



Solar Heating Arab Mark
and Certification Initiative

Table of contents

1. Background	3
1.1. Market Indicators	4
1.1. Policy Indicators	4
2. SHAMCI Certification Rules	7
2.1. Products Covered by the Scheme	7
1.1.1. Required Tests for Products	7
1.1.1.1. Solar Collectors	7
1.1.0.1. Solar Water Heaters	8
2.2. SHAMCI Relevant Bodies	9
2.2.1. SHAMCI Bodies Requirements	10
2.2.1.1. General Requirements	10
2.2.1.2. Specific Requirements	10
2.2.1.2.1. Certification Bodies	10
2.2.1.2.2. Test Labs	10
2.2.1.2.3. Factory Inspectors	10
2.3. Conformity Attestation	10
3. Standards Summary	12
4. Certification Process (Obtaining SHAMCI)	15
5. SHAMCI Benefits	18
6. SHAMCI Network	20
7. Project Activities	22





I. Background

The need for solar thermal products and services certification measures in the Arab region emerged in 2010 after analyzing the status of the Solar Water Heaters (SWHs) market for 2009. Based on this need, 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) requested the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) and the Arab Industrial Development and Mining Organization (AIDMO) to coordinate with AMCE secretariat on a standardization and certification program for SWHs with the aim to achieve a standardized SWH quality certificate across the Arab region.

The next section illustrates the current situation for Egypt, Jordan, Lebanon, Palestine, Syria, Algeria, Libya, Yemen, Morocco, and Tunisia based on market and policy indicators.

1.1. Market Indicators

- The SWHs market exists but lacks consumer purchasing power.
- Competitive prices exist only in Lebanon, Palestine, and Syria.
- Jordan has passed new building codes requiring solar water heaters on all new commercial and residential buildings.
- Syria has created a fund for subsidizing residential solar water heaters, and aims to install 100.000 collectors in 3 years.
- Morocco has developed an integrated program that is part of the national energy strategy and that aims to install 1.7 million m² of solar water heaters by 2020.
- Tunisia has incentives for both consumers and suppliers through a program called PROSOL. The main features of the PROSOL financing scheme are:
 - A loan mechanism for domestic customers to purchase solar water heaters with discounted and progressively phasing out interest rates on the loans.
 - A capital cost subsidy provided by the Tunisian government of up to 100 dinars (57 euros) per m².
- In Lebanon, residential users can benefit from the interest-free loans to install a solar water heater system. In addition, beneficiaries can benefit from the 200 USD subsidies to be discounted from the total cost of system purchased in conformity with standards set by the Lebanese authorities.

1.2. Policies Indicators

RCREEE 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: 54% of Arab countries are willing to update 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 solar water heaters.

Finance: None of the Arab countries allocate enough finance to research and development initiatives, with the exception of 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 through a market breakdown to facilitate adoption.

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

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

Therefore, Arab countries have on average approximately 25% - 50% of readiness to apply SHAMCI scheme. However, few countries such as Tunisia, Egypt, Jordan, Lebanon, and Morocco have a higher readiness score that enables an immediate adoption of SHAMCI.

2. SHAMCI Certification Rules



2. SHAMCI Schematic Certification Rules

The certification rules describe the requirements for obtaining SHAMCI certification for solar collectors and Solar Water Heaters (SWHs factory made systems), and define the test methods needed to check if the requirements are fulfilled. By unifying test methods and conformity attestation, it becomes possible to compare different products based on their results.

2.1. Products Covered by the Scheme

The scheme covers the following products:

- Solar Thermal Collectors as defined in scope of ISO 9806:2013
- 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 9806:2013 "Solar energy -- Solar thermal collectors -- Test methods"

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
- Leakage test (air collectors only)
- Exposure

- High-temperature resistance
- External thermal shock
- Internal thermal shock
- Rain penetration (only for glazed collectors)
- Freeze resistance (only for collectors claimed to be freeze resistant)
- Mechanical load
- Impact resistance
- Thermal performance
- Pressure drop measurement
- Final inspection
- Test of stagnation temperature for liquated collector
- Test collapse

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:

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
- Over temperature protection/scald protection/materials
- Pressure resistance
- Water contamination
- Lightning protection
- Safety equipment

- Ability to cover the load (only solar-plus-supplementary systems¹)
- Reverse flow protection
- Electrical safety

2.2. SHAMCI Relevant Bodies

The issuing of the SHAMCI certificate 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. Inspection 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 to determine whether the samples are granted the SHAMCI label. Test Labs 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 as specified in the ISO 17025 “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
- Approval of 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.

