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SunCache

SOLAR WATER HEATING SYSTEM FREEZE SPECIFICATIONS

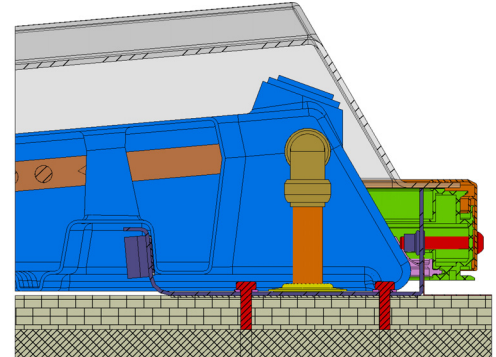
Because of its polymer construction, the SunCache Solar Water Heating System has greater freeze resistance than all other passive solar water heating (SWH) systems, including progressive-tube copper ICS (integral collector storage) systems and indirect thermosiphon systems. These systems use horizontal exterior pipe runs between roof penetrations and the collector systems, which are the limiting factor in their installation range. On the other hand, the connections to the SunCache collector are entirely covered by the low-profile glazing system. Just 2" long, these pipes are also shielded by a steel cover that can be stuffed with fiberglass insulation.

Even more importantly, the SunCache system is the only passive SWH system that has been certified by SRCC and FSEC for installation with PEX supply and return lines. Testing at the National Renewable Energy Laboratory has found that PEX pipe away from brass connectors will never rupture from freezing – at least not until after NREL gave up after more than 250 freeze cycles. This rules out freezing in unconditioned attics.

The SunCache collector itself is made from rotationally molded polyethylene. Like most plastics, PE containers will easily stretch to accommodate freezing water. With its high surface-area-to-volume ratio, the SunCache panel stretches more when heated than when frozen, and six years of field testing in Sacramento have confirmed that neither condition is damaging to the collector.

This leaves the copper heat exchanger and Sharkbite™ connectors as the only components in the SunCache panel that can be damaged by freezing. With unpressurized tap water surrounding it, the pressurized potable water in the heat exchanger can only freeze after all 50 gallons in the panel have frozen. NREL testing has found that the SunCache panel, heat exchanger and connectors will survive 18 hours at 14°F. This is at least 6°F colder than all other passive SWH systems, which are rated by SRCC at 20°F. (The SRCC ratings do not account for line freezing.) Glycol or other anti-freeze solutions should never be used in the SunCache panel. They make it *more* likely that the pressurized potable water inside the heat exchanger will freeze.

As a result of its outstanding freeze tolerance, Harpiris Energy offers an unprecedented 10 year system warranty that *includes freeze damage* when installed in the approved installation territory shown here. Other systems may offer 10 year collector warranties, but only 5 year storage tank and 1 year pump warranties. The Harpiris Energy warranty is inclusive of all system components which are supplied by Harpiris Energy, making it the only system-wide warranty in the SWH industry. Furthermore, the SunCache warranty is the *only SWH collector warranty that includes freeze damage*.



OPEN-LOOP SYSTEMS

Like all passive SWH systems, SunCache is an open-loop system because pressurized potable water is sent to the collector array. ICS and thermosiphon systems have a proven track record of freeze tolerance across the U.S. Sunbelt, and SunCache is substantially more freeze resistant than these conventional passive systems.

Passive open-loop systems, such as SunCache, should not be confused with active open-loop systems. These SWH systems avoid heat exchangers by having pressurized potable water in conventional low-mass active collectors at all times. With radiation losses, these systems can freeze even when ambient temperatures are above 32°F. Common in Hawaii where freezing never occurs, these systems are also installed with some risk in Southern Florida and San Diego.