



**Summary of Substantive Changes  
between  
CSA F378-87 “Solar Collectors”  
and  
CSA F378.1-11 “Glazed and Unglazed Liquid Heating Solar  
Collectors-Test Methods”**

**Note:** CSA F378-1987 “Solar Collectors” was superseded by CSA F378 Series-11 “Solar collectors” which comprises two standards:

- CSA F378.1-11 “Glazed and Unglazed Liquid Heating Solar Collectors — Test Methods” and
- CSA F378.2-11 “Air Heating Solar Collectors — Test Methods”.

*This summary of changes is specific to the requirements for liquid heating solar collectors covered by CSA F378.1-11 since these are the only type of collectors currently listed.*

**Presented to the IAPMO Standards Review Committee on October 7, 2013**

**General:** The changes to this standard will affect currently listed products. The substantive changes are:

- Limited the scope of the standard to liquid heating type solar collectors and expanded the scope to include integral collector storage (ICS) systems (see Section 1)
- Removed material testing requirements (see former Sections 4 and 6.1)
- Changed collector performance requirements (see Section 5)
- Added new tests and changed test procedures (see Section 6)

Section 1, Scope:

Section 1.4: Limited the scope to cover liquid heating solar collectors, and expanded to include ICS systems as follows:

*This Standard is intended to apply to solar collectors that use a liquid as a heat transfer medium (i.e., liquid heating solar collectors) including the following types of solar collectors:*

- (a) glazed flat plate liquid heating solar collectors;
- (b) glazed vacuum tube or vacuum envelope liquid heating solar collectors;
- (c) unglazed flat plate liquid heating solar collectors;
- (d) ~~boiling/condensing collectors~~ integral collector storage (ICS) systems with time constants of less than 30 min; and
- (e) concentrating solar collectors with an acceptance angle greater than 60°.

Section 5, Collector performance: Changed collector performance requirements and added additional requirements as follows:

Section 5.2, Collector static pressure leakage test: Changed the performance requirement from allowing no pressure drop to allow a pressure drop of 17 kPa (2.5 psi) or 10% of the test pressure as follows:

*5.2.2 Acceptance criterion*



*No pressure drop shall occur, with due allowance given for temperature change. The collector shall pass the test if the pressure drop during the test is no more than 17 kPa (2.5 psi) or 10% of the test pressure, whichever is less. Any distortion or permanent deformation shall be observed and reported.*

Section 5.6, Mechanical load test; Changed section title from “Uniform Positive and Negative Load Tests” to “Mechanical load test” and added requirements to cover evacuated tube collectors as follows:  
5.6.2.3 Evacuated tube collectors

*For evacuated tube solar collectors, a visual inspection of the collector after the test shall show no occurrence of.....*

Section 6, Test methods: Added additional requirements and changed the test procedures as follows:  
Section 6.1, Size of test collector: Added this section to clarify the circumstances under which a scaled-down version of a collector may be used for testing.

Section 6.2, Calculation of solar collector areas; Added requirements for the calculation of collector area as follows:

*Collector gross area, absorber area, and aperture area shall be calculated in accordance with Annex B.*

Section 6.3, Static pressure leakage test:

Section 6.3.3, Procedure: Added allowances during testing as follows:

*(d) If the pressure increases during the test interval of a positive gauge pressure test (e.g., due to temperature change of the test fluid of the collector), relieve the pressure to return to the test pressure, and restart the test interval.*

*(e) If the pressure decreases during the test interval of a positive gauge pressure test, and there is no apparent fluid leak from the collector, the test lab may re-pressurize the collector and restart the test interval up to a maximum of six times.*

Section 6.3.4, Test conditions: Changed test conditions from 1.5 times the manufacturer’s recommended maximum working pressure to a related pressure dependent on the collector rating.

Section 6.4, Exposure, high-temperature resistance, and thermal shock tests:

Section 6.4.2, Outdoor no-flow exposure test: Added additional requirements and moved former components (e.g. spray test for rain penetration and internal thermal shock) of this test to new sections.

Section 6.4.4, External thermal shock test: Added additional requirements to this former (spray test for rain penetration) component of the outdoor no-flow exposure test.

Section 6.4.5, Internal thermal shock test: Added additional requirements to this former component of the outdoor no-flow exposure test.

Section 6.5, Thermal performance test: Changed the test procedure and reporting requirements.

Section 6.7, Mechanical load test

Section 6.7.4, Unglazed collectors: Changed the test set-up procedure for unglazed collectors



Section 6.8 Impact resistance test for glazed collectors (optional): Added allowance for this test to be optional and changed the test procedure.

The following new tests and requirements were added:

Section 6.4.3, [High-temperature resistance test](#)

Section 6.6, [Pressure drop test](#)

Section 6.7.5, [Evacuated tube collectors](#)

Section 6.9, [Determination of stagnation temperature](#)

Annex B, [Measurement of aperture area \(Aa\)](#)

The following former tests and requirements were removed:

~~Materials~~ (Former Section 4)

~~Tests on Materials~~ (Former Section 6.1)

~~Heat Aging Test~~ (Former Section 6.1.1)

~~Accelerated Weathering~~ (Former Section 6.1.2)

~~Outdoor Weathering Test~~ (Former Section 6.1.3)

~~Optical Properties~~ (Former Section 6.1.4)

~~Tensile Strength and Elongation~~ (Former Section 6.1.5)

~~Thermal Shock~~ (Former Section 6.1.6)

~~Humidity Exposure~~ (Former Section 6.1.8)

~~Salt Spray Exposure~~ (Former Section 6.1.9)

~~Tape Test~~ (Former Section 6.1.10)

~~Hardness Determination~~ (Former Section 6.1.11)

~~Immersion Test~~ (Former Section 6.1.12)

~~Hose Pressure Test~~ (Former Section 6.1.13)

~~Adhesion Test~~ (Former Section 6.1.14)