

**Corrosion under insulation -
a problem vanishes into thin air:
CPI against CUI.**

CPI – SYSTEM

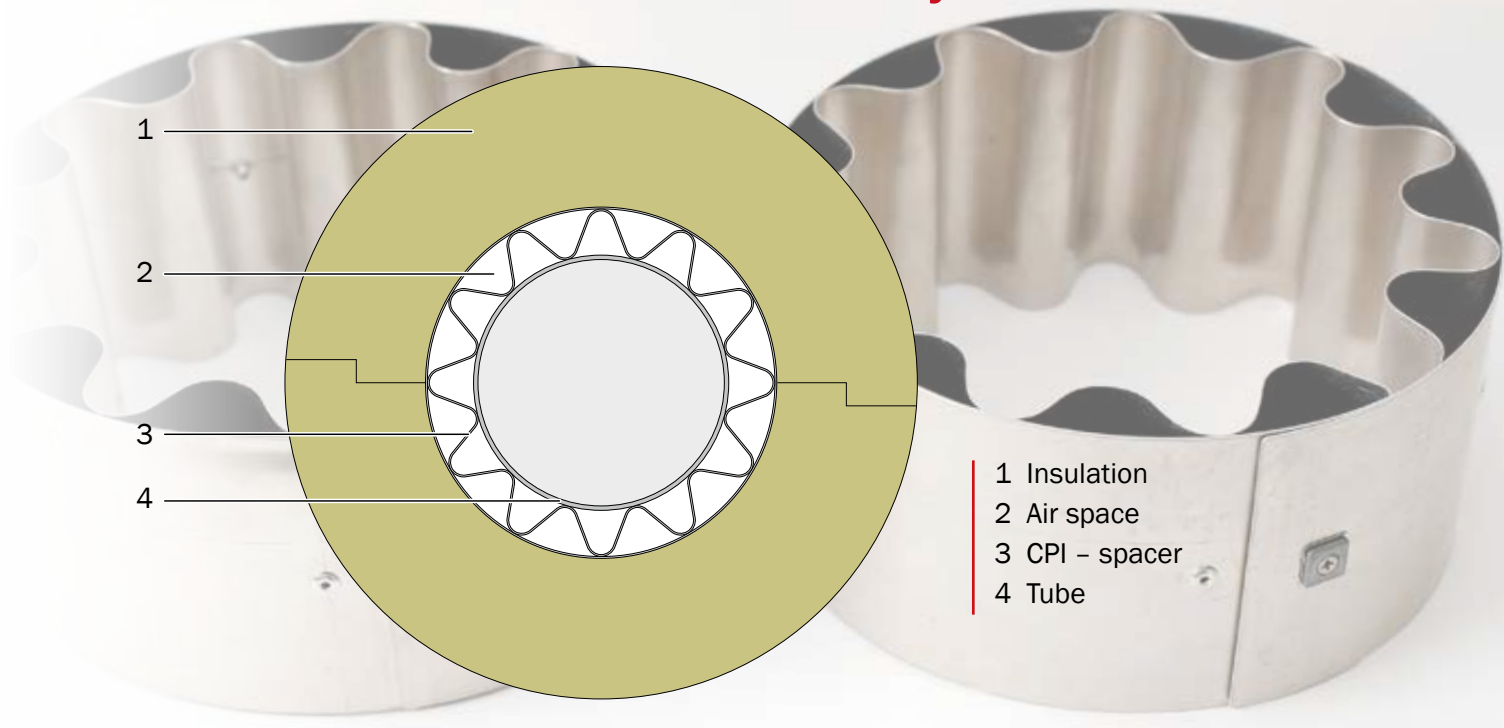
Corrosion Prevention Insulation System



So that corrosion under insulation doesn't become a problem.

CPI – SYSTEM

Corrosion Prevention Insulation System



Corrosion under Insulations (CUI)

Corrosion under insulations (CUI) at technical plants is an immense technical and economical problem known all over the world. A lot of effort is being taken world-wide in order to cope better with this problem.

Despite the normally-present anti-corrosive coatings, corrosion under insulations mainly occurs because of the accumulation of humidity and corrosive substances within the insulating materials. This accumulation of humidity arising from air-transfer and condensation and in addition the corrosive substances within the surrounding air in the insulations, are unavoidable over the long-term even with the highest quality insulation and the appropriate claddings.

Depending on the saturation and concentration of the corrosive substances in the insulating material, unnoticed corrosion of pipes and apparatus under the insulating material can occur, caused by direct contact between the accumulative humidity in the insulating materials as well as the there within released corrosive substances and the object-surfaces. The results of this unnoticed corrosion are, not infrequently, enormous economic damages arising from the renovation of installations and the failure of installations, serious environmental damages with resulting high-costs as well as the endangerment of life and health of the people in the surrounding areas.

How to avoid CUI

And yet, the solution for the avoidance of CUI and the damages and dangers resulting as a consequence, is relatively simple.

