

Replace Coverage Pipeline

Feasibility study

15/03/2019





Longitudinal section





SCOPE

The study analyzes the stress state of an existing sealine and evaluates possible alternatives for restoring the coverage.

Following the erosive action of sea currents, the pipeline is partially uncovered and in a section there is a free span of 27 meters.

Stress has been calculated in the sections most solicited considering the intrinsic conditions of the pipe (geometry, weight), the weight of the inspection tool, the seawater hydrostatic pressure and the marine currents acting on the sealine.

Transversal sections



Stress Calculation



Load on Pipeline





Equivalent section

The contribution of the weighting of the gunite was considered in the section of the pipe using an equivalent steel section.

For the calculation of the longitudinal stresses, the section of the pipeline was schematized as a one-dimensional element, appropriately inserting the constraints according to the Winkler approach.

Structural scheme



Study of Sealine Coverage Replace





The diagram shows the average current speeds at which the sediment particles of different sizes are eroded.



$$\frac{d_{30}}{h} = S_F * C_f * \left(\left(\frac{\gamma_w}{\gamma_a - \gamma_w} \right)^{\frac{1}{2}} * \left(\frac{\gamma_w}{\gamma_a - \gamma_w} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}}$$

Grading curve

The granulometric curve must be correctly designed in order to resist the erosive action of the current. The analysis requires two curves called "gradation" to be calculated, one maximum referring to the upper limit and one minimum to the lower limit.





Covering Operation



Phase 2

In figure are shown the backfill and covering study of the empty section in successive steps. No additional tension is generated on the pipeline and the filling below during the laying of inert material.

Phase 4