¹ solar heating system which utilizes both solar and auxiliary energy sources in an integrated way and is able to provide a specified heating service independent of solar energy availability.

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 “3.2. 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 shall be conducted by independent 3rd party testing and by 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 Party: is an independent party other than manufacturer “1st party” and buyer “2nd party”

X: Indicates the required activity and owner

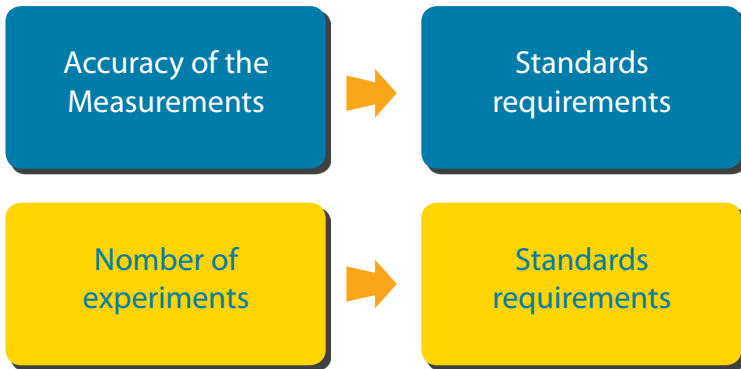


3. Standards Summary

As mentioned in the previous section, all SHAMCI related standards can be summarized:

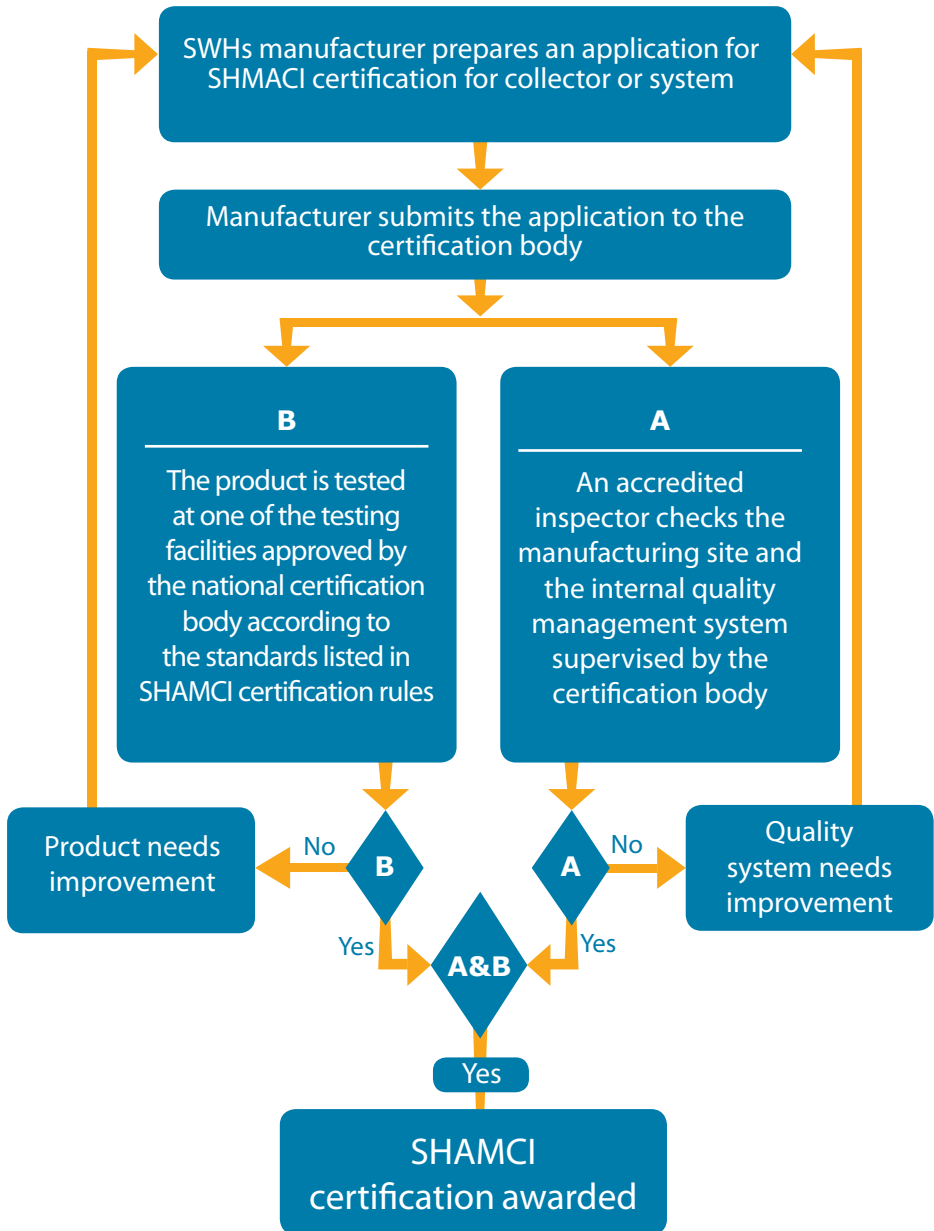
- ISO 9806: 2013: “Solar energy — Solar thermal collectors — Test methods” - Specifies test methods for assessing the durability, reliability and safety for fluid heating collectors.
- ISO 9459-2: 1995, Solar Heating – Domestic water heating systems – Part 2: Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems
- ISO 9459-5: 1995, Solar Heating – Domestic water heating systems – Part 5: System performance characterization by means of whole-system tests and computer simulation.
- EN 12976-2: Thermal solar systems & components – Factory Made Systems part.2 - and that include:
 - ✓ 5.1 Freeze resistance test
 - ✓ 5.2 Over temperature protection test
 - ✓ 5.3 Pressure resistance
 - ✓ 5.4 Water contamination
 - ✓ 5.5 Lightning protection
 - ✓ 5.6 Safety Equipment
 - ✓ 5.9 Ability to cover the load; (only solar-plus-supplementary systems)
 - ✓ 5.10 Reverse flow protection
 - ✓ 5.11 Electrical safety

