



**CULVERT REFURBISHMENT  
WITHOUT TRAFFIC INTERRUPTIONS**



# YOUR PARTNER FOR RAILWAY DRAIN CULVERT REFURBISHMENT

## Lining of railway drain culverts

Railcare Lining offers a unique solution for railway drain culvert refurbishment with equipment that can be transported on or off track. It is today the market leading concept for railway culvert refurbishment in Sweden and it is suitable for both brick or stone culverts, and also culverts in pre-casted concrete.

Also new steel pipe culverts can be lined. The flexible lining adapts fully to the pipe's shape and also fits where the same culvert is partly round, partly rectangular.

The result is a drain culvert with substantially prolonged lifetime!

## Cleaning the culvert important for the final result

The culvert should be completely cleaned from mud, sand and other debris for a perfect final result. Railcare Lining offers effective culvert cleaning using air/vacuum technology and elimination of vegetation at the openings. This measure can also be a way to improve culvert drainage without further lining.

## Essential for function and safety

It is a well known fact within the railway industry that a stable embankment is essential for the track's function and the overall safety. Blocked culverts or culverts with reduced capacity increase the risk for embankment damages with collapse as the ultimate consequence. In old culverts of bricks or natural stone vibrations from the trains make the stones separate, causing gravel and dirt to pour down into the culvert. In this case the lining method is far more persistent than a concrete repair.

Many culverts were installed when the railway originally was built and the need for refurbishment is vast. Ever more frequent extreme weather situations expose the culverts to further strain.



*The Railcare Lining method is suitable for all kinds of culverts.*



*Effective cleaning of the culvert is the first step in order to achieve a perfect result.*



*This is often the case in older stone culverts; the stones have separated and gravel and mud pours into the culvert.*



The installation equipment is transported on a tracked vehicle with low ground pressure. Refurbishment can thus be performed regardless of the tracks are closed or not.



The lining expands at the ends of the culvert and stabilize the embankment.

### Simple installation

The Railcare Lining method in short: a lining of fiberglass is inserted into the existing culvert. The lining is inflated to ensure a perfect sealing to the existing culvert walls. The plastic is hardened using ultraviolet light, resulting in a fiberglass shell that is perfectly fitted to the existing culvert, regardless if it is round or square.

A Railcare Lining culvert is normally installed in about eight hours. Our standard dimensions are within the range of culvert diameter 200-1800 mm.

### More advantages

Existing culverts can be extended to desired length by allowing the lining to continue outside the culvert. This will make it possible to expand and stabilize the embankment. You will also decrease the risk of new slides at the culvert openings.

### Efficient and durable sealing

The Inpipe method has been used for some 30 years. In 2003 Railcare Lining started to use it for railway culverts and the experiences regarding durability are very good. There are also environmental advantages.

When you renovate larger culverts that serves as connecting links between two waters there should be some stone material left on the bottom. This will give you an uneven bottom that makes resembles a natural environment for organisms and fish that pass through the culvert.

The plastic's low friction also enhances the culvert's self-cleaning function, e.g. a heavy rain will rinse it effectively.

### TENSION ROD EFFECT OF INPIPE LINER

Calculation of FX900 liner (Ø1000 mm with 9 mm thickness) gives the following result:

- Tensile strength 200 MPa (2 tonnes/cm<sup>2</sup>)  
Lining Ø1000 mm gives a cross-sectional area of 280 cm<sup>2</sup>  
280 cm<sup>2</sup> x 2 tonnes/cm<sup>2</sup> = 560 tons
- Ø25 mm bar of constructional steel with a tensile strength of 400 MPa (4 tonnes/cm<sup>2</sup>)  
The bar's cross-sectional area is 4.9 cm<sup>2</sup>  
Each bar's effect is 4 x 4.9 = 19.6 tonnes => 560/19.6 = 28.5 bars are needed in order to be equivalent to 560 tonnes.



This is the result of a complete culvert refurbishment.

### Turnkey culvert refurbishments

Railcare Lining offers turnkey drain culvert refurbishment contracts. This includes e. g. cleaning out the existing culvert using our vacuum method, clearing away vegetation, drainage work, installation of new pipes and catchpits and ground work completions. The work is carried out in close cooperation with the client.



## ADVANTAGES WITH THE LINING METHOD

- The method with a flexible lining is suitable for round, rectangular and combined culverts of stone or concrete
- The lining seals and prevents gravel and dirt to pour between blocks of stone, bricks or joints of concrete and stabilizes the entire culvert
- While the lining expands at the culverts' openings you achieve a tension rod effect that stabilizes the embankment
- Existing culvert can be lengthened to desired length
- Enhances the culvert's self-cleaning ability
- Installation track-driven equipment that don't interrupt the railway traffic
- Equipment that can be transported in the terrain or on the railway track
- Installation can be done all year round
- Fast and cost effective solution
- Minimum diameter 200 mm. Maximum diameter 1800 mm
- Well educated and dedicated work crew with extensive experience from railway contracts

### A creative and innovative partner

Railcare is a leading specialist in the railway industry. We are developing creative methods and solutions to old problems. We deliver effective transports and carry out contracts, mainly in Scandinavia and in the UK.

### Cleaning and refurbishment of culverts

You are most welcome to challenge us with your project. Contact us for a preliminary discussion!

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