The surest method for a prevention of these corrosion processes is the faultless application of a requirement-fulfilling, anti-corrosive coating and the use of appropriately-formed air-layers, which avoid direct contact of the object surface to be insulated with the humidity-and corrosive-material-enriched insulating material.

These so-called “non contact insulations” prevent the direct contact between the insulating layer and the object surface. Consequently, the accumulated humidity and corrosive materials within the insulating material cannot result in damage of the anti-corrosive coating or the surface of the object respectively. Corrosion processes, therefore, cannot even start to begin.

“Non-contact insulations” have been successfully used for some length of time in different areas of the oil and gas industries as well as in refining, for the avoidance and considerable reduction of CUI, respectively. However, up to date, the constructive form of the air gap between the object surface and the insulating material has been unsatisfactory because the techniques used up until now often don’t ensure a lasting gap of air, are very work-intensive or even damage the anti-corrosive coating of the object, which again leads to corrosion under the insulations.

NTI - Corrosion-prevention-Insulation-system (CPI) – to avoid CUI in an intelligent and efficient way

The newly-developed CPIsystem (Corrosion-prevention-insulation-system) of NTI is the optimal constructive solution for the realisation of “non contact insulations”.

CPI, with its exactly intertuned system of gap construction and insulation, ideally fulfills the technical requirements for the insulation and corrosion-protection for the avoidance of CUI.



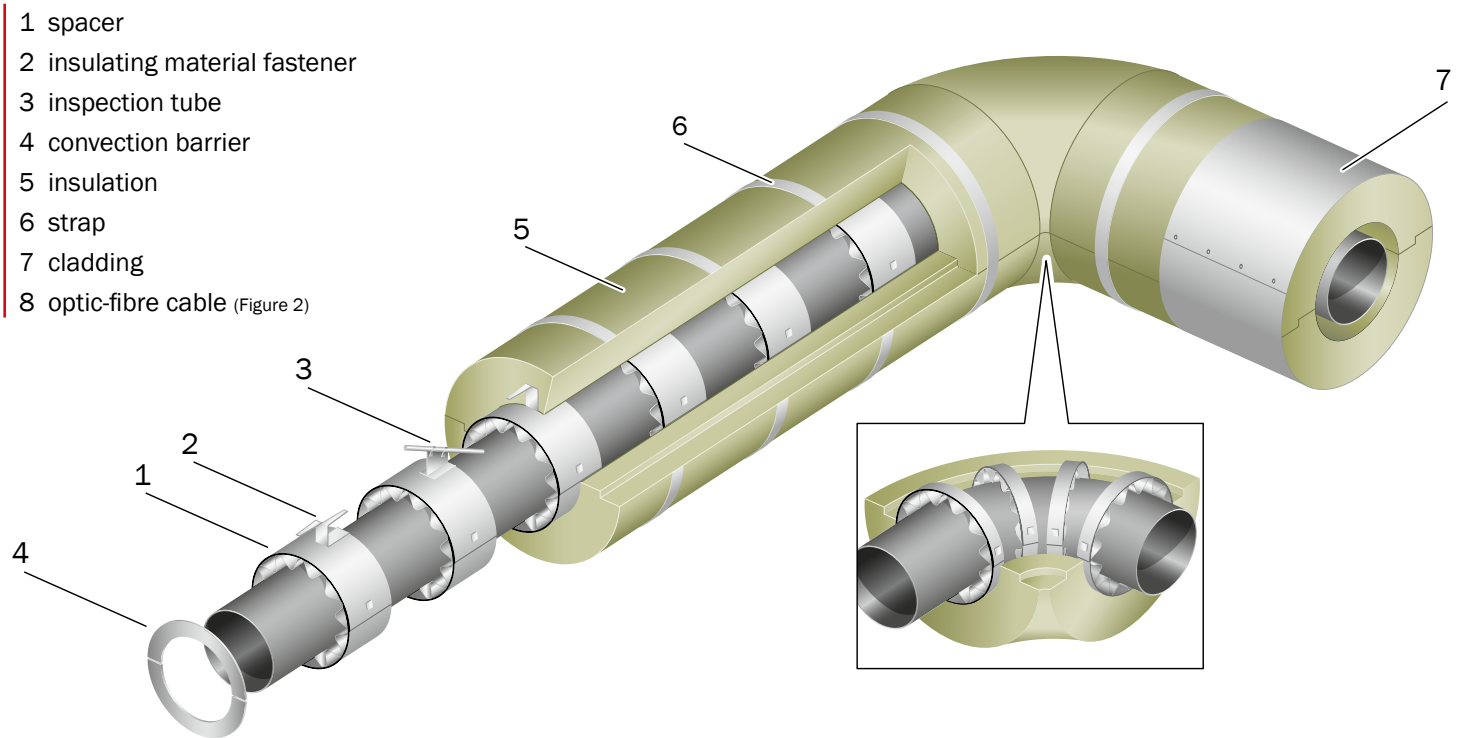


Figure 1 CPI-System with spacers for the efficient realisation of air gaps between object and insulating material.

