

1 Department of Energy, Planning and Development

2 Energy Division

3

4 Adopted Rules of the Department of Energy, Planning and
5 Development Governing Certification and Registration of Solar
6 Collectors to Qualify Renewable Energy Source Expenditures for
7 the Minnesota Individual Income Tax Residential Energy Credit (6
8 MCAR SS 2.1501-2.1512)

9

10 Rules as Adopted

11 6 MCAR S 2.1501 Purpose and authority. Certain renewable energy
12 source expenditures qualify for income tax credit treatment by
13 the Minnesota Department of Revenue. After December 31, 1980,
14 expenditures for a solar collector qualify for the individual
15 income tax residential energy credit only if the Minnesota
16 Department of Energy, Planning and Development has certified the
17 solar collector, pursuant to Minn. Stat. S 290.06, subd. 14.
18 The purpose of 6 MCAR SS 2.1501-2.1512 is to establish the
19 criteria for certification of solar collectors and the
20 procedures for obtaining certification.

21 6 MCAR S 2.1502 Definitions. For purposes of 6 MCAR SS
22 2.1501-2.1512, the following definitions apply.

23 A. Absorber. "Absorber" means the part of the solar
24 collector that receives the incident solar radiation and
25 transforms it into thermal energy. It usually is a solid
26 surface through which energy is transmitted to the transfer
27 fluid; however, the transfer fluid itself could be the absorber
28 in certain configurations.

29 B. Ambient air. "Ambient air" means the outdoor air in the
30 vicinity of the solar collector being tested.

31 C. Approved. "Approved" means accepted, in writing, by the
32 department.

33 D. Certification. "Certification" means the act of
34 attesting officially to something as being true and as meeting a
35 standard.

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- 1 E. Collector. "Collector" means a solar collector.
- 2 F. Collector enclosure. "Collector enclosure" means the
3 structural frame that supports the components of the collector
4 and protects internal components from the environment.
- 5 G. Concentrating collector. "Concentrating collector" means
6 a solar collector that uses reflectors, lenses, or other optical
7 elements to concentrate the radiant energy passing through the
8 aperture onto an absorber that has a surface area smaller than
9 the aperture.
- 10 H. Concentrator. "Concentrator" means the part of the
11 concentrating collector that directs the incident solar
12 radiation onto the absorber.
- 13 I. Corrosion. "Corrosion" means the deterioration of a
14 substance or its properties caused by a chemical or
15 electrochemical reaction with its environment.
- 16 J. Cover plate. "Cover plate" means the material or
17 materials covering the aperture and most directly exposed to the
18 solar radiation. These materials generally are used to reduce
19 the heat loss from the absorber to the surroundings and to
20 protect the absorber.
- 21 K. Crazing. "Crazing" means the formation of minute surface
22 cracks in a major component or subassembly.
- 23 L. Credit. "Credit" means the residential energy credit
24 authorized by Minn. Stat. S. 290.06, subd. 14.
- 25 M. Custom-built solar collector. "Custom-built solar
26 collector" means a site-dependent collector fabricated from
27 components that do not constitute a solar collector kit.
- 28 N. Deformation. "Deformation" means a change in shape or
29 form of any material in the collector from the conditions that
30 existed before testing.
- 31 O. Delamination. "Delamination" means separation into
32 constituent layers.
- 33 P. Department. "Department" means the Minnesota Department
34 of Energy, Planning and Development.
- 35 Q. Domestic hot water. "Domestic hot water" means heated
36 tap water, as distinguished from water heated by a hydronic hot

1 water space heating system.

2 R. Express warranty. "Express warranty" means an
3 affirmation of fact or promise made in connection with the sale
4 or installation of a solar collector or component to a customer
5 that relates to the nature of the material or workmanship and
6 affirms or promises that the material or workmanship is defect
7 free or will meet a specified level of performance over a
8 specified period of time. "Express warranty" also means an
9 undertaking in connection with the sale or installation of a
10 solar system or component to refund, repair, replace, or take
11 other remedial action with respect to the solar system or
12 component. To be an express warranty, the affirmation, promise,
13 or undertaking must become part of the basis of the bargain
14 resulting in the purchase or installation of a solar collector
15 by a customer.

16 S. Gross collector area. "Gross collector area" means the
17 maximum projected area of the complete collector module,
18 including integral mounting means.

19 T. Home-built solar collector. "Home-built solar collector"
20 means a collector built by the owner according to purchased
21 plans or the owner's own design from supplies or components that
22 do not constitute a solar collector kit.

23 U. Inch-pound units. "Inch-pound units" means measurement
24 units that have traditionally been used in the United States,
25 including but not limited to foot, gallon, pound-mass, hour,
26 ampere, degree Fahrenheit and British thermal unit (Btu).

27 V. Innovative collector. "Innovative collector" means a
28 solar collector that, because of its design, cannot be evaluated
29 fairly and adequately by the test methods described in 6 MCAR S
30 2.1507.

31 W. Instantaneous efficiency. "Instantaneous efficiency" of
32 a solar collector means the amount of energy removed by the
33 transfer fluid over a given measuring period divided by the
34 total solar radiation incident onto the gross collector area
35 during the measuring period.

36 X. Integrity of construction. "Integrity of construction"

1 means the physical and mechanical properties of a solar
2 collector that collectively are responsible for the overall
3 thermal performance and physical structure of the solar
4 collector.

5 Y. International System of Units. "International System of
6 Units" means the measurement system defined in the 'Standard for
7 Metric Practice,' issued by the American Society for Testing and
8 Materials as ASTM E380-81 (Philadelphia, 1981). It is commonly
9 referred to as the "metric system," though it does not include
10 many metric terms in use before 1960.

11 Z. Irradiance. "Irradiance" means the rate of solar
12 radiation received by a unit surface area.

13 AA. Irradiation. "Irradiation" means incident energy per
14 unit area on a surface over a specified time.

15 BB. Material category. "Material category" means a class of
16 materials of the same generic type; for instance, glass,
17 fiberglass, and plexiglass are materials in the category of
18 collector glazings.

19 CC. Manufactured solar collector. "Manufactured solar
20 collector" means a solar collector made of components that have
21 been fitted together at an assembly plant. None of the
22 components needs to have been fabricated by the assembly plant
23 for the collector to be classified a manufactured collector.

24 DD. Model. "Model" means a solar collector distinguishable
25 by a specified size, set of materials, construction, and
26 performance. A change in any of these basic characteristics
27 constitutes a new model.

28 EE. Nonpublic data. "Nonpublic data" means "trade secret
29 information" as that term is defined in Minn. Stat. S ~~15.1673~~
30 13.37, subd. 1, clause (b), that is, government data, including
31 a formula, pattern, compilation, program, device, method,
32 technique, or process:

33 1. That was supplied by the affected individual or
34 organization;

35 2. That is the subject of efforts by the individual or
36 organization that are reasonable under the circumstances to

1 maintain its secrecy; and

2 3. That derives independent economic value, actual or
3 potential, from not being generally known to, and not being
4 readily ascertainable by proper means by, other persons who can
5 obtain economic value from its disclosure or use.

6 FF. Outgassing. "Outgassing" means the generation of vapors
7 from materials during exposure to elevated temperature or
8 reduced pressure.

9 GG. Performance rating. "Performance rating" means the
10 rating values based on thermal output characteristics of solar
11 collectors as determined by tests specified in 6 MCAR S 2.1507.

12 HH. Reference collector. "Reference collector" means a
13 solar collector currently certified by the department to which a
14 second collector is being compared for the purposes of
15 certification under the similar collector rules found in 6 MCAR
16 S 2.1506 B. and 6 MCAR S 2.1508 B.