- Certification body - ISO/IEC 17065:2012 - This international standard contains principles and requirements for the competence, consistency and impartiality of the certification of products (including services; see clause 3.3 of ISO/IEC 17000) and processes and for the bodies providing those activities.
- Testing facility ISO/IEC 17025 - Specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods.
- Factory's quality management system - ISO 9001



4. Certification Process (Obtaining SHAMCI)

4. Certification Process (Obtaining SHAMCI)



- After SHAMCI is adopted in a local country, manufacturers should contact the authorized Certification Body, which is already accredited by SHAMCI Network under ISO/IEC 17065.
- Manufacturers will be asked to fill an application to 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 the following:
 - QMS: ISO 9001 preferred/ or internal QMS / or at least ISO 9000 standards.
 - Production control and automated systems.
 - Routine tests during and after production.
 - Complaints and records storage.
- A sample product will be selected randomly from each product to be sent to an accredited testing facility (ISO 17025).
- 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 avoid the identified mistakes in the test report.
- After obtaining the certificate, annual and bi-annual inspections are required for the product. Annual fees will apply.



5. SHAMCI Benefits

SHAMCI was built to benefit solar thermal products and services for consumers, manufacturers and authorities in the Arab region. SHAMCI labeled products combine international standards with regional specific characteristics assuring products of 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:](#)

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



6. SHAMCI Network

SHAMCI Network is an international stakeholder network that 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 in the Arab region.

Network members are in charge of conducting 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 (generally twice a year)
- Selecting, verifying, and monitoring of test labs and ensuring results accuracy

Currently, SHAMCI network consists of 43 registered members out of 17 countries including:

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



7. Project Activities

Since SHAMCI initiative came into being and was approved by LAS and AIDMO, the following activities have been accomplished:

- A cooperation agreement with Stuttgart University has been signed
- SHAMCI Network has been established.
- A lot of meetings and workshops have been conducted to initiate SHAMCI.
- In 2013, SHAMCI was regionally approved, and four requests were received from Egypt, Jordan, Lebanon, and Tunisia, and Libya joined in 2014 to apply SHAMCI on the national level.



In cooperation with:
UNEP through Global Solar Water Heating Project (GSWH)

RCREEE has been a key driver to 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 by developing a new quality scheme for SWHs in developing countries. This ensures the effective dissemination of knowledge to other regions covered by the GSWH project and helps to accelerate the commercialization and sustainable market transformation of the Solar Water Heating industry in the Arab region.

www.shamci.net
info@shamci.net

