

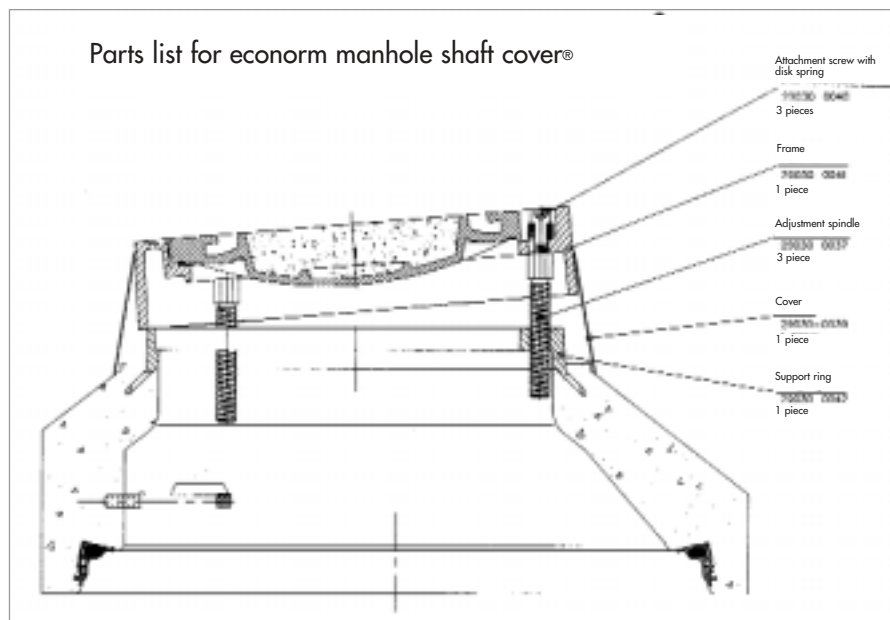
Econorm manhole system tested for engineering company Prinzing GmbH

A new manhole-cover design in rapid corrosion test

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Prinzing GmbH, Blaubeuren in Germany is now offering the econorm* manhole cover, a new design for drainage systems. A special feature of this product is that the height between the frame and bearer ring can be adjusted. This is made possible by three stainless steel spindles, mounting bolts and disc springs. During a four-week rapid test, the laboratory for materials technology at the University of Technology, Ulm in Germany looked into whether the adjustment spindles and mounting bolts would corrode, whether the corrosion of the remaining components would be accelerated by possible potential differences between them and the stainless steel and whether the bolt threads and spindles would still turn easily in a corrosive environment.

One of the spindles of the test sample was treated with a permanent lubri-



General drawing and parts list for the econorm series

cant which was chosen by Prinzing. The other spindles and the bolts were not treated. The rapid test which was adopted (standardised and frequently used in the car industry) includes a salt-spray phase, a drying phase and a

wet phase. The test time of four weeks simulates the corrosion attack of many years exposure to the weather in the open air.

The test can only accelerate the corrosion processes but is not able to simulate the abrasion effects, i.e. the mechanical wear of surface layers made up of corrosion products and passive coatings etc.

