battelle Pacific Northwest Laboratories;

L. HVAC Air Duct Leakage Test Manual, Section 4, 1985 edition, as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., Vienna, Virginia;

M. LTGSTD, lighting prescriptive and system performance compliance calculation program, a computer program developed by Battelle Pacific Northwest Laboratories;

N. "Lighting Efficiency Program Input Wattage Guide," Northern States Power Company, Minneapolis, MN;

O. NFRC 100-91, Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), and NFRC 100-97, Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council;

P. NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence (1995), National Fenestration Council;

Q. Energy Policy Act of 1992, section 122(d), Nominal Full Load Efficiency Requirements for Motors;

R. National Electrical Manufacturers Association Standards Publication X TP 1-1996, Guide for Determining Energy Efficiency for Distribution Transformers; and

S. UL181A, Factory Made Air Ducts and Duct Connectors, Underwriters Laboratories, Inc.

Subp. 2. **Availability.** All standards and documents incorporated by reference are available for public inspection at the Minnesota State Law Library and through the Minitex interlibrary loan system.

7676.0500 DEFINITIONS.

Subpart 1. **Definitions.** The definitions in this part apply to this chapter. Additional terms relating to lighting requirements of this chapter are contained in part 7670.0800, subpart 2.

Subp. 2. **Accessible.** "Accessible" means admitting close approach not guarded by locked doors, elevation, or other effective means.

Subp. 3. **Attic bypass.** "Attic bypass" means a passageway where air may pass from a conditioned space to the unconditioned side of a roof or attic. Attic bypasses include, but are not limited to, utility penetrations, interior soffits, openings in top plates, fan penetrations, and light fixture penetrations.

Subp. 4. **Automatic.** "Automatic" means self-acting, operating by its own mechanism when actuated by some impersonal influence, for example, a change in current strength, pressure, temperature, or mechanical configuration.

Subp. 5. **Building envelope.** "Building envelope" means the elements of a building which enclose conditioned spaces through which thermal energy may be transferred to or from the exterior or semiconditioned spaces.

Subp. 6. **Cfm.** "Cfm" means cubic feet per minute.

Subp. 7. **Conditioned space.** "Conditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system and is capable of maintaining at least 65 degrees Fahrenheit at winter design conditions or less than 78 degrees Fahrenheit at summer design conditions identified in part 7676.1100, subpart 4.

Subp. 8. **Commercial parking facility.** "Commercial parking facility" means a parking garage or ramp except those used exclusively to house vehicles for public emergency, ambulance, public transit, or public utility emergency response.

Subp. 9. **Deadband.** "Deadband" means the temperature range in which no heating or cooling is used.

Subp. 10. **Fenestration (window, door, or skylight) area.** "Fenestration (window, door, or skylight) area" means the area of a window, door, or skylight equal to the rough opening of the window, door, or skylight, respectively, less installation clearances.

Subp. 11. **Gross wall area.** "Gross wall area" means the building envelope wall area from grade to the roof/ceiling assembly enclosing conditioned or semiconditioned space, including opaque wall, window, and door area.

For basement walls with an average below-grade area less than 50 percent of the total wall area, including openings, all walls, including the below-grade portion, are included as part of the gross wall area. Windows and doors in basement walls are also included in the gross wall area.

Subp. 12. **Heated slab.** "Heated slab" means slab-on-grade construction in which the heating elements or hot air distribution system is in contact with or placed within the slab or below the slab.

Subp. 13. **Heat Trap.** "Heat trap" means a device for preventing convection in supply and return pipes serving service water heaters and tanks. It includes pipe loop configurations to prevent convection. For water heaters, it does not include mechanical heat traps that are not included as part of the manufacturer's testing and performance rating of the appliance.

Subp. 14. **HVAC.** "HVAC" means heating, ventilating, and air conditioning.

Subp. 15. **HVAC system.** "HVAC system" means a system that provides either collectively or individually the processes of comfort heating, ventilating, or air conditioning within or associated with a building.

Subp. 16. **Infiltration.** "Infiltration" means the uncontrolled air leakage through cracks and interstices in any building element and around windows and doors of a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density.

Subp. 17. **Interior air barrier.** "Interior air barrier" means a material or combination of materials which are durable and installed at the warm side of the building envelope and continuously sealed to resist the passage of air and airborne moisture from a conditioned or semiconditioned space into the building envelope. Acceptable air barrier materials include, but are not limited to, supported four mil polyethylene, gypsum board, wood products, rigid insulation, plastic, metal, sealed concrete products, and any air impermeable material that qualifies as a draft stop, fire stop, or fire block.

Subp. 18. **Manual.** "Manual" means capable of being operated by personal intervention.

Subp. 19. **New energy.** "New energy" means energy, other than recovered energy, used for the purpose of heating or cooling.

Subp. 20. **Opaque areas.** "Opaque areas" means all exposed areas of a building envelope which enclose conditioned space, except openings for windows, skylights, glass in doors, and building service systems.

Subp. 21. **Projection factor or PF.** "Projection factor" or "PF" means the ratio of the horizontal depth of the external shading

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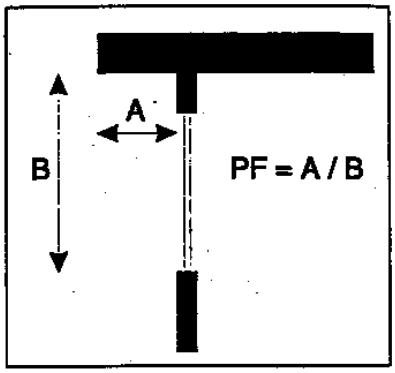
projection divided by the sum of the height of the fenestration and the distance from the top of the fenestration to the bottom of the furthest point of the exterior shading projection, in consistent units, as illustrated in this subpart.



Subp. 22. **Readily accessible.** "Readily accessible" means capable of being reached quickly for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, or similar aids.

Subp. 23. **Recooling.** "Recooling" means the removal of heat by sensible cooling of the supply air, directly or indirectly, that has been previously heated above the temperature to which the air is to be supplied to the conditioned space for proper control of the temperature of that space.

Subp. 24. **Recovered energy.** "Recovered energy" means energy used which would otherwise be wasted.

Subp. 25. **Reheat.** "Reheat" means the application of sensible heat to supply air that has been previously cooled below the temperature of the conditioned space by either mechanical refrigeration or the introduction of outdoor air to provide cooling.

Subp. 26. **Renewable energy sources.** "Renewable energy sources" means sources of energy, excluding minerals, derived from incoming solar radiation, including natural daylighting and photosynthetic processes, including biomass, from resulting phenomena, including wind, waves and tides, and lake or pond thermal differences, and energy derived from the internal heat of the earth, including nocturnal thermal exchanges.

Subp. 27. **Reset.** "Reset" means adjustment of the set point of a control instrument to a higher or lower value automatically or manually to conserve energy.

Subp. 28. **Roof/ceiling assembly.** "Roof/ceiling assembly" means all components of the roof/ceiling envelope through which heat flows, thus creating a building transmission heat loss or gain, where the assembly is exposed to outdoor air and encloses a conditioned or semiconditioned space.

The gross area of a roof/ceiling assembly consists of the total interior surface of the assembly, including skylights exposed to the conditioned or semiconditioned space.

Subp. 29. **Seal.** "Seal" means to secure at all edges, joints, openings, and penetrations of barrier materials in a permanent manner to resist the passage of air and airborne moisture.

Subp. 30. **Service water heating.** "Service water heating" means the supply of hot water for domestic or commercial purposes other than space heating.

Subp. 31. **Semiconditioned space.** "Semiconditioned space" means space within a building which is conditioned either directly or indirectly by an energy-using system to have limited capability of maintaining less than 65 degrees Fahrenheit at winter design conditions or greater than 78 degrees Fahrenheit at summer design conditions, as identified in part 7676.1100, subpart 4.

Subp. 32. **Solar heat gain coefficient or SHGC.** "Solar heat gain coefficient" or "SHGC" means the ratio of the solar heat gain entering the space through the fenestration area to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation, which is then reradiated, conducted, or convected into the space. In the absence of a measured SHGC, the conversion from shading coefficient to SHGC is: SHGC = 0.870 x shading coefficient.

Subp. 33. **Thermal conductance.** "Thermal conductance" means time rate of heat flow through a body, frequently per unit area, from one of its bounding surfaces to the other for unit temperature difference between the two surfaces, under steady conditions (Btu/h ft^2 °F).

Subp. 34. **Thermal resistance or R.** "Thermal resistance" or "R" means the reciprocal of thermal conductance (h ft^2 ° F/Btu).

Subp. 35. **Thermal transmittance or U.** "Thermal transmittance" or "U" means the coefficient of heat transmission (air-to-air).

It is the time rate of heat flow per unit area and unit temperature differential between the warm side and cold side of air films (Btu/h ft² °F).

Subp. 36. **Thermal transmittance, overall or U_o.** "Thermal transmittance, overall" or "U_o" means the overall thermal transmittance of an exterior building envelope component, such as a wall, floor, or roof/ceiling. The value of U_o is calculated by the parallel path heat flow method using the areas and thermal transmittance values of the various elements, such as windows, doors, and opaque surfaces that comprise the gross area of the building component.

Subp. 37. **UL181 or equivalent.** "UL181 or equivalent" means a duct sealing product that meets standards UL181A, UL181B, or the UL standard for metal duct sealant. It also means a duct tape with metal foil backing and acrylic or silicone adhesive. It does not mean cloth-backed tape with rubber adhesive.

Subp. 38. **Unconditioned space.** "Unconditioned space" means space within a building which is neither conditioned nor semiconditioned, including outdoor space and spaces within a building with uncontrolled ventilation to outdoors.

Subp. 39. **Vapor retarder.** "Vapor retarder" means a material or assembly to impede water vapor passage designed to meet a maximum permeability rating of 1.0 grain per hour per square foot per inch Hg pressure differential. Polyethylene material which is used to meet the requirements of this subpart must either be designed to have a minimum thickness of four mils, be cross laminated, or be shown to have the strength and puncture resistance of not less than cross laminated polyethylene.

Subp. 40. **Warm side.** "Warm side" means the location within a building envelope element between the interior surface and the winter design condition dew point.

Subp. 41. **Wind wash barrier.** "Wind wash barrier" means a material or combination of materials to resist the passage of unconditioned air into the building envelope. Acceptable materials must be suitable for exterior conditions, and include exterior sheathing, exterior wrap materials, and other approved air barrier materials. Sealed exterior wrap materials must have a water vapor permeability not less than five perms.

Subp. 42. **Zone.** "Zone" means a space or group of spaces within a building with heating or cooling requirements sufficiently similar so that comfort conditions can be maintained throughout by a single controlling device. Each floor of a nonresidential building must be considered at least one separate zone.

7676.0600 MINIMUM ENVELOPE CRITERIA.

Subpart 1. **General.**

A. Buildings that are heated or mechanically cooled and heated slabs must be constructed so as to provide the required thermal performance for components identified in this part. Buildings must be designed and constructed to permit continuity of air barriers and thermal insulation as required in this part. Building assemblies are required to maintain the thermal performance of installed insulation and the integrity of building materials.

B. The minimum criteria specified in this part must be met for new buildings in all cases, and may not be made less stringent by a trade off.

EXCEPTION: Buildings meeting the criteria of part 7676.0800 for semiconditioned buildings or buildings with high internal heat gain, or part 7676.0900 for greenhouses, inflated structures, or processes requiring heat for cold weather protection, may be designed using trade off provisions.

C. Where sealed materials are required, sealants must be compatible with substrate and other materials being sealed. Consideration must be given to the installation conditions, temperature, moisture, gap width, and permanence of seal required when selecting appropriate material for sealing.

Subp. 2. **Foundation walls and slabs on grade.**

A. Foundation walls, including exposed edges of slabs on grade, which enclose conditioned or semiconditioned spaces must be insulated. The insulation must be continuous except where the insulation must be interrupted for purposes such as penetrations or structural requirements, provided that the insulation is sealed or tightly abutted at the penetration or structural member.

B. Foundation wall insulation must be not less than R-5 from the top of the wall down to the top of the footing, or top of the floor if insulation is on the interior.

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C. Slabs on grade, including heated aprons located outside of a building, must be insulated around the perimeter. The insulation must extend from the top of the slab downward to either the design frost line or to the top of the footing, whichever is less. The thermal insulation must be not less than R-5.

D. If foundation wall insulation is on the exterior, the portion from the top of the foundation wall to six inches below grade must be covered by an approved protective coating finish to protect the insulation from deterioration due to sunlight and physical abuse.

Subp. 3. **Framed components.** All buildings must be constructed in a manner that provides a continuous, durable interior air barrier on the warm side of the building envelope.

EXCEPTION: This subpart shall not apply to alterations and additions.

A. Insulated ceilings must have a vertical clearance of not less than 7-1/4 inches from the outside edge of the exterior wall top plate to the roof sheathing, and not less than R-19 insulation at the inside edge of the top plate.

B. Exterior corners must be framed so that insulation can be installed after the exterior sheathing is installed.

C. Gaps between framing which are less than one-half inch in width must be either eliminated by securing the framing members together, or must be insulated at the time of assembly.

D. Intersections of interior partition walls with exterior walls must be framed so that insulation can be installed between the partition wall and exterior sheathing after the exterior sheathing is installed.

E. Whenever interior framing meets an insulated ceiling or exterior wall, a continuous interior air barrier must be installed on the ceiling or exterior wall prior to installation of interior framing to allow continuity with adjacent interior air barriers. This requirement applies to dropped ceilings, soffits, stairs, fire or draft stops, fireplace framing, and similar elements.

EXCEPTION: An interior air barrier need not be insulated above partition top plates if adjacent interior air barrier materials are sealed to the top plate, provided that penetrations in the top plate are sealed.

F. Prior to installing a tub, shower, or spa located at an exterior wall, a continuously sealed interior air barrier must be installed on the exterior wall to allow continuity with adjacent interior air barriers.

G. Exterior wall intersections of wood, masonry, and other dissimilar materials must be sealed to maintain interior air barrier continuity.

H. Walls exposed to attic areas and skylight shafts must be constructed to meet the same requirements as exterior walls, including wind wash barrier, insulation, vapor retarder, and interior air barrier requirements. If sheathing is not installed, the wind was barrier must be supported between solid blocking.

Subp. 4. **Interior air barrier.** A sealed, continuous interior air barrier must be installed on the warm side of the building envelope to resist air leakage and movement of moisture into the building envelope at ceilings, walls, and floor rim joist areas.

A. An interior air barrier must be installed on the warm side of insulated ceilings and on walls. The interior air barrier must be sealed at all edges, joints, openings, and penetrations.

EXCEPTIONS: An interior air barrier is not required at concrete foundation wall insulation or at fenestration rough openings.

B. An interior air barrier must be installed at floor rim joist areas.

EXCEPTION: An interior air barrier is not required at floor rim joist areas if all HVAC supply and return ducts in the building are sealed with and according to the installation instructions of a product meeting UL181 and penetrations in floor cavities are sealed according to subpart 5.

Subp. 5. **Interior air barrier penetrations.**

A. All penetrations installed through an interior air barrier must be sealed prior to covering or making inaccessible so that a continuous interior air barrier is maintained. All penetrations made prior to framing inspection must be sealed prior to framing inspection.

B. Penetrations that must be sealed include, but are not limited to, piping and ducts, wires and equipment, and flue and chimney penetrations.

C. Sealing for wires and equipment must include the service entrance, wires, conduit, cables, panels, recessed light fixtures, electronic equipment, heating appliances, electrical boxes, and fan housings. Recessed light fixtures must be sealed in an approved manner.

D. Penetration openings must be of appropriate dimensions to facilitate the sealing method. Penetrations in a flexible interior air barrier must be supported by rigid material or an approved method to facilitate permanent air sealing.

Subp. 6. **Vapor retarder requirements.** A vapor retarder must be installed on the warm side of all walls and on ceilings, floor rim joist areas, and earth floors of unvented crawl spaces.

EXCEPTIONS:

A. A vapor retarder is not required at floor rim joist areas if all HVAC supply and return ducts in the building are sealed with and in accordance with the installation instructions of a product meeting UL181 and penetrations in floor cavities are sealed according to subpart 5.

B. For buildings meeting the criteria of part 7676.0800 for semiconditioned buildings or buildings with high internal heat gain, or part 7676.0900 for greenhouses, inflated structures, or processes requiring heat for cold weather protection, consideration must be given to the use of a vapor retarder on the warm side of building envelope components.

Subp. 7. **Exterior wind wash barrier.** A barrier must be provided to resist wind wash. Where sealing is required, the wind wash barrier must be caulked, be gasketed, have sealed exterior wrap, or be otherwise sealed in an approved manner to provide a permanent air seal and prevent entry of wind and wind-driven rain. In wood framing construction, wind wash barrier penetrations must occur through rigid material or approved hardware to enable effective sealing. Penetrations in the wind wash barrier must be sealed at the time of product installation so that a continuous wind wash barrier is maintained.

A. A rigid wind wash barrier must be tightly installed at the exterior edge of the exterior wall top plate, and not less than to the bottom of the truss top chord, or for nontruss wood framing to within 3-1/2 inches of the roof deck.

EXCEPTION: A wind wash barrier is not required to extend greater than 24 inches above the top plate.

B. A sealed wind wash barrier must be installed at floors, overhangs, and floor rim joist areas separating conditioned from unconditioned spaces.

C. Sheathing joints which are not supported by framing, and framing joints which are not covered by sheathing, must be sealed at the exterior side of the joint.

D. All sheathing penetrations must be sealed.

E. A sealed wind wash barrier must be installed to prevent air leakage from garages into interior conditioned spaces.

Subp. 8. **Fenestration product installation requirements.** Minimum clearance between the rough opening framing and fenestration product frame must be maintained in accordance with the manufacturer's instructions to facilitate insulation. When manufacturer's installation instructions require insulation between the rough opening and the frame, the portion of the rough opening which is located to the exterior side of the glazing must be insulated. The required insulation must be installed by the installer at the time of the fenestration product installation. The installer must also provide a durable exterior side infiltration and weather seal around the perimeter of the product frame.

Subp. 9. **Floors over unconditioned spaces.** Floors over unconditioned spaces must have a maximum overall thermal transmittance as required for the building types identified in this chapter. While the U-value may be increased or decreased by trade off calculations, in all cases it must have a maximum overall thermal transmittance of 0.033. Floor rim joist framing must have an interior air barrier on the warm side according to subpart 4 and a sealed wind wash barrier according to subpart 7.

Subp 10. **Thermal insulation placement and support.**

A. Thermal insulation must be installed in ceilings and walls in a permanent manner and in substantial contact with the interior air barrier.

B. When framing or equipment is installed that will restrict access to building cavities requiring insulation, those cavities must be insulated prior to restricting access.

C. All insulation in floors and walls must be supported and protected on the unconditioned side by sheathing or other approved materials to resist insulation movement and wind wash.

D. In buildings having eave ventilation and loose fill attic insulation, a barrier must be installed to prevent the insulation from entering the eave. Loose fill insulation must be installed after eave protection is installed, unless prior loose fill insulation is required to prevent cold weather freezing of interior applied building materials.

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E. Where building designs and code requirements allow, thermal insulation must be continuous and uninterrupted by ducts, pipes, wiring, bracing, and other elements which are capable of being installed to the interior or exterior side of the insulation.

Subp. 11. **Performance and identification of loose fill insulation.**

A. Loose fill insulation installed to meet the requirements of this chapter must provide the required performance at 75 degrees Fahrenheit mean temperature and no less than the required performance at winter design conditions.

B. Insulation must be installed according to the bag count on the manufacturer's coverage chart.

C. The insulation installer shall place identification in accordance with this subpart in accessible attics of all buildings with loose fill insulation.

(1) A means must be provided to verify the claimed insulation level by installing insulation thickness markers labeled with a minimum of one-inch increments at approximately ten-foot spacing throughout the attic.

(2) A completed insulation receipt attic card must be attached to the framing near the access opening in a clearly visible place. The attic card must identify the type of insulation installed, the manufacturer, the installer, the R-value, the design settled thickness, the square footage of attic coverage area, and the number of bags installed, and must be signed and dated by the installer.

(3) Notification must be posted near the building inspection card indicating the installed attic R-value and date of installation.

D. Attic access panels must be insulated to a minimum of R-22.2 for ceiling panels and R-13 for wall panels, and must be weatherstripped.

7676.0700 METHODS FOR COMPLIANCE.

Subpart 1. **Scope.** All buildings except low-rise residential that are conditioned must comply with the requirements of subpart 3 and subpart 5, 6, 7, 8, or 9.

Subp. 2. **Calculations.** Calculation of component thermal transmittance (U-values) and overall thermal transmittance values (U_o-values) must be according to chapter 7678.

Subp. 3. **Minimum requirements.** Minimum R-values, maximum U-values, and other minimum requirements are contained in items A to E.

A. The average U-values for fenestration products as determined by part 7678.0600 used in the building must not exceed:

(1) U-0.37 for windows and glass doors (except foundation windows 5.6 square feet and less);

(2) U-0.55 for skylights;

(3) U-0.51 for foundation windows 5.6 square feet and less.

B. Foundation wall insulation must be not less than R-5.

C. Slabs on grade insulation must not be less than R-5.

D. Floors over unconditioned spaces must have a maximum U_o-value of 0.033.

E. All other minimum criteria specified in part 7678.0600 must be met.

Subp. 4. **Total heat gain or loss for entire building.** The value of U_o for any assembly such as roof/ceiling, wall, or floor may be increased and traded off by decreasing the value of U_o for other components, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from conformance to the values of U_o specified in this part.

Subp. 5. **Building component performance method.** Compliance with this subpart may be demonstrated for buildings where no more than 75 percent of the window area is on one side of the building. The maximum window area as a percentage of exposed wall must not exceed the values given in item A or B using the overall thermal transmittance of the opaque wall, the average thermal transmittance of the windows, and the average SHGC of the windows. Interpolations to intermediate values are permitted. Extrapolations beyond the values found in the tables shall not be permitted. The minimum criteria specified in part 7676.0600 must be met.

A. Buildings located in Zone I, northern Minnesota, as defined in part 1305.5400, must comply with this item. The combined thermal transmittance factor (U_o) for the roof/ceiling must not exceed 0.040 Btu/h ft^2 °F.

Maximum Window Area Zone I - Northern Minnesota

Window U-value =	0.3	0.4	0.5	0.6
Opaque Wall U = 0.06				
SHGC 0.7	32%	27%	23%	20%
SHGC 0.5	39%	30%	25%	20%
SHGC 0.3	45%	33%	26%	22%
Opaque Wall U = 0.07				
SHGC 0.7	30%	26%	22%	18%
SHGC 0.5	37%	29%	23%	19%
SHGC 0.3	43%	31%	24%	20%
Opaque Wall U = 0.08				
SHGC 0.7	29%	24%	20%	17%
SHGC 0.5	35%	27%	21%	17%
SHGC 0.3	41%	29%	22%	18%
Opaque Wall U = 0.09				
SHGC 0.7	27%	22%	18%	15%
SHGC 0.5	33%	24%	19%	16%
SHGC 0.3	38%	26%	20%	16%

B. Buildings located in Zone II, southern Minnesota, as defined in part 1305.5400, must comply with this item. The combined thermal transmittance factor (U_o) for the roof/ceiling must not exceed 0.045 But/h ft² °F.

