

Aquatherm Technical Bulletin

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Aquatherm and Solar

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Aquatherm piping is an excellent choice for use with most solar heating applications. There are, however, a few precautions that need to be observed when using Aquatherm in the solar piping system.

The most significant use of solar heating has been for swimming pool, domestic hot water, and space heating. Solar collectors are classified according to their water discharge temperatures:

- Low temperature. Low temperature systems generally operate at a temperature of 110° F (43°C) and have a maximum stagnation temperature of 180° F (82°C).
- Medium temperature. Medium temperature collectors typically have discharge temperatures of 180-200° F (82 - 93°C) but can generate stagnation temperatures of up to 280° F (154°C) or more for several hours.
- High temperature. High temperature collectors routinely operate at temperatures of at least 210° F (99°C) and can generate stagnation temperatures of more than 400° F (204°F). High temperature collectors operate above the capabilities of Aquatherm piping.

Aquatherm piping may be used in conjunction with low temperature collectors and in those portions of medium temperature systems that will not exceed the temperature/pressure ratings of the Aquatherm piping being used. Aquatherm piping should not be used in conjunction with high temperature collectors such as evacuated tube or concentrating types because of their extreme temperatures.

Medium temperature collectors constitute the bulk of the solar collector market. These glazed collectors are used for domestic hot water and space heating systems. Depending on the type of collector and system design, some special precautions should be taken. The major types of medium temperature systems are described in the following paragraphs along with appropriate precautions.

Medium temperature systems are either passive or active types. Passive type systems use no pumps or mechanical equipment to transport the heated water. The breadbox (passive) design uses a tank placed under a glazing material. The tank is painted flat black or coated with selective absorber to increase the solar energy absorption. The collector may be the primary storage tank or the storage tank may be in the house. In the latter case, when a preset temperature is reached, water flows by gravity to the storage tank in the home and fresh water from the main is added to bring the system up to volume. In the thermo syphon passive design a storage tank is mounted above a collector. Cold water flows down into the collector. As the water is heated in the collector, it rises through thermo syphon action back into the storage tank.

Because of the large volume of water in the collector, passive solar systems are not subject to high stagnation temperatures. Thus, Aquatherm piping can normally be used throughout, including direct

connections to the collector system provided the collector system temperature will remain below the rating of the piping.

Active type solar systems utilize a pump to move heat transfer fluids through the collector. Some utilize potable water as the heat transfer fluid (open systems) while others use solutions of ethylene glycol or propylene glycol, silicone oils, or hydrocarbon oils (closed systems). Hydrocarbon oils or silicone oils are generally used at temperatures that would exceed the recommended temperatures for Aquatherm pipe with these fluids. In closed systems, heat is transferred from the heat transfer fluid to potable water by means of a heat exchanger in the hot water storage tank.

Note: Because there are many heat transfer fluid types available the fluid selected must be approved as being suitable by Aquatherm.

Active type, medium temperature collectors can limit or disqualify the use of Aquatherm piping as stagnation temperatures can exceed 280°F (138°C) as mentioned earlier. Under no circumstances should Aquatherm piping be used inside the collector or in a system where it will be exposed to temperatures higher than those recommended for service in the Aquatherm technical manual/catalog.

Refer to the tables from pages 3.2 and 3.3 of the 2013 technical manual/catalog for guidance of allowable temperatures and pressures under “constant operating parameters”. The tables indicate the allowable high temperatures and pressures that can be used in a solar heating application or any other application for that matter. The maximum temperatures and pressures need to be adhered to in order to maintain the intended life of the system.

Following are some guidelines for solar system piping and Aquatherm:

1. Always follow the working pressures and temperature guidelines noted above. If your system parameters are outside the noted limits listed above, please submit a special applications request found on the website or you can get a form by contacting your local Aquatherm representative. With the completed information on the form we can then determine if Aquatherm piping is suitable for your particular project.
2. Always use a temperature/pressure relief valve in the piping system. (See Figure 1) Make sure that the T&P valve is set at or below the maximum pressure and temperature ratings listed above for the Aquatherm pipe.
3. If Aquatherm piping is to be run on the roof or exposed to UV rays (even through windows, unless the windows have a UV-protective layer, or are made of low E glass) use Aquatherm UV faser-composite pipe or provide appropriate UV protection (UV paint, UV wrap or insulation) for that portion that may be exposed to harmful UV rays.
4. It is recommended that all piping in the solar heating water system be appropriately insulated with fiberglass, mineral wool or expanded elastomeric foam pipe insulation to keep all that hard-earned solar energy where it needs to be. The combination of the thermal resistance of the pipe



itself, and an insulating material on the pipe, may be sufficient to eliminate the need for insulating the fittings.

5. Aquatherm pipe is compatible with propylene and ethylene glycols in any concentration that may be required for your particular solar heating system project. It is recommended that the glycol concentration not exceed NFPA limits for use in heat producing boiler systems.
6. Most codes require that connections to heat producing boilers and water heaters be made through copper or metal piping. The connecting pipes need to be at least 18” in length. Aquatherm pipe may be directly connected to storage tanks, expansion tanks, solar panels and pumps provided the temperature at the piping connection does not exceed the ratings on the Aquatherm system.
7. Always use fiber-composite pipe, Green Pipe SDR 7.4 or Blue Pipe SDR 11, in your solar hot water system. Aquatherm piping may be used on either side of the solar hot water heating system. Either conveying heat to and from the solar panels or conveying heated water to and from the storage tanks and boilers to and from the heating system. Of course, Aquatherm piping may also be used for the domestic potable hot and cold water systems as well.

With a few guidelines and planning strategies Aquatherm pipe is an excellent choice for use in solar hot water heating systems. Its ability to resist rust and corrosion and its long life make it an excellent choice to go “Green”.