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*The part of the SHAMCI Certification Scheme Rules together with these annexes are available from **www.shamci.net**.*

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ANNEX A1 - Requirements for Collectors

1.1 Pass Criteria - Collectors

The pass criteria and classifications are given for each test in the paragraphs in section 1.2 below.

The term "no major failure", denotes that none of the following occurs:

- Fluid channel leakage (in case of liquid heating collectors only) or such deformation that permanent contact between absorber and cover is established;
- Breaking or permanent deformation of cover or cover fixing;
- Breaking or permanent deformation of collector fixing points or collector box;
- Vacuum loss, such that vacuum or sub-atmospheric collectors shall be classified according to the definition in ISO 9488 (only applicable for vacuum and sub-atmospheric collectors);
- Accumulation of humidity in form of condensate on the inside of the transparent cover of the collector exceeding 10 % of the aperture area. In case of an open loop air heating collector for limited periods of time this criterion may be exceeded.

NOTE: The evaluation of accumulation of humidity for application of the pass criteria should be applied only for the following tests:

- External Thermal Shock test
- Rain penetration test

1.2 Required tests

The collector shall be subject to the following series of tests done in the listed sequence as defined in ISO 9806: 2013:

- Internal pressure
- High-temperature resistance
- Exposure
- External thermal shock
- Internal thermal shock
- Rain penetration (only glazed collectors)
- Freeze resistance (only collectors claimed to be freeze resistant)
- Mechanical load
- Impact resistance
- Thermal performance
- Final inspection

1.2.1 Internal pressure test for fluid channels

The test pressure shall be as specified in ISO 9806: 2013 item (6) In the case of fluid channels made of organic materials, climate conditions according to ISO 9806 shall be applied. After the internal pressure test, the collector shall not show any major failure as defined in beginning of section 3.1.2 of the present document.

1.2.2 Leakage test

When tested in accordance with ISO 9806: 2013 item (7), the collector shall not show any major failure as defined in beginning of section 3.1.2 Results shall be reported as stated in ISO 9806. Leakage at maximum operating pressure shall be reported.

NOTE: This test is applicable only for air collectors.

1.2.3 High temperature resistance

When tested in accordance with ISO 9806: 2013 item (9), the collector shall not show any major failure as defined in beginning of section 3.1.2.

1.2.4 Exposure

When tested in accordance with ISO 9806: 2013 item (11), the collector shall not show any major failure as defined in beginning of section 3.1.3 and none of each potential problems of their components shall be graded 2 on the scale given in ISO 9806. Climate class shall be specified.

1.2.5 External thermal shock

When tested in accordance with ISO 9806: 2013 item (12), the collector shall not show any major failure as defined in beginning of section 3.1.2. Climate class shall be specified.

1.2.6 Internal thermal shock

When tested in accordance with ISO 9806: 2013 item (13), the collector shall not show any major failure as defined in beginning of section 3.1.2. Climate class shall be specified.

1.2.7 Rain penetration

When tested in accordance with ISO 9806: 2013 item (14), the collector shall not show any major failure as defined in beginning of section 3.1.2.

NOTE: This test is applicable only for glazed collectors.

1.2.8 Freeze resistance test

This test shall be carried out only in the cases specified in ISO 9806: 2013 item (15). The pass criterion is no major failure as defined in beginning of section 3.1.2 after three freeze-thaw cycles.

1.2.9 Mechanical load test

When tested in accordance with ISO 9806: 2013 item (16) the cover, the collector box and the fixings between collector box and mounting system shall not show any major failure as defined in beginning of section 3.1.2. The permissible and the maximum positive and negative pressure shall be published and recorded in the installer manual.

1.2.10 Resistance test

When tested in accordance with ISO 9806: 2013 item (17) the cover, the collector box and the fixings between collector box and mounting system shall not show any major failure as defined in beginning of section 3.1.2 The method used shall be reported. If ice balls are used, the highest values of ball diameter and velocity not causing damage to the collector shall be reported. If steel balls are used, the highest height causing damage to the collector shall be reported.