Maximum Window Area Zone II - Southern Minnesota

Window U-value =	0.3	0.4	0.5	0.6
Opaque Wall U = 0.06				
SHGC 0.7	23%	22%	20%	18%
SHGC 0.5	32%	28%	25%	22%
SHGC 0.3	44%	35%	30%	26%
Opaque Wall U = 0.07				
SHGC 0.7	23%	21%	19%	18%
SHGC 0.5	30%	26%	24%	20%
SHGC 0.3	43%	35%	29%	24%

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Opaque Wall U = 0.08

SHGC 0.7	22%	20%	18%	16%
SHGC 0.5	29%	25%	22%	20%
SHGC 0.3	41%	33%	27%	23%

Opaque Wall U = 0.09

SHGC 0.7	21%	19%	17%	16%
SHGC 0.5	28%	24%	21%	19%
SHGC 0.3	39%	31%	25%	22%

Subp. 6. **ENVSTD performance method.**

A. The envelope criteria for buildings located anywhere in Minnesota may be determined by the Envelope System Performance Compliance Calculation (ENVSTD) program. The minimum criteria specified in part 7676.0600 must be met. If equipment power density values for the building types listed in item B are unknown, the default values in item B shall be used.

B. Default values for ENVSTD:

Building Type	Equipment Power Density
Assembly	0.25
Health and Institutional	1.00
Hotel and Motel	0.25
Multifamiy High-rise	0.75
Office	0.75
Restaurant	0.10
Retail	0.25
School	0.50
Warehouse and Storage	0.10

Subp. 7. **COMcheck-MN performance method for small buildings.** Buildings of 30,000 square feet gross floor area and less are deemed to comply with this part if the thermal envelope passes the COMcheck-MN program. The minimum criteria specified in part 7676.0600 must be met.

Subp. 8. **Prescriptive method for small buildings.** Buildings of 30,000 square feet gross floor area and less shall be deemed to meet the requirements of this subpart if the thermal envelope meets the criteria of item A or B. The minimum criteria specified in part 7676.0600 must be met. "CMU" means concrete masonry unit and "PF" means the average projection factor for the building.

A. Buildings located in Zone I, northern Minnesota, as defined in part 1305.5400, must comply with this item.

(1) Window area ten percent or less of above-grade wall area:

Window Area 10% or Less of Above-Grade Wall Area

Element	Conditions		
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-3	Cavity: R-13 Continuous: R-0
CMU, ≥8 in. with integral insulation	R-6	Cavity: R-13 Continuous: R-0	Cavity: R-11 Continuous: R-0
Other masonry walls	R-6	Cavity: R-13 Continuous: R-0	Cavity: R-11 Continuous: R-0

Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.7	Any	Any
	U-value	0.5	0.5	0.5
Skylights	U-value		0.6	

Roof Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-30	R-23
Nonwood joist/truss	R-30	R-24
Concrete slab or deck	NA	R-23
Metal purlin with thermal break	X	R-24
Metal purlin without thermal break	X	R-24

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall R-8

(2) Window area over ten percent but not greater than 25 percent of above-grade wall area:

Window Area Over 10% But Not Greater Than 25% Of Above-Grade Wall Area

Element	Conditions		
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-3	Cavity: R-13 Continuous: R-0
CMU, ≥8 in. with integral insulation	R-6	Cavity: R-13 Continuous: R-0	Cavity: R-11 Continuous: R-0
Other masonry walls	R-9	Cavity: R-13 Continuous: R-3	Cavity: R-13 Continuous: R-0

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Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.7	Any	Any
	U-value	0.4	0.4	0.4

Skylights	U-value	0.6

Roof Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-30	R-23
Nonwood joist/truss	R-30	R-24
Concrete slab or deck	NA	R-23
Metal purlin with thermal break	X	R-24
Metal purlin without thermal break	X	R-24

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall	R-8

(3) Window area over 25 percent but not greater than 40 percent above-grade wall area:

Window Area Over 25% But Not Greater Than 40% Of Above-Grade Wall Area

Element		Conditions	
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-4	Cavity: R-13 Continuous: R-3
CMU, ≥8 in. with integral insulation	R-10	Cavity: R-13 Continuous: R-4	Cavity: R-11 Continuous: R-3
Other masonry walls	R-10	Cavity: R-13 Continuous: R-4	Cavity: R-13 Continuous: R-3

Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.7	Any	Any
	U-value	0.4	0.4	0.4

Skylights	U-value	0.6

Roof Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-30	R-23
Nonwood joist/truss	R-30	R-24
Concrete slab or deck	NA	R-23
Metal purlin with thermal break	X	R-24
Metal purlin without thermal break	X	R-24

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall	R-8

B. Buildings located in Zone II, southern Minnesota, as defined in part 1305.5400, must comply with this item.

(1) Window area ten percent or less of above-grade wall area:

Window Area 10% or Less of Above-Grade Wall Area

Element		Conditions	
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-3	Cavity: R-11 Continuous: R-0
CMU, ≥8 in. with integral insulation	R-5	Cavity: R-11 Continuous: R-0	Cavity: R-11 Continuous: R-0
Other masonry walls	R-5	Cavity: R-11 Continuous: R-0	Cavity: R-11 Continuous: R-0

Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.7	Any	Any
	U-value	0.6	0.6	0.6

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Skylights	U-value	0.6	

Roof Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-19
Nonwood joist/truss	R-25	R-20
Concrete slab or deck	NA	R-19
Metal purlin with thermal break	R-30	R-20
Metal purlin without thermal break	X	R-20

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall	R-8

(2) Window area over ten percent but not greater than 25 percent of above-grade wall area:

Window Area Over 10% But Not Greater Than 25% Of Above-Grade Wall Area

Element		Conditions	
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-3	Cavity: R-11 Continuous: R-0
CMU, ≥8 in. with integral insulation	R-5	Cavity: R-11 Continuous: R-0	Cavity: R-11 Continuous: R-0
Other masonry walls	R-9	Cavity: R-13 Continuous: R-3	Cavity: R-11 Continuous: R-0

Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.7	Any	Any
	U-value	0.5	0.5	0.5

Skylights	U-value	0.6

Roof Assemblies	Insulation Between Framing	Continuous Insulation

All-wood joist/truss	R-30	R-23
Nonwood joist/truss	R-30	R-24
Concrete slab or deck	NA	R-23
Metal purlin with thermal break	X	R-24
Metal purlin without thermal break	X	R-24

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall	R-8

(3) Window area over 25 percent but not greater than 40 percent of above-grade wall area:

Window Area Over 25% But Not Greater Than 40% Of Above-Grade Wall Area

Element		Conditions	
Above-Grade Walls	No Framing	Metal Framing	Wood Framing
Framed	NA	Cavity: R-13 Continuous: R-3	Cavity: R-11 Continuous: R-0
CMU, ≥8 in. with integral insulation	R-5	Cavity: R-13 Continuous: R-0	Cavity: R-11 Continuous: R-0
Other masonry walls	R-9	Cavity: R-13 Continuous: R-3	Cavity: R-13 Continuous: R-0

Window assemblies		PF<0.25	0.25≤PF<0.50	PF≥0.50
	SHGC	0.5	0.6	0.7
	U-value	0.4	0.4	0.4

Skylights	U-value	0.6

Roof Assemblies	Insulation Between Framing	Continuous Insulation

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All-wood joist/truss	R-30	R-23
Nonwood joist/truss	R-30	R-24
Concrete slab or deck	NA	R-23
Metal purlin with thermal break	X	R-24
Metal purlin without thermal break	X	R-24

Floor Assemblies	Insulation Between Framing	Continuous Insulation
All-wood joist/truss	R-25	R-22
Nonwood joist/truss	R-30	R-23
Concrete slab or deck	NA	R-22

Slab or below-grade wall	R-8

Subp. 9. **Building design by systems analysis method.**

A. Building design by systems analysis must comply with this subpart. The intent of this subpart is to allow flexibility in the design process while ensuring that the annual energy quantity or energy cost of a proposed design is no more than that allowed under the prescriptive path.

(1) A design by systems analysis consists of a comparison of the annual energy or energy cost of the proposed design with the annual energy or energy cost of a prescriptive design.

(2) If the proposed building uses an air or water source heat pump for heating or cooling, the standard design building must also use a heat pump with the same energy source and meet the requirements of chapter 7678 for the comparative analysis.

(3) Analysis procedures requiring annual average weather data must use the most recently published 30-year average annual heating and cooling data for the nearest location.

B. Design by systems analysis for buildings of 5,000 square feet and less of conditioned or semiconditioned floor area must use either this item or item C.

Adjustment must be made for a proposed heating or cooling system (Eff, proposed) exceeding the efficiency requirements of chapter 7678 (Eff, minimum) in accordance with this subitem. The proposed opaque envelope components' overall thermal transmittance must be adjusted (U_o, adjusted) by modifying the standard required thermal transmittance (U_o, standard) according to the equation in this subitem. For heating systems more efficient than the minimum required, the P used in the equation must be 1.20. For cooling systems more efficient than the minimum required, the P used in the equation must be 0.02.

U_o, adjusted = U_o, standard x (1 + P x (Eff, proposed - Eff, minimum)/(Eff, minimum)).

C. Design by systems analysis for buildings greater than 5,000 square feet of conditioned or semiconditioned floor area must use this item. The design by systems analysis must be prepared by an engineer or architect licensed to practice in Minnesota. The design by systems analysis must comply with:

(1) calculation of the 8,760 hour (one-year) analysis using annual average weather data for the location closest to the building site; or

(2) the energy cost budget method using ASHRAE 90.1-1989, Section 13, amended by replacing references to sections 5 to 12 with parts 7676.0600 to 7676.1000.

Subp. 10. **Daylight credits for skylights.** Skylights used in conjunction with automatic lighting controls may be excluded from the calculation of roof U_o-value when the requirements of this subpart are met.

A. Automatic daylighting controls must be installed to control all of the luminaires in the daylighted area. Controls must be capable of reducing lighting power to 50 percent of full power when adequate daylight is available. The daylighting area is the floor area beneath the skylight and 45 degrees in all directions from the edges of the skylight. Daylighted areas from two or more skylights that overlap cannot be counted twice.

B. Skylights must have a U-value not greater than 0.45. The skylight curb must have a U-value of 0.21 or less. Skylight infiltration must be 0.05 cfm per foot of crack or less under standard test conditions.

C. The maximum skylight area that may be excluded from the calculation of roof U_o-value calculation is the percentage of the total roof area given in this item. If the skylights are shaded so as to block more than 50 percent of the sunlight during the peak cooling design condition, the excluded skylight area may be increased by 50 percent.

(1) Maximum skylight area that may be excluded as a percentage of total roof area for skylight glazing visible light transmission of 0.75:

Range of Lighting Power Density, (W/ft²)

Light level, fc	less than 1.0	1.01 to 1.50	1.51 to 2.0	above 2.0
30	2.3	3.4	4.5	5.6
50	2.5	4.0	5.5	7.0
70	2.8	4.6	6.4	8.2

(2) Maximum skylight area that may be excluded as a percentage of total roof area for skylight glazing visible light transmission of 0.50:

Range of Lighting Power Density, (W/ft²)

Light level, fc	less than 1.0	1.01 to 1.50	1.51 to 2.0	above 2.0
30	3.6	5.1	6.6	8.1
50	3.9	6.0	8.1	10.2
70	4.2	6.9	9.6	12.3

7676.0800 COMPLIANCE CRITERIA FOR SEMICONDITIONED BUILDINGS OR PORTIONS OF BUILDINGS.

Subpart 1. **Scope.** Semiconditioned buildings and buildings classified in the 1994 UBC as "F" or "S" occupancies must comply with this part. Speculative buildings where it is not known whether the building will be conditioned or semiconditioned must meet the requirements for conditioned buildings in part 7676.0600.

Subp. 2. **Criteria.** The combined thermal transmittance U_o-values must not exceed:

A. 0.23 Btu/h ft² °F for walls;

B. 0.060 Btu/h ft² °F for roof/ceilings;

C. 0.040 Btu/h ft² °F for floors over unconditioned spaces;

D. slab on grade insulation to design frost depth of not less than R-5 for an unheated slab and not less than R-10 for a heated slab; and

E. the minimum criteria specified in part 7676.0600.

7676.0900 COMPLIANCE CRITERIA FOR GREENHOUSES, INFLATED STRUCTURES, AND PROCESSES REQUIRING HEAT FOR COLD WEATHER PROTECTION.

Subpart 1. **Greenhouse and inflated structures.** The glazing and fabric elements for greenhouses and inflated structures, respectively, and processes requiring heat for cold weather protection, are exempt from the envelope requirements of this chapter, provided the requirements of this subpart are met.

A. The minimum requirements of this chapter for slab on grade floors, foundation walls, floors over unconditioned spaces, HVAC systems and equipment, service water heating, and lighting and electrical apply.

B. All energy conserving measures with a ten-year and less simple payback must be done to all elements of the building.

C. Greenhouses must incorporate a thermal screen to retard nighttime heat loss through the roof.

Subp. 2. **Processes requiring heat for cold weather protection.** Processes requiring heat for cold weather protection must be enclosed with thermal protection meeting the requirements of this part unless the building official approves an analysis demonstrating that there would not be a ten-year simple payback considering the cost of enclosing the process with thermal protection and the resulting energy savings.

EXCEPTION: Industrial processes.

7676.1000 COMPLIANCE CRITERIA FOR METAL BUILDINGS.

Subpart 1. **Scope.** Envelope components of metal buildings constructed with purlins or girts must comply with this part.

Subp. 2. **Thermal performance.** Thermal performance of building components must be in accordance with part 7676.0700, 7676.0800, or 7676.0900 as appropriate. Thermal transmittance of walls and roofs must be determined in accordance with part 7678.0500, subpart 6.

Subp. 3. **Girts.** Girts must be separated from interior wall finish by a thermal break. The thermal break must be one-inch foam block or compressed mineral fiber insulation. Foam blocks must be a minimum R-value of 5 (2 pound density).

Subp. 4. **Thermal insulation.** Thermal insulation must be protected by an interior air barrier and vapor retarder. Seams must be sealed with nonrubberized sealant or tape, compatible with the interior air barrier and vapor retarder materials.

7676.1100 BUILDING MECHANICAL SYSTEMS.

Subpart 1. **General.**

A. Building mechanical systems must be designed and constructed in accordance with this part. Standards and definitions for building mechanical systems, including, but not limited to, service systems, sequence, system, thermostat, terminal element, and zone, are located in *Code of Federal Regulations*, title 10, parts 430 and 435, Energy Conservation Standards for Consumer Products and Energy Conservation Voluntary Performance Standards for new buildings.

B. EXCEPTIONS: Special applications, including, but not limited to, hospitals, laboratories, thermally sensitive equipment rooms, computer rooms, and facilities with open refrigerated display cases may be exempt from certain requirements of this part when approved by the building official.

C. Other design temperatures may be used for equipment selection if it results in a lower energy usage. Other design parameters may be used, such as a reduction in pipe insulation or not using setback controls, if it does not increase building energy use.

Subp. 2. **Prohibition of heated commercial parking garages.** A new enclosed structure or portion of an enclosed structure used primarily as a commercial parking facility for three or more motor vehicles may not be heated. Incidental heating resulting from building exhaust air passing through a parking facility is not prohibited if substantially all useful heat previously has been removed from the air.

EXCEPTION: Parking facilities that are appurtenant to dwelling unit occupancies.

Subp. 3. **Design conditions and calculation procedures.**

A. The exterior design temperature must be selected from this subpart. Design condition adjustments may be made as determined by the building official to reflect local climates which differ from the tabulated temperatures or local weather experience.

Design Conditions

City	Summer Db/Wb	Winter Db
Albert Lea	87/72	-17
Alexandria	88/72	-22
Bemidji	85/69	-31
Brainerd	87/71	-20
Duluth	82/68	-21
Faribault	88/72	-17
Fergus Falls	88/72	-21
International Falls	83/68	-29
Mankato	88/72	-17
Minneapolis	89/73	-16
Rochester	87/72	-17
St. Cloud	88/72	-15
St. Paul	89/73	-16
Virginia	83/68	-25
Willmar	88/72	-15
Winona	88/73	-14

Db = dry bulb temperature, degrees Fahrenheit

Wb = wet bulb temperature, degrees Fahrenheit

B. Indoor design temperature must be 72 degrees Fahrenheit for heating and 74 degrees Fahrenheit for cooling.

C. Heating and cooling system design loads for the purpose of sizing systems and equipment must be determined in accordance with the procedures described in ASHRAE Handbook of Fundamentals, chapter 28.

D. Design loads may, at the designer's option, be increased by as much as ten percent to account for unexpected loads or changes in space usage.

E. Transient loads such as warm-up or cool-down loads that occur after off-hours setback or shutoff may be calculated from principles based on the heat capacity of the building and its contents, the degree of setback, and the desired recovery time; or may be assumed to be up to 30 percent for heating and ten percent for cooling of the steady-state design loads. The steady-state load may include a safety factor according to item D.

Subp. 4. **System and equipment sizing.**

A. HVAC systems and equipment must be sized to provide no more than the space and system loads calculated in accordance with subpart 3.

B. EXCEPTIONS:

(1) Equipment capacity may exceed the design load if the equipment selected is the smallest size needed to meet the load within available options of the desired equipment line.

(2) Equipment whose capacity exceeds the design load may be specified if oversizing the equipment can be shown to not increase the overall annual energy costs.

(3) Standby equipment may be installed if controls and devices are provided that allow standby equipment to operate automatically only when the primary equipment is not operating.

(4) Multiple units of the same equipment type such as multiple chillers and boilers, with combined capacities exceeding the design load, may be specified to operate concurrently only if controls are provided that sequence or otherwise optimally control the operation of each unit based on load.

(5) For a single piece of equipment that has both heating and cooling capability, only one function, either the heating or the cooling, need meet the requirements of this part. Capacity for the other function must be, within available equipment options, the smallest size necessary to meet the load. For equipment efficiencies, see chapter 7678.

Subp. 5. **Alternate procedure for simple HVAC systems.**

A. HVAC systems may use the simplified procedure if:

(1) the system serves a single HVAC zone;

(2) the cooling capacity supplied by the system is less than or equal to 65,000 Btu/h;

(3) no HVAC equipment is water-cooled; and

(4) the HVAC system is not hydronic.

B. If system fan power is greater than ten horsepower, the system must comply with subpart 9, or if pump power is greater than ten horsepower, the system must comply with subpart 10.

C. Controls must be provided according to this item.

(1) The system must be controlled by a manual or automatic change-over or dual set-point thermostat.

(2) Heat pumps must be controlled as required in subpart 7.

(3) All controls must be tested to ensure that control elements are calibrated, adjusted, and in proper working condition.

D. Outdoor air intakes and exhausts must have dampers in accordance with subpart 8.

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E. Ducts must be insulated and constructed in accordance with subparts 15 and 16, respectively. Pipes must be insulated according to subpart 17.

F. Testing and balancing must be performed according to this item.

(1) Construction documents must require the system to be air balanced in accordance with industry-accepted procedures to within ten percent of specified volume.

(2) If the system contains a fan motor greater than one horsepower, fan speed must be adjusted to meet design air system flow.

(3) All controls must be tested to ensure that control elements are calibrated, adjusted, and in proper working condition.

G. An operation manual must be provided according to subpart 18.

Subp. 6. **Simultaneous heating and cooling.**

A. Use of simultaneous heating and cooling by reheating or recooling supply air or by concurrent operation of independent heating and cooling systems serving a common zone must be restricted according to items B to D.

B. Recovered energy in excess of the new energy expended in the recovery process may be used for control of temperature and humidity.

C. New energy may be used to prevent relative humidity from rising above 60 percent for comfort control or to prevent condensation on terminal units or outlets, or functioning of special equipment.

D. New energy may be used for temperature control if minimized in accordance with this item.

(1) Systems employing reheat and serving multiple zones, other than those employing variable air volume for temperature control, must be provided with a control that will automatically reset the system cold-air supply to the highest temperature level that will satisfy the zone requiring the coolest air. Single-zone reheat systems must be controlled to sequence reheat and cooling.

(2) Dual duct and multizone systems, other than those employing variable air volume for temperature control, must be provided with a control that will automatically reset:

(a) the cold-deck air supply to the highest temperature that will satisfy the zone requiring the coolest air; and

(b) the hot-deck air supply to the lowest temperature that will satisfy the zone requiring the warmest air.

(3) Systems in which heated air is recooled, directly or indirectly, to maintain space temperature must be provided with a control that will automatically reset the temperature to which the supply air is heated to the lowest level that will satisfy the zone requiring the warmest air.

(4) For systems with multiple zones, one or more zones may be chosen to represent a number of zones with similar heating and cooling characteristics. A multiple zone system that employs reheating or recooling for control of not more than 5,000 cfm, or 20 percent of the total supply air of the system, whichever is less, is exempt from the supply air temperature reset requirements in subitems (1) to (3).

(5) Concurrent operation of independent heating and cooling systems serving common spaces and requiring the use of new energy for heating or cooling must be minimized by:

(a) providing sequential temperature control of both heating and cooling capacity in each zone; or

(b) limiting the heat energy input through automatic reset control of the heating medium temperature, or energy input rate, to only that necessary to offset heat loss due to transmission and infiltration and, where applicable, to heat the ventilation air supply to the space.

Subp. 7. **Heat pumps.**

A. Heat pumps must be provided with a control to prevent supplementary heater operation when the operating load can be met by the heat pump alone.

B. Supplementary heater operation is permitted during transient periods of no more than 15 minutes, such as start-ups, following room thermostat set-point advance, and during defrost. A two-stage thermostat, which controls the supplementary heat on its second stage, must be accepted as meeting this requirement. The cut-on temperature for the compression heating must be higher than the cut-on temperature for the supplementary heat.

Subp. 8. **Mechanical ventilation.**

A. Ventilation systems must be designed according to the Minnesota State Mechanical Code, chapter 1346. Ventilation quantities must be according to ASHRAE Standard 62, adopted by chapter 1305.

B. Both supply and exhaust ducts of mechanical ventilation systems must be equipped with a means for shutoff or volume reduction and shutoff when ventilation is not required. Automatic or gravity dampers that close when the system is not operating must be provided for outdoor air intakes and exhausts. Automatic or manual dampers installed for the purpose of shutting off ventilation systems must be designed with tight shutoff characteristics to minimize air leakage.

C. Exceptions to item B:

(1) Manual dampers for outdoor air intakes may be used in the following cases:

(a) for multifamily residential buildings; and

(b) if the fan system capacity is less than 2,500 cfm.

(2) Dampers are not required when the ventilation system is designed for continuous operation.

Subp. 9. **Fan system design criteria.** Total fan power must be no greater than specified in this subpart.

A. EXCEPTIONS:

(1) HVAC systems where the total fan power is ten horsepower or less;

(2) unitary equipment for which the energy used by the fan is considered in the efficiency ratings of the equipment; or

(3) that portion of fan power required by air treatment and filtration systems which is in excess of one inch of water column.

B. The power required by motors of constant air volume fan systems must not exceed 0.8 W/cfm of supply air at design conditions.

C. The power required by motors of variable air volume fan systems must not exceed 1.25 W/cfm of supply air at design conditions.

D. Variable air volume fans with motors 7-1/2 horsepower and larger must provide controls for the fan motor to demand no more than 50 percent of design wattage at 50 percent of design air volume, based on the manufacturer's test data.

Subp. 10. **Piping system design criteria.** Piping systems must be designed according to this subpart.

EXCEPTION: If the total pump system motor power to supply fluid from the heating and cooling source to the conditioned spaces or heat transfer devices and return it back to the source is ten horsepower or less at design conditions.

A. Piping systems must be designed at a friction pressure loss rate of no more than 4.0 feet of water per 100 equivalent feet of pipe where a C-factor of 125 is used.

B. Pumping systems serving control valves designed to modulate or step open and closed as a function of load must be designed for variable fluid flow. The system must be capable of reducing system flow to 50 percent of design flow or less by either variable speed driven pumps or staged multiple pumps.