17 II. Reflector or reflective surface. "Reflector" or
18 "reflective surface" means a surface intended primarily to
19 reflect radiant energy.

20 JJ. Registered. "Registered" means recorded as an eligible
21 expenditure for Minnesota income tax credit.

22 KK. Revoke certification. "Revoke certification" means to
23 withdraw certification from a solar collector. When
24 certification is revoked, the collector is no longer eligible
25 for the credit. A new application is required to certify a
26 collector for which certification has been revoked.

27 LL. Service hot water. "Service hot water" means heated tap
28 water in nonresidential applications.

29 MM. Severe corrosion. "Severe corrosion" means corrosion
30 that impairs the function of a collector or that exhibits
31 evidence that it will progress to the point where it will impair
32 the function of the collector.

33 NN. Severe deformation. "Severe deformation" means
34 deformation that impairs the function of a collector or that
35 exhibits evidence that it will progress to the point where it
36 will impair the function of the collector.

1 OO. Similar solar collector. "Similar solar collector"
2 means a collector that is substantially identical to a certified
3 reference collector manufactured by the same firm. The criteria
4 to be used to determine eligibility as a similar collector are
5 found in 6 MCAR S 2.1508 B.

6 PP. Site-dependent collector. "Site-dependent collector"
7 means a collector intended to be assembled only at the site of
8 application because parts of the building, such as rafters or
9 insulation, are part of the collector or because the size of the
10 collector makes delivery impractical.

11 QQ. Solar collector. "Solar collector" means a device
12 designed to absorb incident solar radiation, to convert it to
13 thermal energy, and to transfer the thermal energy to a fluid in
14 contact with it through either forced or natural convection.
15 For purposes of 6 MCAR SS 2.1501-2.1512, solar collector refers
16 to one specific model of solar collector.

17 RR. Solar collector kit. "Solar collector kit" means a
18 collection of substantially all major components required to
19 assemble a solar collector which is sold as a unit for the
20 purpose of making a solar collector.

21 SS. Solar system. "Solar system" means an assembly of solar
22 collectors installed or intended to be installed at a single
23 site, all of which perform a uniform function.

24 TT. Solar energy. "Solar energy" means the photon energy
25 originating from the sun's radiation primarily encountered in
26 the wavelength region from 0.3 to 2.7 micrometers.

27 UU. Standard. "Standard" means a document that specifies
28 the performance, durability, or safety requirements for a
29 product.

30 VV. Standard solar collector. "Standard solar collector"
31 means a solar collector that can be fairly and adequately
32 evaluated under the test sequence identified in 6 MCAR S 2.1507.

33 WW. State business day. "State business day" means a week
34 day, Monday through Friday, except a holiday listed in Minn.
35 Stat. S 645.44, subd. 5.

36 XX. Suspend certification. "Suspend certification" means to

1 temporarily withdraw certification of a solar collector. A
2 collector purchased while its certification is suspended is not
3 eligible for the credit. Certification may be reinstated by
4 complying with 6 MCAR SS 2.1501-2.1512.

5 YY. Time constant. "Time constant" means the time required
6 for the fluid leaving a solar collector to attain 63.2 percent
7 of its steady state value following a step change in irradiation
8 or inlet fluid temperature.

9 ZZ. Transfer fluid. "Transfer fluid" means the medium such
10 as air, water, or other fluid that passes through or in contact
11 with the solar collector and carries the thermal energy away
12 from the collector.

13 6 MCAR S 2.1503 Applicability of rules.

14 A. Generally. All solar collectors must be certified or
15 registered according to 6 MCAR SS 2.1501-2.1512 at the time of
16 sale to be eligible for the credit. If certification is
17 required for a collector but the collector has not been
18 certified, neither the collector nor other solar system
19 components are eligible for the credit. The collector
20 certification requirements apply no matter who installs the
21 system, whether homeowner, contractor, solar installer, or
22 dealer. All solar collectors which are exempted, registered, or
23 certified by the Minnesota Department of Energy, Planning and
24 Development are deemed certified for the purposes of the
25 Individual Income Tax Residential Energy Credit Solar Collector
26 Certification, pursuant to Minnesota Statutes, section 290.06,
27 subdivision 14.

28 B. Exceptions.

29 1. Home-built solar collectors are exempt from
30 certification.

31 2. Custom-built solar collectors are exempt from the test
32 requirements but must be registered by the department to be
33 eligible for the credit.

34 3. Solar collector kits or manufactured solar collectors
35 of a single model used in systems with sales in Minnesota of 20
36 or fewer solar systems in any consecutive 12-month period are

1 exempt from the certification test requirements, but solar
2 systems using these collectors must be registered by the
3 department to be eligible for the credit. The department shall
4 deny registration of more than 20 solar systems in any
5 consecutive 12-month period unless the collectors used in the
6 system have been certified under the provisions of 6 MCAR SS
7 2.1501-2.1512.

8 4. A manufacturer of a solar collector required to be
9 certified which has had the collector tested or contracted to be
10 tested before the effective date of 6 MCAR SS 2.1501-2.1512 may
11 use the results of that test in its application for
12 certification instead of the test procedures outlined in 6 MCAR
13 S 2.1507. The tests must have been performed at a
14 department-approved laboratory in accordance with ASHRAE
15 Standard 93-77, 'Methods of Testing to Determine the Thermal
16 Performance of Solar Collectors,' issued by the Standards
17 Committee of the American Society of Heating, Refrigerating, and
18 Air Conditioning Engineers (New York, 1978); ASHRAE Standard
19 95-82 95-1981, 'Method of Testing to Determine Thermal
20 Performance of Solar Domestic Water Heating Systems,' issued by
21 the Standards Committee of the American Society of Heating,
22 Refrigerating, and Air Conditioning Engineers (New York, 1982);
23 or ASHRAE Standard 96-80 96-1980, 'Method of Testing the Thermal
24 Performance of Unglazed Flat Plate Liquid Type Solar
25 Collectors,' issued by the Standards Committee of the American
26 Society of Heating, Refrigerating, and Air Conditioning
27 Engineers (New York, 1980).

28 5. Solar collectors that have been certified by the
29 California Energy Commission, the State of Florida, the Solar
30 Rating and Certification Corporation, the Solar Energy Industry
31 Association, or the American Air-Conditioning and Refrigeration
32 Institute before the expiration of the grace period specified in
33 6., or by a national organization that meets the criteria in 6
34 MCAR SS 2.1501-2.1512, are eligible for automatic certification
35 by the department. However, the manufacturer must file an
36 application with the department in order to receive Minnesota

1 solar collector certification.

2 6. A blanket exception is granted for a period of ~~six~~
3 nine months following the effective date of 6 MCAR SS
4 2.1501-2.1512 to provide for timely and orderly testing, rating,
5 and certification of solar collectors. All expenditures for
6 solar collectors after the expiration of the grace period must
7 be in accordance with 6 MCAR SS 2.1501-2.1512 to be eligible for
8 the credit.

9 7. Any solar collector included in a renewable energy
10 source expenditure after February 3, 1982, and before the
11 effective date of 6 MCAR SS 2.1501-2.1512 shall be deemed
12 certified by the Department of Energy, Planning and Development
13 for the purposes of Minnesota Statutes 1980, section 290.06,
14 subdivision 14, so long as the expenditure qualifies for the
15 federal renewable energy source residential credit of Section
16 44C of the Internal Revenue Code of 1954 (26 U.S.C. SS 44C), as
17 amended through December 31, 1978, and any regulation
18 promulgated pursuant thereto.

