

Project REPORT

Amercentrale power station

Pennguard® seals and protects leaking brick chimney liner

In 1996, the Amercentrale power station in the Netherlands found an unexpected problem in the chimney of its 600 MWe Unit 9. The internal brick liner of this large concrete chimney was under attack from highly acidic flue gas condensate. This condensate was permeating the ceramic brick and threatening to attack the concrete structure itself. The owner of the power station, EPZ, immediately started to look for a solution to this problem.

The Amercentrale power station is one of the country's largest electricity producers and additionally, Unit 9 provides district heat (350 MW) to several nearby cities. Therefore, the availability of Unit 9 must be assured at all times. To find the right solution to the chimney problem, EPZ worked together with KEMA, the Dutch research institute for the power industry.

Many different approaches to the problem were analyzed, including the use of additional reheat to 'dry out' the flue gas, which comes from a wet flue gas desulphurisation plant. The clean gas is normally reheated to 60 °C and stays

relatively humid. However, the policy of EPZ is to run its power stations at the highest possible efficiency and so additional reheat was ruled out.



HADEK
Duct & Chimney Linings

As another option, the ceramic brick could be sealed by applying a suitable lining over its surface. Such a lining would have to be impermeable in order to really seal the brick from the condensate. Also, the lining should be able to cope with the many imperfections of a ceramic brick surface, such as open joints. Finally, EPZ demanded that the installation should take not one day longer than 3 weeks; additional, unscheduled downtime would be too expensive.

As to the desired durability of the lining: EPZ demanded a service life of 20 years.

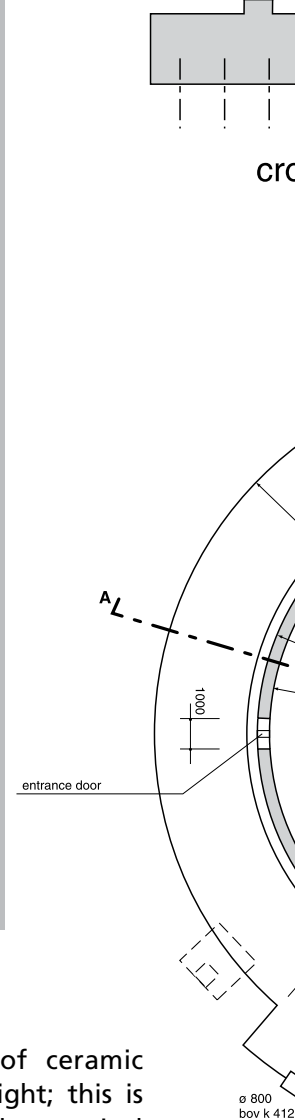
After comparing different options on the basis of their technical properties and field history, EPZ selected a Pennguard® borosilicate glass block lining for this project. In September of 1997, a Pennguard® lining was installed in the lower 75 metres of the chimney, on a surface of some 1.500 m². ♦

The Chimney Problem

The reinforced concrete chimney of Unit 9 has a height of 175 m. Internally, it has a ceramic brick liner that consists of nine independent sections with an internal diameter of 8,25 metres. During normal operation, the more than 90 % desulphurized, re-heated flue gas enters the chimney at 75 metres above ground level, essentially leaving the lower part of the chimney as 'dead space'.

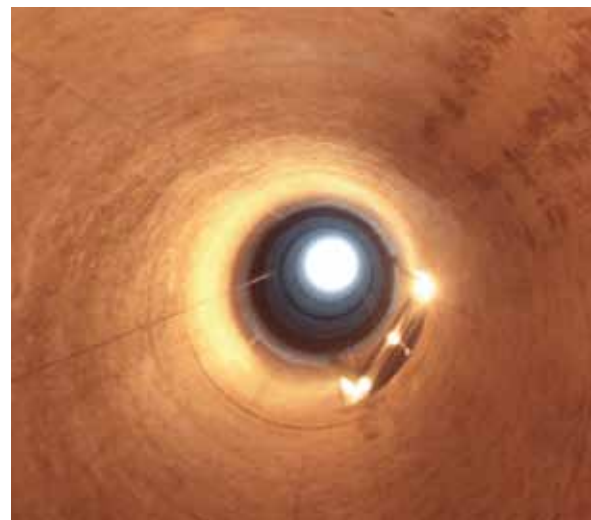


The chimney of Amercentrale, Unit 9.



Acidic deposits on the outside of the brick flue.

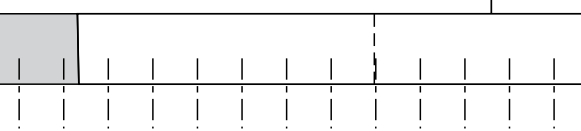
puddles. The joints of ceramic brick are not liquid tight; this is especially true for the vertical joints, which tend to be less well filled with grout than the horizontal ones. ♦



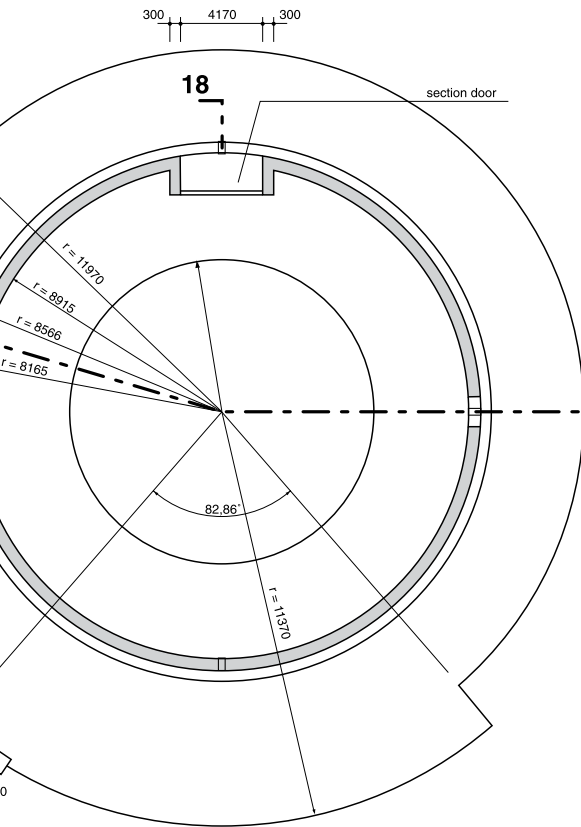
Inside view of the brick flue.

