

Revision: 0 – 26.02.2024	Author: P. Jansen	Reviewed: M. Pienaar	Approved: M. Pienaar
 	LIME SCALE REMOVAL IN RAND WATER PIPELINES – INSTOLATION SITE: ZUIKERBOSCH PUMP STATION PO: 45002150384 Supplier No: 119370		

## Overview

The Close Out Report details a pilot project conducted by Mikhay Solutions for the removal of lime scale deposits in the Rand Water pipeline at the Zuikerbosch Pumping Station. The project employed the innovative Merus Ring technology, which uses molecular oscillation technology to dissolve lime scale and prevent future buildup, thus improving flow rates and reducing energy consumption in the sludge pipelines.



### 1. Purpose

The report reviews the implementation and results of the pilot project aimed at removing lime scale from the Rand Water WTR pumping lines.

### 2. Background

Rand Water generates a significant amount of water treatment residue (WTR), leading to scale buildup that reduces pipeline efficiency and causes mechanical failures. The Merus Ring technology was proposed to alleviate these issues.

### 3. Scope of Work

- Removal of limescale using non-destructive technology.
- Installation of the Merus Ring to increase calcium carbonate solubility and monitor flow performance.
- Prevention of corrosion and future limescale buildup.



#### 4. Important Milestones and Dates

Key milestones in the project included:

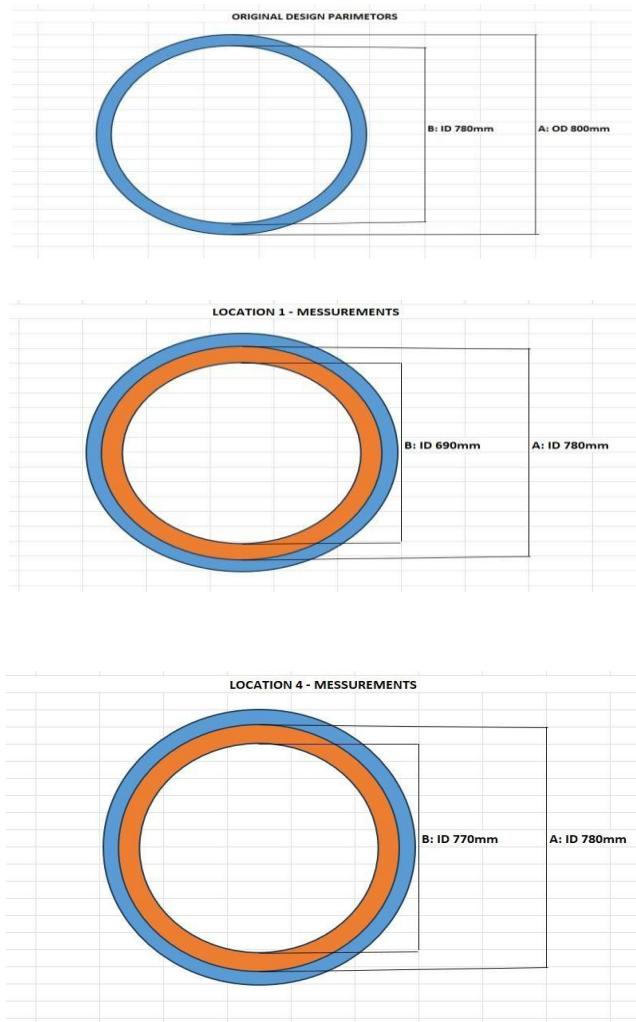
- Kick-off and site mobilization in March 2024.
- Delivery and installation of the Merus Ring in May 2024.
- Completion of diagnostics and post-installation measurements by July 2024.