19 6 MCAR S 2.1504 Application fees. Fees for processing an
20 application are:

21 A. \$300 for an application for certification of a standard
22 or innovative collector based on new or previous testing;

23 B. \$100 for an application to certify a similar collector;

24 C. \$50 for an application based on previous certification by
25 the Solar Rating and Certification Corporation, Solar Energy
26 Industry Association, American Air-Conditioning and
27 Refrigeration Institute, California Energy Commission, or the
28 State of Florida as authorized by 6 MCAR S 2.1503 B.5.;

29 D. \$50 for an application to certify a collector
30 manufactured under license to a previous recipient of
31 certification on the collector;

32 E. \$50 for a resubmitted application after the 180-day time
33 limit; and

34 F. \$10 for an application for registration of a solar system
35 using a custom-built collector or registration of a solar system
36 using a solar collector kit or a manufactured solar collector

1 with sales in Minnesota of 20 or fewer solar systems in any
2 consecutive 12-month period.

3 Checks in payment of fees must be made payable to
4 "Treasurer, State of Minnesota."

5 6 MCAR S 2.1505 Units of measure. The International System of
6 Units is the preferred measurement system for purposes of
7 certification.

8 The information in the certification label must be in the
9 International System of Units specified in Exhibit 6 MCAR S
10 2.1512-1. Values in inch-pound units, if included, must be
11 placed in parentheses following the value in the International
12 System of Units. Note that the measurements in 6 MCAR S 2.1507
13 and succeeding rules are given in the International System of
14 Units followed by the measurements in inch-pound units in
15 parentheses, as illustrated by 6 MCAR S 2.1507 C.3.b.

16 Inch-pound units may be used in the application for
17 certification until further notice. If inch-pound units are
18 used, however, the applicant is encouraged to include the values
19 in the International System of Units in parentheses following
20 the values in inch-pound units to facilitate the use of the
21 information in the application after the transition to the
22 International System of Units has been completed. Contact the
23 department for assistance with measurement units.

24 6 MCAR S 2.1506 Certification procedure.

25 A. Standard solar collector. The provisions of 1.-8. govern
26 certification procedures for standard solar collectors.

27 1. The manufacturer shall request the department to
28 select a solar collector from the manufacturer's stock.

29 2. Within two weeks of the request, or at a mutually
30 agreeable time, a representative of the department shall
31 randomly select one solar collector sample from an existing
32 stock of at least five units at the manufacturer's plant or at a
33 distribution point.

34 3. The manufacturer shall have the designated sample
35 tested in accordance with the test procedures contained in 6

1 MCAR S 2.1507 at a department-approved laboratory of the
2 manufacturer's choice and at the manufacturer's expense.

3 4. If the sample completes the prescribed series of
4 performance and durability tests and passes the inspection, the
5 manufacturer may submit an application for certification. The
6 application must be signed and dated by an authorized agent of
7 the company and two witnesses. The manufacturer may designate
8 information submitted to the department as nonpublic data by
9 requesting that designation plainly and legibly on the
10 application. Test results required for certification shall be
11 considered public only if certification is granted. The
12 application must contain the following:

13 a. It must contain product label information in the
14 format provided by Exhibit 6 MCAR S 2.1512-1.

15 b. It must contain the product warranty.

16 c. It must contain a test report including: thermal
17 performance curve; incident angle modifier; collector time
18 constant; conditions used to establish performance such as flow
19 rate and fluid; exposure or stagnation test results; and results
20 from final inspection after disassembly.

21 d. It must describe the following products or
22 materials by type and commercial designations: cover plates;
23 absorber plate; absorber coatings; reflectors or lenses;
24 collector enclosure; insulation; caulking, sealants, and
25 gaskets; thermal and mechanical bonds, including the bonding
26 used for reflecting materials that are not the same material as
27 the reflector backing; trim, retaining strips, mounting
28 brackets, or other hardware; connecting hoses; control system
29 sensors; and reflector mounting frame. Upon request by the
30 department, the applicant shall furnish information relating to
31 the reflector mounting frame's thermal or flame spread
32 properties, electrical corrosion resistance, ultraviolet
33 radiation, pollutants, or optical characteristics, as specified
34 by the supplier. The application must also contain a
35 component-by-component declaration of combustibility, including
36 the rating, the rating method, and the test standard used.

1 e. It must contain collector drawings of sufficient
2 detail to accurately represent: aperture cover plate dimension
3 and mounting detail; absorber plate dimensions including
4 thickness, location, and spacing of fluid flow paths,
5 cross-section dimensions and shape of flow channels, tube wall
6 thickness, and plate-to-tube heat transfer provisions; collector
7 enclosure dimensions, provisions for attaching absorber and
8 plate, and size and location of holes; collector assembly detail
9 specifying fasteners and other attachment methods indicating
10 overall dimensions; and for concentrator type, a cross-sectional
11 view, dimensions, and mounting detail.

12 f. It must contain working fluid or flow rate
13 recommendations or restrictions. If a heat transfer fluid other
14 than water is to be used, fluid properties of specific heat,
15 density, viscosity, thermal conductivity, and toxicity must be
16 provided.

17 g. It must contain installation, operation, and
18 maintenance considerations.

19 h. It must contain the following statement of
20 commitment by the manufacturer:

21 "As the manufacturer (importer) of the solar collector
22 described in this application, I (we) affirm that all of the
23 information contained herein is correct. Furthermore, if
24 certification for this collector is granted, I (we) agree to:
25 represent a collector as certified only when it is manufactured
26 of the same materials and specifications as the collector that
27 was originally certified; permanently affix the certification
28 label to all production units of the certified collector sold in
29 Minnesota; notify the department of changes in collector
30 materials or construction; provide copies of the department's
31 solar collector certificate to the consumer upon request; permit
32 the department to select, at any time, a certified collector
33 offered for sale or on display for a retest of the collector to
34 verify its compliance to the original specifications and
35 performance; notify the department of licenses awarded to
36 manufacture this collector and other model or brand names under

1 which this collector is marketed; and honor the warranty
2 expressed in the application for certification for the full term
3 of the warranty."

4 5. The department shall evaluate the application and
5 notify the manufacturer in writing of the approval or rejection
6 of the application within 40 state business days after receiving
7 the application.

8 a. If certification is granted, the department shall
9 calculate the thermal performance rating and provide a signed
10 Solar Collector Certificate as provided in Exhibit 6 MCAR S
11 2.1512-1 and photo-ready copies of the certification symbol.

12 b. If certification is denied, the department shall
13 specify the reasons for rejection and identify the necessary
14 corrective action. If all identified corrections are made and
15 the manufacturer has resubmitted the application to the
16 department within 180 days after the date of the rejection
17 notice, the department shall approve the application and certify
18 the collector without additional fees. After that time a
19 resubmittal fee must accompany the application. If the
20 manufacturer has resubmitted the application and the department
21 has made a final decision to deny certification, the
22 manufacturer may initiate the appeal process of 6 MCAR S 2.1511.

23 6. The manufacturer shall permanently affix the
24 certification symbol and the required label information, in a
25 form approved by the department, to all production units of the
26 certified model and not to any other piece of the solar system.

27 a. The manufacturer may produce labels from the
28 certification symbol and label design provided by the
29 department; design its own label that includes the certification
30 symbol and required label information; or include the
31 certification symbol and required label information in the
32 manufacturer's nameplate.

33 b. The manufacturer shall submit a sample of the
34 proposed label or nameplate and written request for approval to
35 the department before using the label or nameplate. The
36 department shall grant approval if all the required label

1 information is presented clearly and legibly, the certification
2 symbol is accurately presented, and the label or nameplate
3 material will reasonably withstand exposure to the climate.

4 c. The department shall send the manufacturer written
5 approval or rejection of the sample and, if appropriate, the
6 reasons for rejection within 15 state business days after
7 receiving the sample and written request.