EXCEPTIONS:

(1) systems where a minimum flow greater than 50 percent of the design flow is required for the proper operation of equipment served by the system, such as chiller loops;

(2) systems that serve no more than one control valve; and

(3) systems that include supply temperature reset controls according to subpart 11.

Subp. 11. **System temperature reset controls.** HVAC systems supplying multiple zones must include controls to automatically reset supply air or water temperatures by representative building loads or by outside air temperature.

A. Air systems controls must be able to reset temperature by at least 25 percent of the design supply-to-return air or water temperature difference. Air system controls for zones which are expected to experience relatively constant loads, such as interior zones, must be designed for the fully reset supply temperature.

EXCEPTIONS:

(1) if at least 75 percent of the energy for reheating or providing warm air in the mixing system is provided by a renewable energy source;

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(2) if humidity levels required to satisfy special needs cannot be met while complying with this item; or

(3) if the design supply air quantity is 300 cfm or less.

B. Hydronic systems must have controls to reset temperature by at least 50 percent of the design supply-to-return air or water temperature difference.

EXCEPTIONS:

(1) systems with variable flow pumping according to subpart 10, item B, if none of the exceptions are used;

(2) systems for which temperature reset cannot be implemented without causing improper operation of heating, cooling, humidification, or dehumidification systems; or

(3) systems with less than 600,000 Btu/h capacity.

Subp. 12. **Balancing.** Means must be provided to balance air and water systems according to this part.

A. Air systems must be balanced. Fan speed must be adjusted to meet design air system flow.

EXCEPTIONS: Speed adjustment is not required for air system balancing with fan motors of one horsepower or less, or if throttling results in no greater than one-third horsepower fan power draw above that required if the fan speed were adjusted.

B. Hydronic systems must be balanced. Pump impellers must be trimmed or pump speed must be adjusted to meet design system flow.

EXCEPTION: Impeller trimming or speed adjustment is not required for hydronic system balancing with pump motors of ten horsepower or less.

C. Systems balancing reports must be submitted to the building owner.

Subp. 13. **Economizer cycle.**

A. For HVAC systems with fan capacity of greater than 3,000 cfm and less than 5,000 cfm, each fan system must be designed to use up to and including 50 percent of the fan system capacity for cooling with outdoor air automatically whenever its use will result in lower usage of new energy.

B. For HVAC systems with fan capacity of 5,000 cfm or more, each fan system must be designed to use up to and including 85 percent of the fan system capacity for cooling with outdoor air automatically whenever its use will result in lower usage of new energy.

EXCEPTION: If the use of 85 percent outside air will cause coil frosting, the quantity of outside air may be limited to less than 85 percent by automatic controls.

C. Activation of the economizer cycle must be controlled by sensing outdoor air enthalpy or outdoor air dry bulb temperature.

D. EXCEPTIONS: Cooling with outdoor air is not required if:

(1) the use of outdoor air cooling may affect the operation of other systems so as to increase the overall energy consumption of the building;

(2) energy recovered from an internal/external zone heat recovery system exceeds the energy conserved by outdoor air cooling on an annual basis;

(3) the quality of the outdoor air is so poor as to require extensive treatment of the air; or

(4) the need for humidification or dehumidification requires the use of more energy than is conserved by the outdoor air cooling on an annual basis.

Subp. 14. **Controls.**

A. Each system must be provided with at least one adjustable thermostat for the regulation of temperature.

(1) Each thermostat must be capable of being set by adjustment or selection of sensors as follows:

(a) when used to control heating only, it must be capable of being set from 55 to 75 degrees Fahrenheit;

(b) when used to control cooling only, it must be capable of being set from 70 to 85 degrees Fahrenheit; or

(c) when used to control both heating and cooling, it must be capable of being set from 55 to 85 degrees Fahrenheit and must be capable of operating the system heating and cooling in sequence. The thermostat or control system must have an adjustable deadband of at least ten degrees Fahrenheit.

(2) Thermostats must be capable of shutting off or reducing the energy use. Lowering thermostat set points to reduce energy consumption of heating systems must not cause energy to be expended to reach the reduced setting.

(a) In residential dwelling units, each thermostat must provide a readily accessible manual or automatic means for reducing the temperature.

(b) In other than residential dwelling units, each HVAC system must be capable of automatic setback during periods of nonuse.

EXCEPTIONS: Automatic setback is not required for systems serving areas expected to operate continuously; or where equipment with full load demands of two kW (6826 Btu/h) or less is controlled by readily accessible manual ON/OFF controls.

B. This item sets criteria for humidity control.

(1) A humidistat must be provided if a system is equipped with a means for adding moisture to maintain specific selected relative humidities in spaces or zones.

(2) A humidistat must be provided to control ventilating systems serving the pool and spa areas.

(3) Humidistats must be capable of being set to prevent new energy from being used to produce space-relative humidity above 30 percent. If a humidistat is used in a system for controlling moisture removal to maintain specific selected relative humidities in spaces or zones, it must be capable of being set to prevent new energy from being used to produce a space-relative humidity of less than 60 percent.

EXCEPTION: Special occupancies requiring different relative humidities.

C. Thermostats must be provided for each separate HVAC system or zone. For all buildings except low-rise residential, at least one thermostat must be provided for each separate system and each separate zone. In a multistory building where the perimeter system offsets only the transmission losses of the exterior wall, an entire side of uniform exposure may be zoned separately.

D. Systems that serve zones which can be expected to operate nonsimultaneously for more than 750 hours per year shall include isolation devices and controls to shut off or set back the supply of heating and cooling to each zone independently. Zones may be grouped into a single isolation area, provided that the total conditioned floor area does not exceed 25,000 square feet per group or include more than one floor.

EXCEPTION: Isolation is not required for zones expected to operate continuously or expected to be inoperative only when all other zones are inoperative.

E. HVAC control systems must be tested to ensure that control elements are calibrated, adjusted, and in proper working condition.

Subp. 15. **Duct insulation.** Ducts must be insulated according to this subpart.

Minimum Required Duct Insulation (see table notes for letter and number interpretations)

Duct Location	Cooling Only or Heating and Cooling	Heating Only
Exterior of building, attics, garages, and ventilated crawl spaces	C, V, and W	C and W
Inside of building and in unconditioned spaces[1] TD less than or equal to 15°F	None required	None required
TD greater than 15°F and less than or equal to 40°F	A and V	A

TD greater than 40°F	B and V	B
Within conditioned space or in basements with insulated walls	None required	None required
Intake and exhaust ducts[2]	A and V	A and V
Within cement slab or within ground	B	B

NOTES:

A. [1]Duct insulation is not required at the following locations:

(1) ceilings which form plenums; and

(2) for that portion of the duct which is located within a wall or a floor-ceiling space with conditioned space on the bottom and sides.

B. [2]Exhaust ducts within a heated space must be insulated for a distance of three feet from the duct outlet.

C. A = a material with installed minimum thermal resistance of R-3.3.

Examples:

(1) 1.5-inch, 0.60 lb/cu ft mineral fiber, slag, or fiberglass blankets;

(2) one-inch, 1.5 to 3.0 lb/cu ft mineral fiber blanket duct liner; and

(3) one-inch, 3.0 to 10.0 lb/cu ft mineral fiber board.

D. B = a material with installed minimum thermal resistance of R-5.0. Insulation encased in cement or within ground must be approved for that application and be installed on the bottom and sides of plenums.

Examples:

(1) 2.5-inch, 0.60 lb/cu ft mineral fiber, slag, or fiberglass blankets;

(2) 1.5-inch, 1.5 to 3.0 lb/cu ft mineral fiber blanket duct liner;

(3) 1.5-inch, 3.0 to 10.0 lb/cu ft mineral fiber board; and

(4) one-inch, 1.35 lb/cu ft extruded polystyrene board.

E. C = a material with installed minimum thermal resistance of R-8.0

Examples:

(1) four-inch, 0.60 lb/cu ft mineral fiber, slag, or fiberglass blankets;

(2) two-inch, 1.5 to 3.0 lb/cu ft mineral fiber blanket duct liner; and

(3) two-inch, 3.0 to 10.0 lb/cu ft mineral fiber board.

The example of materials listed under each type is not meant to limit other available thickness or density combinations with the equivalent installed resistance based on the insulation only.

F. TD = the design temperature differential between the air in the duct and the ambient temperature outside of the duct.

G. V = vapor retarder with all joints sealed.

H. W = approved weatherproof barrier.

Subp. 16. **Duct construction.** Ductwork installation requirements are provided in the Minnesota State Mechanical Code, chapter 1346.

A. Ducts must be sealed according to this subpart. When sealing is required, ducts must be sealed with and in accordance with the installation of a product meeting UL181. Cloth-backed duct tape with rubber adhesive shall not be used to satisfy the requirements of this part. Mastic must be used as the primary sealant for ducts designed to operate at static pressure of a one-inch water gauge or greater.

B. According to the Minnesota State Mechanical Code, chapter 1346, return air ducts conducting air into a furnace through the same space as the furnace must be sealed. Spaces that are not separated by walls or doors must be considered the same space.

C. Ducts for nonresidential buildings and residential buildings greater than three stories must be sealed in accordance with this item.

Minimum Required Sealing

Location	Design Static Pressure	Sealing Required
All locations	Greater than 3.0 inches water gauge	Joints, seams, and all duct wall penetrations must be sealed. Ductwork must be equal to or less than leakage Class 6 as defined in section 4 of the HVAC Duck Leakage Test Manual.*
Outside conditioned space and outside air-vapor barrier	3.0 inches water gauge and less	All transverse joints and longitudinal seams must be sealed.
All locations	2.0 to 3.0 inches water gauge	All transverse joints must be sealed.
Ducts within return, relief, and exhaust plenums	0.25 to 3.0 inches water gauge	All transverse joints must be sealed.

*Leakage testing may be limited to representative sections of the duct system, but in no case shall the tested sections include less than 25 percent of the total installed duct area for the design pressure class.

Subp. 17. **Pipe insulation.**

A. Piping installed to service buildings and within buildings must be thermally insulated according to this subpart. For service water heating systems, see part 7676.1200.

EXCEPTIONS: Piping insulation is not required if:

(1) piping is installed within HVAC equipment;

(2) piping is at fluid temperatures between 55 and 120 degrees Fahrenheit when not required for energy conservation purposes; or

(3) piping is installed in basements and cellars.

B. Insulation thickness in this subpart assumes a k-value of 0.27. If the k-value of a product is less than 0.22, then the thickness must be adjusted to have an equivalent R-value.

C. Ducts must be sealed according to this item.

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Insulation Thickness For Pipe Sizes[1](Inches)

Piping System Types	Fluid Temperature Range °F	Runouts[2]	1" and Less	1-1/4" to 2"	2-1/2" to 4"	5" to 6"	8" and larger
Heating Systems (Steam Condensate and Hot Water)							
	Above 350	1.5	2.5	2.5	3.0	3.5	3.5
	251-350	1.5	2.0	2.5	2.5	3.5	3.5
	201-250	1.0	1.5	1.5	2.0	2.0	3.5
	141-200	0.5	1.5	1.5	1.5	1.5	1.5
	105-140	0.5	1.0	1.0	1.0	1.5	1.5
Cooling Systems							
Chilled water	40-55	1/2	1/2	3/4	1	1	1
Refrigerant or Brine	Below 40	1	1	1-1/2	1-1/2	1-1/2	1-1/2

[1]For piping exposed to outdoor air, increase thickness by one-half inch.

[2]Runouts two inches and less not exceeding 12 feet in length to individual terminal units.

D. For applications with fluid temperatures at 32 degrees Fahrenheit and below, the designer shall consider additional insulation with vapor retarder to prevent condensation.

Subp. 18. **Operation and maintenance manual.** An operation and maintenance manual must be provided. The manual must include basic data relating to the operation and maintenance of HVAC systems and equipment. Required routine maintenance actions must be clearly identified. Where applicable, HVAC controls information such as diagrams, schematics, control sequence descriptions, and maintenance and calibration information must be included.

Subp. 19. **HVAC equipment performance requirements.** HVAC equipment must meet minimum efficiency requirements specified in chapter 7678.

7676.1200 SERVICE WATER HEATING.

Subpart 1. **Ice-making water supply.** Water supplies to ice-making machines and residential refrigerators must be taken from a cold water line of the water distribution system.

Subp. 2. **Efficiency requirements.** Service water heating equipment must meet the minimum efficiency requirements in chapter 7678.

Subp. 3. **Automatic controls.** Service water heating systems must be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use.

Subp. 4. **Shutdown.** A separate switch must be provided to permit turning off the energy supplied to electric service water heating systems. A separate valve must be provided to permit turning off the energy supplied to the main burners of all other types of service water heating systems.

Subp. 5. **Swimming pools and spas.**

A. All swimming pool and spa heaters must be equipped with a readily accessible ON/OFF switch to allow shutting off the operation of the heater without adjusting the thermostat setting and to allow restarting without relighting the pilot light.

B. Indoor pool and spa area ventilating systems must be controlled with a humidistat according to part 7676.1000, subpart 14, item B. Additionally, heated indoor swimming pools and spas must provide for energy conservation by at least one of the following methods:

(1) the pool or spa must be equipped with a cover according to part 4717.1575, the Minnesota Department of Health pool cover safety standard;

(2) the ventilating system serving the pool or spa area must provide a heat recovery of 70 percent as calculated by ASHRAE Standard 84-1991 at winter design conditions; or

(3) renewable energy sources must be capable of providing at least 50 percent of the heating energy required for the pool or spa over an operating season.

C. Heated outdoor swimming pools and spas must either be provided with a cover according to part 4717.1575, or the heating system must use renewable energy sources to provide at least 70 percent of the heating energy required over an operating season.

Subp. 6. **Pump operation.** Circulating hot water systems must be equipped with automatic time switches or other controls so that the circulation pumps can be conveniently turned off when the use of hot water is not required.

Subp. 7. **Pipe insulation.**

A. Minimum pipe insulation for domestic and service water heating systems must comply with this subpart.

EXCEPTION: Piping insulation is not required when the heat loss of the pipeline, without insulation, does not increase the annual energy requirements of the building.

All service water heating pipe in contact with high conductivity material, including, but not limited to, concrete and earth, must have a one-inch minimum insulation. Pipe insulation is assumed to have a k-value of 0.27. If the k-value of a product is less than 0.22, then the thickness must be adjusted to have an equivalent R-value.

Minimum Insulation Thickness for Pipe Sizes

Design water temperature, °F

Pipe Sizes	less than 130°F	131°-160°F	above 160°F
Noncirculating runouts up to 1 inch	1/2 inch	1/2 inch	1/2 inch
Circulating mains and runouts up to 1-1/4 inches	1/2 inch	1/2 inch	1 inch
1-1/2 inches to 2 inches	1/2 inch	1 inch	1-1/2 inches
Over 2 inches	1 inch	1-1/2 inches	2 inches

B. Pipe insulation is not required at support brackets. For water heaters with a draft diverter, pipe insulation is not required to be closer to the draft diverter than is recommended by the manufacturer or safety codes. Pipe insulation is not required for nonrecirculating systems where the water heater is equipped with heat traps on both the supply and return.

C. For recirculating systems, the entire pipe must be insulated.

D. For nonrecirculating systems with unfired storage tank, the first eight feet of both inlet and outlet pipes from the storage tank must be insulated. Pipes between the water heater and storage tank must be insulated.

E. For nonrecirculating water heater systems, both supply and return piping for water heaters must be insulated for a distance of three feet from the water heater.

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7676.1300 ELECTRICAL POWER AND LIGHTING.

Subpart 1. **Electrical energy determination.**

A. In new multifamily dwellings, the electrical energy consumed by each individual dwelling unit must be separately metered with individual metering readily accessible to the individual occupants.

EXCEPTION: Motels, hotels, college dormitories, other transient facilities, and buildings intended for occupancy primarily by persons who are 62 years of age or older or handicapped, or which contain a majority of units not equipped with complete kitchen facilities.

B. In electrical panels of buildings other than residential buildings of three stories or less, all feeder wiring and the panel feeder must be capable of accepting a clamp-on ammeter.

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

A. Lighting systems must meet the requirements of this item.

(1) The following are covered by this subpart:

(a) interior spaces of buildings;

(b) building exteriors and exterior areas, such as entrances, exits, and loading docks; and

(c) roads, grounds, parking, and other exterior areas where lighting is energized through the building electrical service.

(2) Except for fluorescent lamp ballasts, which must meet the requirements of subitem (1), units (a) and (c), the following are exempt from the lighting power budget standards:

(a) manufacturing facilities, processing facilities, and commercial greenhouses;

(b) lighting power for theatrical production studios and stages, television broadcasting, audio-visual presentation, and entertainment facilities in spaces such as stages, hotel ballrooms, nightclubs, discos, and casinos, and where lighting is an essential technical element for the function performed;

(c) specialized luminaires for medical and dental purposes;

(d) outdoor athletic facilities;

(e) lighting power for display lighting required for art exhibits or displays in galleries, museums, and monuments;

(f) exterior lighting for public monuments;

(g) special lighting needs for research;

(h) commercial greenhouses and power for lighting used solely for indoor plant growth during the hours of 10:00 p.m. to 6:00 a.m.;

(i) emergency lighting that is automatically off during normal operation;

(j) high risk security areas or any area identified by local ordinances or regulations or by security or safety personnel as requiring additional lighting;

(k) lighting power densities for spaces with enhanced lighting specifically designed for primary use by the visually impaired, hard of hearing, or senior citizens;

(l) lighting for one- and two-family detached dwellings and the dwelling portion of multifamily buildings;

(m) lighting for signs;

(n) storefront exterior-enclosed display windows in retail facilities;

(o) lighting power for internally illuminated exit signs; and

(p) any lighting application not specifically regulated by this part, including, but not limited to, outdoor auto sales lots, and auto service station outdoor pump lighting.

(3) The definitions in this subitem apply to this subpart.

(a) "Gross lighted area" means the sum of the total lighted areas in a building measured from the inside of the perimeter walls of each floor of the building.

(b) "Programmable timing control" means an automatic control able to program different schedules for occupied and unoccupied days, readily accessible for temporary override with automatic return to the original schedule, and able to keep time during power outages for at least four hours.

(4) The following are acronyms found in this subpart:

(a) AF = area factor;

(b) ALP = adjusted lighting power, watts;

(c) CLP = connected lighting power, watts;

(d) CLPC = connected lighting power for the luminaires controlled by the automatic control device, watts;

(e) ELPA = exterior lighting power allowance, watts;

(f) GLA = gross lighted area, square feet;

(g) ILPA = interior lighting power allowance, watts per square feet;

(h) LPB = lighting power budgets, watts;

(i) LPCC = lighting power control credits, watts;

(j) LSA = listed space area, square feet;

(k) PAF = power adjustment factor;

(l) ULPA = unit lighting power allowance, watts per square feet; and

(m) UPD = unit power density, watts per square feet.

(5) A building complies with this subpart if the following conditions are met:

(a) the minimum requirements for controls and fluorescent ballasts in item B are met;

(b) the exterior lighting power to be installed is not greater than the exterior lighting power allowance required in item C; and

(c) the interior connected lighting power to be installed is not greater than the interior lighting power allowance, based on either the whole building criteria in item D or the space-by-space criteria in item E.

(6) For connected lighting power calculations, ballast and luminaire wattage must be determined according to this subitem.

(a) The ballast wattage must be as listed in the Northern States Power Company (NSP) Lighting Efficiency Program Input Wattage Guide, or if the ballast is not listed in the NSP Lighting Efficiency Program Input Wattage Guide, then ballast wattage must be the American National Standards Institute (ANSI) value published by the manufacturer.

(b) The connected lighting power includes permanently installed lighting plus supplemental or task-related lighting provided by movable or plug-in luminaires.

(c) The connected lighting power for luminaires with incandescent medium base sockets is the higher of the following two wattages: the total lamp wattage proposed for the luminaire; or 50 percent of the listed lighting power capacity of the luminaire in watts.

(d) The connected lighting power for track lights is the higher of the following two wattages: the total lamp wattage proposed for the track; or 50 percent of the total listed power capacity of the elements proposed for the track.

(7) Trade offs between interior lighting power allowance and exterior lighting power allowance are not allowed. Trade offs of the interior lighting power budgets among interior spaces are allowed. Trade offs of exterior lighting power budgets among exterior areas are allowed.

(8) The total lighting power allowances for each building in a multibuilding facility must be calculated separately.

B. Lighting controls and fluorescent lamp ballasts must be in accordance with the minimum requirements of this item.

(1) Lighting controls must be installed to allow efficient operation.

(a) All lighting must be provided with manual, automatic, or programmable controls.

EXCEPTION: Lighting for emergency, exit lighting, lighting for indoor spaces intended for continuous operation, and indoor lighting for security purposes.

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(b) Each space enclosed by walls or ceiling-height partitions must be provided with controls that, together or alone, are capable of controlling all lights within that space.

(c) The minimum number of controls must not be less than one lighting control for each space and one lighting control for each task or group of task locations within an area of 450 square feet or less.

i. A reduction in the minimum number of controls is permitted by using the Equivalent Number of Controls table. Control of the same load from more than one location must not be credited as additional control points.

Equivalent Number of Controls

Type of Control	Equivalent Number of Controls
Manually operated on/off switch	1
Occupancy sensor	2
Programmable timing control	2
Three level, including off, step control, or preset dimming	3
Four level, including off, step control, or preset dimming	3
Automatic or continuous dimming	3

ii. EXCEPTIONS: Lighting for spaces that must be used as a whole, such as public lobbies of office buildings, hotels, and hospitals; retail and department stores; and warehouses, storerooms, and service corridors under centralized supervision is permitted to be controlled by a lesser number of controls. Spaces with a single luminaire or single ballast may be controlled by a manually operated ON/OFF switch.

(d) Hotel and motel guest rooms must have one or more master controls at the main entry door that turn off all permanently wired lighting fixtures and lighting and television receptacles. For multiple room suites, controls at the entry of each room, in lieu of a master switch, will meet these requirements.

(e) All lighting controls required by this chapter must be readily accessible to personnel occupying or using the space.

EXCEPTIONS: automatic controls, programmable controls, lighting for safety hazards and security, controls requiring trained operators, and those controls for spaces that must be used as a whole.

(f) Controls to be counted in the determination of minimum controls include those provided for task areas.

(g) Exterior lighting must be automatically controlled by a timer, a photocell, or a combination of timer and photocell. Timers must be of the automatic type capable of adjustment for seven days and for seasonal daylight schedule variations. All time controllers must be equipped with back-up mechanisms to keep time during a four-hour power outage.

(h) When the building is served by an energy management system, programmable controls, shared tenant services that affect interior environments, or intelligent building systems, provisions must be made to incorporate lighting controls into the system if a separate automatically controlled lighting system is not provided.

(2) Fluorescent lamp ballasts must comply with the requirements of this subitem.

(a) Fluorescent lamp ballasts must comply with *Code of Federal Regulations*, title 10, part 435.103, section 3.3.2, Fluorescent Lamp Ballast Standards.

EXCEPTION: Ballasts specifically designed for use with dimming controls.

(b) Single lamp ballasts are prohibited. Tandem wiring must be used to replace single lamp ballasts with multiple lamp ballasts.

EXCEPTIONS: Single lamp ballasts may be used where luminaire spacing or obstructions cause whip length to exceed ten feet, and odd units at the end arrays.

(c) Fluorescent lamp ballasts must have a power factor equal to or greater than 90 percent.

EXCEPTION: Ballasts for circline lamps and compact fluorescent lamps.

C. Exterior lighting power allowance must be calculated according to this item.

(1) Building exteriors, exterior areas, roads, grounds, and parking must comply with this item. Lighting for streets, highways, and parking lots is regulated by the Department of Transportation, chapter 8885.

