

SolarChill B ETV

What is ETV?

Environmental Technology Verification (ETV) is an independent third-party evaluation of climate and environmental technologies and products. The essence of ETV is to provide independent documentation of the efficiency of individual products.

ETV is a supplement to product certification or type approval, with special focus on innovative technologies and products.

ETV is carried out by independent verification centres and provides comparable and credible technology performance data. The ETV centres aim to help society to choose and invest in technologies that reduce climate change and environmental effects, and to choose technologies to monitor these changes and effects.

EVT helps to reduce risks and skepticism related to investments in new and/or innovative technologies. EVT helps companies to demonstrate the efficiency of these products and to increase market shares.

What does the ETV consist of?

The ETV consists of a series of consecutive documents that describe the verification and testing procedure used during the assessment and evaluation of the SolarChill B refrigerator. Several different tests are done to verify the vendor claims of performance. In the case of the SolarChill B refrigerator the vendor claim is in short adequate refrigeration of perishable foods and drinks without the use external power supply or batteries.

After the testing has taken place a verification- and test report is written to thoroughly document the whole verification and testing of the refrigerator.

If the ETV center finds that the vendor's claims are accurate a verificate is issued.

How will the SolarChill B refrigerator be tested?

When testing a SolarChill B refrigerator it is important to remember that it is in terms of use different from the SolarChill A vaccine cooler. First of all users of the product are no longer trained health personnel, but people who might not have been privileged with refrigeration appliances, or the like, beforehand.

Therefore emphasis should be placed on instruction manuals on how to use the product or carry out maintenance tasks that are easily comprehended by all people. Secondly the users might have a different tradition in the way they both prepare and store their food. Introducing a refrigerator to these people, one should also take care to introduce the proper use of it. Thirdly the refrigerator might be taken apart and parts of it maybe even used for roofing when it no longer works. Therefore it is important that all materials used in the refrigerator do not pose any threat to the environment. Finally, but most importantly, food differs from vaccine in the sense that most foods contain small amounts of pathogenic bacteria. These

bacteria can quite rapidly develop into a population that can cause severe illness if the food is not stored under correct temperatures. One example of such pathogenic bacteria is *Bacillus Cereus* that can grow at temperatures down to 5°C and cause food poisoning if eaten.

Therefore the following tests have been proposed to ensure correct use and food safety.

Test 1: Type examination

This test consists of a short assessment where it is verified that the refrigerator is compatible with a given PV array, that the appliance is delivered with sufficient instructions, and that the refrigerator does not contain any environmentally harmful substances. Basically it is a verification of the vendor's non-measurable claims.

Test 2: PV array performance

As it is important that the PV array can deliver sufficient power to the refrigerator a test of the actual capability of the PV array measurements are made in a field setting using a UI-curve tracer or a variable resistor load at different specified irradiation levels. The measured values from this test will form the basis for the operating voltage and current(s) delivered by a solar power simulator used to supply the refrigerator with power during test 3, 4, and 5.

Testing the PV array performance prior to the actual tests of the refrigerator and using a solar power simulator during the tests will ensure test results that are comparable and evident.

Test 3: Stable running and power consumption test

This is a test of the storage temperatures within the refrigerator compartment. This test also measures the power consumption. The test is done in order to verify that appropriate temperatures are maintained throughout the day. As these storage temperatures are likely to fluctuate quite a bit, this test is done with a loaded refrigerator in order to dampen these temperature fluctuations.

Test 4: Holdover time test

The holdover time test is done in order to ensure that food is not spoiled if no solar radiation is present during a day with bad weather or the unlikely event of technical difficulties that require qualified assistance.

Test 5: Half reload test

As the refrigerator might be used by a vendor that wishes to sell cool drinks or people storing leftover meals it is important to ensure that the refrigerator has enough cooling capacity that it can cool a loading from an initial temperature to an acceptable temperature within reasonable time. This test will both ensure the practicality of the product as well as food safety. It is worth to keep in mind that certain pathogenic bacteria are prone to grow in foods that are cooled too slow.