1.2.11 Thermal performance

When tested in accordance with ISO 9806:2013 item (20), the collector shall not show any major failure as defined in beginning of section 3.1.2 Thermal performance shall be reported according to ISO 9806. For PVT collectors the operating mode of the electrical loop (open / closed circuit or MPP tracked) shall also be reported, and mentioning if the absorber of the hybrid collector is close connected to the electricity generator and whetherthere is any extra glazing in front. This collector shall be treated as unglazed, during thermal performance testing

1.2.12 Rupture or collapse test (air heating collectors only)

When tested in accordance with ISO 9806: 2013 item (8), the collector shall not show any major failure as defined in beginning of section 3.1.2

The results shall be reported as required in A.5 in ISO 9806: 2013

1.2.13 Final inspection

When tested in accordance with ISO 9806: 2013 item (18), the collector used for the test shall be dismantled and inspected. All abnormalities shall be documented and accompanied by photographs. The collector and all of its components shall be described and should be photographed and no major failure", denotes that none of the listed in item (18)- ISO 9806 occurs.

1.2.14 Standard stagnation temperature of liquid heating collectors

When tested in accordance with ISO 9806: 2013 item (10), the collector shall not show any major failure as defined in beginning of section 3.1.2

1.3 Optional tests

- Pressure drop measurement (ISO 9806)
- Reaction to fire (EN13501-1)
- External fire performance (EN 13501-5)
- Surface temperature

Requirements related to these optional tests are not defined so far in the SHAMCI scheme rules - but may be defined elsewhere.

ANNEX A2. Requirements for solar water heaters

1.4 Pass criteria - solar water heaters

The pas criteria related to testing of the collector part of the system are given in ANNEX A1. The pass criteria for related to testing of the solar water heater as a whole are given in section 2.2 below.

1.5 Required tests - solar water heaters

The collector part in the solar water heater shall fulfil requirements given in ANNEX A1 except for requirements related to:

- Internal pressure (all systems excepted)
- Exposure (only systems where the collector cannot be tested separately)
- Internal thermal shock (only systems where the collector cannot be tested separately)
- Freeze resistance (all systems excepted)
- Thermal performance (all systems excepted)

The solar water heater as a whole shall be subject to tests described in the standards:

- ISO 9459-2 or ISO 9459-5

  A. Complete test of performance including prediction of long-term performance

- EN 12976-2:

  A. Freeze resistance/protection (5.1);
  B. Over temperature protection / scald protection / materials (5.2);
  C. Pressure resistance (5.3);
  D. Water contamination (5.4);
  E. Lightning protection (5.5);
  F. Safety equipment (5.6);
  G. Ability to cover the load (5.9); (only solar-plus-supplementary systems)
  H. Reverse flow protection (5.10);
  I. Electrical safety (5.11);

NOTE: Numbers in bracket refers to sections in EN 12976-2:2006.

1.5.1 Freeze resistance

1.5.1.1 General

The manufacturer shall state a minimal allowed temperature for the system. The parts of the system that are exposed to the outdoors shall be able to withstand freezing to this specified temperature without any permanent damage.

The manufacturer shall describe the method of freeze protection used for the system.

Any indoor components that are to be installed in places where temperatures can drop below 0°C shall be protected against freezing.

The freezing mechanism shall be tested in accordance with 5.1 of EN 12976-2:2006.

1.5.1.2 Freeze protection by means of anti-freeze fluid

The manufacturer shall define the composition of the heat transfer fluid, including additives, allowed for the system.

Precautions shall be taken to prevent the antifreeze fluid from deterioration as a result of high temperature conditions. These precautions shall be checked in accordance with 5.2 of EN 12976-2:2006.

NOTE In general the minimal allowed temperature of the system is equal to the freezing point of the antifreeze fluid. If the concentration of some antifreeze fluids - like glycols - exceeds a certain limit, they can freeze without damaging the system. In this case the minimal allowed temperature can be lower than the freezing point of the antifreeze fluid.

1.5.2 Over temperature protection

1.5.2.1 General

The system shall have been designed in such a way that prolonged high solar irradiation without heat consumption does not cause any situation in which special action by the user is required to bring the system back to normal operation.

When the system has a provision to drain an amount of drinking water as a protection against overheating, the hot water drain shall be constructed in such a way that no damage is done to the system or any other materials in the house by the drained hot water. The construction shall be such that there is no danger to inhabitants from steam or hot water from the drain. *Note: Draining drinking water to prevent overheating is not a recommended solution.*

When the overheating protection of the system is dependent on electricity supply and/or cold water supply, this shall be stated clearly in the instructions and on the system.