8 d. The certification symbol may be used in
9 advertising, catalogs, or sales promotion material. The symbol
10 must clearly refer only to certified collectors.

11 7. The manufacturer shall promptly notify the department
12 of licenses awarded to manufacture this collector and other
13 model or brand names under which the solar collector is marketed.

14 8. The department shall maintain a list of all certified
15 collectors and provide the product label information to
16 consumers.

17 B. Similar solar collector. A collector that is
18 substantially identical to a certified or reference collector
19 manufactured by the same firm is eligible for certification
20 based upon the test results from the reference collector. The
21 following procedure must be used:

22 1. The manufacturer shall provide to the department the
23 following material:

24 a. A copy of the application for certification of the
25 reference collector;

26 b. An application in accordance with A.4. for
27 certification of the similar collector;

28 c. A statement completely describing all physical
29 differences between the reference and similar collectors;

30 d. A statement projecting any changes in performance,
31 reliability, or durability that are expected because of the
32 change in physical properties;

33 e. The data, assumptions, and procedures used to
34 develop the projections in d.; and

35 f. The appropriate application fees.

36 The manufacturer may designate new information submitted to

1 the department as nonpublic data by requesting the designation
2 plainly and legibly at the time the information is supplied.

3 2. The department shall evaluate the application for
4 certification of the similar model and supporting documentation
5 and notify the manufacturer in writing of the approval or
6 rejection of the application within 40 state business days after
7 receiving the application.

8 a. If certification is granted, the department shall
9 calculate the thermal performance rating and provide a signed
10 collector certificate and photo-ready copies of the
11 certification symbol.

12 b. If certification is denied, the department shall
13 specify the reasons for rejection. The manufacturer may develop
14 additional supporting arguments and request a review by the
15 department. The department shall send written notification of
16 its final decision to the manufacturer within 20 state business
17 days after receiving the request for review. If certification
18 has been denied, the collector may be tested and a new
19 application, with appropriate fees, may be filed with the
20 department. The department's final decision is subject to the
21 appeal process under 6 MCAR S 2.1511.

22 3. The manufacturer of a collector certified under B.
23 shall follow the labeling, other model number, and brand name
24 requirements of the procedures for a standard solar collector
25 required by A.6. and A.7.

26 C. Innovative solar collector. The provisions of 1. and 2.
27 govern certification procedures for innovative solar collectors.

28 1. The manufacturer shall describe the collector and
29 explain why it cannot be fairly and adequately evaluated by the
30 standard solar collector procedure contained in A. The
31 manufacturer shall propose a procedure to the department for
32 testing and evaluating the innovative collector. The detail of
33 both the description and the procedure should be sufficient to
34 allow the department to fairly assess the validity of the
35 proposed evaluation criteria. The manufacturer may designate
36 information submitted to the department as nonpublic data by

1 requesting the designation plainly and legibly at the time the
2 information is supplied.

3 2. The department shall evaluate the proposed procedure
4 and notify the manufacturer of its decision on the proposal
5 within 40 state business days after receiving the proposal.

6 a. If the proposal is accepted, the manufacturer shall
7 follow the process outlined in the proposal. The appropriate
8 fees must be included in the formal application for
9 certification.

10 b. If the proposal is rejected, the department shall
11 specify the reasons for its decision. The manufacturer may
12 revise the criteria or procedure or both and resubmit the
13 proposal to the department. If the department makes a final
14 decision to reject the proposal, or if it denies certification
15 in a final decision under the terms of the accepted evaluation
16 procedures, the manufacturer may appeal.

17 D. Collector manufactured by licensee. A certified
18 collector that is also manufactured and sold under license is
19 eligible for certification by the department to the licensee
20 without additional testing. The following procedure must be
21 used:

22 1. The licensee shall provide the department with the
23 following material:

24 a. A copy of the application submitted by the original
25 manufacturer for original certification of the collector;

26 b. An application in accordance with A.4. for
27 certification of the collector; and

28 c. Appropriate application fees.

29 The licensee may designate new information submitted to the
30 department as nonpublic data by requesting the designation
31 plainly and legibly at the time the information is supplied.

32 2. The licensee shall request the licensor to send to the
33 department a written authorization to certify the licensed
34 collector and a declaration that the collector is identical in
35 all respects to the originally certified collector.

36 3. The department shall review the application and letter

1 of authorization and notify the licensee in writing of the
2 approval or rejection of the application within 40 state
3 business days after receiving the application.

4 a. If certification is granted, the department shall
5 provide a signed collector certificate and photo-ready copies of
6 the certification symbol.

7 b. If certification is denied, the department shall
8 specify the reasons for rejection. The licensee may request a
9 review by the department and offer additional material in
10 support of the application. The department shall send the
11 manufacturer written notification of its final decision within
12 20 state business days after receiving the request for review.
13 The department's final decision is subject to the appeal process
14 of 6 MCAR S 2.1511.

15 4. The manufacturer of a licensed collector certified by
16 the department shall follow the labeling, other model number,
17 and brand name requirements of the procedures for a standard
18 solar collector required by A.6. and A.7.

19 E. Custom-built solar collectors.

20 1. The contractor of a custom-built solar collector shall
21 apply to the department for tax credit registration for the
22 solar system the contractor intends to build. Though
23 custom-built solar collectors are not required to be tested, the
24 contractor must supply sufficient information about the
25 collector to allow the department to register it as a unique
26 collector. The application must include the following
27 information:

- 28 a. Name, firm, and address of the contractor;
- 29 b. Name and address of the customer;
- 30 c. Gross collector area;
- 31 d. Collector dimensions;
- 32 e. Cover plate material;
- 33 f. Absorber plate material;
- 34 g. Insulation;
- 35 h. Framing material;
- 36 i. Sealants;

- 1 j. Heat transfer fluid;
- 2 k. Mounting surface type;
- 3 l. Orientation;
- 4 m. Slope angle from horizontal;
- 5 n. Product warranty, if any;
- 6 o. Owner's manual or instructions, if any; and
- 7 p. Thermal performance estimates, if any.

8 2. If the necessary information has been provided, the
9 department shall assign a registration number and send a solar
10 system registration document to the customer, with a copy to the
11 contractor, within ten state business days after receiving the
12 application.

13 F. Solar collector kit or manufactured solar collector. A
14 solar system using a model of a solar collector kit or a
15 manufactured solar collector is eligible for registration for
16 the tax credit if 20 or fewer solar systems using the collector
17 have been registered by the department during a consecutive
18 12-month period. If 20 solar systems have been registered
19 during a 12-month period, additional solar systems are eligible
20 for registration only if the department has approved a grace
21 period in accordance with 2.a.

22 1. Sale of 20 solar systems or fewer.

23 a. If 20 or fewer solar systems using a model of a
24 solar collector kit or manufactured solar collector have been
25 registered during a consecutive 12-month period, the
26 manufacturer or dealer of the solar collector kit or
27 manufactured solar collector must apply to the department for
28 registration in order for the solar system to be eligible for
29 the credit. The application must include the following
30 information: product label information required by Exhibit 6
31 MCAR S 2.1512-1 excluding information on the thermal performance
32 efficiency and performance rating; name and address of
33 purchaser; description of the major components in the kit or
34 manufactured solar collector, including glazing material,
35 absorber material and surface, insulation, enclosure, and
36 sealants; and working fluid and flow rate recommendations or

1 restrictions.

2 b. If the manufacturer has complied with the
3 requirements in a., the department shall assign a registration
4 number and send a solar system registration document to the
5 customer, with a copy to the dealer or manufacturer, within ten
6 state working days after receiving the application.