#### 5. Results

The results of the pilot project for lime scale removal using the Merus Ring technology at Rand Water's Zuikerbosch Pump Station revealed several significant improvements in pipeline performance:

1. **Limescale Removal:** The Merus Ring installation effectively eliminated existing limescale deposits, which had previously reduced the effective internal diameter of the pipelines from 800mm to approximately 480mm. Post-installation measurements indicated a substantial increase in the effective diameter, with an average internal diameter of around 700mm at Inspection Hatch No: 2 and 690mm at Inspection Hatch No: 1. This demonstrated a more uniform layer of limescale buildup compared to areas without the installation.
2. **Improved Flow Rates:** The removal of limescale resulted in an increased cross-sectional area of the pipes, enhancing flow rates ( $Q$ ). The smoother internal surfaces reduced turbulence and resistance, leading to higher flow velocity ( $v$ ) and a decrease in the pressure difference ( $\Delta P$ ) required to maintain or enhance the same flow rate.
3. **Reduced Energy Consumption:** With lower resistance and reduced pressure drops, the power ( $P$ ) needed to maintain flow rates decreased, resulting in lower energy consumption for the pumping system. This improvement indicates enhanced operational efficiency.
4. **Reduced Vibrations:** The technology contributed to a reduction in vibrations caused by turbulence from limescale. By promoting a more laminar flow, the Merus Ring minimized disturbances within the pipeline, leading to smoother operation and improved stability.
5. **Long-Term Effectiveness:** Performance monitoring confirmed that the Merus Ring technology not only provides immediate benefits in flow performance but also serves as a sustainable solution for preventing future corrosion and limescale buildup in the sludge pipelines. This ensures long-term operational efficiency and improved water quality.
6. **Operational Continuity:** The technology was deployed without disrupting ongoing operations, showcasing its practical applicability in active systems.

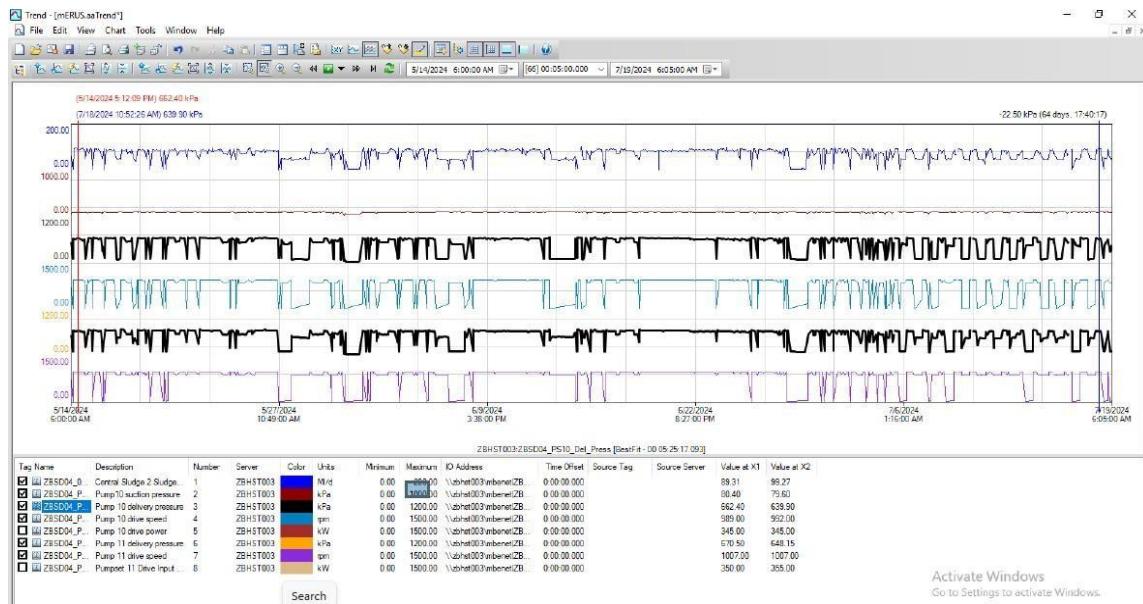
These results suggest that the Merus Ring technology is a viable solution for addressing the challenges posed by limescale in pipeline systems, particularly in water treatment facilities like those operated by Rand Water.



## 6. Inspection

An inspection conducted in August 2024 confirmed the effectiveness of the Merus Ring in reducing limescale buildup, with measurements showing increased internal diameters at various inspection points along the pipeline.

## Trend Merus ring, Flow Measurements



## Conclusion of Findings

The pilot project was successful, demonstrating significant improvements in pipeline performance. Recommendations include:

- Approval for ongoing use of the Merus Ring technology.
- Full-scale implementation across Rand Water's infrastructure.
- Regular monitoring and maintenance to ensure the technology's continued effectiveness.