(2) The exterior lighting power density must not exceed the exterior lighting power allowance (ELPA). The ELPA is the sum of the allowances for each area of the building.

EXCEPTION: Outdoor security lighting may be exempt when approved by the building official, provided the lamp efficacy is not less than 55 lumens per watt.

(3) Exterior lighting power density must be in accordance with this subitem.

Exterior Lighting Unit Power Density

Area Description	Unit Power Density
Exit (with or without canopy)	25 W/Lin.ft. of door opening
Entrance (without canopy)	30 W/Lin.ft. of door opening
Entrance (with canopy)	
High traffic (retail, hotel, airport, theater, etc.)	10 W/ft^2 of canopied area
Light traffic (hospital, office, school, etc.)	4 W/ft^2 of canopied area
Loading area	0.40 W/ft^2
Loading door	20 W/Lin.ft. of door opening
Building exterior surfaces/facades	0.25 W/ft^2 of surface area to be illuminated
Storage and nonmanufacturing work areas	0.20 W/ft^2
Other activity areas for casual use such as picnic grounds, gardens, parks, and other landscaped areas	0.10 W/ft^2
Private driveways/walkways	0.10 W/ft^2

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Public driveways/walkways	0.15 W/ft²
Private parking lots	0.12 W/ft²
Public parking lots	0.18 W/ft²

D. Interior lighting for the whole building procedure must be calculated according to this item.

(1) The definitions in this subitem apply to this item.

(a) "Food service, fast food, and cafeteria" includes cafeterias, hamburger and sandwich stores, bakeries, ice cream parlors, cookie stores, and all other kinds of retail food service establishments in which customers are generally served at a counter and their direct selections are paid for and taken to a table or carried out.

(b) "Garages" includes all types of parking garages, except for service or repair areas.

(c) "Leisure dining and bar" includes cafes, diners, bars, lounges, and similar establishments where orders are placed with a waitperson.

(d) "Mall concourse and multistore service" includes the interiors of multifunctional public spaces, such as shopping center malls, airports, resort concourses and malls, entertainment facilities, and related types of buildings or spaces.

(e) "Offices" includes all kinds of offices, including corporate and professional offices, office/laboratories, governmental offices, libraries, and similar facilities, where paperwork occurs.

(f) "Retail" includes a retail store, including departments for the sale of accessories, clothing, dry goods, electronics, and toys, and other types of establishments that display objects for direct selection and purchase by consumers. "Direct selection" means literally removing an item from display and carrying it to the checkout or pick-up at a customer service facility.

(g) "Schools" subdivided by preschool/elementary, junior high/high school, and technical/vocational, includes public and private educational institutions for children or adults and may also include community centers, college and university buildings, and business educational centers.

(h) "Service establishment" includes a retail-like facility, such as watch repair, real estate offices, auto and tire service facilities, parts departments, travel agencies, and similar facilities, in which the customer obtains services rather than the direct selection of goods.

(i) "Warehouse and storage" includes all types of support facilities, such as warehouses, barns, storage buildings, shipping and receiving buildings, boiler or mechanical buildings, electric power buildings, and similar buildings where the primary visual task is large items.

(2) The connected lighting load must not exceed the product of the unit power density from this subitem and the gross floor area of the building.

Whole Building Unit Lighting Power Allowance, W/Ft²

Gross Lighted Area

Building Type/Area Function	0-2,000 ft²	2,001-10,000 ft²	10,001-25,000 ft²	25,001-50,000 ft²	50,001-250,000 ft²	>250,000 ft²
Food Service:						
Fast Food/ Cafeteria	1.50	1.38	1.34	1.32	1.31	1.30
Leisure Dining/ Bar	2.20	1.91	1.71	1.56	1.46	1.40
Offices	1.90	1.81	1.72	1.65	1.57	1.50
Retail*	3.30	3.08	2.83	2.50	2.28	2.10

Mall Concourse/ Multi-store Service	1.60	1.58	1.52	1.46	1.43	1.40
Service Establishment	2.70	2.37	2.08	1.92	1.80	1.70
Garages	0.30	0.28	0.24	0.22	0.21	0.20
Schools:						
Preschool/ Elementary	1.80	1.80	1.72	1.65	1.57	1.50
Jr. High/ High School	1.90	1.90	1.88	1.83	1.76	1.70
Technical/ Vocational	2.40	2.33	2.17	2.01	1.84	1.70
Warehouse/ Storage	0.80	0.66	0.56	0.48	0.43	0.40

*Includes general, merchandising, and display lighting.

(3) If the building has secondary functions that are ten percent or more of the gross lighted area of the buildings that are listed in subitem (1), the UPD must be determined by weighting the fraction of lighted floor of each building type with the respective UPD for that building.

(4) The interior lighting power allowance in partially defined speculative buildings must be determined by using the highest UPD for the likely uses.

E. Interior lighting for the space-by-space procedure must be calculated according to this item.

(1) The total adjusted lighting power in a building must not exceed the sum of the interior lighting power allowances. The adjusted lighting power is equal to the connected lighting power minus the lighting power controls credit.

(2) The total adjusted lighting power in defined areas of partially defined speculative buildings must not exceed the interior lighting power allowance for the defined areas of the building.

(3) The lighting power budget of each interior space must be determined by:

$LPB = A_{wp} \times UPD_b \times AF$

Where:

A_{wp} = Area of the room at the horizontal lighted working plane

UPD_b = Base UPD

(a) The area factor must be determined based on the floor area and ceiling height of the room. Rooms with identical ceiling height and activities, and with similar size, may be treated as a group. The area factor of such a group of rooms must be determined from the average area of the rooms. The equation for area factor (AF) is:

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AF = 0.2 + 0.8 EXP - [[[10.21 x (CH - 2.5)]/ A_r] x 0.1054]

Where:

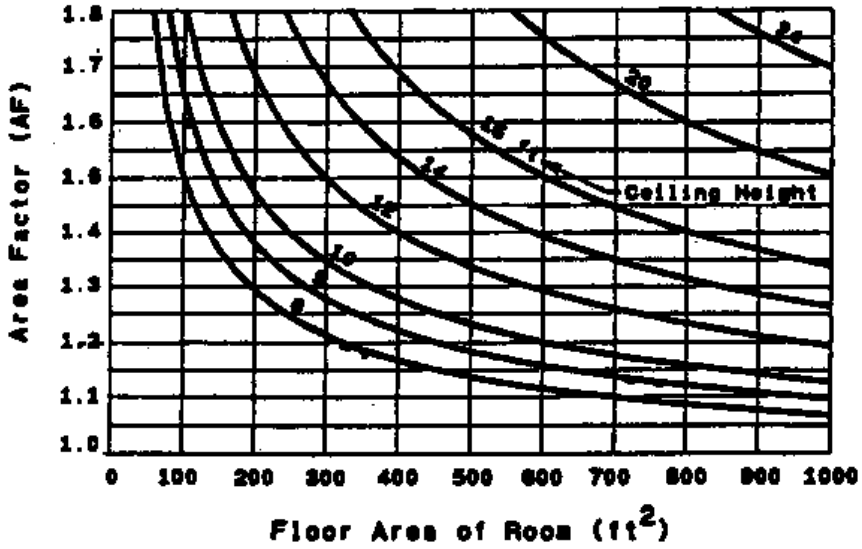
CH = Ceiling height, feet

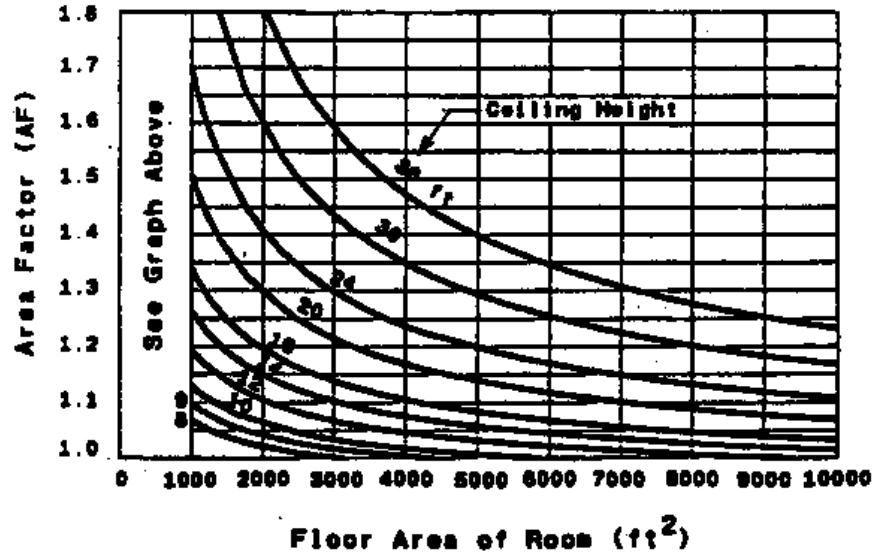
A_r = Floor area of the room, square feet calculated from the inside dimensions of the room

If AF<1.0 then AF = 1.0

If AF>1.8 then AF = 1.8

AREA FACTOR





(b) The unit power density must be selected from the table in this unit. For applications to areas or activities other than those given, select values for similar areas or activities.

Performance Procedure Unit Power Density

Area/Activity	UPD	Note or Area Factor (AF) Required
Common Activity Areas		
Auditorium	1.4	(b)
Corridor	0.8	AF = 1.0
Classroom/Lecture Hall	2.0	
Elec/Mech Equipment Room:		
General	0.7	AF = 1.0
Control Rooms	1.5	AF = 1.0
Food Service:		
Fast Food/Cafeteria	1.3	
Leisure Dining	1.4	(a)
Bar/Lounge	2.5	(a)
Kitchen	1.4	
Recreation/Lounge	0.7	
Stairs:		
Active Traffic	0.6	
Emergency Exit	0.4	
Toilets and Washing	0.8	
Garage:		
Auto/Pedestrian Circulation	0.3	(d)
Parking Area	0.2	(d)
Laboratory	2.2	
Library:		
Audio Visual	1.1	
Stack Visual	1.1	
Card File and Cataloging	0.9	
Reading Area	1.1	
Lobby (General)		
Reception and Waiting	1.0	
Elevator Lobbies	0.4	

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Atrium (Multistory):		
First Three Floors	0.7	
Each Additional Floor	0.2	
Locker Room and Shower	0.8	
Office Category 1		
Enclosed offices, of less than 900 ft²		(c)
All open plan offices w/out partitions or w/partitions power plan 4.5 ft below the ceiling:		
Reading, Typing, and Filing	1.5	AF<1.55
Drafting	1.9	AF<1.55
Accounting	1.6	AF<1.55
Office Category 2		
All open plan offices, 900 ft² or larger w/partitions 3.5 to 4.5 ft below the ceiling:		(c)
Reading, Typing, and Filing	1.5	AF = 1.0
Drafting	2.0	AF = 1.0
Accounting	1.8	AF = 1.0
Office Category 3		
Open plan offices, 900 ft² or larger w/partitions higher than 3.5 ft below the ceiling:		(c)
Reading, Typing, and Filing	1.7	AF = 1.0
Drafting	2.3	AF = 1.0
Accounting	1.9	AF = 1.0
Common Activity Areas:		
Conferences/Meeting Room	1.3	(b)
Computer/Office Equipment	1.1	
Filing, Inactive	1.0	
Mail Room	1.8	
Shop (Nonindustrial)		
Machinery	2.5	
Electrical/Electronic	2.5	
Painting	1.6	
Carpentry	2.3	
Welding	1.2	

Storage and Warehouse:		
Inactive Storage	0.2	
Active Storage, Bulky	0.3	
Active Storage, Fine	0.9	
Material Handling	1.0	
Unlisted Space	0.2	
Specific Building Area/Activity		(e)
Airport, Bus, and Rail Station:		
Baggage Area	0.8	
Concourse/Main Throughway	0.9	
Ticket Counter	2.0	
Waiting and Lounge Area	0.8	
Bank		
Customer Area	1.0	
Banking Activity Area	2.2	
Barber and Beauty Parlor	1.6	
Church, Synagogue, Chapel:		
Worship/Congregational	1.7	
Preaching and Sermon/Choir	1.8	
Dormitory:		
Bedroom	1.0	
Bedroom with Study	1.3	
Study Hall	1.2	
Fire and Police Department:		
Fire Engine Room	0.7	
Jail Cell	0.8	
Hospital/Nursing Home:		
Corridor	1.3	AF<1.55
Dental Suite/Exam/Treatment	1.6	
Emergency	2.0	
Laboratory	1.7	
Lounge/Waiting Room	0.9	
Medical Supplies	2.4	
Nursery	1.6	
Nurse Station	1.8	
Occupational/Physical Therapy	1.4	

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Patient Room	1.2	
Pharmacy	1.5	
Radiology	1.8	
Surgery and OB Suites:	1.8	
General Area		6.0
Operating Room		2.0
Recovery Room		2.0
Hotel/Conference Center:		
Banquet Room/Multi-purpose	1.7	(b)
Bathroom/Powder Room	1.2	
Guest Room	0.9	
Public Area	1.0	
Exhibition Hall	1.8	
Conference/Meeting	1.5	AF = 1.0
Lobby	1.5	
Reception Desk	2.4	
Laundry:		
Washing	0.9	
Ironing and Sorting	1.3	
Museum and Gallery:		
General Exhibition	1.9	
Inspection/Restoration	3.0	
Storage (Artifacts):		
Inactive	0.6	
Active	0.7	
Post Office:		
Lobby	1.1	
Sorting and Mailing	2.1	
Service Station/Auto Repair	0.8	
Theater:		
Performance Arts	1.3	
Motion Picture	1.0	
Lobby	1.3	
Retail Establishments: (Merchandising and circulation area applicable to all lighting, including accent and display lighting, installed in merchandising and circulation areas)		
Type A: Jewelry merchandising, where the minute display and examination of merchandise is critical	5.6	

Type B: Fine merchandise includes fine apparel and accessories, china, crystal and silver, and art galleries, where the detailed display and examination of merchandise is important	2.0	
Type C: Mass merchandising, where focused display and detailed examination of merchandise is important	2.7	
Type D: General merchandising includes general apparel, variety, stationery, books, sporting goods, hobby, cameras, gift and luggage, where general display and examination of merchandise are adequate	2.3	
Type E: Food and miscellaneous includes bakeries, hardware and housewares, grocery, appliances and furniture, where appetizing appearance is important	2.4	
Type F: Service establishments, where functional performance is important	2.6	
Mall Concourse	1.4	
Retail Support Area:		
Tailoring	2.1	
Dressing/Fitting Room	1.1	
Indoor Athletic Area/Activity		(f)
Seating Area, All Sports	0.4	AF = 1.0
Badminton:		
Club	0.5	AF = 1.0
Tournament	0.8	AF = 1.0

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Basketball/Volleyball:		
Intramural	0.8	AF = 1.0
College	1.3	AF = 1.0
Professional	1.9	AF = 1.0
Bowling:		
Approach Area	0.5	AF = 1.0
Lanes	1.1	AF = 1.0
Boxing or Wrestling (platform)		
Amateur	2.4	AF = 1.0
Professional	4.8	AF = 1.0
Gymnasium:		
General Exercising and Recreation Only	1.0	AF = 1.0
Handball/Racquetball/Squash:		
Club	1.3	AF = 1.0
Tournament	2.6	AF = 1.0
Hockey, Ice:		
Amateur	1.3	AF = 1.0
College or Professional	2.6	AF = 1.0
Skating Rink:		
Recreational	0.6	AF = 1.0
Exhibition/Professional	2.6	AF = 1.0
Swimming:		
Recreational	0.9	AF = 1.0
Exhibition	1.5	AF = 1.0
Underwater	1.9	AF = 1.0
Tennis:		
Recreational (Class III)	1.3	AF = 1.0
Club/College (Class II)	1.9	AF = 1.0
Professional (Class I)	2.6	AF = 1.0
Tennis, Table:		
Club	1.0	AF = 1.0
Tournament	1.6	AF = 1.0

NOTES:

i. Base UPD includes lighting power required for cleanup purpose.

ii. A 1.5 adjustment factor is applicable for multifunctional spaces.

iii. A minimum of 90 percent of all work stations must be enclosed with partitions of the height prescribed.

iv. Outdoor security lighting may be exempt when approved by the building official, provided the lamp efficacy is not less than 55 lumens per watt.

v. Use a weighted average UPD in rooms with multiple simultaneous activities, weighted in proportion to the area served.

vi. Consider as ten feet beyond playing boundaries but less than or equal to the total floor area of the sports space minus spectator seating area.

(5) Lighting power for special spaces and activities must comply with this subitem.

(a) For rooms serving multifunctions, such as hotel banquet or meeting rooms and office conference or presentation rooms, an adjustment factor of 1.5 times the base UPD may be used if a supplementary lighting system is actually installed to serve the secondary function of the room and the design meets the following conditions:

i. the installed power for the supplementary system must not be greater than 33 percent of the adjusted lighting power budget calculated for that room; and

ii. independent controls must be installed for the supplementary lighting system.

(b) In rooms containing multiple simultaneous activities, such as a large general office having separate accounting and drafting areas within the same room, the lighting power budget for the rooms must be the weighted average of the activities in proportion to the areas being served.

(c) The floor area of indoor sports activities areas must be considered as the area within the playing boundaries of the sport, plus the floor area ten feet beyond the playing boundaries, not to exceed the total floor area of the indoor room less the spectator seating area.

(d) The interior lighting power allowance must include a 0.20 watts per square foot allowance for unlisted spaces.

(6) The adjusted lighting power is the connected lighting power minus the lighting power controls credit. The adjusted lighting power in a building must not exceed the sum of the interior lighting power allowance. The lighting power controls credit is allowable for luminaires automatically controlled by occupancy sensors, daylight sensors, programmable timing controls, or lumen maintenance controls.

Power Adjustment Factor

Automatic Control Device(s)	Power Adjustment Factor
Daylight Sensing Controls (DS), Continuous Dimming	0.30
DS, Multiple Step Dimming	0.20
DS, on/off	0.10
DS, Continuous Dimming and Programmable Timing	0.35
DS, Multiple Step Dimming and Programmable Timing	0.25
DS, on/off and Programmable Timing	0.15
DS, Continuous Dimming, Programmable Timing, and Lumen Maintenance	0.40
DS, Multiple Step Dimming, Programmable Timing, and Lumen Maintenance	0.30
DS, on/off, Programmable Timing, and Lumen Maintenance	0.20
Lumen Maintenance	0.10
Lumen Maintenance and Programmable Timing Control	0.15
Programmable Timing Control	0.15
Occupancy Sensor	0.30
Occupancy Sensor, DS, Continuous Dimming	0.40
Occupancy Sensor, DS, Multiple Step Dimming	0.35

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Occupancy Sensor, DS, on/off	0.35
Occupancy Sensor, DS, Continuous Dimming, and Lumen Maintenance	0.45
Occupancy Sensor, DS, Multiple Step Dimming, and Lumen Maintenance	0.40
Occupancy Sensor, DS, ON/OFF, and Lumen Maintenance	0.35
Occupancy Sensor and Lumen Maintenance	0.35
Occupancy Sensor and Programmable Timing Control	0.35

(a) The lighting power control credits are limited to the specific luminaires controlled by the automatic control device.

(b) Only one adjustment factor may be used for each building space or luminaire, and 50 percent or more of the controlled luminaire must be within the applicable space to qualify for the power adjustment factor.

(c) Controls must be installed in series with the lights and in series with all manual switching devices in order to qualify for an adjustment factor.

(d) Daylight sensing controls must be capable of reducing electrical power consumption for lighting, continuously or in steps, to 50 percent or less of maximum power consumption.

(e) Daylight sensing controls must control all luminaires to which the power adjustment factor is applied and that direct a minimum of 50 percent of their light output into the daylight zone.

F. The COMcheck-MN program is an acceptable method for demonstrating compliance of the lighting system with items C to E.

Subp. 3. **Internally illuminated exit signs.** New internally illuminated exit signs must not exceed five watts per side.

Subp. 4. **Electric motor efficiencies.** All permanently wired, single speed Design A and B polyphase induction motors of one horsepower or more and expected to operate more than 500 hours per year must have National Electric Manufacturers Association (NEMA) nominal efficiencies not less than required by the Energy Policy Act of 1992, section 122(d).

Subp 5. **Distribution transformers.** New distribution transformers must meet the requirements of this subpart for NEMA class 1 efficiency as defined in NEMA Publication X TP 1-1996, Guide for Determining Energy Efficiency for Distribution Transformers.

A. Efficiency levels for liquid-filled distribution transformers must not be less than required in this item.

NEMA CLASS 1 EFFICIENCY LEVELS FOR LIQUID-FILLED DISTRIBUTION TRANSFORMERS

Reference Condition	Temperature	% of Nameplate Load
Load Loss	85°C	50%
No Load Loss	20°C	50%

kVA	Single Phase Efficiency	kVA	Three Phase Efficiency
10	98.3%	15	98.0%
15	98.5%	30	98.3%
25	98.7%	45	98.5%
37.5	98.8%	75	98.7%
50	98.9%	112.5	98.8%
75	99.0%	150	98.9%
100	99.0%	225	99.0%
167	99.1%	300	99.0%
250	99.2%	500	99.1%
333	99.2%	750	99.2%
500	99.3%	1,000	99.2%
667	99.4%	1,500	99.3%
833	99.4%	2,000	99.4%
		2,500	99.4%

B. Efficiency levels for dry-type distribution transformers must not be less than required in this item.

NEMA CLASS 1 EFFICIENCY LEVELS FOR DRY-TYPE DISTRIBUTION TRANSFORMERS

Reference Condition	Temperature	% of Nameplate Load
Low Voltage	75°C	35%
Medium Voltage	75°C	50%

Single Phase Efficiency

kVA	Low Voltage	Medium Voltage
15	97.7%	97.6%
25	98.0%	97.9%
37.5	98.2%	98.1%
50	98.3%	98.2%
75	98.5%	98.4%
100	98.6%	98.5%
167	98.7%	98.7%
250	98.8%	98.8%
333	98.9%	98.9%
500		99.0%
667		99.0%
833		99.1%

Three Phase Efficiency

kVA	Low Voltage	Medium Voltage
15	97.0%	96.8%
30	97.5%	97.3%
45	97.7%	97.6%
75	98.0%	97.9%
112.5	98.2%	98.1%
150	98.3%	98.2%
225	98.5%	98.4%
300	98.6%	98.5%
500	98.7%	98.7%
750	98.8%	98.8%
1,000	98.9%	98.9%
1,500		99.0%
2,000		99.0%
2,500		99.1%

7676.1300 ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS.

Subpart 1. **General.** Except as provided in this part, alterations and repairs to the building must comply with the applicable requirements of this chapter.

Subp. 2. **Affecting air leakage.** If an addition or alteration affects the air leakage characteristics or capacity of a building, and vented appliances are present that are not sealed or power vented and are without combustion air supply, then a combustion air supply must be provided according to the Minnesota State Mechanical Code, chapter 1346.

Subp. 3. **Additions.** Compliance for an addition may be demonstrated in one of three ways:

A. the addition alone must comply with this chapter;

B. the addition together with the entire existing building must comply with the requirements of this chapter; or

C. when taken together with the energy improvements of remodeling other components of the building as part of the same permit, the addition must meet the requirements of this chapter.

Subp. 4. **Conversions.** A change in the occupancy or use of an existing building or structure constructed under this chapter which would require an increase in demand for either fossil fuel or electrical energy supply shall not be permitted unless the building or structure is made to comply with the requirements of this chapter or chapter 7672 or 7674 as appropriate for the converted building.

