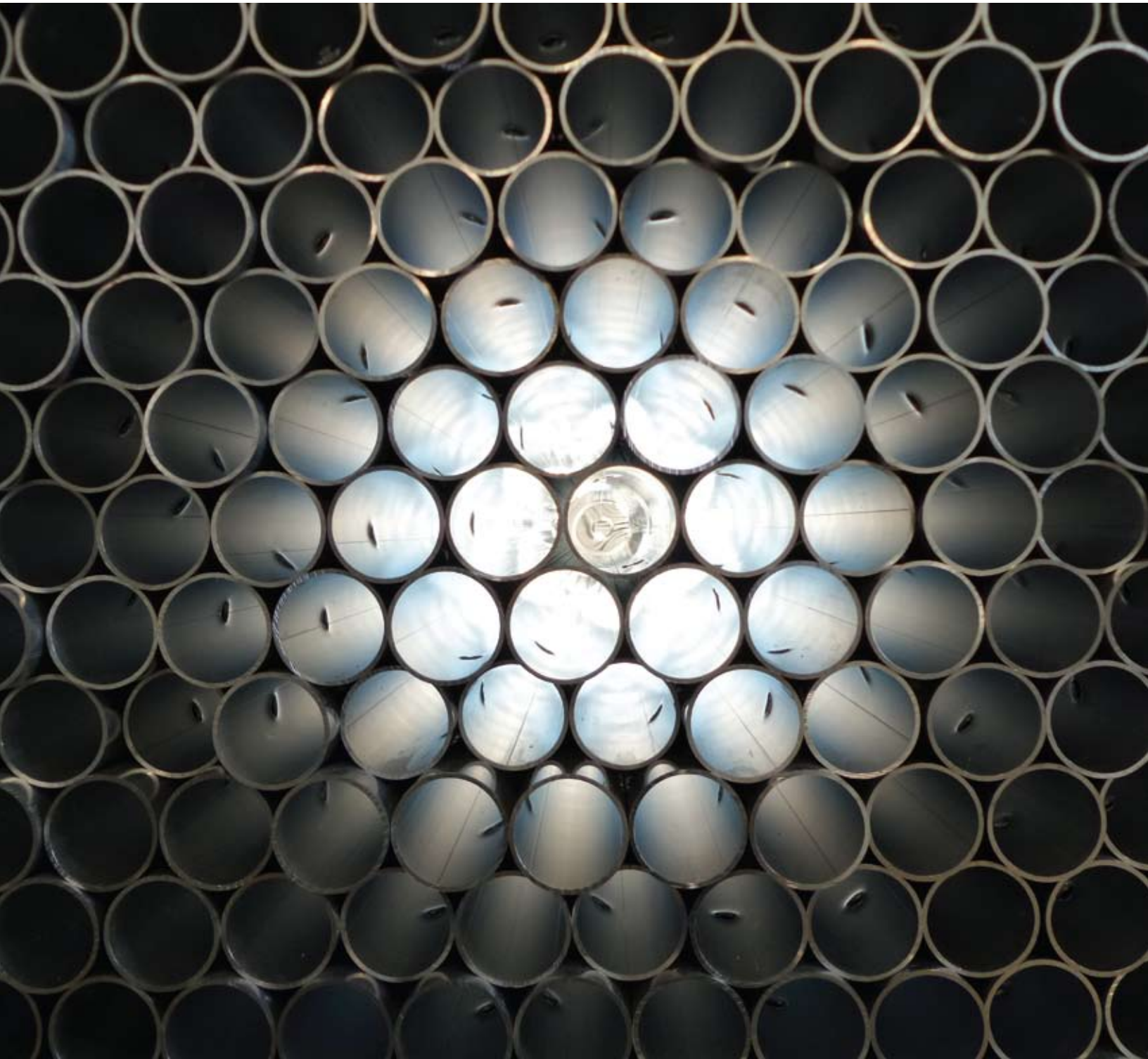
KINECTRICS

Water Blocking Materials for Asset Protection



ADVANCED POLYMER MATERIALS TO PREVENT WATER INGRESS

OVERVIEW

Kinectrics has developed water blocking and self-healing polymer materials that can be used to prevent water ingress. These materials can be tailored to work in difficult environmental conditions such as subsea or underground, where assets are not easily accessible for repair or maintenance. These materials reduce maintenance costs and offer increased output.