7 2. Sale of more than 20 solar systems in Minnesota.

8 a. The manufacturer of a solar collector kit or
9 manufactured solar collector may apply to the department for a
10 six-month grace period in order to complete testing and
11 certification requirements. The application must include
12 evidence that a collector sample has been selected by the
13 department and submitted to an accredited laboratory for
14 Minnesota certification testing.

15 b. The department shall review the application. If
16 the criteria have been met, the department shall approve the
17 grace period. All systems using the model of solar collector
18 kit or manufactured solar collector sold during the grace period
19 are eligible for tax credit registration by the department.

20 c. The manufacturer shall follow the steps for
21 certification as a standard solar collector.

22 6 MCAR S 2.1507 Test methods and minimum standards for
23 certifying solar collectors.

24 A. Purpose. Rule 6 MCAR S 2.1507 specifies the test methods
25 to be followed and the standards to be met in determining the
26 thermal performance and the durability of solar collectors used
27 for space heating and cooling and water heating. Only collector
28 models meeting the standards are eligible for the certification
29 label.

30 B. Scope.

31 1. Rule 6 MCAR S 2.1507 applies to liquid and air
32 collectors. It provides a means for evaluating the
33 maintainability and structural integrity of solar collectors and
34 data for determining a thermal performance rating for solar
35 collectors.

36 2. The procedures in C.8.-C.10. cannot be followed for

1 devices meeting the following description:

2 a. The device is intended for solar domestic water
3 heating systems;

4 b. Its collectors cannot be appropriately tested under
5 the requirements of ASHRAE Standard 93-77, 'Methods of Testing
6 to Determine the Thermal Performance of Solar Collectors,'
7 issued by the Standards Committee of the American Society of
8 Heating, Refrigerating, and Air Conditioning Engineers (New
9 York, 1978); and

10 c. Its collection function cannot be separated from
11 the system function, commonly referred to as an integral
12 collector storage (ICS) device.

13 For these devices, the procedures in C.8.-C.10. must be
14 replaced by the procedures contained in ASHRAE Standard 95-82
15 95-1981, 'Method of Testing to Determine Thermal Performance of
16 Solar Domestic Water Heating Systems,' issued by the Standards
17 Committee of the American Society of Heating, Refrigerating, and
18 Air Conditioning Engineers (New York, 1982), and SRCC Standard
19 200-82, 'Test Methods and Minimum Standards for Certifying Solar
20 Water Heating Systems,' issued by the Solar Rating and
21 Certification Corporation (Washington D.C., March 1982).

22 C. Test methods for solar collectors.

23 1. Solar collector testing shall be performed in the
24 following sequence:

- 25 a. Receiving inspection;
- 26 b. Static pressure test;
- 27 c. Thirty-day exposure test;
- 28 d. Thermal shock/water spray test;
- 29 e. Thermal shock/cold fill test;
- 30 f. Static pressure test;
- 31 g. Collector time constant determination test;
- 32 h. Thermal performance test;
- 33 i. Incident angle modifier test; and
- 34 j. Disassembly and final inspection.

35 2. Upon receiving a collector for tests, the test
36 laboratory shall inspect and document the condition of the

1 collector.

2 3. The laboratory shall conduct a static pressure test
3 before exposure testing.

4 a. The test method must be specific to the type of
5 collector. Collectors are categorized as follows: street
6 pressure solar collectors (collectors which, by virtue of their
7 installation in a municipal water system, will be directly
8 subjected to variations in street water pressure and hot water
9 tank pressure); low pressure service hot water collectors
10 (collectors which, by virtue of their installation, will not
11 have a direct fluid interchange with an auxiliary heater or
12 street pressure, but use an appropriate heat exchanger); or
13 alternate fluid solar collectors (collectors which, by virtue of
14 design, are not intended to have a direct fluid connection to a
15 solar water heating system). Alternate fluid solar collectors
16 may or may not be designed to accept street pressure.

17 b. The test pressure must be 1100 kPa gauge (160 psig)
18 for street pressure collectors. This test pressure is two times
19 the allowable street pressure, 550 kPa gauge (80 psig), in a
20 dwelling as set out in Section 1213.9 of the 'Standard Plumbing
21 Code,' issued by the Southern Building Code Congress
22 International (Birmingham, Alabama, 1976) and exceeds the
23 required pressure-temperature valve relief setting on hot water
24 tanks, which is 1030 kPa gauge (150 psig).

25 c. Collectors specified for positive operating
26 pressure less than street pressure 550 kPa gauge (80 psig) must
27 be pressure-tested at one and one-half times the manufacturer's
28 rated operating gauge pressure, but at a minimum of 170 kPa
29 gauge (25 psig).

30 d. Collectors specified for operating pressures
31 greater than 550 kPa gauge (80 psig) must be pressure tested at
32 1.5 times the manufacturer's rated operating gauge pressure or
33 1100 kPa gauge (160 psig), whichever is greater.

34 e. Collectors specified for operation at atmospheric
35 pressure or below must be pressure tested at the discretion of
36 the test director, but at no greater than 170 kPa gauge (25

1 psig).

2 f. Determination of test pressure must be based on
3 documentation supplied by the manufacturer in the application
4 for certification as specified in 6 MCAR S 2.1506 A.4.

5 g. For liquid collectors, either hydrostatic or
6 pneumatic pressure sources may be used. The test laboratory
7 shall follow the following test procedures: a pressure gauge
8 must be attached to read pressure at the exit port of the
9 collector, the collector completely filled with unheated fluid,
10 and the exit port closed off. Hydraulic pressure must be
11 applied via the inlet port until the gauge indicates the test
12 pressure. After stable test pressure has been reached, the exit
13 port must be closed and the pressure monitored for 15 minutes.

14 h. Pneumatic pressure sources must be used for air
15 collectors. The following test procedures must be followed: a
16 pressure tap of pipe or tubing must be sealed into the exit port
17 of the test specimen and connected to a manometer which can be
18 read directly to 2.5 Pa (0.01 inch water column) or to a
19 pressure gauge of equivalent accuracy. An air volume meter
20 accurate to within 150 mL (± 0.5 cubic feet) must be placed in
21 the air supply system between the supply source and the
22 collector. Pressure of 125 Pa gauge (0.5 inch water column)
23 must be applied via the inlet port and the pressure monitored
24 for one hour. The volume of air added or removed in order to
25 maintain the required pressure must be documented.

26 4. The test laboratory shall conduct an exposure test to
27 verify integrity of construction after at least 30 days of
28 exposure to adverse conditions. The following methods must be
29 followed:

30 a. Liquid collectors must be filled completely with
31 clean liquid, following which the liquid must be allowed to
32 gravity-drain for 15 minutes with the collector mounted at a 45
33 degree tilt angle. The collector inlet and outlet must be
34 loosely sealed.

35 b. Exposure conditions must consist of 30 days of
36 cumulative exposure to a minimum daily incident solar radiation

1 flux of $17 \text{ MJ/m}^2 \cdot \text{day}$ ($1500 \text{ Btu/ft}^2 \cdot \text{day}$) as measured in the plane
2 of the collector aperture. The exposure conditions must include
3 at least one consecutive four-hour period with a minimum
4 instantaneous flux of 950 W/m^2 ($300 \text{ Btu/ft}^2 \cdot \text{hr}$). The average
5 baseline ambient temperature must be 27 degrees Celsius (80
6 degrees Fahrenheit) or higher during the four-hour period.

7 c. Data recorded and reported during exposure testing
8 must include integrated daily solar radiation data. A regularly
9 scheduled weekly visual inspection must also be made, and a
10 record of changes in the physical appearance of the collector
11 must be kept.