1.5.2.2 Scald protection

When the system is tested in accordance with 5.2 of EN 12976-2:2006, no steam shall escape from any tapping point. When this test has been performed with other than the highest irradiations this shall be mentioned in the documentation for the user.

For systems in which the temperature of the domestic hot water delivered to the user can exceed 60 °C, the assembly instructions shall mention that an automatic cold water mixing device or any other device to limit the tapping temperature to at most 60 °C +/- 5°C shall be installed on the solar heating system or elsewhere in the domestic hot water installation.

This device shall be able to withstand the maximum possible domestic hot water temperature from the solar heating system.

1.5.2.3 Over temperature protection for materials

The system shall have been designed in such a way that the maximal allowed temperature of any material in the system is never exceeded.

NOTE Care should be taken in cases where under stagnation conditions steam or hot water can enter the collector pipes, pipe work, distribution network or heat exchanger).

1.5.3 Reverse flow protection

The system shall contain provisions in order to prevent increased heat loss resulting from reverse flow in any circuit. This shall be checked in accordance with 5.10 of EN 12976-2:2006.

1.5.4 Pressure resistance

The storage tank and heat exchangers in this tank shall withstand 1.5 times the manufacturer's stated maximum individual working pressures.

When tested in accordance with 5.3 often 12976-2:2006 to the above pressures, there shall be no visible permanent damage or leakage of the system components and interconnections. After the waiting period in the test, the hydraulic pressure shall not have dropped more than 10 % from the value measured at the start of the waiting period.

The drinking water circuit shall withstand the maximum pressure required by national/European drinking water regulations for open or closed drinking water installations.

The system shall have been designed in such a way that the maximal allowed pressure of any materials in the system is never exceeded.

Every closed circuit in the system shall contain a safety valve. This safety valve shall withstand the highest temperature that can be reached at its location. It shall conform to EN 1489. If thermostatic valves are used, these shall conform to EN 1490.

1.5.5 Electrical safety

If the system contains any electrical devices, these shall conform to EN 60335-1 and EN 60335-2-21.

1.5.6 Safety equipment

1.5.6.1 Safety valves

Each section of the collector array, which can be shut off, shall be fitted with at least one safety valve. ICS systems shall be fitted with at least one safety valve, which may be integrated with an inlet combination. The safety valve shall resist the temperature conditions which it is exposed to, especially the highest temperature that can occur. The safety valve shall resist the heat transfer medium. The safety valve shall be dimensioned such that it can release the highest flow of hot water or steam that can occur. The dimension of the safety valve(s) shall be proved by suitable means.

The safety valves shall conform to EN 1489.

1.5.6.2 Safety lines and expansion lines

If the system is equipped with a safety line, this safety line shall not be capable of being shut off.

If the system is equipped with a safety line and an expansion line, the safety line and expansion line shall be dimensioned such, that for the highest flow of hot water or steam that can occur, at no place in the collector loop the maximum allowed pressure is exceeded due to the pressure drop in these lines. The dimension of the safety line and expansion line shall be proved by suitable means.

The expansion line and the safety line shall be connected and laid in such a way that any accumulations of dirt, scale or similar impurities are avoided.

1.5.6.3 Blow-off lines

If the system is equipped with blow-off lines, these blow-off lines shall be laid in such a way that they cannot freeze up and that no water can accumulate within these lines. The orifices of the blow-off lines shall be arranged in such a way that any steam or heat transfer medium issuing from the safety valves does not cause any risk for people, materials or environment.

The system shall be checked according to 5.6.3 of EN 12976-2:2006.

1.5.7 Resistance to external influences

The components, which are exposed to the effect of weather, shall resist weathering and shall be designed, constructed and fastened in such a way that they can withstand the weather.

In respect of lightning protection, the system should conform to IEC 61024-1.

1.6 Other requirements

1.6.1 Supporting frame

Maximum allowable load for supporting frame shall be stated by the manufacturer.

1.6.2 Materials

The design and materials in the system shall be such that there is no possibility of deforming, clogging or lime deposit in its circuits that will drastically influence the system performance and safety.

With regard to corrosion, Annex B of EN 12976-2:2006gives information to assist manufacturers in selecting the materials used in the collector loop.