WATER BLOCKING MATERIALS

Many utility companies use below ground pits to house key assets. Examples of these include gas regulation or electrical transmission equipment. Since these pits are below ground, they are prone to flooding. The most common locations for water inflow are:

- Failed seals surrounding pipe or conduit wall penetrations
- Damaged sections of pit wall
- Rainfall through poorly sealed pit lids

To alleviate the problem of water ingress Kinectrics has developed a water blocking system that significantly reduces the amount of water entering the pit, therefore, reducing maintenance and replacement costs.

Kinectrics' water blocking gaskets are produced from a high performance, non-absorbent, semi-rigid polymeric material. These have been designed and used for water blocking applications in buried gas pipes. The product provides immediate, long-lasting water blocking on application, even when challenged with active leaks and increasing hydrostatic pressure. The system is commonly used in a ring formation, cut to create a compression fit, within a specific configuration. The ring can be easily and rapidly fitted without the need for specific training or powered equipment. If required, more rings can be added to strengthen the water blocking capabilities of the seal. This process does not represent any risk to the pipe itself due to the low load transfer between seal and pipe. The gaskets can be easily removed to work on the asset as required.

ADVANTAGES

- Highly efficient water blocker
- Can be applied directly to active leaks
- Simple application procedure; does not require training or powered equipment
- Chemically resistant and rot proof
- Excellent compression recovery
- Non-extruding
- Non-tainting
- Minimal operator hazards

Pre-formed water blocking gasket.

Preformed water blocking gasket after fitting.

Flooded Gas Pit

Pipe penetration before and after fitting of an annular seal.

SELF REPAIR/WATER BLOCKING MATERIALS

In response to requests from the utilities sector, Kinectrics has developed a range of highly effective water blocking materials that also offer asset self-repair and self-reporting functionality. Work is now being carried out in order to fully incorporate these into high value assets. This aims to reduce maintenance costs, improve resilience and extend service lifetime.

Many utility assets are difficult to access for inspection and repair. This means that in time small defects can progress, unchecked, to failure. This can result in loss of service and high repair costs.

This is shown in the case of underground power cables, where water ingress through the sheath can cause progressive degradation of the insulation and eventual failure. Current protective measures provide limited short-term protection and are difficult to incorporate in the cable structure.

In response to this problem Kinectrics has developed a patented cable design including a water blocking thermoplastic elastomer. This is capable of preventing high pressure ingress from both fresh and salt water (through damage such as that shown below). This can respond dynamically to seal damage as it arises, therefore providing self-repair functionality. The material, when incorporated as a sub-sheath layer, blocks water ingress in both the radial and longitudinal directions. Materials have also been developed to self-report, for example by a simple colour change at the location of a damage site.

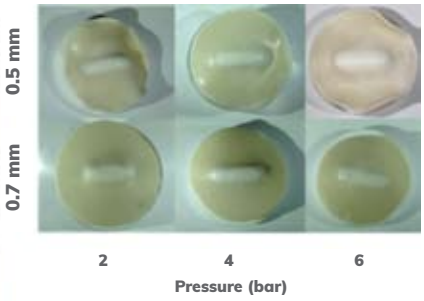
ADVANTAGES

- Water blocking up to at least 7 bar (equivalent to 70m depth in sea water)
- Autonomously resolves minor damage in the presence of water
- Self-repair capabilities linked to extended service lifetime
- Easy to form through low temperature extrusion
- Longer cable lifetime
- Lower replacement costs
- Reduced risk of unplanned downtime

Cable cross section

Damaged outer sheath, installed water blocking sub-sheath prevents water ingress

Demonstration of water swelling capability over 4 hrs



Demonstration of water resistance of thin layers at different pressures

BESPOKE DEVELOPMENT AND SUPPORT

Kinectrics has many years of R&D experience, both for its own product lines and as a contract research organisation. Kinectrics is currently exploring the application of this material across the utility sector.

Our services include:

- The capability and experience to develop bespoke materials to meet your specific requirements (including non-aqueous environments)
- Facilities to test the material after development and perform the necessary certification trials
- Prepare component prototypes for testing and analysis before deployment to the field
- Provide ongoing support to monitor the performance and/or condition of the asset over time

1. EP 3259765A2 Self Repairing Cable, filed 17/02/2016, granted 29/08/2019

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