12 5. The laboratory shall conduct a thermal shock/water
13 spray test. During a five minute period on three different days
14 of the exposure test, the collector must be subjected to heavy
15 spray from above or in front of the collector. Spray testing
16 must be conducted after at least one hour of direct sun at a
17 minimum intensity of 850 W/m^2 ($270 \text{ Btu/ft}^2 \cdot \text{hr}$) and within two
18 hours of solar noon. These three spray tests must be conducted
19 during the last 10 days of the exposure test.

20 Water delivery must be at a rate not less than 20 mL/s per
21 square meter of collector ($1.8 \text{ gallons/ft}^2 \cdot \text{hr}$) (2.9 inches of
22 rainfall per hour), with the spray pattern designed to wet the
23 surface that would be wet during a normal rain shower.

24 Temperature of the water must be between 19 and 29 degrees
25 Celsius (65 and 85 degrees Fahrenheit) during the spray test.
26 The procedure of NBSIR 1305A, test 7.3, in 'Provisional Flat
27 Plate Solar Collector Testing Procedures' by D. Waksman et al.,
28 first revision, issued by the National Bureau of Standards
29 (Washington D.C., June 1978) must be used.

30 6. The laboratory shall conduct a thermal shock/cold fill
31 test for liquid collectors. At one time during the test
32 sequence the unfilled collector must be exposed to full sun, not
33 less than 950 W/m^2 ($300 \text{ Btu/ft}^2 \cdot \text{hr}$), for one hour. While the
34 collector is still so exposed, liquid must be circulated through
35 the collector for five minutes at a flow rate of approximately
36 17 mL/s per square meter of collector ($1.5 \text{ gallons/hr} \cdot \text{ft}^2$). The

1 temperature of the entering liquid must be between 19 and 29
2 degrees Celsius (65 and 85 degrees Fahrenheit) during this
3 test. The procedure of NBSIR 1305A, test 7.4 must be used.

4 Solar collectors may be certified without the thermal
5 shock/cold fill if their designs are such that cold refill of a
6 hot collector is not allowed. The manufacturer shall state this
7 limitation in writing and the limitation must be included in the
8 test report.

9 7. The laboratory shall conduct a static pressure test
10 following the provisions of 3. after exposure and before thermal
11 performance testing.

12 8. The laboratory shall conduct a time constant test to
13 determine the time required for the outlet fluid temperature to
14 attain 63.2 percent of its steady state value following a step
15 change in the input. This figure is used to determine the time
16 period over which temperature and irradiance data are integrated
17 to obtain the computed efficiency values for the thermal
18 performance test. The test method must conform to ASHRAE
19 Standard 93-77, 'Methods of Testing to Determine the Thermal
20 Performance of Solar Collectors,' issued by the Standards
21 Committee of the American Society of Heating, Refrigerating and
22 Air Conditioning Engineers (New York, 1978).

23 9. The laboratory shall conduct a thermal performance
24 test on those collectors that have met the criteria of D.1.-5.
25 and for which the collector time constant has been determined.
26 The thermal performance test determines "instantaneous"
27 efficiency of the solar collector over a wide range of operating
28 temperatures. Efficiency is defined as the ratio of collected
29 energy to the total available energy falling upon the entire
30 collector area. Collected energy is determined by the product
31 of fluid mass flow, specific heat, and integrated temperature
32 gain across the collector. Available energy is determined by
33 the integrated solar irradiance. Typically, four data points of
34 at least five minutes duration are taken at each of four
35 different inlet fluid temperatures. For unglazed collectors,
36 the inlet fluid temperatures include test temperatures below and

1 above ambient air temperature. Glazed collectors are normally
2 tested over a range of inlet fluid temperatures from near
3 ambient to approximately 70 degrees Celsius (126 degrees
4 Fahrenheit) above ambient temperature.

5 The test method used for glazed collectors must conform to
6 ASHRAE Standard 93-77, 'Methods of Testing to Determine the
7 Thermal Performance of Solar Collectors,' issued by the
8 Standards Committee of the American Society of Heating,
9 Refrigerating, and Air Conditioning Engineers (New York, 1978).
10 The test method used for unglazed collectors must conform to
11 ASHRAE Standard 96-80, 'Method of Testing the Thermal
12 Performance of Unglazed Flat Plate Liquid Type Solar
13 Collectors,' issued by the Standards Committee of the American
14 Society of Heating, Refrigerating, and Air Conditioning
15 Engineers (New York, 1980). Any deviations from either standard
16 must be delineated in the test report. Normal incidence data
17 must be taken as specified by ASHRAE Standard 93-77 or 96-80.
18 Test data must be taken within plus or minus five degrees
19 Celsius (nine degrees Fahrenheit) of the maximum temperature
20 differential for which a rating is desired.

21 10. A collector incident angle modifier determination
22 must be made. The thermal performance curve for a collector is
23 determined when the irradiance incident on the collector is
24 within 30 degrees of normal to the aperture of the collector.
25 To predict collector performance over a wide range of
26 conditions, the test laboratory shall conduct tests to determine
27 the collector incident angle modifier. This is used to modify
28 the efficiency curve (determined within 30 degrees of normal
29 incidence) to account for changes in performance as a function
30 of the sun's incidence angle. The test method used must conform
31 to ASHRAE Standard 93-77, 'Methods of Testing to Determine the
32 Thermal Performance of Solar Collectors,' issued by the
33 Standards Committee of the American Society of Heating,
34 Refrigerating, and Air Conditioning Engineers (New York, 1978)
35 or ASHRAE Standard 96-80, 'Methods of Testing to Determine the
36 Thermal Performance of Unglazed Flat Plate Liquid Type Solar

1 Collectors,' issued by the Standards Committee of the American
2 Society of Heating, Refrigerating and Air Conditioning Engineers
3 (New York, 1980).

4 Biaxial incident angle modifiers are required on collectors
5 which are nonsymmetrical in their response to irradiance as
6 solar altitude and azimuth change. These types of collectors
7 have optical characteristics that depend on direction in the
8 aperture plane, so that the incident angle modifier depends on
9 both the solar azimuth in the aperture plane and the angle of
10 incidence. Examples of this type of collector include tubular
11 collectors and collectors employing trough structures, mirrors,
12 or lenses such that the geometries are characterized by biaxial
13 symmetry.

14 In the case of anisotropic collectors, data must be taken
15 in each of the two perpendicular planes that characterize the
16 collector geometry.

17 In all cases, the test laboratory shall take enough
18 incident angle modifier data to describe adequately the
19 relationship between the incidence angle and the incident angle
20 modifier.

21 11. Disassembly and final inspection. The test
22 laboratory shall disassemble the collector and shall visually
23 inspect the major components and subassemblies and shall report
24 their condition. All abnormalities must be reported and
25 accompanied by a photograph. The test laboratory shall use the
26 guide in Exhibit 6 MCAR S 2.1507 C.11.-1 to identify conditions
27 to be reported.

