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**SECTOR A - Paper 03**

**Long-term corrosion prevention of carrier pipe inside sleeve pipes; 10 years experience in the Netherlands with a new anti corrosion system**

**Protection contre la corrosion à long terme de pipelines gainés; 10 ans d'expérience avec un nouveau système anti-corrosion**

**Langzeit-Korrosionsschutz der Transportleitung in einem Mantelrohr; 10 Jahre Erfahrung in den Niederlanden mit einem neuen Korrosionsschutz-System**

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**Abstract**

Although the best casing is no casing, certain circumstances require the use of casings. The presentation deals with specifications of construction and problems concerning pipeline integrity inside casings.

The difficulties encountered when applying CP on pipelines inside casings and the problems to monitor of the effectiveness of the CP are discussed.

As an alternative, the author presents a totally different method for long term, maintenance free, corrosion protection of the pipeline inside the casing, using a flexible electrically isolating product to be injected into the annular space between casing and pipeline.

**Résumé**

Quoique le meilleur gainage en soit l'absence, certaines situations requièrent l'utilisation de gaines. Cette présentation traite des spécificités de construction et des problèmes concernant l'intégrité des pipelines dans leurs gaines.

Les difficultés rencontrées lors de l'application d'une PC sur les pipelines gainés et les problèmes de surveillance de l'efficacité de cette PC y sont abordés.

En guise d'alternative, l'auteur présente une méthode originale, à long terme et sans entretien de protection contre la corrosion des pipelines gainés. Cette méthode prévoit l'utilisation d'un produit souple d'isolation électrique à injecter dans l'espace annulaire situé entre la gaine et le pipeline.

## **Introduction**

In the Netherlands sleeve pipes are under certain conditions obliged to prevent damage of the railroad and/or pipeline. Also very important is to be able to continue the operations of each company separately. Cathodic protection people know that for good cathodically protected steel carrier pipes it is not necessary to construct crossings with sleeve pipes.

However no pipe will cross a railway without a sleeve pipe.

Nowadays only concrete and plastic sleeve pipes are available. Asbestos cement sleeve pipes are not permitted anymore. So we searched for alternatives. We found for up to 16" diameter only plastic sleeve pipes. The sleeve pipes above 16" are made of concrete.

Plastic or coated steel sleeve pipes are shielding the cathodic protection current. So without additional measures the pipeline inside is not cathodically protected. Complementary measures as using Magnesium ribbons inside are necessary to protect the carrier pipe against corrosion. Under certain conditions there is no possibility to check or monitoring the corrosion prevention system inside the sleeve pipe.

## **Corrosion prevention inside a sleeve pipe; an answer to solve the problem**

The construction of the pipeline and the situation in which the pipeline has to be laid asks for other measures than normally has to be done. These are not necessary if the material of the sleeve pipe is not isolating. Nevertheless the pipe is closed on both sides there almost always comes water and soil inside the sleeve pipe. If the sleeve pipe conducts the current and is filled with water cathodic protection will do his job. No corrosion of the carrier pipe will occur. This is an uncertain situation. With measurements in combination with calculations there is a possibility to establish if the protection of the carrier pipe is sufficient or not. On the other hand if above ground new roads will be built and there is no possibility anymore for easy or even no access to the buried pipe line To prevent corrosion problems afterwards there must be measures to keep the pipe line integer. This can be done by installing inside the sleeve pipe a cathodic protection system by means of galvanic anodes However after about 10 years the system will not deliver enough cathodic protection current Another system of corrosion prevention is to lead a copper wire in the annulus The cathodic protection current will flow through the wire inside the annulus to the carrier pipe line. This system also has a limited lifetime. So you have to taken into account that in a relative short period the system has to be renewed. For both systems is renewing very difficult and is mostly possible with high costs and great effort. Especially when the accessibility to the sleeve pipe becomes difficult because there is a new construction built above ground The buried pipe line should be maintenance free for a long period. About 10 years ago we started to use a new system for corrosion prevention. We can describe this as an anti corrosion system. The material stays flexible. It behaves like water and it penetrates in the rough surface of the metal. It adheres very intensive to the metal surface. For new constructions is cleaning of the annulus not necessary. Problems can occur about the cleaning of the annulus of an existing sleeve pipe. With water under a certain pressure and flow the space between the carrier pipe and the sleeve pipe can be cleaned.