1.6.3 Heat exchangers

If the system is intended for use in areas with high water hardness and at temperatures above 60 °C, heat exchangers in contact with drinking water shall be designed such that scaling is prevented or there shall be a facility for cleaning.

1.6.4 Control system, sensors

When present, the collector temperature sensor shall withstand stagnation conditions as specified in ISO 9806 without drifting by more than 1 K.

When present, the store temperature sensor shall withstand 100 °C without reduction of the accuracy by more than 1 K.

The location and installation of all temperature sensors shall ensure a good thermal contact with the part of which the temperature shall be measured. The temperature sensors shall be insulated against ambient.

1.6.5 Hydraulic safety

Each section of the collector array, which can be shut off, shall be fitted with at least one safety valve. ICS systems shall be fitted with at least one safety valve, which may be integrated with an inlet combination. The safety valve shall resist the temperature conditions which it is exposed to, especially the highest temperature that can occur. The safety valve shall resist the heat transfer medium. The safety valve shall be dimensioned such that it can release the highest flow of hot water or steam that can occur. The dimension of the safety valve(s) shall be proved by suitable means.

If the system is equipped with a safety line, this safety line shall not be capable of being shut off.

If the system is equipped with a safety line and an expansion line, the safety line and expansion line shall be dimensioned such, that for the highest flow of hot water or steam that can occur, at no place in the collector loop the maximum allowed pressure is exceeded due to the pressure drop in these lines. The dimension of the safety line and expansion line shall be proved by suitable means.

The expansion line and the safety line shall be connected and laid in such a way that any accumulations of dirt, scale or similar impurities are avoided.

If the system is equipped with blow-off lines, these blow-off lines shall be laid in such a way that they cannot freeze up and that no water can accumulate within these lines. The orifices of the blow-off lines shall be arranged in such a way that any steam or heat transfer medium issuing from the safety valves does not cause any risk for people, materials or environment.

1.6.6 Resistance to external influences

The components, which are exposed to the effect of weather and environments, shall resist weathering and shall be designed, constructed and fastened in such a way that they can withstand the weather and attacks from insects, birds and animals.

1.6.7 Electrical safety

If the system contains any electrical devices, these shall conform to EN 60335-1 and EN 60335-2-21.

ANNEX B1 - DOCUMENTATION OF THE SOLAR COLLECTOR

1.7 Drawings and data sheet

The solar collector submitted for test shall be accompanied by:

- a set of drawings describing the solar collector's dimensions and structure
- a list of materials used in the solar collector
- important physical and optical properties

Drawings shall have a number, date of issue and possible revision date.

These documents shall be filed by the test institute for at least the period of time that the solar collector type is traded by the manufacturer.

NOTE The manufacturer is usually obliged to keep these drawings for at least the period of time that the warranty of the solar collector type is valid.

1.8 Marking, labelling and packaging

Solar collectors shall carry a visible and durable label with the following data:

- Name of manufacturer;
- Type;
- Serial number;
- Year of production;
- Gross area of solar collector;
- Dimensions of solar collector;
- Maximum operation pressure;
- Stagnation temperature at 1000 W/m2 and 30 ºC;
- Volume of heat transfer fluid; (liquid heating solar collectors only)
- Optical efficiency, ηa0
- First order heat loss coefficient, ka1 (W/(m²K)
- Second order heat loss coefficient, ka2 (W/(m²K²)
- Maximum start temperature (air heating solar collectors only)
- Weight of empty solar collector;
- Made in:.....

1.9 Installer instruction manual - collector

Solar collectors shall be accompanied by an installer instruction manual, if traded as stand-alone components. When they are part of a complete system, the system installation manual can cover the complete system. In that case no separate manual for the solar collector shall be required. The instruction manual shall at least contain the following information:

- Dimensions and weight of the solar collector, instructions about the transport and Handling of the solar collector; stagnation temperature of the solar collector
- Description of the mounting procedure
- Recommendations about lightning protection

- Instructions about the coupling of the solar collectors to one another and the connection of the solar collector field to the heat transfer circuit, including dimensions of pipe connections for solar collector arrays up to 20 m²

Recommendations about the heat transfer media which may be used (also with respect to corrosion) and precautions to be taken during filling, operation and service.

