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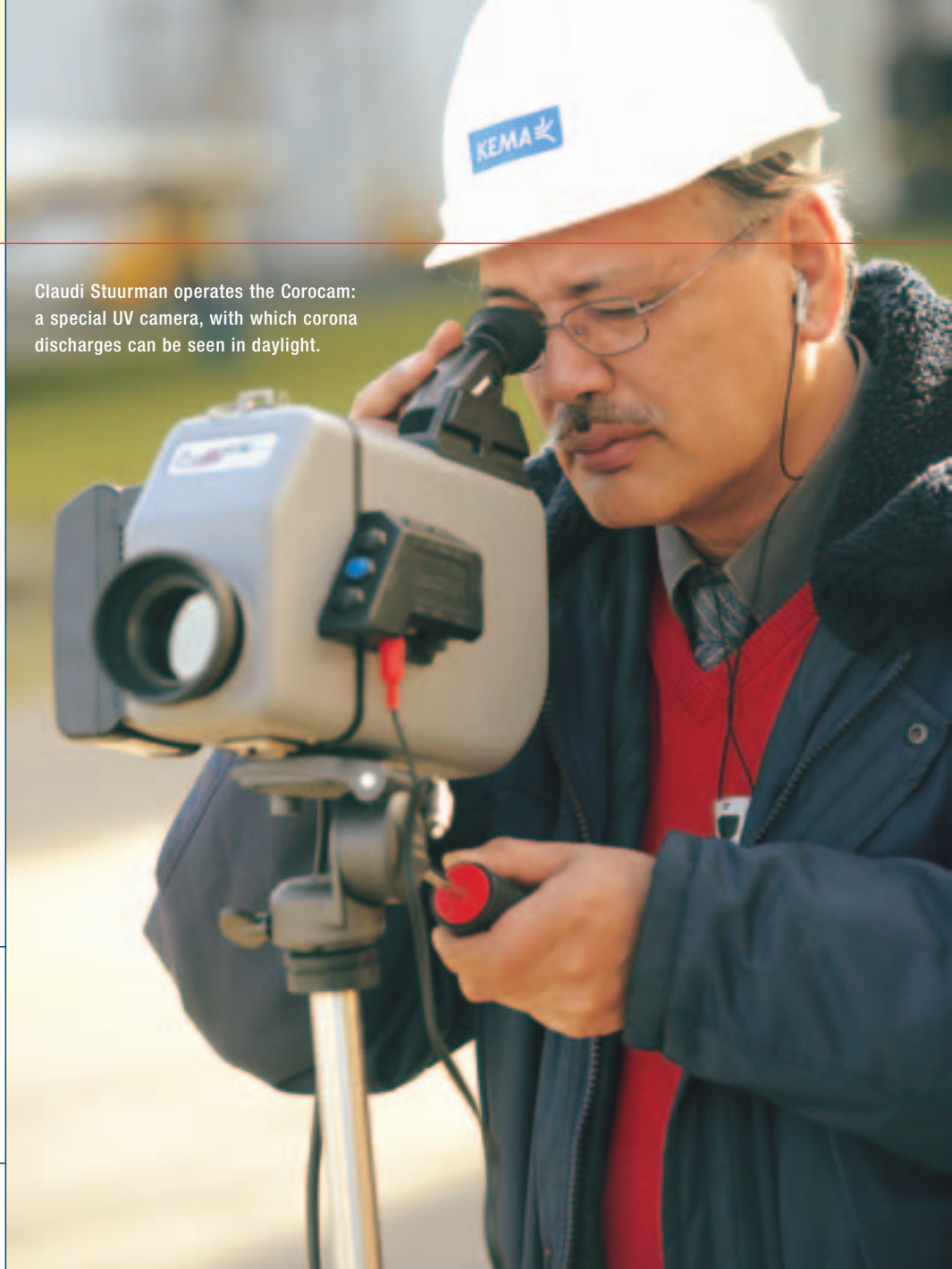


▲ A construction worker on an elevated platform attaches an insulator from the existing high-voltage link to the portal. If the insulator gets dirty, this can increase the number of discharges.

▼ By placing a barrel around the conductor, a simple small-scale test rig is created in order to establish the electrical field at which discharges occur.



► KEMA's Imre Tannemaat cleans the conductor using a number of different products in order to see what effect each has on discharges.



Claudi Stuurman operates the Corocam: a special UV camera, with which corona discharges can be seen in daylight.

## Crackling high-voltage lines?



## REPORT

A year ago, a high-voltage link in the densely populated western Netherlands was upgraded to 400 kV. Previously, it had been operating at 150 kV. However, with a view to increasing transmission capacity, Dutch national grid operator TenneT had decided to upgrade the line to its original rated voltage, i.e. 400 kV. Following the change, local residents started complaining about noise from the line. So TenneT commissioned KEMA to investigate the validity of the complaints by recording the number of electrical discharges, which are often accompanied by crackling.

As part of the investigation, KEMA built a test rig designed to simulate a high-voltage link in the field.

Parts of the existing line were brought to Arnhem and used to create a mini high-voltage link in the lab. A special UV camera and a directional microphone were used to record the discharges.

Another rig was built also, with conductors routed through a 'barrel' in order to measure the electrical field at which discharges occurred.

The tests found that brushing the conductors could reduce the noise. Noise caused by glass insulators can be reduced by replacing them with composite insulators.

As a result of the investigation TenneT decided to replace the glass insulators with composite insulators and to brush the conductors in the vicinity of the residents.



▲ The complete test rig, with the conductors, the corona shields, the spacer, the insulators and the test transformer. The latter is used to vary the voltage so the investigators can determine the electrical field at which most discharges occur.



▲ A directional microphone allows the investigators to pinpoint the discharge location. Test manager Pieter Kuipers can then observe the discharges with a camera.



▲ Corona discharges, as photographed using the UV camera.

[More information](#)

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