

Repair of defects in pipelines with "Hot Sleeves"

The increased use of intelligent inspection pigs (pipeline inspection gauges) to determine the actual wall thickness of pipelines gave rise to the demand for development of a procedure to remedy wall thinning, laminations and sharp discontinuities, i.e. defects which normally make it necessary to restrict the maximum permissible operating pressure. The aim of the repair method is to restore pipe strength lost due to the defect and make the pipe as strong as in its previous, undamaged condition.

In cooperation with Deutsche Transalpine Oelleitung GmbH, TÜV SÜD Industrie Service GmbH developed a procedure for repairing defects in pipelines cost-effectively and permanently without having to interrupt pipeline operation or drain the pipeline section in question.

The repair method uses heat shrink sleeves and works as follows: two half shells made of the same material and with the same wall thickness are fitted around the pipe defect by means of clamping devices and encircle the pipe. They are then evenly heated. The defined heat input causes the shells to expand longitudinally.



nally. The change in length is taken into account during welding, so that the two half shells will be an exact fit for the pipe wall to be repaired after the longitudinal seams have been welded. Subsequently, the shells are cooled and fit snugly around the pipe to be repaired.

When pressure is applied to the repaired pipe, any impermissible elongations at the defect will be absorbed by the supporting effect of the closely fitting sleeve. Through appropriate dimensioning of the sleeve, stresses up to the permissible upper yield point of the pipe to be repaired can be absorbed.

Provided the defect in the pipe is appropriately prepared, this repair method can be applied equally to defects on the outer and inner pipe wall with a length of up to the sleeve length (approx. 0.5 to 0.7 x D). Should the length of the defect exceed that of the sleeve, several adjoining sleeves may be used.

The following defects can be repaired by applying this method irrespective of whether they are located on the inner or outer pipe wall:

- Wall thinning: this type of defect includes all defects that can also be remedied by machining the pipe wall down to residual wall thickness
- Scabs running towards, not parallel to, the surface
- Blisters with one-sided bulge towards the pipe interior

To prevent additional bending stress, external defects must be supported in such a manner that pressure fluctuations inside the pipe will not result in bending movements. The effectiveness of this repair method can be proved by measuring circumferential elongation on both the pipe and the sleeve.



The "Hot Sleeves" repair method can be applied to defects in pipelines with diameters of over DN 200 and an s/D ratio of ≤ 0.015 .

TÜV SÜD Industrie Service GmbH developed the "Hot Sleeves" repair method discussed here with the objective of providing a cost effective method of repairing defects in pipelines from the outside without having to drain the pipeline, thus removing any restrictions that may limit continued pipeline operation.

This system is in conformity with the German regulations.

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