- Maximum operation pressure, the pressure drop and the maximum and minimum tilt angle
- Permissible wind and snow load

- Maintenance requirements

If the solar collector is traded as a component and sold directly to customers, all relevant documentation concerning personal safety, maintenance and handling of the product shall be made available to the customer in the national language of the country where it is sold.

NOTE: The stagnation temperature shown at solar collector label and in installer instruction manual should be given in 10°C resolution.

ANNEX B2 - DOCUMENTATION OF THE SOLAR WATER HEATER[1]

1.10 General

With each Factory Made solar heating system, the manufacturer or official supplier shall deliver documents for assembly and installation (for the installer) and documents for operation (for the user). These documents shall be written in the official language(s) of the country of sale. These documents shall include all instructions necessary for assembly and operation, including maintenance, and draw attention to further requirements and technical rules that are concerned.

1.11 Installer instruction manual - solar water heater

The assembly instructions shall be appropriate to the system and include information concerning:

- Technical data, at least those with respect to:

  A. Layout of the system.
  B. Location and nominal diameters of all external connections.
  C. an overview with all components to be delivered (such as solar collector, storage tank, support structure, hydraulic circuit, back-up provisions, control system and accessories), with information on each component: type, electrical power, dimensions, weight, marks and mounting.
  D. Maximum operating pressure of all fluid circuits in the system, such as the collector circuit, the domestic hot water line and the auxiliary heating circuit (in Pa).
  E. Working limits: admissible temperatures, pressures etc. throughout the system.
  F. Type of corrosion protection.
  G. Type of heat transfer fluid.

- Packing and transport of the whole system and/or components and way of storage (outdoors, indoors, packed, not packed);
- Guidelines with recommendations concerning:

  A. Mounting surfaces.
  B. Distances to walls and safety with regard to frost.
  C. The way the entrance of piping into the building shall be finished (resistance against rain and moisture).
  D. The procedure to be followed for thermal insulation of pipes.
  E. The roof integration of the collector (if appropriate).
  F. For drain-back or drain-down systems, the minimal pipe slope and any other instructions necessary to ensure proper draining of the collector circuit.
  G. Climate class.
  H. Permissible wind and snow load.
  I. Recommendations about lightning protection.

[1]Annex B2 is a slightly modified version of the requirements for documentation given in EN 12976-1.

- If a support frame that is normally mounted outdoors is part of the system, the maximum values for snow load and mean wind velocity - and the statement that the system may only be installed in locations with lower values for these loads.
- Method for pipe work connections.
- Types and sizes of the safety and security devices and their draining. The assembly instruction shall demand that any pressure relief valves from which steam can escape during normal or stagnation conditions shall be mounted, in such a way that no injuries, harm or damage can be caused by the escape of steam. When the system has a provision to drain an amount of drinking water as a protection against overheating, the hot water drain shall be constructed in such a way that no damage is done to the system or any other materials in the building by the drained hot water

The necessary control and safety devices including the wiring diagram, including the need for:

A. a thermostatic mixing valve which limits the draw-off temperature to 60 °C, when this is required
B. adequate means for preventing backflow from all circuits to drinking main supplies

- Reviewing, filling and starting up of the system
- Commissioning of the system
- A checklist for the installer to check proper functioning of the system
- The lowest temperature at which the system can withstand freezing

1.12 Documents for the user - solar water heater

The operating instructions shall include information concerning:

- Existing safety and security components and their thermostat adjustment where applicable.
- Implementation of the system drawing particular attention to the facts that:

  A. Prior to putting the system in operation it shall be checked that all valves are properly working and the system is filled with water and/or antifreeze fluid completely or according to the manufacturer's instructions.
  B. In the event of any failure condition a specialist shall be called in.

- Regular operation of safety valves.
- Precautions with regard to the risk of frost damage and/or overheating.
- The manner of avoiding failure when starting the system under frost or possible frost conditions.
- Decommissioning of the system.
- Maintenance of the system by a specialist, including frequency of inspections and maintenance and a list of parts that need to be replaced during normal maintenance.
- Performance data for the system:

  A. The recommended load range for the system (l Collector/day) at specified temperature.
  B. The thermal performance and solar fraction of the system.

C. The annual electricity consumption for pumps, control systems and electrical valves of the system for the same conditions as specified for the thermal performance, assuming a yearly pump operating time of the collector pump of 2000 h.
D. If the system contains devices for freeze protection that cause electrical consumption, the electrical power of these devices (in W) and their characteristics (e.g. switch-on temperatures).
E. For a “solar-plus-supplementary system”, the maximum daily hot water load which can be met by the system without any contribution from solar energy.

