Cross Linked Polyethylene (PE-X) pipe in hot water applications – Guidance for determining conformance to AS/NZS 3500

The National Construction Code Volume 3 (Plumbing Code of Australia - PCA) is published by the Australian Building Codes Board (ABCB) and provides the minimum safety, health, amenity and sustainability objectives for plumbing and drainage in Australia. The ABCB also publishes a schedule of specifications for the mandatory WaterMark Certification Scheme for plumbing and drainage products. The Standard series AS/NZS 3500 in turn provides a set of practices that are deemed to satisfy the PCA objectives. In order to comply with the deemed to satisfy requirements under the PCA it is essential that products are certified under the WaterMark scheme where required and the installation is carried out in accordance with the relevant section of AS/NZS 3500.

Simply having a WaterMarked product is only part of the process – that product must meet the specific application requirements as defined by AS/NZS 3500.

In most cases it is obvious which product standard and which associated products can be used for any given application. For example, products complying with the Drain Waste and Vent Standard (AS/NZS 1260) for PVC pipe would not be suitable for a pressure pipe application. There are however other applications where the requirements defined in AS/NZS 3500 mean only some products covered by a product standard can be used in that specific application.

Such a case exists with hot water.

AS/NZS 2492 covers cross linked polyethylene pipe (PE-X). PE-X pipe can be used for both hot and cold water applications. AS/NZS 3500.4 and AS/NZS 3500.5 include added requirements for pipes used in hot water covered in Section 2 Materials and Products in AS/NZS 3500.4 and Section 3 Heated Water Services in AS/NZS 3500.5 – specifically these are for pipes ≤DN100 and these sections state they shall have a maximum allowable operating pressure of **at least 1.0 MPa at 60°C**. As a result of these additional requirements nominated in AS/NZS 3500 it is possible to have PE-X pipe that is WaterMarked as compliant with AS/NZS 2492 that is suitable for cold water applications but not comply with the additional requirements for hot water applications – hence **care must be exercised when determining if a PE-X pipe complies with the hot water requirements of AS/NZS 3500 parts 4 and 5.**

AS/NZS 2492 Appendix B provides guidance on the allowable working pressures of PE-X-80 pipes (the most commonly used PE-X pipe material) over a range of water temperatures. This guidance is based on information drawn from ISO 15875 in order to facilitate selection of the appropriate pipe for the application. Table B1 lists the 5-common pipe SDR values with corresponding allowable working pressures at 20°C, 60°C and 70°C. Table B1 states that only pipes with SDR values of 7.4 and 9 have allowable working pressures above the specified level of 1.0 MPa at 60°C.

As pressure rating or PN classification is more commonly used in the plumbing industry the SDR values can be readily translated into PN values by using Table 3.2 in AS/NZS 2492. According to Table 3.2 pipe

made from PE-X-80 compound with an SDR of 9 has a nominal pressure rating of PN 16 (at 20°C). Similarly, a PE-X-80 pipe with an SDR of 7.4 is PN 20.

The interpretation of the combined requirements of AS/NZS 3500 parts 4 and 5 along with AS/NZS 2492 is that for hot water applications PE-X-80 pipe must have a rating of PN 16 or PN 20 to comply. Lower pressure classes might satisfy the requirements for cold water but not hot water as nominated in AS/NZS 3500 parts 4 and 5.

That is, based on the guidance provided in Appendix B of AS/NZS 2492 PE-X-80 pipes with PN ratings of 12.5 or less do not comply with the requirements of AS/NZS 3500.4 for use in hot water applications.

An alternate interpretation would require formal analysis of long term pressure tests on the particular PE-X pipe product, carried out in accordance with ISO 9080 to determine the material MRS to which an appropriate factor of safety would need to be applied.

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