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Industrial Member Report Summary – Key Findings for Industry

Effect of Forced Cooling on the Integrity of Polyethylene Butt Fusion Welds

TWI Core Research Programme

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Industrial need

Forced air cooling is starting to be used in industry for butt fusion welding of polyethylene (PE) pipes with the objective of reducing the time required for the joint to cool and hence increase installation productivity. However there is a concern that forced air cooling may be detrimental to the integrity of the welds.

Key Findings

- Forced cooling of butt fusion welds in PE sheet from one side of the joint does significantly reduce the cooling time (by around 40%) required for the weld to completely solidify.
- Forced cooling appears to cause a significant reduction of both the short-term and long-term integrity of PE butt fusion welds.
- Forced cooling of PE butt fusion welds should not be used for critical applications without qualifying the welding procedure incorporating forced cooling, using both short-term and long-term mechanical tests.
- The recommended short-term mechanical test for qualifying PE butt fusion welding procedures is the tensile test using a waisted specimen according to BS EN 12814-7, where the parameter used is the energy to break.
- The recommended long-term mechanical test for qualifying PE butt fusion welding procedures is a tensile creep rupture test according to BS EN 12814-3, using either a specimen cut from the welded joint or a whole pipe section, where the parameter used is the time to failure.

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