Subp. 5. **Penetrations.** All penetrations resulting as part of an alteration must be sealed in accordance with part 7676.0600. This includes, but is not limited to, penetrations for telecommunication wires and equipment, electrical wires and equipment, electronic wires and equipment, fire sprinklers, plumbing and ducts, and penetrations in exterior walls and ceilings.

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Subp. 6. **Membrane or built-up roofs.** Alterations comprising the removal of at least 50 percent of existing membrane or built-up roof covering must comply with this subpart. Alterations to buildings need not meet the requirements of this chapter for new buildings, provided that either:

A. the existing roof insulation is at least R-16 for buildings that are conditioned; or

B. the existing roof insulation is at least R-10 for buildings that are semiconditioned.

Subp. 7. **All roof/ceilings.**

A. Ventilation requirements for alterations to roof/ceilings are given in the Minnesota State Building Code, part 1305.0010.

B. Attic insulation may not be installed unless accessible attic bypasses have been sealed.

C. A ceiling vapor retarder is not required if the interior ceiling finish is not removed.

Subp. 8. **Walls.**

A. Storm windows may be installed over existing glazing without meeting additional requirements of this chapter.

B. Glazing in existing sash may be replaced without meeting additional requirements of this chapter, provided the area-weighted U-value and area-weighted solar heat gain coefficient, or shading coefficient, of the glazing will be equal to or lower than before the glazing replacement. Replaced windows must conform to parts 7676.0600 and 7676.0700.

C. Interior wall finish may not be replaced unless wall cavities have been insulated to full depth. This requirement must apply whenever plaster is removed, even though lath may not have been removed.

EXCEPTIONS: Walls that are back-plastered, walls that are more than 50 percent filled with insulation, walls without framing cavities, or where the building official determines that a new exterior weather barrier must be installed to prevent imminent damage to the wall cavity.

D. A vapor retarder is not required if the interior wall finish is not removed.

Subp. 9. **Heating, ventilation, and air conditioning; service water heating; and electrical power equipment and controls.** All new equipment or control devices installed in conjunction with the alteration must comply with the specific requirements of this part and parts 7676.1100 and 7676.1200 applicable to that equipment or control device.

Subp. 10. **Lighting.** An enclosed space must comply with the applicable requirements of this part if either 50 percent of the luminaires in the enclosed space are replaced, or if the occupancy classification is changed. For alterations to a portion of an enclosed space lighting system, such as moving luminaires or installing control devices, the requirements of this part need not be met, provided that the connected lighting load within the enclosed space is not increased.

7676.1400 EFFECTIVE DATE.

The effective date of this chapter is July 1, 1998.

7678.0100 AUTHORITY AND PURPOSE.

This chapter is adopted pursuant to *Minnesota Statutes*, section 216C.19, subdivision 8. The purpose of this chapter is to provide a basis for thermal transmittance calculations for opaque envelope components for determining energy code compliance as required in chapters 7670, 7672, and 7674. This chapter also provides specific efficiencies for heating, ventilating, and air conditioning equipment and service water heating equipment.

7678.0200 APPLICATION.

This chapter applies to buildings and equipment covered by chapters 7670, 7672, 7674, and 7676.

7678.0300 INCORPORATIONS BY REFERENCE.

Subpart 1. **Incorporated items.** The following standards and references are incorporated by reference:

A. ASHRAE, 1997 Handbook of Fundamentals, chapters 27 and 28;

B. *Code of Federal Regulations*, title 10, part 430, Energy Conservation Program for Consumer Products;

C. *Code of Federal Regulations*, title 10, part 435, Energy Conservation Voluntary Performance Standards for New Commercial and Multi-Family High Rise Residential Buildings Mandatory for New Federal Buildings;

D. ASTM C236-89 (1993)e1, Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; and

E. ASTM C976-90 (1996)e1, Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box.

Subp. 2. **Availability.** All standards and documents incorporated by reference are available for public inspection at the Minnesota State Law Library and through the Minitex interlibrary loan system. In addition:

A. ASHRAE documents and standards are available from the American Society of Heating, Refrigerating and Air-Conditioning Engineers - Publication Sales, 1791 Tullie Circle NE, Atlanta, GA 30329; and

B. ASTM standards are available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

7678.0400 DEFINITIONS.

Subpart 1. **Definitions.** The definitions in this part apply to this chapter.

Subp. 2. **Annual fuel utilization efficiency or AFUE.** "Annual fuel utilization efficiency" or "AFUE" means the efficiency descriptor for furnaces and boilers determined using test procedures prescribed in *Code of Federal Regulations*, title 10, part 430.

Subp. 3. **Boiler capacity.** "Boiler capacity" means the rate of heat output in Btu/h measured at the boiler outlet, at the design inlet and outlet conditions, and rated fuel/energy input.

Subp. 4. **Efficiency, combustion.** "Efficiency, combustion" means 100 percent minus flue loss.

Subp. 5. **Efficiency, thermal.** "Efficiency, thermal" means the results of a thermal efficiency test referenced in *Code of Federal Regulations*, title 10, part 430 or 435.

Subp. 6. **Energy efficiency ratio or EER.** "Energy efficiency ratio" or "EER" means the ratio of net equipment cooling capacity in Btu/h to total rate of electric input in watts under designated operating conditions, as determined by *Code of Federal Regulations*, title 10, part 430 or 435.

Subp. 7. **Heating degree day.** "Heating degree day" means a unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal heating load of a building in winter. For any one day, when the mean temperature is less than 65 degrees Fahrenheit, there exist as many degree days as there are Fahrenheit degrees difference in temperature between the mean temperature for the and 65 degrees Fahrenheit.

Subp. 8. **Heating seasonal performance factor or HSPF.** "Heating seasonal performance factor" or "HSPF" means the total heating output of a heat pump during its normal annual usage period for heating, in Btu, divided by the total electric energy input during the same period, in watt-hours, as determined by *Code of Federal Regulations*, title 10, part 435.

Subp. 9. **Integrated part load value or IPLV.** "Integrated part load value" or "IPLV" means a single number figure of merit for air-conditioning and heat pump equipment based on weighted operation at a set of less than full capacities for the equipment, as determined by *Code of Federal Regulations*, title 10, part 435.

Subp. 10. **Once-through system.** "Once-through system" means an HVAC or refrigeration system used for any type of temperature or humidity control application using groundwater that circulates through the system and is then discharged without reusing it for a higher priority purpose.

Subp. 11. **Roof/ceiling assembly.** "Roof/ceiling assembly" means the surface area of all components of the roof/ceiling envelope through which heat flows, thus creating a building transmission heat loss or gain, where such assembly is exposed to outdoor air and encloses a conditioned or semiconditioned space.

Subp. 12. **Seasonal energy efficiency ratio or SEER.** "Seasonal energy efficiency ratio" or "SEER" means the total cooling output of an air conditioner during its normal annual usage period for cooling, in Btu/h, divided by the total electric energy input during the same period in watt hours, as determined by *Code of Federal Regulations*, title 10, part 430 or 435.

Subp. 13. **Thermal resistance or R.** "Thermal resistance" or "R" means the reciprocal of thermal transmittance (h ft^2 ° F/Btu).

Subp. 14. **Thermal transmittance or U.** "Thermal transmittance" or "U" means the coefficient of heat transmission (air-to-air). Thermal transmittance is the time rate of heat flow per unit area and unit temperature differential between the warm side and cold side of air films (Btu/h ft^2 °F).

Subp. 15. **Thermal transmittance, overall or U_o.** "Thermal transmittance, overall" or "U_o" means the overall thermal transmittance of an exterior building envelope component, such as a wall, floor, or roof/ceiling. The value of U_o is calculated by the parallel path heat flow method using the areas and thermal transmittance values of the various elements, such as windows, doors, and opaque surfaces that comprise the gross area of the building component.

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7678.0500 ENVELOPE THERMAL TRANSMITTANCE CALCULATIONS.

Subpart 1. **General.** The thermal transmittance of thermal envelope components must be determined in accordance with this part.

Subp 2. **Overall thermal transmittance.** Overall thermal transmittance must be determined in accordance with this subpart. The parallel heat flow U_o is the area weighted average of the thermal transmittance of the components of an overall assembly.

The equation for thermal transmittance of an assembly is as follows:

$U_o = (A_1/R_1 + A_2/R_2 + A_3/R_3 + ...)/A_o$

Where:

A_1, A_2, A_3, ... = the cross-sectional area of the different elements, such as opaque walls, windows, and doors

R_1, R_2, R_3, ... = the cross-sectional R-value of the different elements

A_o = the gross area of the element or overall assembly

Subp. 3. **Thermal transmittance of opaque building components.** Thermal transmittance of opaque building components must be determined according to this subpart.

EXCEPTION: Calculations performed by a professional engineer registered in Minnesota according to the procedures in the ASHRAE Handbook of Fundamentals, Chapter 27.

A. When return air ceiling plenums are employed, the roof/ceiling assembly must:

(1) for thermal transmittance purposes, not include the ceiling proper nor the plenum space as part of the assembly; and

(2) for gross area purposes, be based upon the interior face of the upper plenum surface.

B. Calculation of overall thermal transmittance for framed walls must be based upon the percentage of wall area in this item.

FRAMING AREA FACTORS FOR LOAD BEARING STUD WALLS

Stud Spacing	Studs and Headers	Insulated Cavity
16 inches	23 percent	77 percent
24 inches	17 percent	83 percent

FRAMING AREA FACTORS FOR BLOCK WALLS WITH WOOD STUD FURRING

Stud Spacing	Studs and Headers	Insulated Cavity
16 inches	12 percent	88 percent
24 inches	9 percent	91 percent

C. The proposed design may take into account the thermal mass of the building components in considering energy conservation. This applies only for walls in locations with less than 8,000 heating degree days and a base temperature of 65 degrees Fahrenheit with a heat capacity equal to or exceeding 6.0 Btu/ft^2 °F. The required wall thermal transmittance is adjusted according to the table in this item.

Required Value of U_w without Consideration of Thermal Mass	Required Value of U_w with Consideration of Mass (position of insulation)		
	Exterior of wall mass	Interior of wall mass	Integral with wall mass
0.20	0.22	0.21	0.22
0.18	0.20	0.19	0.20
0.16	0.18	0.17	0.18
0.14	0.15	0.14	0.16

0.12	0.13	0.13	0.13
0.10	0.11	0.10	0.11
0.08	0.09	0.08	0.09
0.06	0.07	0.06	0.07
0.04	0.05	0.04	0.05

D. Conversion to metric (SI) units.

Unit of Measure	Multiply	By	To Obtain Metric Unit
Thermal transmittance	R-value ($h.ft^2.°F/Btu$)	0.578	RSI-value ($m^2.°C/W$)
Thermal conductance	U-value ($Btu/h/ft^2/°F$)	1.73	U-value ($W/m^2.°C$)
Heat capacity	(Btu/lb/°F)	0.43	k/kg/°K

Subp. 4. **Wood frame construction.** The thermal transmittance of wood frame construction must be determined by the parallel heat flow method in this subpart. The parallel heat flow U-value is the area weighted average of the thermal transmittance of the components of an assembly.

A. The equation for thermal transmittance of an assembly is as follows:

$U = (A_1/R_1 + A_2/R_2 + A_3/R_3 + ...)/A_o$

Where:

A_1, A_2, A_3, ... = the cross-sectional area of the different elements, such as framing and insulated cavities. Subpart 3, item B, must be used to calculate insulated and framing areas unless different values are shown by documentation

R_1, R_2, R_3, ... = the cross-sectional R-value of the different elements

A_o = the gross area of the element or overall component

B. The U-values table for wood framed wall assemblies is as follows:

WOOD FRAMED WALL ASSEMBLIES

				With Foam Plastic Insulation Sheathing			
Insulation		OSB or Plywood	25/32 Fiberboard	Extruded Polystyrene (in.) (R-5/inch minimum)		Poly-isocyanurate (in.) (foil-backed foam board)	
Framing	R-Value	Sheathing	Sheathing	0.75	1	0.75	1
			Total Opaque Wall U-values*				
2x4	13	0.074	0.067	0.060	0.056	0.055	0.050
16"	15	0.067	0.061	0.055	0.052	0.051	0.046

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o.c.**							
2x6	19	0.056	0.051	0.047	0.045	0.044	0.041
16”	21	0.049	0.046	0.043	0.041	0.040	0.037
o.c.**							

*This U-value includes studs and insulated cavity as well as siding, sheathing, gypsum board, and air films.
**o.c. refers to “on center” spacing of studs, rafters, and trusses.

C. The U-values table for wood framed rim and band joists is as follows:

WOOD FRAMED RIM AND BAND JOISTS

			With Foam Plastic Insulation Sheathing			
	OSB or Plywood	25/32 Fiberboard	Extruded Polystyrene (in.) (R-5/inch minimum)		Poly-isocyanurate (in.) (foil-backed foam board)	
Rim/Band Joist Description	Sheathing	Sheathing	0.75	1	0.75	1
		Rim/Band Joist U-values*				
2x or TGI, R-13 batt	0.074	0.067	0.060	0.056	0.055	0.050
2x or TGI, R-19 batt	0.045	0.042	0.040	0.038	0.037	0.035
2x or TGI, R-21 batt	0.042	0.039	0.037	0.035	0.035	0.033
Floor truss**, R-13 batt						
Floor truss**, R-19 batt	0.053	0.049	0.045	0.043	0.042	0.039
Floor truss**, R-21 batt	0.048	0.045	0.042	0.040	0.039	0.037
Floor truss, air seal***	0.061	0.056	0.051	0.048	0.047	0.043

*This U-factor includes floor joists or trusses and insulated cavity as well as siding, sheathing, and air films.
**These values are for bottom chord bearing trusses. For top chord bearing trusses, include the truss area as part of the framed wall.
***Air-sealed design incorporates 1-1/2 inches of polystyrene and 1-1/2 inches of polyisocyanurate board to form an air-vapor barrier.

D. Roof/ceiling assemblies with rafter, truss, or scissors truss construction is as follows:

Loose Fill Insulation R-value	U-value
30	0.033
38	0.026
44	0.022
49	0.020

E. Roof/ceiling assemblies with cathedral ceiling (solid lumber, not truss framing) is as follows:

Batt Insulation R-value	With R-5 Sheathing U-values	Without Insulation Sheathing U-values
25	0.040	0.050
30	0.033	0.040
38	0.026	0.030

Subp. 5. **Masonry block walls.** To determine the thermal transmittance of masonry block walls with insulation inserts or filled cores, the series-parallel method must be used.

A. The series-parallel heat flow method is a procedure that accounts for the fact that heat does not always flow straight through a wall.

The equations for series-parallel thermal transmittance are as follows:

$U = 1/R_o$

$R_o = R_f + (R_w \times R_c)/[(A_c \times R_w) + (A_w \times R_c)] + R_{film}$

Where:

R_f = thermal resistance of faces

R_w = thermal resistance of the web

R_c = thermal resistance of the core

A_w = fraction of the total area perpendicular to heat flow of the web (conductive)

A_c = fraction of the total area perpendicular to heat flow of the core (insulated)

B. The U-value table for normal weight blocks is as follows:

Normal Weight Concrete Blocks (132 PCF) U-Value Table[1]

Block Width: 12 Inches			Additional Insulation Thickness (in.)				
Core	Block Only	Type	0.75	1	2	2x4 studs R-11	2x2 furring 1.5 inch
grouted	0.51	expanded[2]	0.20	0.17	0.10		0.13
grouted	0.51	extruded[3]	0.16	0.13	0.081		
grouted	0.51	poly-isocyanurate[4]	0.13	0.10	0.059		

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grouted	0.51	fiberglass				0.083	
empty	0.45	expanded	0.19	0.16	0.101		0.13
empty	0.45	extruded	0.16	0.13	0.079		
empty	0.45	poly-isocyanurate	0.12	0.10	0.059		
empty	0.45	fiberglass				0.081	
filled[5]	0.20	expanded	0.12	0.11	0.080		0.094
filled	0.20	extruded	0.11	0.097	0.065		
filled	0.20	poly-isocyanurate	0.093	0.080	0.051		
filled	0.20	fiberglass				0.066	
UFFI[6]	0.19	expanded	0.12	0.11	0.078		0.09
UFFI	0.19	extruded	0.11	0.094	0.064		
UFFI	0.19	poly-isocyanurate	0.091	0.078	0.050		
UFFI	0.19	fiberglass				0.065	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

Normal Weight Concrete Blocks (132 PCF) U-Value Table[1]

Block Width:
10 Inches

Core	Block Only	Type	Additional Insulation Thickness (in.)			2x4 studs	2x2 furring
			0.75	1	2	R-11	1.5 inch
grouted	0.56	expanded[2]	0.20	0.17	0.11		0.076
grouted	0.56	extruded[3]	0.17	0.14	0.082		
grouted	0.56	poly-isocyanurate[4]	0.13	0.11	0.060		
grouted	0.56	fiberglass				0.085	
empty	0.46	expanded	0.19	0.16	0.10		0.073
empty	0.46	extruded	0.16	0.13	0.079		
empty	0.46	poly-isocyanurate	0.12	0.102	0.059		
empty	0.46	fiberglass				0.082	
filled[5]	0.23	expanded	0.13	0.12	0.083		0.100
filled	0.23	extruded	0.12	0.10	0.068		
filled	0.23	poly-isocyanurate	0.098	0.083	0.052		
filled	0.23	fiberglass				0.069	
UFFI[6]	0.22	expanded	0.13	0.12	0.082		0.062
UFFI	0.22	extruded	0.11	0.10	0.067		
UFFI	0.22	poly-isocyanurate	0.10	0.082	0.051		
UFFI	0.22	fiberglass				0.068	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

Normal Weight Concrete Blocks (132 PCF) U-Value Table[1]

Block Width:
8 Inches

Core	Block Only	Type	Additional Insulation Thickness (in.)			2x4 studs	2x2 furring
			0.75	1	2	R-11	1.5 inch
grouted	0.62	expanded[2]	0.21	0.18	0.11		0.014
grouted	0.62	extruded[3]	0.17	0.14	0.083		
grouted	0.62	poly-isocyanurate[4]	0.13	0.11	0.061		
grouted	0.62	fiberglass				0.086	
empty	0.48	expanded	0.19	0.16	0.103		0.13
empty	0.48	extruded	0.16	0.13	0.080		
empty	0.48	poly-isocyanurate	0.13	0.10	0.059		
empty	0.48	fiberglass				0.083	
filled[5]	0.27	expanded	0.14	0.13	0.088		0.11
filled	0.27	extruded	0.13	0.11	0.070		
filled	0.27	poly-isocyanurate	0.10	0.088	0.054		
filled	0.27	fiberglass				0.072	
UFFI[6]	0.25	expanded	0.14	0.12	0.086		0.10
UFFI	0.25	extruded	0.12	0.11	0.069		
UFFI	0.25	poly-isocyanurate	0.10	0.086	0.053		
UFFI	0.25	fiberglass				0.071	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

C. The U-value tables for lightweight blocks are as follows:

Light Weight Concrete Blocks (100 PCF) U-Value Table[1]

Block Width:
12 Inches

Core	Block Only	Type	Additional Insulation Thickness (in.) 0.75	1	2	2x4 studs R-11	2x2 furring 1.5 inch
grouted	0.42	expanded[2]	0.18	0.16	0.10		0.12
grouted	0.42	extruded[3]	0.15	0.13	0.078		
grouted	0.42	poly-isocyanurate[4]	0.12	0.10	0.058		
grouted	0.42	fiberglass				0.080	
empty	0.37	expanded	0.17	0.15	0.097		0.12
empty	0.37	extruded	0.15	0.12	0.076		
empty	0.37	poly-isocyanurate	0.12	0.097	0.057		
empty	0.37	fiberglass				0.078	
filled[5]	0.12	expanded	0.089	0.082	0.063		0.072
filled	0.12	extruded	0.081	0.074	0.054		
filled	0.12	poly-isocyanurate	0.072	0.063	0.044		
filled	0.12	fiberglass				0.054	
UFFI[6]	0.11	expanded	0.083	0.077	0.060		0.068
UFFI	0.11	extruded	0.076	0.069	0.052		
UFFI	0.11	poly-isocyanurate	0.068	0.060	0.042		
UFFI	0.11	fiberglass				0.052	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

Light Weight Concrete Blocks (100 PCF) U-Value Table[1]

Block Width:
10 Inches

Core	Block Only	Type	Additional Insulation Thickness (in.) 0.75	1	2	2x4 studs R-11	2x2 furring 1.5 inch

grouted	0.45	expanded[2]	0.19	0.16	0.10		0.13
grouted	0.45	extruded[3]	0.16	0.13	0.079		
grouted	0.45	poly-isocyanurate[4]	0.12	0.10	0.059		
grouted	0.45	fiberglass				0.081	
empty	0.37	expanded	0.17	0.15	0.097		0.12
empty	0.37	extruded	0.14	0.12	0.076		
empty	0.37	poly-isocyanurate	0.12	0.097	0.057		
empty	0.37	fiberglass				0.078	
filled[5]	0.14	expanded	0.099	0.091	0.068		0.079
filled	0.14	extruded	0.089	0.080	0.057		
filled	0.14	poly-isocyanurate	0.078	0.068	0.046		
filled	0.14	fiberglass				0.058	
UFFI[6]	0.13	expanded	0.092	0.085	0.065		0.074
UFFI	0.13	extruded	0.084	0.076	0.055		
UFFI	0.13	poly-isocyanurate	0.073	0.065	0.044		
UFFI	0.13	fiberglass				0.055	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

Light Weight Concrete Blocks (100 PCF) U-Value Table[1]

Block Width:
8 Inches

			Additional Insulation				
Core	Block Only	Type	Thickness (in.)			2x4 studs	2x2 furring
			0.75	1	2	R-11	1.5 inch
grouted	0.51	expanded[2]	0.20	0.17	0.10		0.13
grouted	0.51	extruded[3]	0.16	0.14	0.081		
grouted	0.51	poly-isocyanurate[4]	0.13	0.10	0.060		
grouted	0.51	fiberglass				0.083	
empty	0.40	expanded	0.18	0.15	0.098		0.16
empty	0.40	extruded	0.15	0.13	0.077		
empty	0.40	poly-isocyanurate	0.12	0.098	0.058		

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empty	0.40	fiberglass				0.091	
filled[5]	0.17	expanded	0.11	0.10	0.074		0.086
filled	0.17	extruded	0.099	0.088	0.061		
filled	0.17	poly-isocyanurate	0.085	0.074	0.048		
filled	0.17	fiberglass				0.062	
UFFI[6]	0.15	expanded	0.10	0.094	0.070		0.081
UFFI	0.15	extruded	0.092	0.083	0.059		
UFFI	0.15	poly-isocyanurate	0.080	0.070	0.047		
UFFI	0.15	fiberglass				0.059	

[1]All U-values include air film coefficients and one-half inch gypsum board when insulation is present.

[2]Expanded is typically white "bead board" foam plastic.

[3]Extruded is typically colored R-5 per inch of foam plastic.

[4]Polyisocyanurate (iso board) is foam plastic, foil faced on both sides.

[5]Filled with vermiculite or EPS beam insulation.

[6]UFFI means filled with urea formaldehyde.

Subp. 6. **Metal buildings.** Thermal performance of envelope components of metal buildings with thermal insulation between purlins or girts must be determined by the effective assembly R-value method prescribed in this subpart.

A. The equation to determine thermal transmittance by effective assembly R-value thermal transmittance method is as follows:

$U_o = 1/(R_i + R_e)$

Where:

R_i = the R-values of series elements excluding the draped insulation and framing.

R_e = the effective assembly R-value from tables in item B or C. Interior air film coefficients are included in these table values.