28
29 Exhibit 6 MCAR S 2.1507 C.11.-1
30 Guide for Collector Inspection

| 32 Major Components or Subassemblies | Conditions to be Reported |
|---|---------------------------------|
| 33 a. Collector case and enclosure 34 fasteners | Cracking, warping, corrosion |
| 35 b. Mounting means (mounting 36 brackets, flanges, etc.) | Loss of mounting integrity |

- | | | |
|----|--------------------------|----------------------|
| 1 | c. Seals, gaskets | Cracking, loss of |
| 2 | | elasticity or |
| 3 | | adhesion |
| 4 | d. Covers and reflectors | Cracking, crazing, |
| 5 | | buckling, |
| 6 | | delamination, |
| 7 | | warping |
| 8 | e. Absorber: | |
| 9 | Coating | Crazing, cracking, |
| 10 | | blistering |
| 11 | Inlet and outlet tubes | Deformation, |
| 12 | | corrosion, leakage |
| 13 | Flow tubes | Deformation, |
| 14 | | corrosion, leakage, |
| 15 | | loss of bonding |
| 16 | Headers | Deformation, |
| 17 | | corrosion, leakage |
| 18 | Absorber Mountings | Loss of mounting |
| 19 | | integrity |
| 20 | f. Insulation | Water retention, |
| 21 | | swelling, outgassing |
- 22 D. Collector standards. The following criteria represent
- 23 the requirements for durability in collector design and
- 24 construction in order to qualify for certification.
- 25 1. All glass cover plates must be of a nonshattering or
- 26 tempered type.
- 27 2. The collector must be designed to prevent condensate
- 28 buildup. The use of desiccants to control condensation is
- 29 permitted. The test report should note any unusual condensate
- 30 buildup.
- 31 3. Pressure test results criteria must be as follows:
- 32 a. Liquid collectors after testing must be considered
- 33 passable if: a loss of pressure does not occur; there is no
- 34 evidence of fluid leakage; and there is no evidence of fluid
- 35 path deterioration such as by swelling or stretching.
- 36 b. Air collectors after testing must be considered

1 passable if there is no evidence of fluid path deterioration
2 such as swelling or stretching.

3 4. Thermal shock/water spray test results must show that
4 the collector structure and performance are not degraded by
5 moisture penetration. There must be no cracking, crazing,
6 warping, or buckling of the cover plate.

7 5. The test laboratory shall terminate the test if it is
8 apparent without collector disassembly that the unit no longer
9 meets the quality requirements of 6.

10 6. The department may deny certification if the tests
11 show disassembly and final inspection conditions that, in its
12 judgment, may lead to an abnormally short collector life. The
13 conditions are:

- 14 a. Severe deformation of the absorber;
- 15 b. Severe deformation of the fluid flow passages;
- 16 c. Loss of bonding between fluid flow passages and
17 absorber plate;
- 18 d. Leakage from fluid flow passages or connections;
- 19 e. Loss of mounting integrity;
- 20 f. Severe corrosion or other deterioration caused by
21 chemical action;
- 22 g. Crazing, cracking, blistering, or flaking of the
23 absorber coating or delamination of reflective surfaces;
- 24 h. Retention of water in the insulation;
- 25 i. Swelling, severe outgassing, or other detrimental
26 changes in collector insulation that adversely affect collector
27 performance;
- 28 j. Cracking, loss of elasticity, or loss of adhesion
29 of gaskets and sealants;
- 30 k. Leakage or damage to hoses used inside the
31 collector enclosure or leakage from mechanical connections;
- 32 l. Cracking, crazing, permanent warping, or buckling
33 of the cover plate; and
- 34 m. Cracking or warping of the collector enclosure
35 materials.

36 6 MCAR S 2.1508 Evaluation criteria, ratings, and warranties.

1 A. Standard solar collector. The department shall certify a
2 standard solar collector if:

3 1. The collector sample has successfully completed the
4 specified testing;

5 2. The collector has passed the evaluation of the
6 disassembly and final inspection;

7 3. The application for certification is complete;

8 4. The warranty meets the minimum requirements; and

9 5. The appropriate application fee is included.

10 B. Similar solar collector.

11 1. A collector is eligible for certification as a similar
12 collector only if all materials and construction techniques are
13 identical to the reference collector except that:

14 a. The collector size has been increased;

15 b. The cover plates are in the same material category
16 but of a different material;

17 c. The cover plates are of the same material but of
18 minor differences in thickness; or

19 d. There are other changes in material or techniques
20 that the manufacturer deems to be insignificant.

21 2. If the application is based on either 1.b. or 1.c.,
22 the thermal performance of a similar collector must be
23 calculated from the test results of the reference collector and
24 the difference in transmissivity between the two cover plates.

25 3. The department shall grant certification if:

26 a. The application for certification is complete and
27 all required supporting documents have been provided;

28 b. The performance and durability of the collector can
29 be accurately and reliably described by the information
30 submitted on and with the application for certification;

31 c. The warranty meets the minimum requirements; and

32 d. The appropriate application fee is included.

33 C. Innovative solar collector. The manufacturer shall
34 propose an evaluation procedure that will fairly and adequately
35 test and evaluate the innovative solar collector and that will
36 result in reliable information about the performance and

1 durability of the collector. The procedure must include:

- 2 1. Testing of a random sample of a production collector
3 for reliability, durability, and thermal performance by an
4 independent laboratory;
- 5 2. An application form that adequately describes the
6 collector, its operation, and performance;
- 7 3. A procedure for performance rating the collector; and
- 8 4. The procedure from the rules for certifying standard
9 collectors specifying the requirements for the manufacturer's
10 commitment, 6 MCAR S 2.1506 A.4.h.; the department's decision, 6
11 MCAR S 2.1506 A.5.; labeling, 6 MCAR S 2.1506 A.6.; and
12 marketing, 6 MCAR S 2.1506 A.7.

13 D. Collector manufactured by licensee. A collector
14 manufactured and sold by a licensee of a firm that has
15 previously received certification for the collector must be
16 certified upon:

- 17 1. Verification by the licensor that the collector
18 manufactured under its license is identical in materials and
19 construction to the collector already certified;
- 20 2. Written authorization from the licensor for the
21 department to certify the collector being manufactured under its
22 license; and
- 23 3. Payment of appropriate fees.

24 E. Rating. The thermal performance of the collector must be
25 rated by using 'Standard RM-1: Methodology for Determining the
26 Thermal Performance of Solar Collectors,' as adopted by the
27 Solar Rating and Certification Corporation (Washington D.C.,
28 1981). Rating values must be provided in at least two adjacent
29 categories specified by "Performance Rating" in the Solar
30 Collector Label Information in Exhibit 6 MCAR S 2.1512-1.

31 F. Warranty. The intent of the warranty is to encourage the
32 use of solar energy and promote the development of a viable
33 solar industry by providing purchasers with effective,
34 well-designed, carefully manufactured solar collectors and by
35 providing warranty protection for certified solar collectors in
36 accordance with the standards, terms, and conditions specified

1 in the Magnuson-Moss Warranty -- Federal Trade Commission
2 Improvement Act, 15 United States Code, Sections 2301-2312
3 (1976), and the regulations promulgated thereunder as found in
4 16 Code of Federal Regulations, Subchapter G (1981).

5 1. The manufacturer of a certified solar collector shall
6 give a full warranty against defects in materials, manufacture,
7 or design of a the solar collector for a period equal to at
8 least one year, which begins on the date of sale. In addition,
9 the manufacturer shall provide a limited warranty on the
10 collector for at least 20 percent of the claimed collector
11 design life, beginning one year after the date of sale.

12 2. The full warranty and any additional express
13 warranties must be in writing and must clearly and conspicuously
14 disclose the following information in readily understood
15 language:

16 a. The identity of persons to whom the warranty is
17 extended;

18 b. A clear description and identification of products,
19 parts, characteristics, components, or properties covered by the
20 warranty;

21 c. A statement of what the warrantor will do in the
22 event of a defect, malfunction, or failure, as provided in 3.;

23 d. When the warranty term begins and how long it lasts;

24 e. A step-by-step procedure that the customer should
25 follow to obtain performance of warranty obligations, including
26 a list of the class of persons authorized to perform warranty
27 obligations;

28 f. If applicable, information concerning the
29 availability of an informal dispute settlement mechanism that
30 the consumer is required to use;

31 g. If applicable, any exclusion or limitation on
32 incidental or consequential damages, and the statement: "Some
33 states do not allow the exclusion or limitation of incidental or
34 consequential damages, so the above limitation or exclusion may
35 not apply to you"; and

36 h. The statement: "This warranty gives you specific

1 legal rights, and you may also have other legal rights that vary
2 from state to state."