This explains why the permeation of the ceramic brick was by far the worst in the lower three sections. A thorough inspection of the chimney showed, that large amounts of acidic condensate

were coming out through the brick joints into the annular space. The acid then ran down the outside of the brick, behind the insulation, and gathered on the concrete support structure in highly acidic



cross-section view
SOUTHSIDE 1:200



cross-section 5600+
1:200



All work in the chimney was done from a movable work platform.

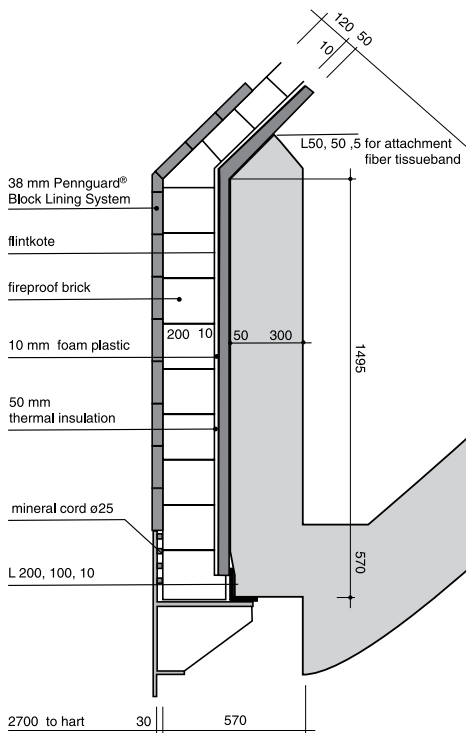
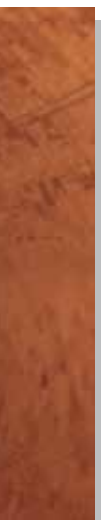
The selection of Pennguard®

More than 10 years of experience has been gathered with the use of Pennguard® on ceramic brick surfaces. There are several important reasons, why Pennguard® is so suitable for this type of substrate.

First of all, a Pennguard® lining is impermeable. Therefore, it will form a real, durable barrier between the ceramic brick and the moisture.

Secondly, a Pennguard® lining is a strong insulator and so it will protect the ceramic brick from temperature shock at the same time. In chimneys where FGD operation as well as hot, FGD bypass operation can occur, temperature shocks are sometimes an important factor.

Finally, a Pennguard® lining is tolerant of imperfect substrates. Clearly, a ceramic brick liner has many imperfections, such as the many joints which may vary in width and depth. ♦



detail 8



Experienced brick layers apply the Pennguard® lining.



A well-earned break for the application crew: the work is on schedule!

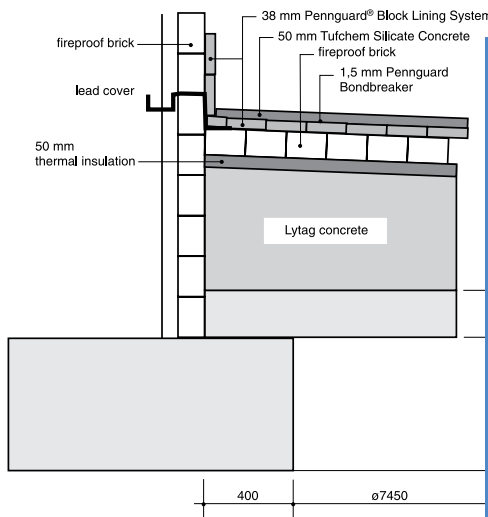
The work was performed in two shifts, with 7 brick layers on the movable work platform practically around the clock. With an average production of 1,5 m² per man per hour, the installation of the Pennguard® lining took less than 9 days.

The entire program itself, which included not only the surface preparation but also some repairs to the existing expansion joints, took 20 days exactly and so the customer's demand for a 3 week installation time was met. ♦

The installation of Pennguard®

When installing a Pennguard® lining on a ceramic brick surface, the substrate is first grit blasted in order to remove all dirt, deposits and other loose particles. Then, if the surface is sufficiently dry, an epoxy sealer, Penntrowel® Epoxy Primer, is applied using roller and brush.

The installation of the Pennguard® lining itself is the work of experienced brick or tile layers. In the case of this project, a group of 17 applicators came over from England to do the job.



Basic Data about the 'Amercentrale' power station

The Amercentrale power station is the largest in the Netherlands. The station has two coal fired units, 8 and 9, with 645 MWe and 600 MWe respectively. Both Units 8 and 9 comply with the strict Dutch emission laws.

Unit 9 has low-NOx burners and a wet limestone desulphurisation plant with > 90 % SO₂ removal efficiency.

Unit 8 has a DeNOx installation and a similar desulphurisation plant, with > 88 % efficiency.



The chimney floor receives an additional layer of acid resistant cement.

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