B. The equivalent R-value of a purlin or girt system where the system is described in this item.

ASSEMBLY EFFECTIVE R-VALUES (R_e)

Batt Insulation R-value	One Fastener Per Linear Foot of Purlin/Girt Purlin/Girt Spacing (Feet)			
	5	4	3	2
R-38	11.61	10.18	8.45	6.30
R-30	11.08	9.79	8.21	6.20
R-26	10.80	9.59	8.08	6.14
R-22	10.06	9.04	7.73	5.99
R-19	9.95	8.95	7.67	5.97

Batt Insulation R-value	Two Fasteners Per Linear Foot of Purlin/Girt Purlin/Girt Spacing (Feet)			
	5	4	3	2
R-38	9.96	8.64	7.07	5.19
R-30	9.56	8.36	6.91	5.12
R-26	9.35	8.21	6.81	5.09
R-22	8.80	7.80	6.56	4.98
R-19	8.71	7.74	6.52	4.96

C. The assembly effective R-value (R_e) is defined in this item for purlin or girt insulation systems where purlin or girt spacing is five feet or greater. Foam blocks must be a minimum R-value of five, and a minimum of two pound density.

(1) For assemblies where the blanket insulation is draped over each purlin or grit and a foam block is installed between the purlin or girt and exterior panel, the R_e-values of this subitem apply.

	INSULATION R-VALUE			
	10	11	13	19
EFFECTIVE SYSTEM R-VALUE	9.8	10.0	12.0	15.3

(2) For assemblies with a blanket total R-value of R-30, where a thicker layer is installed uncompressed between each purlin or girt and a thinner layer is draped over each purlin or girt, the R_e-values of this subitem apply.

(a) When a foam block is installed between the purlin or girt and exterior panel, the R_e-value is 24.5.

(b) When a foam block is not installed between the purlin or girt and exterior panel, the R_e-value is 17.4

(3) For assemblies where purlins or girts are completely filled with R-30, foam blocks of at least one-inch separate purlins or girts from the roof or wall sheet, and continuous insulation board covers the insulation and purlin or girt, the R_e-values of this subitem apply.

(a) Where the continuous insulation board is at least R-6, the R_e-value is R-31.4.

(b) Where the continuous insulation board is at least R-10, the R_e-value is R-43.2.

Subp. 7. **Metal stud walls.** The overall thermal transmittance of metal stud walls are provided in this subpart. The U-values given including studs and insulated cavity as well as siding, sheathing, gypsum board, and air films. The table U-values do not include effects of structural framing, which can substantially increase the U-value.

U-Values for Metal Stud Walls and Insulated Cavities

Size of Studs	Stud Spacing	Cavity Insulation R-value	Insulated Cavity Equivalent R-value	With Foam Plastic Insulation Sheathing: Extruded Polystyrene (in.) (R-5/in. minimum) 0.75	Extruded Polystyrene (in.) (R-5/in. minimum) 1	Extruded Polystyrene (in.) (R-5/in. minimum) 1.5	Polyisocyanurate (in.) (foil-backed foam board) 0.75	Polyisocyanurate (in.) (foil-backed foam board) 1
				Total Opaque Wall U-values*				
2x4	16”	11	5.5	0.086	0.077	0.065	0.075	0.066
2x4	16”	13	6.0	0.082	0.075	0.063	0.072	0.064
2x4	16”	15	6.4	0.080	0.072	0.061	0.070	0.062
2x4	24”	11	6.6	0.078	0.071	0.061	0.069	0.061
2x4	24”	13	7.2	0.075	0.068	0.058	0.067	0.059
2x4	24”	15	7.8	0.072	0.066	0.056	0.064	0.064
2x6	16”	19	7.1	0.075	0.069	0.059	0.067	0.060
2x6	16”	21	7.4	0.074	0.067	0.058	0.066	0.059
2x6	24”	19	8.6	0.068	0.062	0.054	0.061	0.055
2x6	24”	21	9.0	0.066	0.061	0.053	0.059	0.059
2x8	16”	25	7.8	0.072	0.066	0.056	0.064	0.057
2x8	24”	25	9.6	0.063	0.059	0.051	0.057	0.052

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*This U-value includes studs and insulated cavity, as well as siding, sheathing, gypsum board, and air film. It does not include structural framing.

Subp. 8. **Zone method.** For assemblies with metal components that are not described in subpart 6 or 7, the zone method must be used. The zone method is a procedure in which the thermal transmittance of a surface is computed by dividing the surface into its highly conductive and remaining areas. The highly conductive area is a function of the width or diameter of the metal heat path terminal and the distance from the panel surface to the metal. The respective thermal transmittance of the two areas are separately computed, combined, and then divided by the total cross-sectional area.

The equation for zone method thermal transmittance is as follows:

$U = (U_1A_1 + U_2A_2)/A_o$

Where:

For the highly conductive area:

A_1 = the highly conductive area.

U_1 = the thermal transmittance of the highly conductive area.

For the remainder of the area:

A_2 = the remainder of the area.

U_2 = the thermal transmittance of the remaining area.

A_o (cross-sectional area of the element) = A1 + A2.

The equation for areas is as follows:

$A_1 = m + 2d$, $A_2 = A_o - A_1$

Where:

m = width or diameter of the metal heat path terminal.

d = distance from panel surface to metal.

Subp. 9. **Thermal measurement method.**

A. The overall thermal transmittance value of a building assembly determined by testing must be tested by either ASTM C236 or ASTM C976 by a laboratory meeting the qualities in item B.

B. Approved laboratory means any testing facility, including a facility owned or operated by a manufacturer, that has been accredited by one or more of the following agencies to perform the required test:

(1) United States Department of Commerce, National Voluntary Laboratory Accreditation Program;

(2) American Association for Laboratory Accreditation, Gaithersburg, Maryland; or

(3) Standards Council of Canada, Ottawa, Ontario, Canada.

EXCEPTION: In the event that an approved laboratory program is temporarily delayed or is not capable of being accredited to perform a test or tests, a testing laboratory possessing the appropriate equipment, facilities, and qualified personnel to perform the required testing is an approved laboratory.

C. Product samples must be production line material or representative material as purchased by the consumer or contractor. If the assembly is too large to be tested at one time in its entirety, then either a representative portion must be tested or different portions must be tested separately and a weighted average determined. To be representative, the portion tested must include edges of panels, joints with other panels, typical framing percentages, and thermal short circuits.

7678.0600 FENESTRATION PRODUCTS.

Subpart 1. **Air infiltration.** Fenestration products must have air infiltration rates not exceeding those shown in this subpart. The manufacturer must test door infiltration rates in accordance with ASTM E283-91, and window infiltration rates in accordance with applicable industry standards. Infiltration rates for all fenestration products must be disclosed in product literature. A manufacturer's certification that products comply with the infiltration requirements of the 1995 Model Energy Code shall be deemed to comply with these requirements.

ALLOWABLE AIR INFILTRATION RATE

Operable windows	0.34 cfm per foot of operable sash crack
Nonresidential doors	1.25 cfm per square foot of door area

Subp. 2. **Thermal transmittance.** Thermal transmittance of windows, doors, and skylight elements must be determined in accordance with item A or B.

A. Thermal performance (U-values) of fenestration products (windows, doors, and skylights) must be determined in accordance with the National Fenestration Rating Council (NFRC) standard 100-91 or 100-97 by an accredited, independent laboratory, and labeled and certified by the manufacturer.

B. When a manufacturer has not determined product U-value according to NFRC standards for a particular product line, the U-value shall be determined by assigning products a default U-value from the U-value default table. Product features must be verifiable for the product to qualify for the default value associated with those features. Where the existence of a particular feature cannot be determined with reasonable certainty, the product must not receive credit for that feature. Where a composite of materials from two different product types are used, the product U-value must be the high U-value.

(1) The U-value default table for windows, glass doors, and skylights is as follows:

Frame/Glazing Features	Double Pane	Double Pane w/ Low-E Permanent Label on Glass	Triple Pane
	U-value	U-value	U-value
Metal With Thermal Break			
Operable	0.67	0.62	0.54
Fixed	0.63	0.57	0.47
Glass door	0.66	0.60	0.50
Skylight	1.13	1.06	0.93
Metal-Clad Wood			
Operable	0.60	0.52	0.46
Fixed	0.58	0.52	0.41
Glass door	0.57	0.51	0.43
Skylight	0.88	0.79	0.71
Wood/Vinyl			
Operable	0.56	0.56	0.43
Fixed	0.57	0.52	0.41
Glass door	0.56	0.52	0.42
Skylight	0.85	0.82	0.67
Glass Block Assemblies	0.60		

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(2) The U-value default table for nonglazed doors is as follows:

Steel Doors	U-Value
Without foam core	0.60
With foam core	0.35

Wood Doors	U-Value	
	Without Storm	With Storm
Panel with 7/16 inch panels	0.54	0.36
Panel with 1-1/8 inch panels	0.39	0.28
Solid core flush	0.40	0.26

Subp. 3. **Solar heat gain coefficients.** Solar heat gain coefficients of windows, glazed doors, and skylight elements must be determined according to this subpart.

A. The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors, and skylights) shall be determined according to the National Fenestration Rating Council (NFRC) standards by an accredited, independent laboratory, and labeled and certified by the manufacturer.

B. When a manufacturer has not determined product SHGC according to NFRC standards for a particular product line, the SHGC shall be determined by assigning such products a default SHGC from the SHGC default table. Product features must be verifiable for the product to qualify for the default value associated with those features. Where the existence of a particular feature cannot be determined with reasonable certainty, the product must not receive credit for that feature. Where a composite of materials from two different product types are used, the product shall be assigned the higher value.

The SHGC default table for windows, glazed doors, and skylights is as follows:

PRODUCT DESCRIPTION	SINGLE GLAZED			
Metal-Framed:	Clear	Bronze	Green	Gray
Operable	0.75	0.64	0.62	0.61
Fixed	0.78	0.67	0.65	0.64
Nonmetal Frames:				
Operable	0.63	0.54	0.53	0.52
Fixed	0.75	0.64	0.62	0.61

PRODUCT DESCRIPTION	DOUBLE GLAZED			
Metal-Framed:	Clear	Bronze	Green	Gray
Operable	0.66	0.55	0.53	0.52
Fixed	0.68	0.57	0.55	0.54
Nonmetal Frames:				
Operable	0.55	0.46	0.45	0.44
Fixed	0.66	0.54	0.53	0.52

7678.0700 MECHANICAL EQUIPMENT EFFICIENCY REQUIREMENTS.

Subpart 1. **HVAC equipment performance requirements.** HVAC equipment must meet the minimum efficiency requirements specified in this part.

A. Standards and definitions for HVAC equipment including, but not limited to, coefficient of performance; package terminal air conditioner; package terminal heat pump; room air conditioner; unitary cooling and heating equipment; unitary heat pump; water chilling package of absorption; water chilling package, centrifugal or rotary; and water chilling package, reciprocating, are located in *Code of Federal Regulations*, title 10, parts 430 and 435.

B. Omissions of minimum performance requirements for equipment not listed in this part does not preclude use of such equipment.

C. When multiple rating conditions or performance requirements are provided, the equipment must satisfy all stated requirements.

Subp. 2. **Air cooled, electrically operated equipment.** Unitary conditioners, heat pumps, and condensing units air cooled, electrically operated must meet the requirements of this subpart.

UNITARY AIR CONDITIONERS AND AIR-COOLED, ELECTRICALLY OPERATED HEAT PUMPS

EQUIPMENT CATEGORY	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
Single Package	<65,000 Btu/h Cooling Capacity Cooling Mode	Seasonal Rating	9.7 SEER
Split System			10.0 SEER
Split System and Single Package	≥65,000 and <135,000 Btu/h Cooling Mode	Standard Rating (95°F db)	8.9 EER
		Integrated Part Load Value (80°F db)	8.3 IPLV
Air Conditioners	>135,000 Btu/h and <760,000 Btu/h		8.9 EER 7.5 IPLV
Air-Cooled Cooling	>760,000 Btu/h		8.2 EER 7.5 IPLV
Heat Pumps	>135,000 Btu/h	Entering Air (47°F)	2.9 COP
Air-Cooled Heating		Entering Air (17°F)	2.0 COP
Split System	<65,000 Btu/h Cooling Capacity Heating Mode	Seasonal Rating	6.8 HSPF
Single Package			6.6 HSPF
Split System and Single Package	<65,000 Btu/h Cooling Capacity Heating Mode	High Temperature Rating (47°F db/ 43°F wb)	3.0 COP
		Low Temperature Rating (17°F db/ 15°F wb)	2.0 COP

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Split System and Single Package	≥65,000 and <135,000 Btu/h Cooling Capacity Heating Mode	High Temperature Rating (47°F db/ 43°F wb)	3.0 COP
		Low Temperature Rating (17°F db/ 15°F wb)	2.0 COP
Split System and Single Package	>135,000 Btu/h Cooling Capacity Heating Mode	High Temperature Rating (47°F db/ 43°F wb)	2.9 COP
		Low Temperature Rating (17°F db/ 15°F wb)	2.0 COP
Condensing Units	>135,000 Btu/h		9.9 EER 11.0 IPLV

Subp. 3. **Electrically operated, evaporatively cooled equipment.** Unitary air conditioners, heat pumps, and condensing units electrically operated, evaporatively cooled must meet the requirements of this subpart.

ELECTRICALLY OPERATED, EVAPORATIVELY COOLED EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
All Equipment	<65,000 Btu/h Cooling Capacity	Indoor Temperature (80°F db/67°F wb) Outdoor Temperature (95°F db/75°F wb)	9.3 EER
		Integrated Part Load Value (80°F db/67°F wb)	8.5 IPLV
	≥65,000 and <135,000 Btu/h Cooling Capacity	Indoor Temperature (80°F db/67°F wb) Outdoor Temperature (95°F db/75°F wb)	10.5 EER
		Integrated Part Load Value (80°F db/67°F wb)	9.7 IPLV
	>135,000 Btu/h		9.6 EER 9.0 IPLV
Condensing Units	>135,000 Btu/h		12.9 EER 12.9 IPLV

Subp. 4. **Water-cooled equipment.** Water-cooled air conditioners, heat pumps, and condensing units must meet the requirements of this subpart. *Minnesota Statutes*, section 103G.271, subdivision 5, prohibits once-through systems.

WATER-COOLED EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
Water Source Heat Pumps	<65,000 Btu/h Cooling Capacity	Standard Rating Indoor Air (80°F db/65°F wb) and Entering Water (85°F)	9.3 EER
		Low Temperature Rating Indoor Air (80°F db/67°F wb) and Entering Water (75°F)	10.2 EER
	≥65,000 and <135,000 Btu/h Cooling Capacity	Standard Rating Indoor Air (80°F db/67°F wb) and Entering Water (85°F)	10.5 EER
Groundwater Cooled Heat Pumps	<135,000 Btu/h Cooling Capacity	Standard Rating Entering Water (70°F)	11.0 EER
		Low Temperature Rating Entering Water (50°F)	11.5 EER
Water-Cooled Unitary Air Conditioners	<65,000 Btu/h Cooling Capacity	Standard Rating Indoor Air (80°F db/67°F wb) and Entering Water (85°F)	9.3 EER
		Integrated Part Load Value Entering Water (75°F)	8.4 IPLV
	≥65,000 and <135,000 Btu/h Cooling Capacity	Standard Rating Indoor Air (80°F db/67°F wb) and Entering Water (85°F)	10.5 EER 9.7
	<135,000 Btu/h		9.6 EER

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		9.0 IPLV
Condensing Units	≥135,000 Btu/h	12.9 EER 12.9 IPLV

Subp. 5. **Packaged terminal equipment.** Packaged terminal air conditioners and heat pumps air cooled, electrically operated must meet the requirements of this subpart.

PACKAGED TERMINAL EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
PTAC AND PTAC Heat Pumps	All Capacities Cooling Mode	Standard Rating (95°F db)	10.0 - (0.16 x Cap./1,000) EER
		Low Temperature Rating (82°F db)	12.2 - (0.20 x Cap./1,000) EER
PTAC Heat Pumps	All Capacities Heating Mode	Standard Rating (47°F db/43°F wb)	2.9 - (0.26 x Cap./1,000) COP

Subp. 6. **Room equipment.** Room air conditioners and room air conditioner heat pumps must meet the requirements of this subpart.

ROOM EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES & MODE	EFFICIENCY
Without Reverse Cycle and with Louvered Sides	<6,000 Btu/h	8.0 EER
	≥6,000 and <8,000 Btu/h	8.5 EER
	≥8,000 and <14,000 Btu/h	9.0 EER
	≥14,000 and <20,000 Btu/h	8.8 EER
	≥20,000 Btu/h	8.2 EER
Without Reverse Cycle and without Louvered Sides	<6,000 Btu/h	8.0 EER
	≥6,000 and <20,000 Btu/h	8.5 EER
	≥20,000 Btu/h	8.2 EER
With Reverse Cycle and With Louvered Sides - All Capacities		8.5 EER
With Reverse Cycle and Without Louvered Sides - All Capacities		8.0 EER

Subp. 7. **Water source equipment.** Water source, groundwater source, and ground source heat pumps electrically operated must meet the requirements of this subpart. *Minnesota Statutes*, section 103G.271, subdivision 5, prohibits once-through systems.

WATER SOURCE EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
Water Source	<135,000 Btu/h	Standard Rating Entering Water (70°F)	3.8 COP
Groundwater Source Heat Pumps	<135,000 Btu/h	High Temperature Rating Entering Water (70°F)	3.4 COP
		Low Temperature Rating Entering Water (50°F)	3.0 COP
Ground Source Heat Pumps	<135,000 Btu/h	High Temperature Rating Entering Water (41°)	2.70 COP
		Low Temperature Rating Entering Water (32°)	2.50 COP

Subp. 8. **Gas-fired and oil-fired equipment.** Gas-fired and oil-fired boilers, furnaces, and unit heaters and combination furnace/air conditioner units must meet the requirements of this subpart.

GAS-FIRED AND OIL-FIRED EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES AND MODE	RATING CONDITION	EFFICIENCY
Gas-fired boilers	<300,000 Btu/h	Hot water	80% AFUE
		Steam	75% AFUE
	>300,000	Both maximum and minimum rated capacity	80% Ec*
Gas-fired furnaces	<225,000 Btu/h	Seasonal rating	78% AFUE
	>225,000 Btu/h	Maximum rated capacity	80% Et**
		Minimum rated capacity	78% Et

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Gas-fired duct furnaces	All sizes	Maximum rated capacity	78% Et
		Minimum rated capacity	75% Et
Gas-fired unit heaters	All sizes	Maximum rated capacity	78% Et
		Minimum rated capacity	74% Et
Oil-fired furnaces	<225,000 Btu/h	Seasonal rating	78% AFUE
	>225,000 Btu/h	Both maximum and minimum rated capacity	81% Et**
Oil-fired boilers	<300,000 Btu/h	Seasonal rating	80% AFUE
	>300,000 Btu/h	Both maximum and minimum rated capacity	83% Ec*
Oil-fired boilers (residual)	>300,000 Btu/h	Both maximum and minimum rated capacity	83% Ec
Oil-fired unit heaters	All sizes	Both maximum and minimum rated capacity	81% Et

*Ec = Efficiency, combustion

**Et = Efficiency, thermal

Subp. 9. **Mobile home equipment.** Mobile home furnaces, steam boilers, and direct heating equipment must meet the requirements of this subpart.

MOBILE HOME EQUIPMENT

EQUIPMENT	EQUIPMENT SIZES	EFFICIENCY (AFUE)
Mobile Home Furnaces		75 percent
Gas Steam Boilers		75 percent
Gas Fueled Direct Heating Equipment		
Vented Wall Furnaces	<42,000 Btu/h	73 percent
Fan Type	≥42,000 Btu/h	74 percent
Vented Wall	<10,000 Btu/h	59 percent
Furnaces	≥10,000 and <12,000 Btu/h	60 percent

Gravity Type	≥12,000 and <15,000 Btu/h	61 percent
	≥15,000 and <19,000 Btu/h	62 percent
	≥19,000 and <27,000 Btu/h	63 percent
	≥27,000 and <46,000 Btu/h	64 percent
	≥46,000 Btu/h	65 percent
Vented Floor Furnaces	<37,000 Btu/h	56 percent
	≥37,000 Btu/h	57 percent
Vented Room Heaters	<18,000 Btu/h	57 percent
	≥18,000 and <20,000 Btu/h	58 percent
	≥20,000 and <27,000 Btu/h	63 percent
	≥27,000 and <46,000 Btu/h	64 percent
	≥46,000 Btu/h	65 percent

Subp. 10. **Water chilling packages.**

A. Double effect, heat operated water chilling packages must be used in lieu of single effect equipment.

EXCEPTION: Single effect equipment may be used when all energy input is from low temperature waste heat or renewable energy sources.

B. Water chilling packages, water and air cooled, electrically operated must meet the requirements of this subpart.

ELECTRICALLY OPERATED WATER CHILLER PACKAGES

WATER-COOLED	CFC	NON-CFC
Centrifugal	0.63 KW/Ton	0.73 KW/Ton
Helical-rotary (screw)	0.75 KW/Ton	0.80 KW/Ton
Reciprocating or scroll	0.93 KW/Ton	
AIR-COOLED (any type)		
≥150 Ton	1.41 KW/Ton	
<150 Ton	1.30 KW/Ton	

7678.0800 SERVICE WATER HEATING EQUIPMENT EFFICIENCY REQUIREMENTS.

Subpart 1. **Scope.** Service water heating equipment must meet the minimum efficiency requirements in this part.

Subp. 2. **Standards.** Standards for service water heating equipment are located in *Code of Federal Regulations*, title 10, parts 430 and 435.

Subp. 3. **Efficiency.** Efficiency requirements for water heaters regulated by the National Appliance Energy Conservation Act.

EFFICIENCY REQUIREMENTS FOR WATER HEATERS REGULATED BY THE NATIONAL APPLIANCE ENERGY CONSERVATION ACT

Fuel Type (Size)	Energy Factor
Storage gas (<75,000 Btu/h)	$0.62 - (0.0019 \times V_y)$
Instantaneous Gas (<200,000 Btu/h)	$0.62 - (0.0019 \times V_y)$
Storage oil (<105,000 Btu/h)	$0.59 - (0.0019 \times V_y)$

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Instantaneous oil (<210,000 Btu/h)	0.59 - (0.0019 x V_v)
Electric (<12 kw)	0.93 - (0.00132 x V_v)
Pool heater (all sizes)	Thermal efficiency ≥ 78 percent

Where: V_v = rated storage volume in gallons.

Subp. 4. **Other water heaters.** Efficiency requirements for all other water heaters.

EFFICIENCY REQUIREMENTS FOR ALL OTHER WATER HEATERS

Fuel Type	Input Rating or Volume	Input to Volume Ratio (Btu/gal)	Minimum Thermal Efficiency	Maximum Standby Loss (% hour)
Electric	>12 KW			0.30 + 27 ÷ V_t
Gas/Oil	≤155,000 Btu/h		78 percent	1.30 + 114 ÷ V_t
Gas/Oil				1.3 + 95 ÷ V_t
Gas/Oil	≥10 gal	>4,000	80 percent	2.3 + 67 ÷ V_t
Gas/Oil	<10 gal	<4,000	78 percent	
Gas/Oil	All	>4,000	77 percent	2.3 + 67 ÷ V_t
Unfired storage tanks	All			≤6.5 Btu/hr/sq. ft. based on 80°F water-to-air temperature difference

Where: V_t = the measured storage volume in gallons.

REPEALER. *Minnesota Rules*, parts 7670.0495; 7670.0610, subparts 2, 5, 6, 9, 10, 11, and 13; 7670.0660; and 7670.0800, subpart 4, are repealed.

