



Solar Heating Arab Mark and Certification Initiative

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I. Background

The need for solar thermal products and services certification measures in the Arab region emerged in 2010 after analyzing the status of Solar Water Heaters (SWHs) market in 2009. The Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) conducted a study on the analysis of the certification and standardization potentials in member states in 2011.

Therefore, the Executive Office at the Arab Ministerial Council for Electricity (AMCE) raised a request to the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) and the Arabian Industrial Development and Mining Organization (AIDMO) to coordinate with AMCE secretariat on a standardization and certification program for SWHs aiming to achieve a quality certificate standardized across the Arab region.

The next section illustrates the current situation for Egypt, Jordan, Lebanon, Palestine territory, Syria, Algeria, Libya, Yemen, Morocco, and Tunisia according to market and policy indicators:

1.1. Market Indicators

- The SWHs market is available, but the affordability (consumer purchasing power) doesn't exist.
- Competitive prices exist only in Lebanon, Palestine, and Syria.
- Lebanon and Morocco have incentives for consumers only, while Tunisia has incentives for both consumers and suppliers.

1.2. Policies Indicators

RCCREEE conducted an analysis to determine readiness levels of the Arab countries' regulations and markets to apply SHAMCI scheme rules into their systems.

The countries covered by the analysis differ from each other in terms of their levels of interest regarding policy indicators in the following categories:

Policies: Only 23% of Arab countries have interested in updating their policies, and regulations, trade movements, and export and import laws.

Government Initiatives: Recently, 60% of Arab countries' governments started to initiate new transformation strategies for the SWHs.

Finance: None of the Arab countries allocate enough finance to research and development initiatives, except Tunisia as the only country that almost achieved their R&D expenditure / GDP.

SHAMCI Readiness: Before applying any certification scheme, country readiness should be determined to facilitate adoption (Market breakdown).

From this analysis, 80% of Arab countries apply standardization and testing processes, although 20% only apply certification schemes.

25% of Arab countries apply quality control regulations and rules.

Therefore, Arab countries in average have 50% of readiness to apply SHAMCI scheme. However, few countries such as Tunisia, Egypt, Jordan, Lebanon, and Morocco have higher readiness score which enables an immediate adoption.

2. SHAMCI Schematic Certification Rules



The schematic certification rules describe the requirements for obtaining SHAMCI certification for solar collectors and Solar Water Heaters, and define the test methods to be used to check if requirements are fulfilled. Unifying test methods and conformity attestation, it becomes possible to compare different products based on their test results.

2.1. Products Covered by the Scheme

The scheme covers the following products:

- Solar Thermal Collectors as defined in scope of ISO 9806
- Solar Water Heating Systems as defined in scopes of ISO 9459-2 and ISO 9459-5

2.1.1. Required Tests for Products

The following standards for testing methods are required for the SHAMCI certification scheme:

2.1.1.1. Solar Collectors

- ISO 9806 “Solar energy -- Solar thermal collectors -- Test methods”

Required Tests:

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

- Internal pressure
- Leakage test (air collectors only)
- 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
- Pressure drop measurement
- Final inspection

2.1.1.2. Solar Water Heaters:

The following two test methods are required for performance testing of Solar Water Heaters. No other test methods for characteristics covered by these test methods shall be used.

- ISO 9459-2 "Solar heating -- Domestic water heating systems -- Part 2": Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems
- ISO 9459-5 "Solar heating -- Domestic water heating systems -- Part 5": System performance characterization by means of whole-system tests and computer simulation

Required Tests:

- 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 following test methods are available for testing of characteristics other than performance of Solar Water Heaters. No other test methods for characteristics covered by the test methods below shall be used.

- EN 12976-2 "Thermal solar systems and components -- Factory made systems -- Part 2": Test methods

Required Tests:

- Freeze resistance/protection (5.1)
- Over temperature protection/scald protection/materials (5.2)
- Pressure resistance (5.3)

- Water contamination (5.4)
- Lightning protection (5.5)
- Safety equipment (5.6)
- Ability to cover the load (5.9) (only solar-plus-supplementary systems)
- Reverse flow protection (5.10)
- Electrical safety (5.11)

NOTE: Numbers between brackets refer to sections in standard EN 12976-2:2012.

The standards are available from national standardization bodies and from the ISO website: www.iso.org

2.2. SHAMCI Bodies in the Certification Scheme

Issuing SHAMCI will depend on the following bodies:

Inspection Bodies

Inspection bodies will be responsible for collecting product samples according to specific reports and pass it to testing labs. Inspections bodies shall meet the following requirement(s):

- Inspection bodies shall have experience from ISO 9001 level factory production control

Test Labs

Test labs will be responsible for performing product testing procedures determine their applicability to be granted the SHAMCI label. Test Labels wishing to join SHAMCI Bodies shall meet the following requirement(s):

- Have accreditation (ISO 17025) for solar collectors and solar water heaters according to standards mentioned in “3.2 List of standards concerned