- The required solar irradiation on the plane of the collector or the minimum solar lamp irradiance at the plane of the collector for which overheating protection of the system has been tested and, the requirement that the system shall not be used in climate zones with higher irradiation values than these values.
- When the overheating protection of the system is dependent on electricity and/or cold water supply and/or the system being filled with drinking water, the requirement to never switch off the electricity supply and/or the main water suppliers, or that the system is not drained when there is high solar irradiation.
- The fact that drinking water may be drained from the system during high irradiation situations, if this method is used to prevent overheating.
- The lowest temperature at which the system can withstand freezing.
- Type of heat transfer fluid.
- In case of solar heating systems with emergency auxiliary heaters, instructions shall be issued that this emergency heater shall only be used for emergency heater purposes.

ANNEX C1 - COLLECTOR DATA SHEET

See separate document. (Based on page 1 Solar Keymark collector data sheet)

Get updated version from: www.shamci.org or SHAMCI certification body.

ANNEX C2 - SOLAR WATER HEATER DATA SHEET

See separate document. (Based on Solar Keymark system data sheet)

Get updated version from: www.shamci.org or SHAMCI certification body.

ANNEX D - Factory Production Control

Based on ISO 9001 and **Solar Keymark Scheme Rules Annex E**). See separate document.

ANNEX E - INSPECTION REPORTS

Report templates for factory production and physical inspection based on **Solar Keymark Scheme Rules Annex A1b**. See separate document.

ANNEX F. SPECIAL TEST

In connection with a complaint concerning the conformity of the product, a special test can be ordered through the certification body by anyone, if the fulfillment of the requirements of the certification program or the registered values (see section below) of a certified product is doubted.

The special test is normally to be made as a type test and in agreement with the manufacturer by a second approved testing laboratory listed in paragraph 8. If only one or a few points of the certification program are challenged, the certification body decides after consulting the testing laboratory if the special test can be made as a partial or supplementary test.

If the tested product does not fulfill the requirements and/or does not comply with the registered values, the legal person holding the SHAMCI license of the product in question has to carry the costs of the special test.

If the tested product fulfills the requirements and complies with the registered values, the costs have to be carried by the party which questioned the fulfillment of the requirements or registered values and ordered the test through the certification body.

If the special test shows that the failure of the product to conform to the requirements and/or registered values is due to random manufacturing error or transport damage, the testing laboratory has to take a second sample. The result of this test is the obliging result for the special test.

The legal person holding the SHAMCI license or a person authorized by the legal person holding the SHAMCI license must have the opportunity to take part during the whole procedure of the special test. He must be informed of the results of the test without delay to have the chance to react directly.

If the special test states deviations from the requirements and/or the registered values, the certification body requires the legal person holding the SHAMCI license to rectify the faults within a certain limited time which should not exceed one month, depending on the extent and manner of the fabrication. Thereafter the testing laboratory performs a new special test, the extent and manner being determined by the certification body consulting the testing laboratory.

1.13 Compliance with registered values

Collectors (ISO 9806):

- The integral of the measured instantaneous efficiency at the special test shall be more than 90% of the already registered integral in the interval of the reduced temperature from 0 – 0,1 K/(W/m²). The reduced temperature and the instantaneous efficiency are defined ISO 9806.

Solar water heaters (ISO 9459-2 & ISO 9459-5):

- Solar-plus-supplementary systems: The calculated Qaux,net based on the special test shall be less than 110% of the originally calculated Qaux,net. Qaux,net is defined in ISO 9459-2 & ISO 9459-5. The calculations to be compared shall be based on the region climate data and the design load already given by the manufacturer.
- Solar-only and solar preheat systems: The calculated fsol based on the special test shall be more than 90% of the originally calculated fsol. fsol is defined in ISO 9459-2 & ISO 9459-5. The calculations to be compared shall be based on the region climate data and the design load already given by the manufacturer.

