

Test Case – Field Performance Evaluation of Pexgol



Field evaluation of Pexgol PE-Xa pipes under highly abrasive iron ore slurry conditions at Cauê Mine.



Vale
Brazil | 2025

Operational Test Parameters

Flow Rate:
700 tons per hour

Installed Pipe:
Pexgol 500 mm – SDR 11
Wall thickness: 45.4 mm

Replaced Pipeline:
Steel pipe with polyurethane lining

Steel thickness:
3/16" (4.95 mm)

Polyurethane lining thickness:
1/2"

Polyurethane properties

Tensile strength: 5800 PSI
Tear resistance: 480 PSI
Hardness: 85 Shore

Maximum Operating Pressure:
150 PSI

Operating Temperature:
33 °C

Slurry Composition:
Iron ore slurry with 48–60% iron and silica content in water.

Particle Size:
D80 = 150 microns

Test Timeline

Start of Test: December 15, 2022

First Inspection: May 3, 2023

Second Inspection: December 2, 2025

The Challenge

The Cauê Mine, operated by Vale in Brazil, has a tailings transport pipeline several kilometers long with a diameter of 18 inches. The existing pipeline is constructed from carbon steel internally lined with polyurethane (PU).

Due to the highly abrasive nature of the iron ore slurry, the pipeline requires frequent and costly maintenance. This includes periodic replacement of full pipe sections or refurbishment of the internal polyurethane lining.

Given the significant capital investment required to replace the entire pipeline, Vale decided to first conduct a field performance test using Pexgol crosslinked polyethylene (PE-Xa) pipes. The objective was to evaluate the pipe's resistance to abrasion and its operational performance under real operating conditions.

The test installation was performed in the Grinding Area (Milling Plant) of the Cauê Mine.

Test Objective

The objective of the test was to perform Non-Destructive Testing (NDT) on a 3,000 mm long Pexgol pipe section installed in the discharge pipeline of pumps BP-1920EE-05/06, responsible for feeding tank CX-1491EE-09.

The installation took place on December 15, 2022, and the evaluation aimed to verify the pipe's structural integrity and wear performance during operation.

Additionally, the test provided technical support to the Cauê Mine engineering team in their evaluation process for potential pipeline replacement decisions.



Inspection and Testing Methodology

During the monitoring period, the following inspections and tests were performed:

- Visual Inspection (VI)
- Ultrasonic Thickness Measurement (UT)

These tests were conducted in the Grinding Plant area of the Cauê Mine to identify any operational deviations or anomalies during pipeline service.

The inspections focused on detecting:

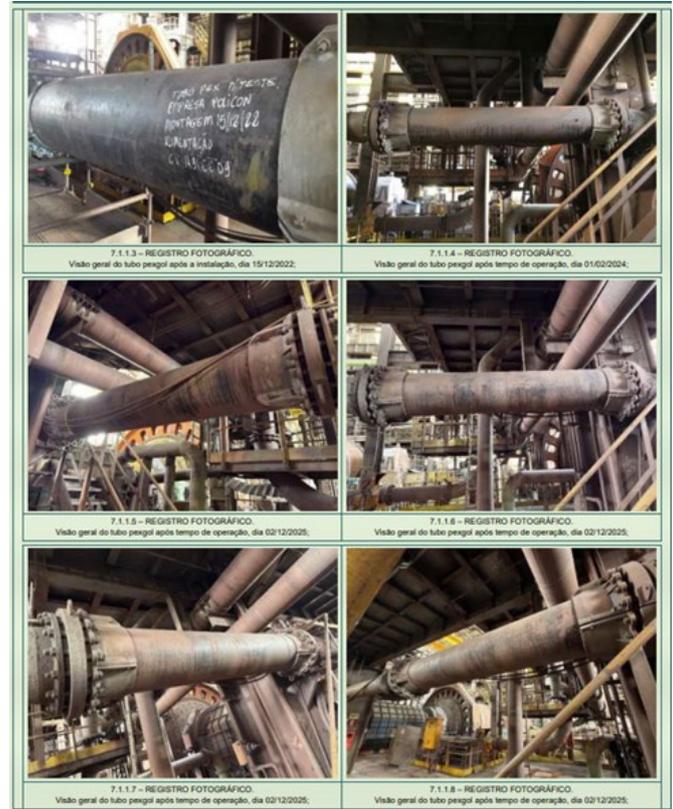
- Premature wall thickness reduction
- Material deformation
- Operational anomalies that could compromise the pipeline integrity

All inspections were conducted in accordance with SAT-3833 standard procedures and applicable technical reference documents.