Certification Bodies

SHAMCI certification bodies will be responsible for awarding the SHAMCI label. All bodies wishing to be enlisted as certification body shall meet the following requirements:

- Experience in the certification of solar collectors and solar water heaters in other certification schemes
- A management system in accordance with ISO/IEC 17065
- Will be approved by the SHAMCI Network

2.2.1. SHAMCI Bodies Requirements

2.2.1.1. General Requirements

- Certification bodies shall be approved by the SHAMCI Network
- Approved certification bodies shall recognize test labs and inspection bodies

2.2.1.2. Specific Requirements

2.2.1.2.1. Certification Bodies

Certification bodies shall - as a minimum - have:

- Experience in Solar Collectors and Solar Water Heaters certification management in other certification schemes
- A certification management system in accordance with ISO/IEC 17065

2.2.1.2.2. Test Labs

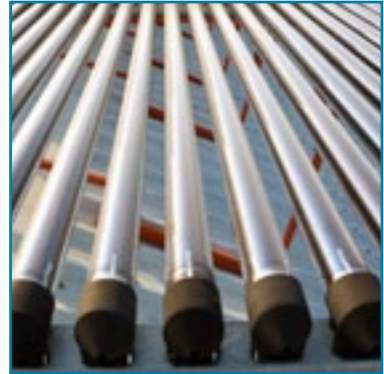
- Test labs shall have an accreditation of ISO 17025 for Solar Collectors and Solar Water Heaters according to the standards mentioned in "List of standards concerned"

2.2.1.2.3. Factory Inspectors

- Inspection bodies shall have experience from ISO 9001 level factory production control

2.3. Conformity Attestation

The whole conformity attestation process is done by 3rd party (independent) testing and inspection bodies – (See Table 1).



Conformity Attestation			
Activity group	Activity	Actor	
		Manufacturer	3rd party
Testing/ inspection	Initial type testing		X
	Sampling for initial type testing		X
	Biannual detailed product inspection		X
Factory production control	Factory production control (QMS)	X	
	Initial inspection of factory production control		X
	Annual inspection of factory production control		X

Table 1: SHAMCI attestation of conformity is based on 3rd party testing and inspection.

QMS: Quality Management System

3rd Part): is an independent party other than manufacturer (1st party) and buyer (2nd party) parties