CPI – key benefits

CPI integrates advantages for plant operators and insulation technicians (installation companies) in a particular way:

- ▶ Due to the specially rounded form of the inner side of the spacers and the rounding off of all the irregularities during a further refining process, there is no damage to the anti-corrosive coating or the surface of the object respectively during either the assembly of the spacers or during the running of the plant. Therefore, there is no danger of unnoticed resulting corrosion of the object surface due to damage to the anti-corrosive coating.
- ▶ Due to the corrugated design of the interior elements of the spacers, the disturbance-free installation of tracer pipes, tracer cables, leak detection cables and gas detectors is possible.
- ▶ The outside cladding of the spacer is of sufficient stability for taking the weight-strains resulting from the insulating construction.
- ▶ Owing to the creation of a continuous, permanent air-gap, no direct contact between insulating material and object surface occurs anywhere. Humidity which has penetrated into the insulation or corrosion-promoting substances are kept completely away from the surface of the object.

CPI – key benefits

- ▶ The inspection pipes of the system make it possible to do a direct fibre-optical assessment of the air gap between the object and insulation material, of the state of the object's surface as well as of maybe-installed tracer pipes and cables, without wasting time and money for dismantling and renewal the insulation.

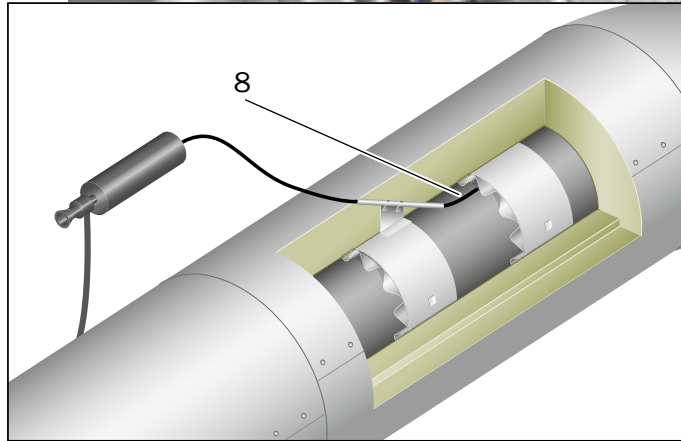


Figure 2 CPI-System with inspection-opening for fibre-optical (fibrescope) inspection.

- ▶ The shut-down times needed for plant revisions can be reduced by this new type of fibre-optical inspection and correspondingly the availability of the production plant can be increased.
- ▶ Thermal expansions of the object are compensated for by the elastic, corrugated construction of the inner ring.
- ▶ In order to fasten the insulation material, the outside cladding of the spacer can be fitted with slip-on insulating-material fasteners or screw rivets for screwable insulating-material fasteners.
- ▶ The spacer is fitted with an unlosable snap-shut mechanism and can be installed very quickly and simply with just a few turns of the hand.
- ▶ The snap-shut connection can be opened easily and without a risk of breakage using a hand-held screwdriver and can be reclosed without the use of tools.
- ▶ The outside cladding and the corrugated inner part of the spacer are already connected together upon delivery. This means that the installation of the spacer construction for the production of the air-gap and the weight-distribution cladding and inspection tubes can be performed very quickly simultaneously and without any usage of tools. Hence, there is no risk of the anti-corrosive coating of the object being damaged by the use of tools.
- ▶ Convection barriers in axial and radial directions are optionally available.
- ▶ By using perfectly-fitting pre-made insulation elements, such as e.g. pipe sections, pipe segments, pipe elbows, board segments etc. with measurements fitting exactly to the above-mentioned spacers, an optimal, high-quality insulation without seams throughout or other deficiencies can be achieved.

CPI – key benefits

- ▶ The insulation elements on the longitudinal and circumferential seams are optionally fitted with stepped edges and on the side facing the object, with convection barriers.
- ▶ The pending-patent CPI system is allowed to be used on the basis of the licence agreements for commercial purposes by end-users, plant operators, plant constructors and qualified installation companies and may only be produced or installed by companies which fulfill the given quality standards and which are authorised and instructed by NTI. This ensures a continually constant high-level of product-quality and implementation quality.

Multi benefit with CPI

CPI plays a contribution to the prevention and clear reduction of the CUI respectively. Production plants can be investigated during the running of the plant, without a lot of effort, by using CPI for possibly-occurring corrosion. By the use of CPI, further costs arising from corrosion damages caused by plant shutdowns, plant and environmental repair and dangers for people can be avoided. Operating life-times and life-times of the anti-corrosive coatings are clearly increased and hence also the life-times of piping and equipment, whereby the running costs of the production plants are significantly reduced and the plant availability increased.



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