Wear Rate Results

Average wear rate measured during inspections:

- **Point 01:** 0.6 – 1.0 mm/year
- **Point 02:** 0.9 – 1.3 mm/year
- **Point 03:** 0.8 – 1.2 mm/year
- **Point 04:** 0.4 – 0.8 mm/year



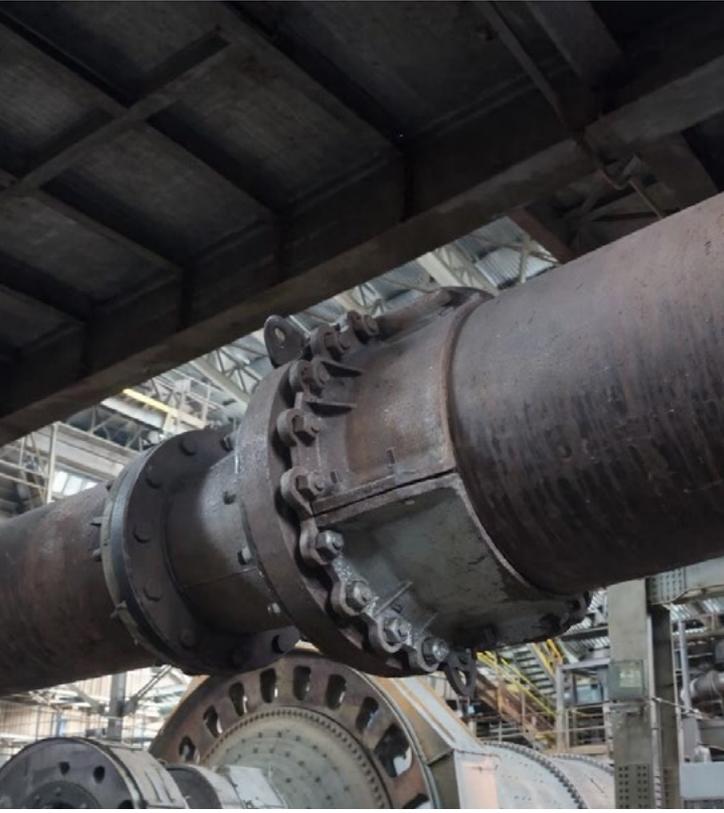
Conclusions

The field test was considered successful, as the wear rate measured in the Pexgol pipe was lower than the expected wear behavior of the previously installed steel pipe with polyurethane lining, when considering the available wall thickness and operational conditions.

No leaks, structural failures, or operational anomalies were observed during the testing period.

Considering that the installed pipe is Pexgol SDR 11, capable of operating at 220 PSI, and accounting for an allowable 40% wall thickness wear, the estimated service life of the pipe under these operating conditions is approximately: 12 years.

This result demonstrates the excellent abrasion resistance and operational reliability of Pexgol pipes for highly abrasive slurry transport applications in mining operations.



The Advantages of Pexgol Pipe Systems



High resistance to wear

Pexgol is the preferred solution for abrasive materials transportation. Typically resists three times more than HDPE and twice more than steel.



Superb internal and external corrosion resistance

Our pipes are proven to withstand decades of exposure to corrosive environments, with nonstop performance in some of the world's harshest environments.



Excellent chemical and corrosion resistance

Pexgol pipes can resist a wide range of chemical agents, slurries, toxic and radioactive materials.



Long pipe sections

Pexgol pipes can be supplied in long coil lengths, reducing number of joints, installation time and risks.



High temperature resistance

Working temperatures can range from -50°C / -58°F up to 110°C / 230°F .



Creep and impact resistance

Pexgol pipes can withstand high amounts of axial and radial stresses and are highly resistant to impact, fracture and fatigue. Furthermore, Pexgol pipes are completely resistant to cracks even when dragged over sharp rocky terrain and coagulated salt crystals.

For more information please visit:
pexgol.com

