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Temperature derating of PVC pipes for pressure applications

Alan Whittle and Mike Stahmer, January 2005

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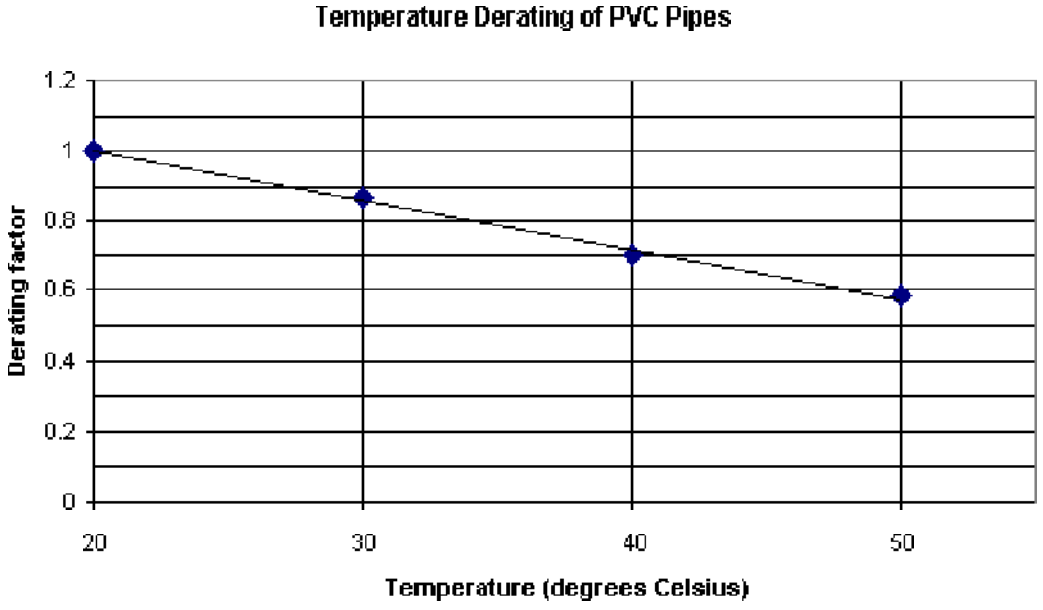
Table 1

Temperature Degrees	Derating factor
20	1
30	0.87
40	0.7
50	0.58

The reduced maximum allowable operating pressure under static pressure is determined by multiplying the PN rating of the pipe by the derating factor given in Table 1 or by interpolation from the graph in Figure 1.

Figure 1



The derating factors have been selected from the International Standard ISO 4422.2, Pipes and fittings made of unplasticised polyvinyl chloride (PVC-U) for water supply - Part 2: Pipes (with or without integral sockets). The table has been extended from 45°C up to 50°C and interpolation may be used to select a derating factor for temperatures between those nominated.

These derating factors may be applied to PVC-U, PVC-M and PVC-O pipes.

Design Operating temperature:

The material temperature under consideration is the average temperature of the pipe wall under operational conditions.

In most instances it may be assumed that the pipe temperature is equal to the elevated temperature of the fluid being carried.

Where a temperature differential exists between the fluid in the pipe and the external environment, the operating temperature may be taken as the mean of the internal and external pipe surface temperatures.

For the usual case of turbulent flow of fluid inside the pipe, the inside surface temperature may be taken as the temperature of the fluid. The rate of heat transfer across the wall of a PVC pipe is low, and provided the exterior of the pipe is well ventilated, the external surface will be near ambient. Where heat transfer to or from the surrounding material is very slow, the external surface temperature will be near to that of the internal surface.

It may be necessary in critical cases to establish surface temperature characteristics by experiment. For the situation of a buried pipeline with flowing water, an appropriate ‘rule of thumb’ is:

$$Tm = \frac{2Tw + Ts}{3}$$

Tm = mean material temperature Tw = water temperature Ts = soil temperature

It should be noted that the pressure condition where flow is stopped should also be checked. In this event, water temperature and outside temperature will equalise.

For Further information please contact
Plastics Industry Pipe Association of Australia Ltd
Suite 246, 813 Pacific Hwy, Chatswood NSW 2067
or email plasticspipe@pipa.com.au