The anti corrosion system used for the sleeve pipe in combination with the carrier pipe line will give during a very long period prevention against corrosion. The construction can be mentioned maintenance free. Cathodic protection is not necessary and is even not possible because the material will completely cover the metal surface.

## **Field of use**

The use of Stopaq casingfiller depends on the following circumstances and which priority man will give considerations

- No cathodic protection inside.
- In future no accessibility possible other than with high costs and great effort.
- To prevent difficulties in the future

## **Properties of the material**

Stopaq Anti-corrosion system is a not cross linked polymer. That means there is no strength in any direction This may be a disadvantage but if there is a possibility to keep the material on one place than will be a great advantage namely it will be creeping into every hole and crevice. So the protected surface will be covered by coating on every place. The following great advantage is the property to adhere to almost every material e.g. polyethylene, polypropylene, bitumen, PVC coating etc. It becomes liquid at about 60°. The specific mass is 0,85 After solidify the properties of the material come back. So the casingfiller adhere to the casing as well as the pipeline.

## **Considerations to use Stopaq casingfiller**

We made some considerations to use Stopaq casing filler. In the first place the accessibility of the construction. Our first project was to protect a steel pipe in a steel casing which could not be removed. The age of the pipe was about 30 years and coated with bitumen. We had no idea how good the existing bitumen coating of the pipeline was. We could see that the annulus was free from sand and water.

Our experience with other products of the Stopaq anti-corrosion system was that the material has a very good adherence to bitumen as well as to steel. We did some practical experiments and marked that after solidify the same properties of the stopaq anti-corrosion system came back. So we decided to use the casingfiller for this project. The job was done very successful so we continued with this system and we got a lot of experience. Now every new casing isolated or not will be filled with Stopaq Casingfiller.

To use the casingfiller you can take in account the working of the cathodic protection system. Dr Schöneich told us last year in Malmö how to calculate the degree of protection of the pipeline inside the sleeve pipe. If the pipeline inside is protected against corrosion by cathodic protection there is no need to fill the annulus of the sleeve pipe. But if there is a possibility that the sleeve pipe and of course the carrier in the near future is not accessible anymore, or only with great effort and high costs you can consider to fill the annulus in advance with casingfiller. It is not possible to solve the metallic contacts between the steel pipeline and the steel casing. On the other hand if such a contact exist and the annulus is filled with Stopaq casingfiller the problem will be cut in halve. In the first place the pipeline will now surrounded by Stopaq and this has a very good adherence to the metal surface of the pipeline. Contact with soil or water is not possible anymore and so the pipeline is protected against corrosion. Unfortunately the sleeve pipe remained in metallic contact with the carrier pipe. The protection current remains high if the sleeve pipe is not good coated.

# Construction

The casing must be handled before there is a possibility to fill the annulus. Also with practical experience we developed instructions to use Casingfiller properly. Our first experience was the pipeline mentioned before. Only a filling and a ventilating hole was created. Nevertheless



we had a very good feeling about the filling. To get more confidence about the filling the construction is made better and more liable. In the first place there is an opening at the bottom for sucking the water out of the annulus of the casing. (If water is present). Second there are two openings at both side of the casing So it is easy to let the present air out of the casing and the Casingfiller can completely fill the annulus of the casing.

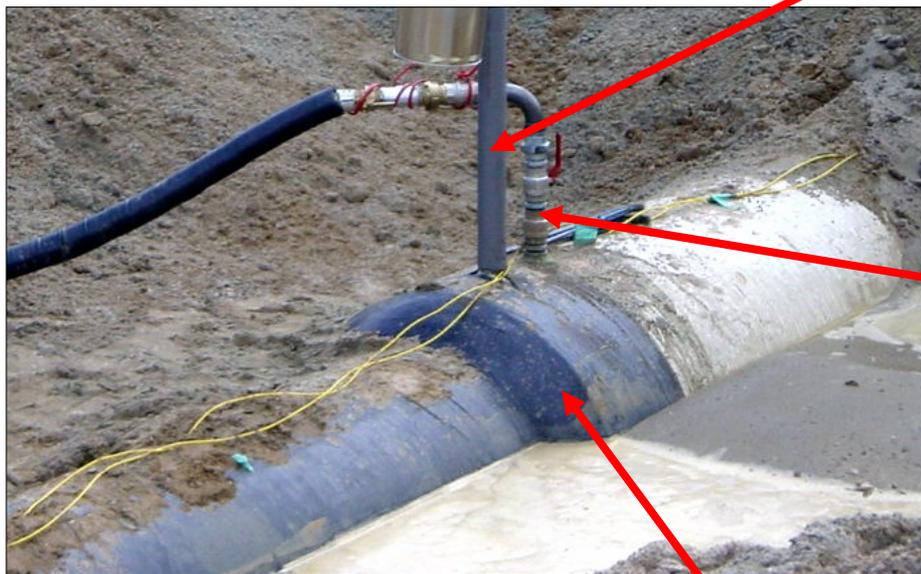
**Fig. 1 Connection and vent pipe (first realization)**