3 3. The manufacturer, as a warrantor, has the following
4 duties:

5 a. In the case of a defect, malfunction, or failure of
6 the solar collector to conform with the express warranty, the
7 warrantor shall repair or replace the solar collector within a
8 reasonable time and without charge.

9 b. If the solar collector contains a defect or
10 malfunction after a reasonable number of attempts by the
11 warrantor to remedy defects or malfunctions, the warrantor shall
12 permit the customer to choose a refund or a replacement of the
13 solar system or component as appropriate. A replacement must
14 include reinstallation without charge.

15 c. The warrantor need not perform the duties specified
16 in a. and b. if the warrantor can show that the defect,
17 malfunction, or failure was caused by unreasonable use, or that
18 the defect, malfunction, or failure resulted from improper or
19 faulty installation of the solar system.

20 d. The warrantor may not require a customer to return
21 a warranty registration card as a prerequisite of warranty
22 coverage and performance. The warrantor may not impose any
23 other duty as a condition of obtaining a remedy unless the
24 warrantor can demonstrate that the other duty is reasonable.

25 e. The warrantor may not limit the duration of any
26 implied warranty on the solar system.

27 f. The warrantor shall extend the warranty obligations
28 during the term of the express warranty to any person to whom
29 the solar system, or the building on which the solar system is
30 installed, is transferred.

31 G. Laboratory approval. The department shall approve all
32 laboratories accredited by the Solar Rating and Certification
33 Corporation for solar collector certification testing. The
34 department shall maintain a list of approved laboratories.

35 6 MCAR S 2.1509 Verification retest. To verify that a certified
36 solar collector being marketed has the same physical and

1 performance characteristics as the sample that was tested during
2 the initial certification procedures, the department may require
3 that the collector be reevaluated or retested or both. The
4 following procedure must be used.

5 A. Sampling and testing. The department shall select a
6 sample of the certified collector from the manufacturer's
7 existing stock and examine the materials and design or require
8 that it be tested according to the procedures contained in 6
9 MCAR S 2.1506 A.1.-A.3. The manufacturer shall pay all fees and
10 charges and submit the results of the retest to the department.

11 1. If the sample is constructed of the same materials and
12 design as the originally certified collector and passes the
13 retest, if performed, no change shall be made in the
14 certification status and the department shall reimburse the
15 manufacturer for testing and shipping charges actually incurred
16 for the collector retest.

17 2. If the sample is constructed of different materials or
18 design than the originally certified collector or fails the
19 retest, the department shall suspend certification for the
20 collector and shall notify the manufacturer of the suspension in
21 writing. The collector shall pass the verification retest only
22 if the retest thermal performance ratings are no less than 90
23 percent of the ratings in any of the categories completed for
24 the certified collector.

25 B. Challenging results. The manufacturer may challenge the
26 results of the retest and evaluation by requesting, within 20
27 state business days after the date of the suspension
28 notification, the department to select an additional sample for
29 testing from the manufacturer's stock in accordance with the
30 procedures contained in 6 MCAR S 2.1506 A.1.-A.3. and by
31 submitting the results of the retest to the department.

32 1. If the second sample passes the retest and evaluation,
33 the department shall promptly reinstate certification.

34 2. If the second sample fails the retest or evaluation,
35 the department shall formally revoke certification. The results
36 from either test may be used, however, in a subsequent

1 application for certification as a new collector model.

2 6 MCAR S 2.1510 Terminating certification. Certification may be
3 terminated in the following ways.

4 A. Voluntary termination. The manufacturer of a certified
5 product may voluntarily terminate certification by giving
6 written notice to the department. The notice must state the
7 effective termination date and reason for termination.

8 B. Revocation or suspension of certification. The
9 department may revoke or suspend certification of a solar
10 collector in the event of:

11 1. Material misrepresentation in the application for
12 certification;

13 2. Misrepresentation that a collector certification
14 applies to other collector models that have not been certified;

15 3. Failure to notify the department of changes in
16 materials or designs used in a certified collector;

17 4. A sample of the collector failing the verification
18 retest; or

19 5. Failure to comply with a condition of certification or
20 labeling.

21 If certification is suspended, the department shall notify
22 the manufacturer in writing, including the reasons for
23 suspension and the necessary corrective action. If
24 certification is revoked, a new application is required to
25 recertify the collector.

26 C. Notification of suspension, termination, or revocation of
27 certification. The department shall notify appropriate state
28 and local agencies and states cooperating with the Solar Rating
29 and Certification Corporation certification program of
30 collectors for which certification has been revoked, suspended,
31 or terminated.

32 6 MCAR S 2.1511 Appeal process. An applicant aggrieved by a
33 final decision may file a written request for review with the
34 department. The request must be filed within 20 state business
35 days after the date of the final decision. The department shall

1 appoint an advisory review board made up of two representatives
 2 from the solar collector industry and one representative each
 3 from the Consumer Service Division of the Department of
 4 Commerce, a solar energy technical training institute, and a
 5 technical college or university to reconsider the evidence on
 6 file. The department shall affirm, modify, or reverse the
 7 initial decision based upon the recommendation of the advisory
 8 review board and shall inform the applicant of the board's
 9 recommendation and the department's action.

10 6 MCAR S 2.1512 Solar Collector Certificate. The solar
 11 collector certificate issued under 6 MCAR SS 2.1501-2.1511 must
 12 be in the form in Exhibit 6 MCAR S 2.1512-1.

13

14 Exhibit 6 MCAR S 2.1512-1

15 Solar Collector Certificate

16

17 The solar collector identified and described in the Solar
 18 Collector Label Information below is certified by the Minnesota
 19 Department of Energy, Planning and Development as having met the
 20 testing, disclosure, and warranty requirements of the State of
 21 Minnesota for solar collector certification.

22 This certificate entitles the manufacturer or its agent to:

23 1. Publicize this collector as certified by the State of
 24 Minnesota and eligible for the Minnesota residential energy tax
 25 credit; and

26 2. ~~Affix the certification label to each production unit~~
 27 ~~of this collector; and~~

28 3. Use the certification symbol and label information in
 29 advertising, catalogs, or sales promotion material, provided the
 30 symbol clearly refers only to certified collectors.

31 In the application for collector certification the
 32 manufacturer agreed to comply with the rules for collector
 33 certification. Certification for this solar collector may be
 34 revoked or suspended in the event of:

35 1. Material misrepresentation in the application for
 36 certification;

| | | |
|---|------------------------------------|-------------------------------------|
| 1 | (1500 Btu/ft ² .day) | |
| 2 | Delta t | Rating |
| 3 | <u>(inlet temp.-ambient temp.)</u> | (Energy supplied per panel per day) |
| 4 | +5 °C (+9 °F) | _____MJ (thousand Btu) |
| 5 | +20 °C (+36 °F) | _____MJ (thousand Btu) |
| 6 | +50 °C (+90 °F) | _____MJ (thousand Btu) |

7 Use Restrictions: _____

8 Minnesota Tax Credit Approval: The label shall contain the
9 statement, "This collector is certified by the State of
10 Minnesota for the Minnesota Residential Energy Credit."

11 As the duly authorized representative of the State of
12 Minnesota, I hereby grant certification for the solar collector
13 described in this document.

14 Signature _____

15 Name _____

16 Commissioner, Department of Energy, Planning and Development

17 Date _____