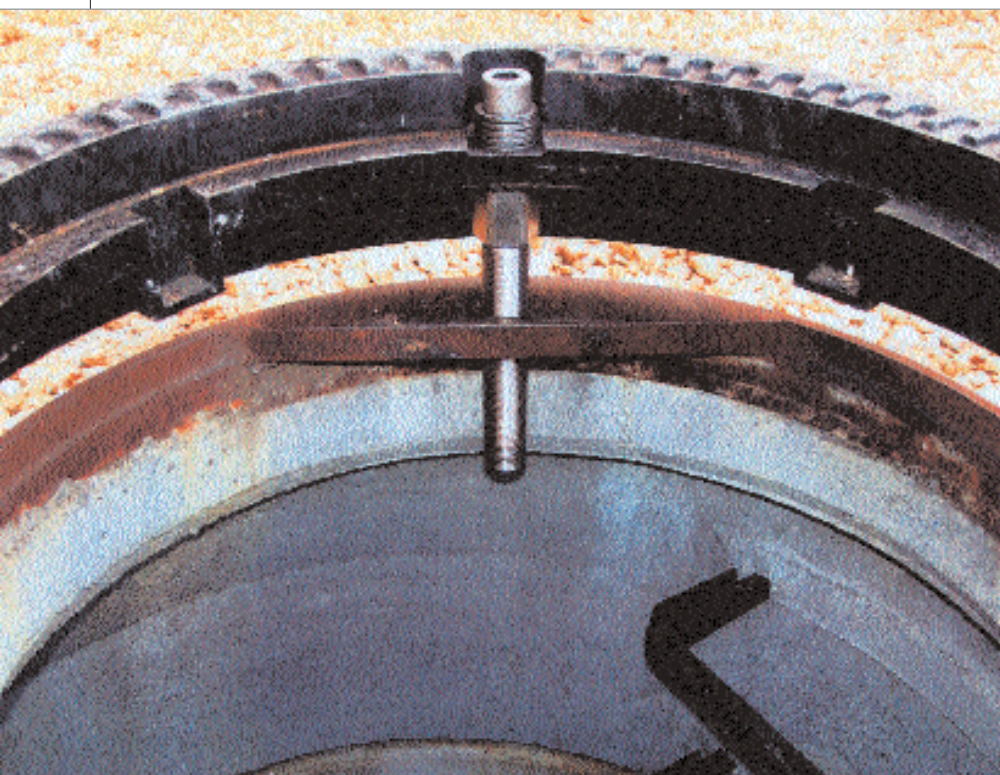
Test pieces

Two bearer ring segments embedded in concrete, each with a spindle hole, were bolted together and a bearer segment was also bolted to part of the frame for the test. A part of the cover was used to produce the distance to the bearer ring. A freely rotating spindle was mounted in the other bearer ring segment and then the whole test assembly was placed in the test chamber to simulate the real installation situation.