INCORPORATIONS BY REFERENCE

Part 7672.0400

ASHRAE, 1997 Handbook of Fundamentals, chapter 27;

ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

ASTM E779-87 (1992)el, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization;

CAN/CSA-439-88, Standard Methods of Test for Rating the Performance of Heat Recovery Ventilators, Canadian Standards Association;

CGSB Standard 51.71, The Spillage Test, Canadian Standards Board;

HVI Standard 915-10/95, Procedure for Loudness Rating of Residential Fan Products, Home Ventilating Institute;

HVI Standard 916 (April 1995), Airflow Test Standard; Home Ventilating Institute;

Manual J, Load Calculation for Residential Winter and Summer Air Conditioning, 7th ed., Air Conditioning Contractors of America;

The Model Energy Code, 1995 Edition, Chapter 4, as published by the Council of American Building Officials, Falls Church, Virginia;

MNcheck, residential energy code compliance personal computer program published by the Minnesota Department of Public Service;

NFRC 100-91, Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), and NFRC 100, 1997 ed., Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council; and

UL181A, Duct Sealing for Flexible Ducts, and UL181B, Duct Sealing for Fiberglass Ducts, Underwriters Laboratories, Inc.

Part 7674.0400

ASHRAE, 1997 Handbook of Fundamentals, chapter 27;

ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

Manual J: Load Calculation for Residential Winter and Summer Air Conditioning, 7th ed., Air Conditioning Contractors of America;

MNcheck, residential energy code compliance personal computer program published by the Minnesota Department of Public Service;

The Model Energy Code, chapter 4, 1995 Edition, as published by the Council of American Building Officials, (Falls Church, Virginia); and

NFRC 100-91: Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), and NFRC 100-97: Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council.

Part 7676.0400

ASHRAE Standard 90.1-1989, Section 13, "Building Energy Cost Budget Method";

ASHRAE, 1997 Handbook of Fundamentals, chapter 28;

ASHRAE Standard 84-1991, Method of Testing Air-to-Air Heat Exchangers;

ASTM C236-89 (1993)el, Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot box;

ASTM E283-91, Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors;

ASTM C976-90, (1996)el, Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box;

ASTM E779-87 (1992)el, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization;

COMcheck-MN program, a computer program for energy analysis of medium to small nonresidential buildings developed by Battelle Pacific Northwest Laboratories;

ENVSTD, Envelope System Performance Compliance Calculation program, a computer program developed by Battelle Pacific Northwest Laboratories;

HVAC Air Duct Leakage Test Manual, Section 4, 1985 edition, as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., Vienna, Virginia;

LTGSTD, lighting prescriptive and system performance compliance calculation program, a computer program developed by Battelle Pacific Northwest Laboratories;

"Lighting Efficiency Program Input Wattage Guide," Northern States Power Company, Minneapolis, MN;

NFRC 100-91, Procedure for Determining Fenestration Thermal Properties (Currently Limited to U-values), and NFRC 100-1997, Procedure for Determining Fenestration Product U-factors, National Fenestration Rating Council;

NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence (1995), National Fenestration Council;

Energy Policy Act of 1992, section 122(d), Nominal Full Load Efficiency Requirements for Motors;

National Electrical Manufacturers Association Standards Publication X TP 1-1996, Guide for Determining Energy Efficiency for Distribution Transformers; and

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UL181A, Factory Made Air Ducts and Duct Connectors, Underwriters Laboratories, Inc.

Part 7678.0300

ASHRAE, 1997 Handbook of Fundamentals, chapter 27 and 28;

ASTM C236-89 (1993)el, Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; and

ASTM C976-90, (1996)el, Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box.

Available at the Minnesota State Law Library and through the Minitex interlibrary loan system.

Withdrawn Rules

Department of Natural Resources

Division of Fish and Wildlife

Notice of Withdrawal of Administrative Rule

NOTICE IS HEREBY GIVEN that the Department of Natural Resources has withdrawn its plans to amend *Minnesota Rules*, Chapter 6212, to include provisions that would give the commissioner authority to grant variances to permitted fishing contests for rules governing fishing regulations. The planned rule amendment was noticed by a Request for Comments that was published in the *State Register* on July 21, 1997, at 22 S.R. 58 to 59.

Dated: 3 November 1997

Rodney W. Sando, Commissioner
Department of Natural Resources

By Gail Lewellan, Assistant Commissioner of
Human Resources and Legal Affairs

Pursuant to *Minnesota Statutes* §§ 14.101, an agency must first solicit comments from the public on the subject matter of a possible rulemaking proposal under active consideration within the agency by publishing a notice in the *State Register* at least 60 days before publication of a notice to adopt or a notice of hearing, and within 60 days of the effective date of any new statutory grant of required rulemaking.

The *State Register* also publishes other official notices of state agencies and non-state agencies, including notices of meetings and mat-

Department of Agriculture

Agronomy & Plant Protection Services Division

Notice of Minnesota Agricultural Response Compensation Board Retreat

The Agricultural Chemical Response Compensation Board (ACRRA Board) will meet on Tuesday December 2, 1997 — 9:00 a.m. - 3:00 p.m. for a board retreat. The retreat will be held at the Minnesota Judicial Center Building • 25 Constitution Avenue • St. Paul, Minnesota. The general public may attend this meeting; however, if you do plan to attend you should RSVP the ACRRA staff by Wednesday, November 26, 1997.

Please call the ACRRA Program, 297-3490, should you require additional information.

Minnesota Comprehensive Health Association

Notice of Meeting of the Actuarial Committee

NOTICE IS HEREBY GIVEN that a meeting of the Minnesota Comprehensive Health Association's (MCHA), Actuarial Committee will be held at 1:00 p.m. on Friday, November 21, 1997 by conference call. Members of the public interested in monitoring the conference call, should come to the MCHA executive office located at 5775 Wayzata Blvd., Suite 910, St. Louis Park, MN.

For additional information, please call Lynn Gruber at (612) 593-9609.

Department of Human Services

Finance and Management Operations - Financial Operations

Public Notice Regarding Disproportionate Population Adjustment for State Regional Treatment Centers

NOTICE IS HEREBY GIVEN to recipients, providers of services under the Medical Assistance (MA) Program, and to the public, of changes in the disproportionate population adjustment (DPA) for state Regional Treatment Centers in the MA Program. The following DPA factors are effective for admissions occurring from October 1, 1997 through June 30, 1998. The inpatient cost of care rate of each Regional Treatment Center is increased by the indicated percentage.

This notice is published pursuant to the federal Balanced Budget Act of 1997 (P.L. 105-33), signed by the President on August 5, 1997. Section 4711 of the Balanced Budget Act of 1997, amending Title XIX of the Social Security Act (42 *United States Code* section 1396a(a)(13)), requires the Department to publish final cost of care payment rates, the methodologies underlying the establishment of such rates, and the justification for such rates. Cost of care payment rates are determined in accordance with *Minnesota Statutes*, Section 246.50, subdivision 5.

Increases in inpatient cost of care rates for each Regional Treatment Center, effective from July 1, 1997 through June 30, 1998, were published prior to enactment of the Balanced Budget Act of 1997 in the July 21, 1997 *State Register* (22 S.R. 55). Because the Balanced Budget Act of 1997 lowers these increases, note that the following percentages are lower than those published on July 21, 1997. Additionally, because §4711 of the Balanced Budget Act of 1997 is effective for payments made on or after October 1, 1997, the prior published increases are effective only through September 30, 1997; as stated above, the percentages that follow are effective from October 1, 1997 through June 30, 1997.

Facility	DPA %
Anoka-Metro	45.093%
Brainerd	44.909%
Eveleth	46.369%
Fergus Falls	38.821%
St. Peter	43.750%
Willmar	40.625%

Questions and comments may be directed to:

Larry Houff
Department of Human Services
Reimbursement Division
444 Lafayette Road North
St. Paul, Minnesota 55155-3824
(612) 296-4889

Emergency Medical Services Regulatory Board

Request For Comments on Planned Amendment to Rules Governing Ambulance Services, *Minnesota Rules*, Chapter 4690

Subject of Rules. The Emergency Medical Services Regulatory Board (Board) requests comments on its planned amendment to rules governing drugs that a basic ambulance service is allowed to carry and to administer. The Board is considering rule amendments that: 1) expand the types of drugs that basic ambulance services may carry and administer for emergency medical treatment; 2) allow basic ambulance service personnel to assist a patient in the administration of the patient's personally prescribed drugs; and 3) no longer require any ambulance service to carry syrup of ipecac.

Persons Affected. The amendment to the rules would likely affect basic ambulance services and their medical directors, emergency medical technicians-basic, users of a basic ambulance service, and emergency medical training programs approved by the Board.

Statutory Authority. *Minnesota Statutes*, section 144E.16, subdivision 4 authorizes the Board to adopt rules for establishing standards for the operation of ambulance services.

Public Comment. Interested persons or groups may submit comments or information on these planned rules in writing until 4:30 p.m. on January 23, 1998.

Rules Drafts. The Board has a draft of the planned amendments to the rules.

Agency Contact Person. Written comments, questions , and requests for more information on these planned rules should be addressed to: Keith Wages, Emergency Medical Services Regulatory Board, 2829 University Avenue, SE, #310, Minneapolis, Minnesota 55414- 3222, phone (612) 627-6000 or (800) 747-2011. TTY users may call MN Relay Service for Hearing/Speech Impaired at (800) 627-3529.

Alternative Format. Upon request, this Request for Comments can be made available in an alternative format, such as large print, Braille, or cassette tape. To make such a request, please contact the agency contact person at the address or telephone number listed above.

Note: Comments received in response to this notice will not necessarily be included in the formal rulemaking record submitted to the administrative law judge when a proceeding to adopt rules is started. The agency is required to submit to the judge only those written comments received in response to the rules after they are proposed.

Dated: 3 November 1997

Keith Wages, Executive Director
Emergency Medical Services Regulatory Board

Department of Human Services

Aging Initiative

Public Notice Regarding Changes in the Medical Assistance (MA) Program

NOTICE IS HEREBY GIVEN to recipients and providers of services under the Medical Assistance (MA) Program, of certain changes to Nursing Facility (NF) rates that were enacted by the Second Special Session of the 1997 Minnesota Legislature. This notice is published pursuant to the *Code of Federal Regulations,* Title 42, section 447.205, which requires public notice of any significant proposed change in the methods and standards for payment rates for services.

The actual text of this change is contained in *1997 Minnesota Session Laws* at the chapters cited below. *Minnesota Session Laws* are available at most law libraries. Also you may obtain a copy of the bill summarized in this notice by calling the House or Senate Index at (612) 296-6646 or (612) 296-0504. It is important to note that not all changes made to this program by the 1997 Legislature are mentioned in this notice.

A change was made in the following area:

I. Medical Assistance (MA)

Effective 8/23/97, *Minnesota Laws,* Chapter 203, article 3, section 16, regarding appropriation of $492,700 for replacement of two flood damaged nursing facilities is repealed. (1997 Second Special Session, Chapter 2, section 32)

Department of Human Services

Community Supports for Minnesotan's with Disabilities

Public Notice Regarding Changes in the Medical Assistance (MA) Program

NOTICE IS HEREBY GIVEN to recipients and providers of services under the Medical Assistance (MA) Program, of certain changes to Nursing Facility (NF) rates that were enacted by the Second Special Session of the 1997 Minnesota Legislature. This notice is published pursuant to the *Code of Federal Regulations,* Title 42, section 447.205, which requires public notice of any significant proposed change in the methods and standards for payment rates for services.

The actual text of this change is contained in *1997 Minnesota Session Laws* at the chapters cited below. *Minnesota Session Laws* are available at most law libraries. Also you may obtain a copy of the bill summarized in this notice by calling the House or Senate Index at (612) 296-6646 or (612) 296-0504. It is important to note that not all changes made to this program by the 1997 Legislature are mentioned in this notice.

A change was made in the following area:

I. Medical Assistance (MA)

For rates effective 10/1/97, for a provider group that includes seven ICFs/MR with a total of 54 licensed beds and was affected significantly by the severe conditions of the winter and spring of 1996-1997, the operating cost payment rate for each of its six facilities located in Polk and Norman counties for the rate year beginning October 1, 1997, shall be the operating cost payment rate in effect for each facility on September 30, 1997. (1997 Second Special Session, Chapter 2, section 26)

Department of Human Services

Request for Comments on Planned Amendment to Rules Governing Use of Random Sample Extrapolation in Monetary Recovery, *Minnesota Rules*, 9505.2220

Subject of Rules. The Minnesota Department of Human Services requests comments on its planned technical amendment to rules governing the use of random sample extrapolation in monetary recovery. The Department is considering rule amendments that make part 9505.2220 more useable and less cumbersome. The planned amendment would allow the Department's Surveillance and Integrity Review program to use an appropriate statistically reliable random sampling techniques to calculate the amount of a monetary recovery due from a vendor.

Persons Affected. The amendment to the rules would likely affect all persons who provide services through medical assistance, general assistance medical care, consolidated chemical dependency treatment, MinnesotaCare, or any other health services program administered by the Department.

Statutory Authority. *Minnesota Statutes*, section 256B.04, subdivisions 2 and 10, require the Department to adopt rules to carry out the purposes of Chapter 256B generally and specifically to establish, criteria and procedures for identification and investigation of fraud, theft, abuse, and presentment of false claims by a vendor of medical services and for sanctions against a vendor of medical services.

Public Comment. Interested persons or groups may submit comments or information on these planned rules in writing or orally until 4:30 p.m. on January 30, 1998 OR until further notice is published in the *State Register* that the Department intends to adopt or to withdraw the rules. The Department does not contemplate appointing an advisory committee to comment on the planned amendments, because the planned amendments would be considered technical amendments which are unlikely to cause concern among those affected by the planned amendments.

When this rule part was amended in 1991 there was concern expressed by two trade groups representing vendors about a vendor's rebuttable presumption if the vendor wanted to contest the amount determined by the random sample technique used. The rule was modified during the 1991 rulemaking process to meet the concerns of the commentators regarding rebuttable presumption. The planned rule amendment does not change the rebuttal presumption regarding the calculation of monetary recovery. Copies of the planned amendment were sent to the 1991 commentators for their review. They responded that the planned amendment did not cause them concern regarding the rebuttable presumption.

Rules Drafts. The Department has prepared a draft of the planned rules amendments. The amendments are now available from the agency contact person.

Agency Contact Person. Written or oral comments, questions, requests to receive a draft of the rules, and requests for more information on these planned rules should be addressed to: Robert Klukas, Minnesota Department of Human Services, 444 Lafayette Road, St. Paul, MN 55155-3816, or telephone (612) 296-2794. TTY users may call the Department at (612) 296- 7385.

Alternative Format. Upon request, this Request for Comments can be made available in an alternative format, such as large print, Braille, or cassette tape. To make such a request, please contact the agency contact person at the address or telephone number listed above.

Note: Comments received in response to this notice will not necessarily be included in the formal rulemaking record submitted to the administrative law judge when a proceeding to adopt rules is started. The agency is required to submit to the judge only those written comments received in response to the rules after they are proposed.

Dated: 10 November 1997

David S. Doth
Commissioner
Minnesota Department of Human Services

Department of Labor and Industry

Labor Standards Division

Notice of Addition to Prevailing Wage Rates

An additional class of Labor, Code 418 Plasterer, has been determined for the Commercial Prevailing Wage Rates in Norman County which were certified 10/20/97.

Copies of the corrected certification may be obtained by writing the Minnesota Department of Labor and Industry, Prevailing Wage Section, 443 Lafayette Road, St. Paul, Minnesota 55155-4306 or by calling (612) 296-6452. Charges for the cost of copying and mailing are $1.00 for the first page and $.50 for each additional page. Make check or money order payable to the State of Minnesota.

Gary W. Bastian
Commissioner

Metropolitan Council

Environmental Services

Public Hearing on a Draft Facility Plan for a Laboratory Facility at the Metropolitan Wastewater Treatment Plant Wednesday, December 17, 1997, 7:00 P.M. at Metropolitan Council Chambers, Mears Park Centre, 230 East Fifth Street, St. Paul, MN 55101

A Draft Facility Plan for a Laboratory Facility to be built at the Metropolitan Wastewater Treatment Plant in St. Paul, recommends building a 30,000 gross square foot Laboratory/Water Quality building and remodeling the Administration Building for Operations, Technical Services, and Process Engineering offices. Review copies of the Draft Facility Plan will be available at the Metropolitan Council Environmental Services Office, Mears Park Centre, Sixth Floor, 230 East Fifth Street, St. Paul, MN 55101; phone 602-1129. All interested persons are encouraged to attend the hearing and offer their comments. Persons may register at the door to speak. Upon request, the Council will provide reasonable accommodations to persons with disabilities. Requests for reasonable accommodations must be received by December 10, 1997, by calling 602-1129 or 229-3760 or TDD/TTY). Questions should be referred to Pauline Langsdorf at 612-602-1805. The public hearing record will remain open until January 2, 1998. Written comments should be send to Pauline Langsdorf at the above address or sent via FAX at 602-1003.

Department of Natural Resources

Division of Fish and Wildlife

Request For Comments on Planned Rule Amendments Governing Use of Off-Road Vehicles and other Motor Vehicles for Small Game Hunting, *Minnesota Rules*, Chapter 6234

Subject of Rule. The Minnesota Department of Natural Resources requests comments on its planned rule governing use of motor vehicles for small game hunting, specifically the use of off-road vehicles (ORV) and other motor vehicles for taking grouse and other types of small game. The rule will address fair-chase aspects of using motor vehicles for taking small game, and may also address conflicts between motorized and non-motorized small game hunters.

Persons Affected. The rule may affect hunters and ORV users. The rule may also affect businesses related to hunting and ORV's, such as resorts, motels, gas stations, vehicle manufacturers and dealers.

Advisory Committee. The department does not contemplate appointing an advisory committee to comment on the planned rule. Direct communication with interested and affected parties and public news releases will be used to provide input for the proposed rule.

Statutory Authority. The adoption of the rule is authorized by *Minnesota Statutes*, section 97B.711, subdivision 3.

Public Comment. Interested persons or groups may submit comments or information on the planned rule in writing or orally until 4:30 p.m. on January 16, 1998. The department has not yet prepared a draft of the planned rule. Written or oral comments, questions, requests to receive a draft of the rule when it has been prepared, and requests for more information on this planned rule should be addressed to:

Ed Boggess
Department of Natural Resources
500 Lafayette Road, Box 7
St. Paul, Minnesota 55155
Telephone: (612) 297- 2072

Alternative Format: Upon request, this Request for Comments can be made available in an alternative format, such as large print, Braille, or cassette tape. To make such a request, please contact the agency contact person at the address or telephone number listed above.

Note: Comments submitted in response to this notice will be considered in drafting the rule, but comments submitted in response to this notice will not be included in the formal rulemaking record when a proceeding to adopt a rule is started.

Dated: 7 November 1997

Rodney W. Sando, Commissioner
Department of Natural Resources

By Gene Gere, Assistant Commissioner for Administration

Teachers Retirement Association

Notice of Meeting of the Board of Trustees

The Board of Trustees, Minnesota Teachers Retirement Association will hold a meeting on Friday, December 5, 1997, at 9:30 a.m. in Suite 500, Gallery Building, 17 W. Exchange Street, St. Paul, Minnesota to consider matters which may properly come before the Board.

In addition to requests by state agencies for technical/professional services (published in the State Contracts section), the *State Register* also publishes notices about grants and loans available through any agency or branch of state government. Although some grant and loan programs specifically require printing in a statewide publication such as the *State Register*, there is no requirement for publication in the *State Register* itself.

Agencies are encouraged to publish grant and loan notices, and to provide financial estimates as well as sufficient time for interested parties to respond.

Office of Environmental Assistance (OEA)

Notice of Availability of Solid Waste Processing Grant Funds

The Solid Waste Management Processing Facilities Capital Assistance Program (CAP) was established by the Minnesota Legislature to provide financial and technical assistance to local governments to encourage the proper management of solid waste. The objective of the CAP program is to minimize land disposal of solid waste through solid waste processing and resource recovery.

This notice is issued by the OEA Director under authority provided in *Minnesota Rules* Parts 9210.0100 to 9210.0180. The purpose of this notice is to solicit preliminary applications for projects that meet the CAP Program objectives.

Eligible applicants are cities, counties, solid waste management districts, and sanitary districts. The applicant, or their county, must have an OEA approved County Solid Waste Management Plan.

Eligible projects are solid waste processing facilities that include resource recovery. The project, inclusive of land, building, and equipment, must be owned by the Applicant. Examples of eligible facilities are waste-to-energy facilities, composting facilities, recycling/household hazardous waste facilities, projects to improve control of or reduce air emissions, and transfer stations that will serve waste processing facilities.

Depending on the project type, a project may receive funding of 25 to 50% of the eligible capital cost, up to a maximum of $2 million. Multi-county projects with an intercounty cooperative agreement may receive 25 to 50% of the eligible capital costs, or up to $2 million times the number of participating counties, whichever is less. A project to construct a new mixed municipal solid waste transfer station that has an enforceable commitment of at least 10 years, or of sufficient length to retire bonds sold for the facility, to serve an existing resource recovery facility may receive grant assistance up to 75% of the capital cost of the project if addition of the transfer station will increase substantially the geographical area served by the resource recovery facility.

Copies of the CAP Procedures Manual and Application Forms, including the statutes and rules applicable to the program, are available by contacting:

Mary James
Office of Environmental Assistance
520 Lafayette Road No., Second Floor
St. Paul, Minnesota 55155-4100
(612) 215-0194, or 1-800-657-3843 (toll-free in Minnesota)

OEA staff is available to meet with interested applicants to discuss the CAP program, the grant process, and proposed projects prior to applicants submission of preliminary grant applications. All submissions should be unbound, single-sided, page numbered, and on 8 1/2" by 11" paper.

Preliminary applications meeting the requirements of *Minnesota Statutes* 115A.51, 115A.54, and *Minnesota Rules* Parts 9210.0100 to 9210.0180 must be received by the OEA at the above address by 4:30 p.m., CST, Friday, **January 30, 1998.**

Preliminary applications should be mailed or hand delivered to the OEA. Faxed submittals will not be accepted.

Department of Health

Division of Environmental Health

Requests for Proposals for Two Lead-Related Grants

1. The Minnesota Department of Health intends to award grants of up to $75,000 to one or more applicants for purchase and maintenance of lead cleanup equipment for loan to the public and related training.
2. The Minnesota Department of Health intends to award grants of up to $35,000 to one or more applicants for provision of lead-safe housing and relocation costs for families displaced by lead abatement of their primary residence.

Key Dates

- Proposals must be postmarked by **December 18, 1997.**
- Awards will be made by January 19, 1998.
- Funding for lead cleanup equipment must be used by May 15, 1999.
- Funding for lead-safe housing must be used by June 30, 1999.

Submit three copies of proposals to:

Douglas M. Benson
Minnesota Department of Health
Division of Environmental Health
121 East Seventh Place, Suite 360
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Questions on this Request for Proposal should be addressed to Mr. Benson at (612) 215-0881. TTY users may call the Department at (612) 623-5522.

Grant 1: Lead Cleanup Equipment and Material Grants

Proposals must identify lead cleanup equipment to be purchased, its cost, and how it will be made available to the public. Applicants must indicate that they have space available to store and maintain the equipment. Applicants must also explain how they will cope with any perceived potential liability from loaning lead cleanup equipment to the public. Lead cleanup equipment includes high efficiency particle accumulator and wet vacuum cleaners, drop cloths, secure containers, respirators, scrapers, dust and particle containment material, and other cleanup and containment materials to remove loose paint and plaster, patch plaster, control household dust, wax floors, clean carpets and sidewalks, and cover bare soil. Lead cleanup equipment may include other items if the applicant justifies it as being effective at removal or disposal of lead waste.