**Fig. 2 connection of the tank to the sleeve pipe (first realization)**



**Fig. 3 Connection pipe to tank car with Casingfiller**

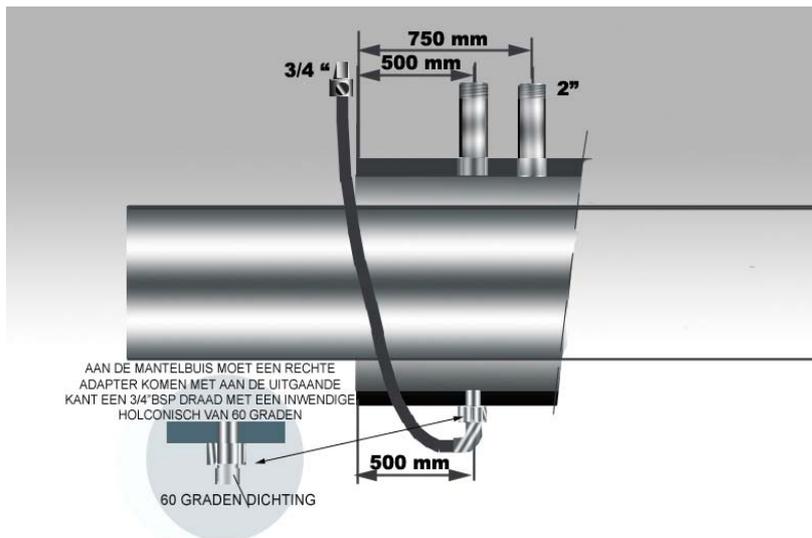


**Fig. 4 Connection pipe and vent pipe**

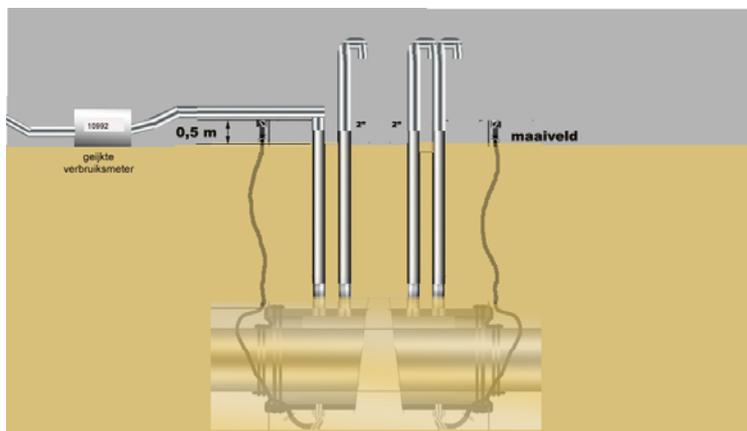
**Vent pipe**

**Mouth**

**End seal**



**Fig. 5 Connection pipes**



**Figure. 6 Lay out of Stopaq casingfiller equipment**

### **Cleaning of the casing**

For existing casings there can be the need to clean the annulus. Most of the time soil and water will come into the casing. Nevertheless the openings on both sides are covered by sealing rings. Water is not a problem because this will flow away. However soil has to be removed. The technique is to pulse with water and air on this manner the soil will be removed. I must say it rather expensive and you should consider if this is worth to clean or look after an other solution. .

### **Conclusion**

The Stopaq anti-corrosion-system is an excellent system for corrosion prevention. The use of this material can help to make the buried or submerged structures maintenance-free. Because of the very good adhesion to other coating materials it is suitable for use in the field in combination with shop coatings. As the manufacturer guarantees the anti-corrosion system for 30 years you can suppose that the pipeline inside the sleeve pipe filled with casingfiller is maintenance free.