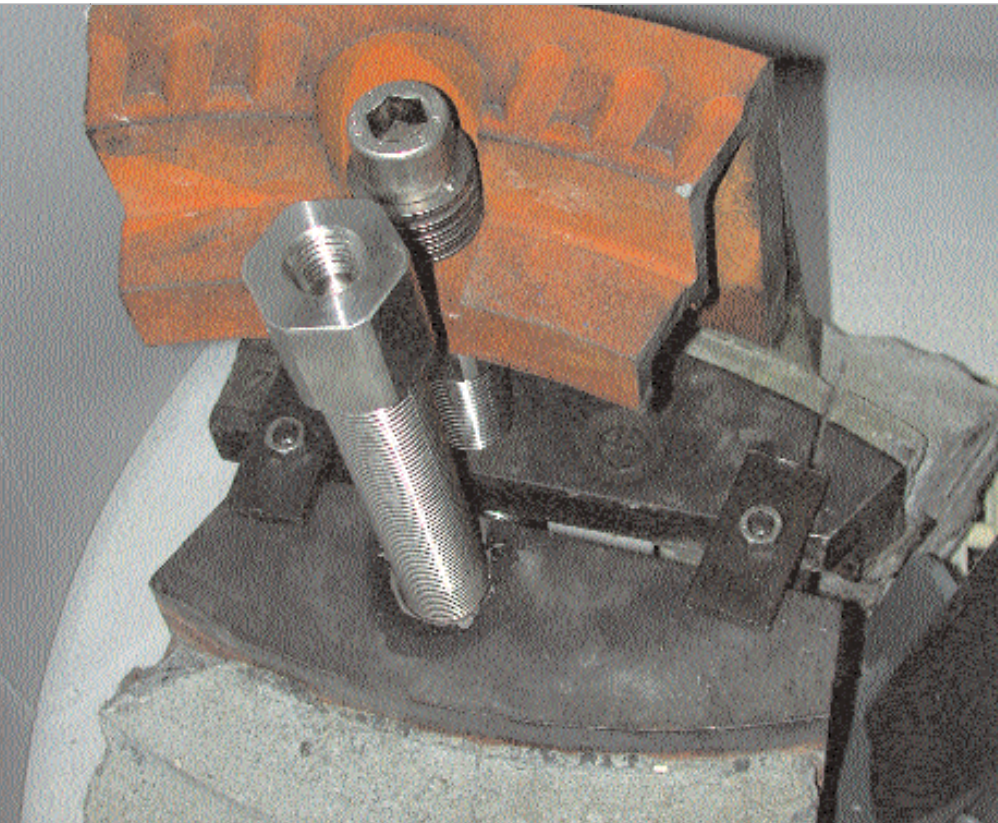
Test procedure

The test cycle was set up in accordance with the alternating test of VW as follows:

4 hours exposure to salt-spray mist in accordance with German standard DIN



Concrete collar, bearer ring, frame and spindles in actual use



Test component before exposure to corrosion

50 021, 4 hours cooling at room temperature 18-28°C and 40-60% rh, standard climate according to DIN 50 014-23/50 and 16 hours moisture and heat storage in condensation water climate according to DIN 50 017 KK at 40°C (+/-3°C) and 100% rh.

Each test cycle lasted 24 hours and

the laboratory terminated the test after 29 cycles. This process showed good agreement with the real corrosion processes and included the application of a highly corrosive electrolyte - the 'drying in' of a salt by concentration and the moisture phase during which solid salt binds the moisture to create the right conditions for



Rapid test after 16 days

crevice corrosion. On unprotected steel, iron and galvanised steel, the corrosion damage is similar to the corrosion damage there would be after years of exposure to the weather in the open air.

In the car industry, the alternating climate test with a defined duration has now become established as a reproducible standard - for suppliers, this is often used for a quality criterion for their products: all components must function perfectly and satisfy certain visual criteria after a four-week test period.

Picture documentation during the test period

Documenting the progress with pictures every three to four days is an easy way to spot rapid surface corrosion attack on grey iron and steel components. Although the surface of stainless steel components become discoloured, this is due to rust particles from the surroundings. The coating is loose, can be wiped off and does not lead to corrosion damage, nor does it impair the operation of the spindles, springs and bolts.

Concluding expert opinion

After the test period was over, considerable corrosion could be seen on the grey iron components. There was a layer of white salt consisting of zinc dissolution (white rust) over the cover but the zinc had not completely corroded away at any place. The bolts, disc springs and spindles made from stainless steel showed no traces of corrosion. The only lubricated spindle to be fitted could still be turned easily but the bolt which was not lubricated could not be loosened or turned using the appropriate tool.

The surface of the bearer ring which was treated with permanent lubricant showed only slight corrosion since the grease had largely prevented the aggressive electrolyte from wetting the surface. The lubricant was still fully effective and the spindle could still be turned easily by hand.

In the area of the bolts, disc springs and spindle on the side which was not lubricated, corrosion of the casting in contact with the stainless steel was no worse than in the other places. Comparisons with manhole covers exposed to the weather in the open and manhole covers in use at



At the end of the test after 29 days

Prinzing showed significantly less surface wear even after many years exposure. It can therefore be concluded that the corrosion test had a very pronounced acceleration effect for the grey iron.

Summary

The combination of materials with spindles, bolts and disc springs made from stainless steel has been found to be fully effective. These components showed no corrosion, even when in direct contact with grey iron. Neither was the corrosion attack any worse in the other direction on the bearer ring and frame components made from rusting material. In other words, the econorm manhole cover when corrosion-

induced held out just as long as the previous manhole covers and the bolts and spindles remained fully operational even after many years of use. Conversion and adjustment work is made significantly easier: even after a long period, the spindles could still be moved easily.

The permanent lubricant had been found to be effective. It guaranteed lubrication and ensured that the spindles could be turned easily while significantly reducing the corrosion on the threads, even on the grey-iron components.

** econorm is a registered trademark*

Further information:

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