Eligible applicants

Grant applicants must be nonprofit community-based organizations in areas at high risk for toxic lead exposure. Applicants must include copies of their letters from the U.S. Internal Revenue Service confirming their status as "501(c)(3)" organizations.

Applicants must demonstrate ability to provide services to people who are at risk for lead exposure. Areas at high risk for toxic lead exposure include census tracts that meet one or more of the following criteria:

1. elevated blood lead levels have been diagnosed in a population of children or pregnant women;
2. many residential structures are known to have or are suspected of having deteriorated lead- based paint; or
3. median soil lead levels greater than 100 parts per million.

Eligible Costs

Eligible costs include:

1. purchase of the equipment identified in the proposal;
2. provision of a location for storage and loan to people for cleanup of residential property;
3. training of grantee's staff and of people borrowing equipment;
4. routine cleaning and maintenance of the equipment by grantee's staff; and
5. proper disposal of any waste materials on or in the equipment when it is returned.

Grant 2: Safe Housing Grants

Safe housing includes lead-safe temporary shelter for families displaced by lead abatement or lead hazard reduction that was ordered by an inspecting agency.

Eligible applicants

Applicants must be community health service agencies with authority to conduct lead inspections within their jurisdictions.

Eligible Costs

Eligible costs include:

1. inspection of housing prior to purchase or rent;
2. purchase or rent of temporary housing found by inspection to be free of sources of immediate lead exposure, i.e., free of deteriorating lead-based paint, free of bare lead- contaminated soil and dust, and free of lead-contaminated drinking water;
3. moving expenses up to $250 per family; and
4. staff training costs related to provision of lead-related health education to families using lead-safe, temporary housing.

Professional, Technical & Consulting Contracts

Department of Administration procedures require that notice of any consultant services contract or professional and technical services contract which has an estimated cost of over $10,000 be printed in the *State Register*. These procedures also require that the following information be included in the notice: name of contact person, agency name and address, description of project and tasks, and final submission date of completed contract proposal.

In accordance with *Minnesota Rules* Part 1230.1910, certified Targeted Group Businesses and individuals submitting proposals as prime contractors shall receive the equivalent of up to 6% preference in the evaluation of their proposal. For information regarding certification, call the Materials Management Helpline (612) 296-2600 or [TTY (612) 297-5353 and ask for 296-2600].

Department of Administration

Division of State Building Construction

Notice of Procedural Change: ***The Department of Administration, Division of State Building Construction, will be using Professional/Technical contracts in lieu of writing Master Professional/Technical Services Contracts. Firms desiring to do business with the State should submit the required documentation for their areas of interest outlined below. Firms will remain on file throughout calendar year 1998. As needs dictate, firms responding to this request will be contacted and requested to submit a project specific proposal and availability status. Job specific Professional/Technical contracts will then be processed.***

Notice of Requests for: (1) Investigatory Professional Services of Architects, Engineers, and Landscape Architects; (2) Professional Testers; and (3) Programming and Interior Designers

1) Contracts Available for Registered Professional Architects, Engineers, Landscape Architects, and Land Surveyors

The Department of Administration (Admin) intends to compile a list of qualified professionally registered architects, engineers, and landscape architects to provide investigatory services only (no design) on a number of projects during the year commencing January 1, 1998. These projects will be varied in nature and scope and will involve new construction, remodeling projects and facility studies. Projects under this procedure will have fees limited, not to exceed, Five Thousand Dollars ($5,000.00) per project. Particular emphasis will be placed on the background and experience of the firm on similar projects as well as the firm's geographic proximity to the project.

Firms wishing to be considered for these projects are asked to submit a letter of interest giving qualifications, experience of the firm, **Federal Tax Identification Number (or Social Security Number) and State Tax Identification Number.** Qualified applicants will be contacted as the need arises and may be requested to submit project specific proposals or appear in St. Paul for an interview. In submitting their letter of interest or resumes, firms shall indicate the areas shown below in which they possess qualifications.

1) Research and Planning
2) Educational
3) Health and Medical
4) Correctional
5) Restoration
6) Office and Administration
7) Recreational
8) Service and Industrial
9) Arts, including Performing Arts
10) Exhibition and Display
11) Landscape and Site Planning
12) Interiors
13) Water and Waste Facilities
14) Energy Supply and Distribution
15) Pollution Control
16) Acoustics
17) Hazardous Substance Disposition
18) Mechanical Engineering
19) Electrical Engineering
20) Civil Engineering
21) Structural engineering
22) Land Surveying

The names of firms responding will be provided to other agencies of the State thereof having a need for the services described herein.

Names of qualified firms will be retained on file with Admin until December 31, 1998.

Firms which have previously responded to this request need to resubmit in accordance with the requirements above.

Designers for projects with estimated costs or fees in excess of those shown above will be selected by the Commissioner of Administration from the list of firms that responded to the July 7, 1997 *State Register* advertisement, up to those limits requiring submission to the State Designer Selection Board. Projects referred to the Board will be advertised in the *State Register*.

2) Contracts Available for Registered/Certified Professional Testers

The Department of Administration (Admin) intends to retain the services of qualified professionally registered/State or Nationally certified individuals and firms to conduct site surveys, materials testing, soil borings and tests, hazardous materials remediation layout, or air monitoring. These projects will be varied in nature and scope. The fees associated with these projects will generally be in the $3,000.00 - $5,000.00 range, although the fees for some projects may exceed this amount.

As projects arise, it is the intention of Admin to contact firms who have expressed an interest in providing such services to the State. The final selection will be made on the basis of the background and experience of the firm, the geographic proximity of the firm to the project site, and an estimate of the fees to be charged for the specific project and the ability to meet given time frames. Firms wishing to be considered for these projects are asked to submit a letter of intent or resume consisting of no more than 10 pages outlining their background, qualifications, and fields of expertise selected from the following choices: (Site surveying, materials testing, soil borings and tests, hazardous materials remediation layout, or air monitoring) and **Federal Tax Identification Number (or Social Security Number) and State Tax Identification Number.**

Qualified applicants will be contacted as the need arises for project specific proposals and may be requested to appear in St. Paul for an interview.

Firms which have previously responded to this request need to resubmit in accordance with the requirements above.

Names of qualified firms will be retained on file with Admin until December 31, 1998. Names of firms will be provided to other agencies of the State thereof having a need for the services described herein.

3) Contracts for Programming and Designing Furnishing Layouts for Public Facilities

The Department of Administration (Admin) intends to retain the services of qualified independent interior designers to program and design furnishing layouts for State facilities, both owned and leased through December 31, 1998. These projects would be varied in scope; however, in no case will the fees for an individual project exceed $35,000.00.

Firms wishing to be considered for these projects are asked to submit a letter of intent or resume outlining the following information:

1. Name, address, and contact person for the firm;
2. The number of staff involved in interior design and their classifications;
3. Whether the firm has CAAD capabilities;
4. A listing of the number of interior design projects in the past three years in each of the following categories to 5000 square feet

   5000 to 10000 square feet

   10001 to 15000 square feet

   15001 + square feet
5. A listing of the firms past 10 projects indicating date completed and square footage.
6. An indication of the lines of modular furnishings with which the firm has familiarity.
7. **Federal Tax Identification Number (or Social Security Number) and State Tax Identification Number**

Designers' Services and Responsibilities Will Include the Following Tasks:

1. Interview key personnel and survey existing facilities to collect programming data.
2. Inventory existing equipment and systems furnishings to be reused.
3. Develop prototype workstations.
4. Develop furnishings budget.
5. Prepare (as each individual project requires) space plans and/or furniture, modular furniture and related equipment lay-outs for Agency approval.
6. Investigate existing conditions and make all necessary field verifications and should they occur, resulting changes to plans.
7. Develop color and finishes for systems furnishings to coordinate with building finishes.
8. Prepare written specifications where applicable for all new furniture, new or refurbished.
9. Prepare a preliminary list cost estimate for all new modular furniture.
10. Based on the approved design, the Designer shall prepare for the Agency's approval, documents consisting of drawings, specifications indicating quantity, product number, description, and list price, and any other document(s) necessary to describe the quantity and the placement of the furnishings and related equipment. The modular furniture will require the following:
    a. Panel plan(s) to indicate panel height, width, finish information, panel type (i.e.; acoustical, fabric wrapped, powered, etc.) And critical dimensions.
    b. Electrical plan(s) to indicate dimensioned location of power entry points where panel system interfaces with build ing power and type of power entry (i.e.; power pole, base power entry, etc.). The plan must indicate the number, location and type of duplex receptacles to be used, and must also locate all voice and data locations.
    c. Component plan(s) to indicate size, type, finish information, and any necessary for complete installation (i.e.; install heights, special conditions, etc.).
    d. Reconfiguration plan(s) shall be developed when existing modular furniture is to be reused in a new floor plan(s), and when reconfigured in phases the phases must be indicated on the floor plan(s).
11. Documents shall be prepared to include, but not limited to:
    a. Floor plans showing functional relationships between work units.
    b. Floor plans indicating furniture types and arrangements.
    c. Furniture specifications.
    d. Furniture/furnishings installation schedule, including critical dimensions.
12. Prepare move documents indicating the location of all existing furniture to be reused and any special instructions necessary for moving and placement of existing furnishings. Where existing modular furniture is to be reused, a list must be provided to installers indicating existing product to be reused, excess existing product, and new product required. If the reconfiguration is to be complete in phases the list must be broken down into their respective phases.

13. Review with the Dealer/Manufacturer the schedules for delivery and installation of the modular furniture. The Designer shall not be held responsible for any malfeasance, neglect or failure of the supplier or installer to meet completion schedules or to perform respective duties and responsibilities.
14. All interpretations necessary for the installation of those portions of the work where the Designer is responsible, shall be supplied by the Designer.
15. Review and respond to the suppliers submittals of shop drawings, product data, samples, etc., but only for those portions of the design for which the Designer is responsible, and for conformance only with the information given in the documents. The Designer's review of shop drawings, product data and samples shall not relieve the Agency and its suppliers and/or installers of responsibility for any deficiencies in, or deviations from the requirements of the Documents, unless written notice is given to the Designer at the time of submittal.
16. The Designer shall review the placement of all items to determine that the modular furniture and related equipment have been installed in accordance with the Documents, or shall provide directions to alter locations.

Firms which have previously responded to this request need to resubmit in accordance with the requirements above.

Firms wishing to be considered for one or more of the listings described in this announcement may send their letter of interest, indication of which category(s) (1, 2, 3) and other pertinent information ***on or before close of business December 15, 1997*** *to Division of State Building Construction, Room G-10, State Administration Building, 50 Sherburne, St. Paul, Minnesota 55155, attn: Lawrence Pepin*

Questions regarding this request should be directed to Lawrence Pepin (voice)612.296.4650 or (e-mail) lawrence.pepin@state.mn.us

Higher Education Services Office

Request for Proposals for Redesign of Web Site

The Higher Education Services Office (MHESO) is requesting proposals from qualified professionals for assistance with strategic planning for the redesign of the agency web site as a medium to support agency mission, communications, and service delivery functions. Proposals must be submitted no later than ***December 8, 1997.***

The Request for Proposals (RFP) does not obligate the MHESO to complete this project, and the agency reserves the right to cancel the solicitation if it is considered to be in its best interest.

The total cost of this proposal is not to exceed $50,000.

Copies of the complete RFP are available from:

Communications
Minnesota Higher Education Services Office
400 Capitol Square Building
550 Cedar Street
St. Paul, MN 55101
612/296-9684

Department of Human Services

Notice of Request for Proposal to Provide Services to the Child Support Payment Center

The Minnesota Department of Human Services, Child Support Enforcement Division ("the State"), is seeking proposals from qualified contractors to assist in the processing of child support payments at its central facility. *Minnesota Statutes* sections 518.5851-5853 require the State to centralize the receipting, processing and disbursement of child support payments. The State is also authorized to use electronic-transfer technology to receipt and disburse payments. The selected contractor will be awarded a contract with the State to assist in receipting and disbursing child support payments. The contract with the State will include three (3) months of training/pilot and twenty-one (21) months of full implementation of the functions described in this proposal. The State reserves the right to extend the contract for three more years, in one-year increments. This request for proposal does not obligate the State to complete the proposed project and the State reserves the right to cancel the solicitation if it is considered to be in its best interest.

PLEASE NOTE: There are two separate RFPs for services related to the Child Support Payment Center. Qualified contractors may respond to more than one RFP.

In conjunction with the public notice of this contract, notice of this project will be provided to the Human Resources offices of all *Minnesota Statutes* 15.091 agencies and the Higher Education Board. In compliance with *Minnesota Statutes* 16B.167, the availability of this contracting opportunity is being offered to state employees. Responses of any state employees along with other responses to this Request for Proposal (RFP) shall be evaluated. This notice or the RFP does not obligate the State to complete the proposed project, and the State reserves the right to cancel the solicitation if it is considered to be in its best interest.

A copy of the complete RFP may be obtained by contacting Diane Eishen at: (612) 215-5632; fax: (612) 297-4450; or by writing to:

Attn: Diane Eishen
Minnesota Department of Human Services
Child Support Enforcement Division
444 Lafayette Road
St. Paul, MN 55155-3846

The closing date for proposal submission is no later than 4:00 p.m. on January 5, 1998. No faxed or other electronically transmitted proposals will be accepted.

Department of Human Services

Notice of Request for Proposal to Provide a Front-end Receipting System

The Minnesota Department of Human Services, Child Support Enforcement Division ("the State"), is seeking proposals from qualified contractors to assist in establishing an automated, server-based front-end payment receipting system to be used at the State's Child Support Payment Center. *Minnesota Statutes* sections 518.5851-5853 require the State to centralize the receipting, processing and disbursement of child support payments. The selected contractor will be awarded a contract with the State to develop, test, install and provide maintenance for a front-end payment receipting system as defined in this Request For Proposals ("RFP").

PLEASE NOTE: There are two separate RFPs for services related to the Child Support Payment Center. Qualified contractors may respond to more than one RFP.

In conjunction with the public notice of this contract, notice of this project will be provided to the Human Resources offices of all *Minnesota Statutes* 15.091 agencies and the Higher Education Board. In compliance with *Minnesota Statutes* 16B.167, the availability of this contracting opportunity is being offered to state employees. Responses of any state employees along with other responses to this Request for Proposal (RFP) shall be evaluated. This notice or the RFP does not obligate the State to complete the proposed project, and the State reserves the right to cancel the solicitation if it is considered to be in its best interest.

A copy of the complete RFP may be obtained by contacting Diane Eishen at: (612) 215-5632; fax: (612) 297-4450; or by writing to:

Attn: Diane Eishen
Minnesota Department of Human Services
Child Support Enforcement Division
444 Lafayette Road
St. Paul, MN 55155-3846

The closing date for proposal submission is no later than 4:00 p.m. on January 5, 1998. No faxed or other electronically transmitted proposals will be accepted.

Department of Natural Resources

Division of Forestry

Notice of Request for Proposals for Preparation of Forest Stewardship Plans

NOTICE IS HEREBY GIVEN that the Department of Natural Resources through its Division of Forestry is requesting proposals to help provide technical assistance to non-industrial private forest landowners to manage their land using ecosystem concepts. Preparation of Forest Stewardship plans for individual private landowners is the main activity. A higher education degree in a natural resource science such as forestry is required. Human relation skills, ability to perform year round field work, and proficiency in technical writing are required.

The funding source is federal forest stewardship funding and a state appropriation based on the Minnesota Forestry Association proposal to the Legislative Commission on Minnesota Resources. The funds are limited to local units of government and private sector for-profit and non-profit organizations, individuals, and companies. All proposals are reviewed and ranked by the 30 member State Forest Stewardship Committee.

To obtain a copy of the Request for Proposal, please contact:

Sharon Schmitz
DNR-Forestry
500 Lafayette Road
St. Paul, MN 55155-4044
612-297-7298

Pollution Control Agency

Notice of Request for Proposals for Consultant Services

The Minnesota Pollution Control Agency (MPCA) requests proposals to assist in the derivation of biologically-based sediment quality guidelines (SQGs) for the St. Louis River Area of Concern in northeastern Minnesota.

Contract Period: January 1, 1998 - September 30, 1999

Proposals must be received not later than 4:00 p.m. CST, December 16, 1997.

To obtain a complete copy of the Request for Proposal, contact:

Judy L. Crane, Ph.D.
Research Scientist 2
Water Quality Division
Minnesota Pollution Control Agency
Phone: (612) 297-4068
Fax: (612) 297-2343
e-mail: Judy.Crane@pca.state.mn.us

In compliance with *Minnesota Statutes* § 16B.167, the availability of this contracting opportunity is being offered to state employees. We will evaluate the responses of any state employee along with other responses to this Request for Proposal.

Office of the Revisor of Statutes

Notice of Request for Systems and Programming Services

NOTICE IS HEREBY GIVEN that the Office of the Revisor of Statutes is seeking the following systems and programming services for the period ending January 31, 1998:

System design and programming on an in-house text editing and composition system.

Programming experience in C on Hewlett Packard UNIX operating system is a prerequisite to performing the services. Where current contractors have at least equal qualifications, they will be given preference in order to maintain program consistency and stability. Responses must be received by the Office of the Revisor of Statutes by Monday, November 24, 1997.

Direct inquiries and responses to:

Tom Klein
Office of the Revisor of Statutes
700 State Office Building
100 Constitution Avenue
St. Paul, MN 55155
(612) 297-2949
TTY use State Relay Services: Metro MN 297-5353
Greater MN 1-800-627-3529

Department of Transportation

Operations Division

Notice of Availability of a Contract for: "Competitive Cost Analysis Projects to Develop a View of the Competitive Environment for Selected Mn/DOT Activities"

The Minnesota Department of Transportation is requesting proposals for doing competitive cost analysis projects for selected Mn/DOT activities (approximately 50). This competitive cost analysis will allow us to compare, and possibly benchmark, our activities against the private sector.

The Department of Transportation has estimated that the cost of this project need not approach but shall not exceed $45,000. This does not obligate the agency to spend the estimated amount.

It is anticipated that the contract period will begin on January 15, 1998 and continue through June, 1999.

For further information, or to obtain a copy of the completed Request for Proposal, contact: Joy Penney, Business Operations Coordinator, Mn/DOT, 1000 T.H. 10 West, Detroit Lakes, MN 56501 or 218/846-0792.

Proposal must be received at the above address no later than 4:00 p.m. on December 15, 1997.

This request does not obligate the State of Minnesota, Department of Transportation, to complete the work contemplated in this notice, and the department reserves the right to cancel this solicitation. All expenses incurred in responding to this notice shall be borne by the responder.

Non-State Public Bids, Contracts & Grants

The *State Register* also serves as a central marketplace for contracts let out on bid by the public sector. The *Register* meets state and federal guidelines for statewide circulation of public notices. Any tax-supported institution or government jurisdiction may advertise contracts and requests for proposals from the private sector.

It is recommended that contracts and RFPs include the following: 1) name of contact person; 2) institution name, address, and telephone number; 3) brief description of project and tasks; 4) cost estimate; and 5) final submission date of completed contract proposal. Allow at least three weeks from publication date (four weeks from date article is submitted for publication). Surveys show that subscribers are interested in hearing about contracts for estimates as low as $1,000. Contact the editor for further details.

Metropolitan Council Environmental Services

Public Notice for Letters of Interest for Professional Services

NOTICE IS HEREBY GIVEN that the Metropolitan Council Environmental Services (MCES) is soliciting qualifications for professional engineering services for the Metropolitan Wastewater Treatment Plant (MWWTP) Liquid Treatment project. Services are required in the areas of Structural, Architectural, HVAC, Electrical and Instrumentation to support the previously selected lead process consultant.

The Liquid Treatment project will be based on recommendations contained in the recently completed MWWTP Master Plan and will incorporate improvements as necessary for process optimization, facility rehabilitation, capacity expansion and regulatory compliance to meet current and future demands of the MWWTP liquid treatment stream. The consulting team will support MCES efforts in the areas of facility planning, detailed design and construction support services.

All supporting consultants on this project will be selected jointly by MCES and the lead process consultant and will be expected to enter into subconsulting agreements with the lead process consultant.

All firms interested in being considered for any or all of the disciplines identified above are invited to submit a Letter of Interest asking for the Statement of Qualifications package. Statements of Qualifications will tentatively be due December 12, 1997.

All inquiries are to be addressed to:

Administrative Assistant, Contracts and Documents
Metropolitan Council Environmental Services
Mears Park Centre
230 East Fifth Street
St. Paul, MN 55101

St. Paul Water Utility

Notice of Request for Proposals for Review of Accounting and Financial Reporting Function

The Saint Paul Water Utility is soliciting proposals from qualified individuals or firms to perform a review of its accounting and financial reporting function.

Proposals must be submitted on or before 2:00 p.m., December 17, 1997 in Room 280 City Hall/Court House, 15 W Kellogg Blvd, Saint Paul, MN 55102. Proposal forms and specifications are available in the Division of Contract & Analysis Services, Room 280 City Hall/Court House.

Project Manager: Bill Carroll, 266-6322
Buyer: Duane Kroll, 266-8905

University of Minnesota

Notice of Request for Proposals for Intercampus Natural Gas Pipeline

Extension of Proposal Deadline:

The University of Minnesota is seeking proposals from qualified firms for the design, construction and maintenance of an intercampus natural gas pipeline. This pipeline will connect the steam generation plants located on the St. Paul and Minneapolis campuses of the University. The deadline for receipt of proposals is ***extended to 2:00 p.m., Thursday, December 18, 1997.***

Details concerning the scope of work, qualifications, evaluation criteria and submission requirements are included in the Request for Proposals. A copy of the Request for Proposals is available upon non-refundable payment of $50 made payable to Sebesta Blomberg & Associates, Inc. for shipping and handling and request to Tom Schubbe, Sebesta Blomberg & Associates, Inc., 5075 Wayzata Boulevard, Minneapolis, MN 55416 (Telephone: 612-546-7570; FAX: 612-546-0494, or e-mail: tschubbe@sebesta.com)

Washington County

Request for Proposal for Browns Creek Hydrologic Study

Washington County is requesting proposals from consultants interested in preparing a hydrologic study of the Browns Creek watershed. Washington County is conducting this study on behalf of and at the request of the Browns Creek Watershed District. It is the intent of this request to receive proposals from qualified consultants experienced with this type of study.

1. INSTRUCTIONS

Washington County reserves the right to modify or interpret the request for proposal documents by additions, deletions, clarifications or corrections. If any potential proposer desires clarification or interpretation of any aspect of these Proposal Documents, such request shall be directed to:

Mark Doneux, Water Resource Specialist
Washington Soil and Water Conservation District
1825 Curve Crest Boulevard, Room 101
Stillwater, MN 55082
Phone: 612.430.6826
Fax: 612.430.6819

All proposals must be submitted in an envelope which bears the inscription: "PROPOSAL SUBMITTAL FOR BROWNS CREEK HYDROLOGIC STUDY", Due: 5:00 p.m., December 1, 1997, as well as the name and address of the vendor.

Proposal must be sent or delivered to:

Washington Soil and Water Conservation District
1825 Curve Crest Boulevard, Room 101
Stillwater, MN 55082

Proposals received after 5:00 p.m., December 1, 1997 will not be considered.

Ten original proposals must be submitted. Oral, facsimile, telegraphic or other electronic transmissions of proposals are invalid and will not receive consideration.

FOR COPIES OF THE REQUEST FOR PROPOSALS, CONTACT MARK DONEUX AT THE WASHINGTON SOIL AND WATER CONSERVATION DISTRICT