X: Indicates the required activity and owner

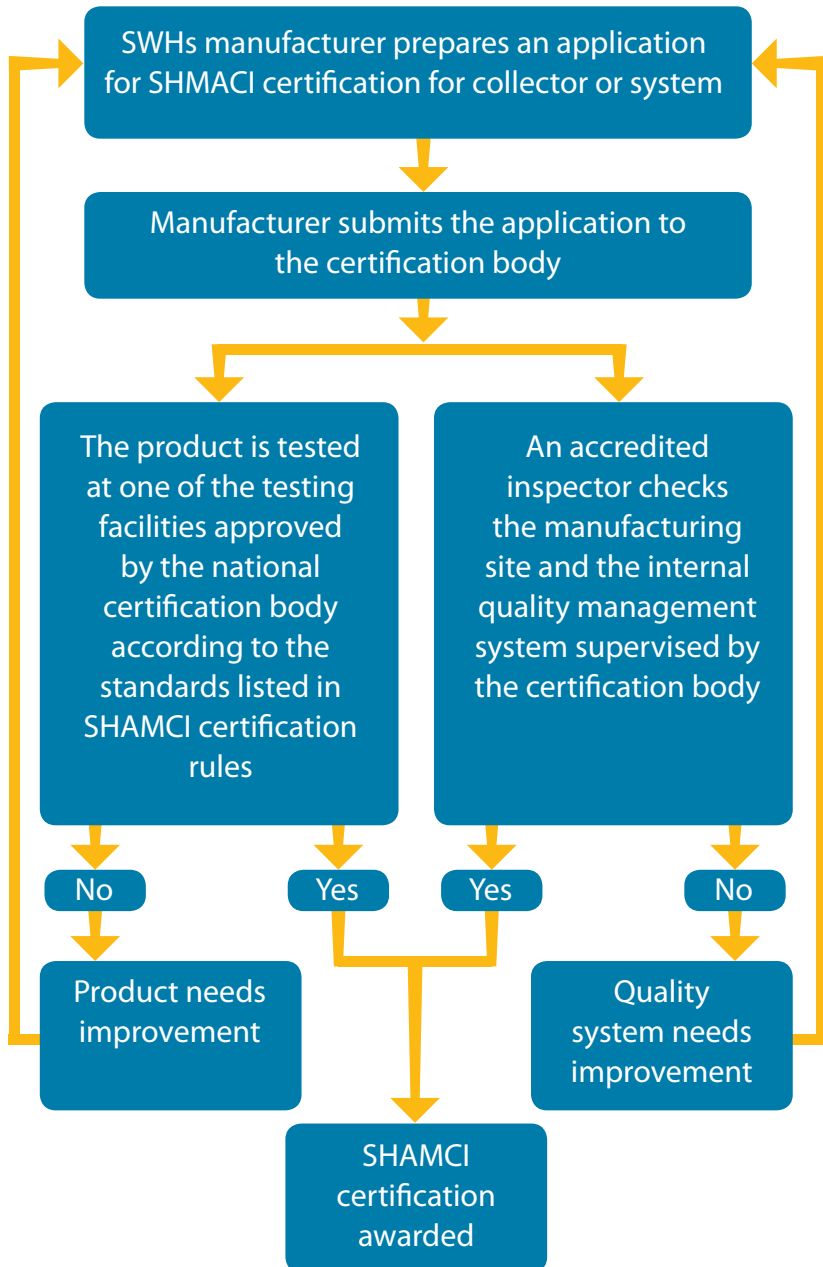


As mentioned in this section, all SHMACI related standards can be summarized in;

- Solar thermal collectors - ISO 9806
- Solar water heating systems - ISO 9459-2 & ISO 9459-5
- Thermal solar systems & components – Factory Made Systems part.2 - EN 12976-2
- Certification body - ISO/IEC 17065
- Testing facility - ISO 17025

4. Certification Process (Obtaining SHAMCI)

• Factory's quality management system - ISO 9001



4. Certification Process (Obtaining SHAMCI)

- After SHAMCI is adopted in local country, manufacturer should contact the authorized Certification Body, which is already accredited by SHAMCI Network under (ISO/IEC 17065).
- Manufacturer will be asked to fill an application to start the start the certification process.
- An authorized inspector will contact the manufacturer to visit the factory.
- During the auditing visit, a formal questionnaire will take place to determine the quality level of management and manufacturing operations according to following:
 - QMS: ISO 9001 preferred/ or internal QMS / or ISO 9000 standards.
 - Production control and automated systems.
 - Routine tests during and after production.
 - Complains and records storage.
- A sample product will be selected randomly from each product to be sent to an accredited testing facility (ISO17025).
- At the testing lab, products will be tested according to the following standards:
 - Testing the solar collector only – test method (ISO 9806).
 - Testing the whole system.
- Performance characterization and yearly performance prediction outdoor (ISO 9459-2).
- Performance characterization by means of whole system and computer simulation (ISO 9459-5).
- Characteristics and components testing for the whole system (EN 12976-2)
- All questionnaire and testing lab results will be sent to the Certification Body to issue the certification for your products.

In case failures:

- In Questionnaire: failed points should be updated by your QMS.
- In testing lab; product design should be.
- After obtaining the certificate, annual and bi-annual inspections are required for the product. Annual fees will be applied.



SHAMCI is natively-built to benefit solar thermal products and services consumers, manufacturers and authorities in the Arab region. SHAMCI labeled products combine international standards with regional specific characteristics assuring products high quality, safety, reliability, durability and high performance.

[Adopting SHAMCI helps authorities to:](#)

- Improve customer confidence
- Facilitate trade barriers and regional collaboration
- Streamline compliance monitoring
- Create jobs
- Promote industrial quality standards compliance.

[Adopting SHAMCI helps solar thermal product manufacturers to:](#)

- Offer high quality products at reasonable costs
- Improve visibility to SWH customers
- Achieve operational economies of scale
- Simplify test procedures at lower costs.
- Develop new markets and create export opportunities

[Adopting SHAMCI helps solar thermal product consumers to:](#)

- Identify high-quality products easily
- Assure safety, durability, and reliability
- Compare seller prices through standard product features



SHAMCI Network is an international stakeholder network which is responsible for developing and running SHAMCI. Network members are representatives from energy authorities, industrial sector, certification bodies, testing and inspection bodies, consumers, NGOs, international organizations, and other concerned stakeholders.

[Network members take charge of the following activities:](#)

- Developing and updating the certification standards and scheme.
- Harmonizing certification practices and processes.
- Approving and listing certified products.
- Organizing regular network meetings and facilitating communication between stakeholders (in general twice a year).
- Selecting, verifying, and monitoring of test laboratories and ensuring results accuracy.

[Currently, SHAMCI network consists of 43 registered members out of 17 countries including:](#)

- Official representatives
- Private sector and consultants
- Regional and international organizations



- Since SHAMCI initiative came to light and approved by LAS and AIDMO, the following activities have been accomplished:
- A cooperation agreement with Stuttgart University is signed
- SHAMCI Network is established.
- A lot of meetings and workshops are conducted to initiate SHAMCI.
- In 2013, SHAMCI was regionally approved, and three requests were received from Egypt, Jordan, and Tunisia to apply SHAMCI on the national level.



In cooperation with:

UNEP through Global Solar Water Heating Project (GSWH)

RCREEE has been a key driver for the first Pan-Arab product standards and certification of solar thermal products through SHAMCI. As a regional partner in the Global Solar Water Heating project (GSWH project), RCREEE serves as a regional hub to develop products and services knowledge through developing a new quality scheme for SWHs in developing countries. This ensures that the effective dissemination of that knowledge to other regions covered by the GSWH project to accelerate the commercialization and sustainable market transformation of Solar Water Heating industry.

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