

DEVELOPMENT OF KNOWLEDGE ABOUT AGEING MECHANISM AND ITS ASSESSMENT FOR PRE-INSULATED DISTRICT HEATING PIPE

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Abstract

District heating (DH) systems constitute a smart and environmentally friendly solution for the energy distribution in Europe. This technique is in steady expansion but still faces some issues such as reliable status assessment of the current DH networks and the development of a new generation networks for low temperature DH. Therefore, it is essential to understand the ageing behaviour of pipes under operating conditions and to find relevant parameters that control the degradation processes. Many factors affect the deterioration of DH pipes, especially the polyurethane foam, which makes it very complex to find a reliable prediction model.

The results from 10 years research work at RISE helped us to gain a better comprehension of the ageing mechanisms of the current generation of pre-insulated DH pipes and to improve the accelerated ageing methods currently used to predict the technical lifetime of DH pipes. Our results suggest that the lifetime of DH pipes has been underestimated when using artificial ageing at relatively high temperatures. The data collected from naturally aged pipes gave confirmatory information about their physical status compared to our laboratory tests. Our study also suggests that accelerated thermal ageing should be done in a temperature range which reflects the degradation mechanism of PUR in the service life. IR analyses could also be used as an early indication of degradation of PUR foam at the interface with steel pipe.