

FACT SHEET

MICROBIOLOGICALLY INFLUENCED CORROSION (MIC) IN OFFSHORE WIND FARM FOUNDATIONS

Intertek provides complete solutions to investigate and address MIC in offshore wind turbine foundations.

Our specialists offer end-to-end MIC solutions for offshore wind foundations, from inspections with X3 subsea ROV to corrosion risk analysis, minimising operation and maintenance risks.



What is it?

Sulphate reducing bacteria (SRB, see Figure 1, below) can be found in the biofilm attached to metallic structures in marine environments and thrive in areas covered by deposits such as mud, in deaerated waters and areas of stagnation.



Such locations may have a supply of sulphate, a suitable carbon source, anaerobic conditions, near neutral pH, and a benign temperature range to sustain growth, which therefore can lead to microbiologically influenced corrosion (MIC).

Where can it be found?

In simple terms, high levels of oxygen in the splash zone can cause corrosion near the

top of a carbon steel monopile foundation, whereas MIC can cause corrosion towards the other end – down at the mudline.

High density of SRB, the presence of sulphide, and shallow pitting can together with other factors indicate the presence of MIC. Figure 2 shows a classic example of this.

How do we test for it?

There are highly skilled Intertek laboratory methods available to analyse potential MIC. Traditional methods include the serial dilution method like NACE TM 0194. Advanced molecular methods include DNA based methods such as polymerase chain reaction (q/PCR), denaturing gradient gel electrophoresis (DGGE), new generation sequencing (NGS), and RNA based methods such as Fluorescence *in situ* hybridisation (FISH). FISH requires the appropriate probes and is quicker than traditional culture techniques and can distinguish between different genus and is more sensitive.

These techniques, of course, are all lab-based and require retrieval of the appropriate sample from the OWF, noting that the O in OWF means offshore (and subsea). Sampling can be undertaken using Intertek's X3 (Figure 3), or similar ROV from our fleet, with the appropriate tools, and operated by our experienced team.

How is it controlled?

MIC can be controlled using methods such as coating, and cathodic protection. For new build foundations, this may be practical, but for older operational OWF this may not, and neither will completely control bacterial population. Correct cathodic protection is effective at mitigating MIC due to SRB, and enhanced protection levels are often specified, e.g., potentials $\leq -900\text{mV}$ (Ag/AgCl/SW reference electrode). Alternatively, biocides may be used in certain applications, but these are normally limited to closed or possibly once-through systems.

See also our corrosion mapping service with our Ariel subsea crawler, [here](#).




Figure 2. Steel corrosion



Figure 3. Intertek X3 ROV

FOR MORE INFORMATION

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