Annex G - International standards adopted in AIDMO for collectors & SWHs

Standards	Entitled	Standards adopted by AIDMO
ISO 9806-1 : 1994	Test methods for solar collectors -- Part 1: Thermal performance of glazed liquid heating collectors including pressure drop	AIDMO ISO 9806-1 : 2008
ISO 9806-2 : 1995	Test methods for solar collectors -- Part 2: Qualification test procedures	AIDMO ISO 9806-2 : 2008
ISO 9806-3 : 1995	Test methods for solar collectors -- Part 3: Thermal performance of unglazed liquid heating collectors (sensible heat transfer only) including pressure drop	Does not exist
ISO 9806 (DIS) (it will replace the Three parts mentioned above)	Solar energy — Solar thermal collectors — Test methods	Does not exist
ISO 9488 : 1999	Solar energy. Vocabulary	Does not exist
ISO 9459-1 : 1993	Solar heating -- Domestic water heating systems -- Part 1: Performance rating procedure using indoor test methods	AIDMO ISO 9459-1
ISO 9459-2 : 1995	Solar heating -- Domestic water heating systems -- Part 2: Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems	AIDMO ISO 9459-2 : 2008
ISO 9459-3 : 1997	Solar heating -- Domestic water heating systems -- Part 3: Performance test for solar plus supplementary systems	AIDMO ISO 9459-3 : 2008
ISO 9459-5 : 2007	Solar heating -- Domestic water heating systems -- Part 5: System performance characterization by means of whole-system tests and computer simulation	Does not exist
EN 12976-2 : 2006	Thermal solar systems and components - Factory made systems - Part 2: Test methods	Does not exist
EN 12976-1 : 2006	Thermal solar systems and components. Factory made systems. General requirements	Does not exist
EN13501-1 : 2007	Fire classification of construction products and building elements-Part1: Classification using data from reaction to fire tests	Does not exist
EN 13501-5 : 2012	Fire classification of construction products and building elements. Classification using data from external fire exposure to roofs tests	Does not exist
ISO 9845 -1 : 1992	Solar energy -- Reference solar spectral irradiance at the ground at different receiving conditions -- Part 1: Direct normal and hemispherical solar irradiance for air mass 1,5	AIDMO ISO 9845 -1: 2008

Standards	Entitled	Standards adopted by AIDMO
ISO 9847 : 1992	Solar energy -- Calibration of field pyranometers by comparison to a reference pyranometer	AIDMO ISO 9847 : 2009
EN 1489 : 2000	Building valves. Pressure safety valves. Tests and requirements	Does not exist
EN 1490:2000	Building valves. Combined temperature and pressure relief valves. Tests and requirements.	Does not exist
EN 60335-1 : 2012	Household and similar electrical appliances. Safety. General requirements	1
EN 60335-2-21 : 2003	Household and similar electrical appliances. Safety. Particular requirements for storage water heaters	2 AIDMO IEC 60335-2-21 : 2008
EN 12975-1: 2006	Thermal solar systems and components. Solar collectors. General requirements	Does not exist
EN 12975-2 : 2006 (it will be replaced by ISO 9806)	Thermal solar systems and components - Solar collectors - Part 2: Test methods	Does not exist
ISO/IEC 17025 : 2005	General requirements for the competence of testing and calibration laboratories	Does not exist
ISO/IEC 17065 : 2012 (this standard has already replaced ISO/IEC Guide 65 and EN 45011)	Conformity assessment -- Requirements for bodies certifying products, processes and services	Does not exist
ISO/IEC 17020 : 2012	Requirements for the operation of various types of bodies performing inspection	Does not exist

Annex H - Checklist for test labs concerning availability of standards and competence

Name of Standard	Standard code	Availability of standards Y/N	Competence of testing team Y/N	Comments
Solar thermal collector	ISO 9806			
Solar water heaters (performance tests)	ISO 9459-2			
Solar water heaters (performance tests)	ISO 9459-5			
Solar water heaters (other characteristics tests)	EN 12976-2			
Vacuum and sub-atmospheric collectors dimensions: 2013	ISO 9488: 8.6 & 8.7			
Pressure drop measurement *Optional for liquid heating collectors*	ISO 9806			
Reaction to fire *Optional – depending on national regulation*	EN 13501-1			
External fire performance *Optional – depending on national regulation*	EN 13501-5			
Thermostatic valves	EN 1490			
Safety valve	EN 1489			
Electrical devices	EN 60335-1 EN 60335-2-21			
Lightning protection *Optional – depending on national regulation*	IEC 61024-1			