

HOT WATER PIPES

Choose carefully when you select materials for pipes that will be handling hot water. Here's some helpful advice.*

Pipes are classified by their pressure rating at 20°C, for example PN16 is rated for a pressure of 1600 kPa at 20°C. The allowable working pressure will decrease with temperature, and the rate of decrease and the maximum working pressure will vary with different materials. Think carefully about what can happen if any of the temperature or pressure controls on the system fail. The piping must be able to handle these failure conditions.

Solar systems

The pipes taking hot fluid from a solar collector to a storage cylinder can reach temperatures in excess of 100°C. To guard against injury in the event of split piping, pipes and pipe fittings used for piping of hot water must be suitable for the temperatures and pressures within that system. This is a requirement of the NZ Building Code G12, as well as commonsense.

The pipe material may be copper or an appropriate plastic. Most systems will be installed using copper. Some types of plastic pipe will be suitable for use where the solar heating system is protected by use of temperature/pressure relief valves. Where there is a risk of the temperature/pressure relief valve failing, or for pumped systems there is a risk of pump failure, plastic piping is not recommended. The limiting condition to be covered by the choice of piping material is that where a fault in the system occurs and high temperatures and pressures arise.

Some types of plastic pipe may be appropriate for some low pressure

cylinders that are fitted with the temperature/pressure relief valves.

The choice of hot fluid pipe material will depend on the solar system design and equipment configuration.

Plastic piping is not suitable for use when the hot water system includes an uncontrolled heat source such as a wetback.

Acceptable solutions

1. The use of copper pipe for transfer of hot fluid is acceptable.
2. Polybutylene (PB) and cross-linked polyethylene (PEX) piping systems are acceptable for hot water if the temperature and pressure limitations of those materials are not exceeded by the system under normal operating conditions, or under fault conditions, such as failure of the TPR valve or of the circulating pump.

Take note!

- Cross-linked polyethylene (PEX) is a different product from the types of polyethylene (LDPE, MDPE and HDPE) used in cold water, agricultural and other applications.
- G12/AS1 and AS/NZS 3500.4 require the first metre of length of pipe from water heaters to be in copper.
- Use of a short length of copper as a transition between a heat source and distribution pipe is to allow for the effect of heat conducted down the pipe from the heat source (solar panel or water storage cylinder). It doesn't affect the ability of the plastic pipe to

withstand circulating water at high temperature.

- Few grades of cross-linked polyethylene (PEX) pipe obtainable at a reasonable price will tolerate 100°C water for any significant length of time.
- One supplier of cross-linked polyethylene piping gives the following maximum allowable working temperatures and pressures:

Central Heating 300 kPa at 92°C
Hot Water 600 kPa at 65°C
Cold Water 1200 kPa at 20°C

- Cross-linked polyethylene can withstand 114°C intermittently for short periods.
- A supplier of solar water heaters who has used polybutylene, and Speedfit® fittings, with a one metre thermal break (copper pipe at the panel hot outlet), but no longer does so, advises: "The controlling items were that the controller cut out the pump when the storage cylinder reached 65°C. The system also included a 99°C TPR valve at the panel. TPR valves can fail on mains pressure panels, with the result that the middle of the panel can reach 140°C before the TPR valve at the outlet is aware of this. If there were no TPR valve the water in the panel can reach 155°C when the pump is off. When someone opens a tap introducing cold water, the pump will re-start and extremely hot water will flow through the piping."

- New piping products, such as the macro-composite PEX/Al/PEX, are becoming available and may be suitable for some applications above the temperature and pressure limits of PEX and PB pipe.
- PE-RT (polyethylene for use at raised temperatures) is designed for use in hydronic heating systems. Its temperature/pressure rating is inadequate for use at the higher temperatures and pressures possible in hot water supply systems.

Editor: This article is based on the Solar Industries Assn Code of Practice prepared by Eric Palmer, Master Plumbers' Technical Manager, and Brian Cox, Executive Officer of the Solar Industries Assn.