

Power Station Amercentrale 9 modifies its brick lining for “Wet Stack” operation



Martin Atkins

is Acquisition and Project Manager in Züblin Chimney and Refractory GmbH. An English man in Cologne – now with the STRABAG Group over 25 years. His move into Chimneys came with ETW. The European Transonic Windtunnel located near to the airport in Cologne financed by UK, Germany, France and NL and visited by Queen Elizabeth. – who he knew from earlier when he handed her a spade to plant a tree – back in school days. It died but we never told her!



Barbara van Spronsen

Barbara van Spronsen is Marketing and Publicity Manager at Hadek Protective Systems, a leading supplier of internal lining systems for the protection of new and existing power plant flue gas ducts and chimneys. Barbara is involved in solutions to increase customer awareness worldwide.



Figure 1: Location of the Power Station

1. Introduction

Amercentrale 9 Power Station is located in Geertruidenberg, the Netherlands, and is owned by the Dutch Utility Company Essent. Essent is a 100% member of the German Utility Company RWE, one of the biggest utilities in Europe. The Power Station consists of 2 Units (Unit 8 and Unit 9), together generating 1245 MW, which is used to provide 3 million households yearly from electricity.

Unit 9 is in operation since 1993. At the moment, this coal/biomass fired Unit is burning 35% biomass. It’s wet limestone

flue gas desulphurization (FGD) plant is scrubbing the gas to > 90% SO₂ removal efficiency.

In 1996, the Power Station found an unexpected problem in the lower 75 m of the chimney. The brick liner of this 8,25 m diameter chimney was under heavy attack from highly acidic flue gas condensate. In 1997, 40% of the brick liner was sealed with the Pennguard Block Lining System.

In 2013 the Owner decided to eliminate the reheater and to operate “wet stack”. Züblin Chimney and Refractory GmbH was appointed as the Contractor to prepare the upper 60% of the brick chimney flue for safe “wet stack” operation by sealing the bricks with the Pennguard Block Lining System, supplied by Hadek Protective Systems.



Figure 2: Amercentrale, The Netherlands

2. The chimney problem in 1996

In 1996, the Owner found an unexpected problem in the 181 m high Unit 9 chimney (figure 3). The brick liner consists of nine independent sections with an internal diameter of 8,25 m (figure 4). The 90% desulphurized flue gas was reheated to 60 °C. The flue gas enters the chimney at 75 meters above ground level, leaving the lower part of the chimney as ‘dead space’. Large amounts of acidic condensate were coming out through the brick joints into the annular space (figure 5) attacking the concrete chimney support structure.

3. Solution to the problem

In 1997 the lower 75 m (1.500 m²) of the brick flue was sealed from acidic condensate with the impermeable Pennguard Block Lining System. The installation of the lining took less than 9 days.



Figure 3: 181 m high chimney Unit 9. Inlet duct at 75 m.

4. Situation in 2012

In 2012 it appeared that the reheater got corroded and needed replacement. The Owner also considers complete elimination of the reheater and to operate more efficient “wet stack” operation. The flue gas temperature will then be at water dewpoint approx. 50°C.

Operating “wet stack” will have consequences for the existing chimney:

- The operating temperature is below acid dewpoint, which means aggressive condensates in the chimney flue;
- The operating temperature is at water dewpoint, which means continuous condensate formation within the chimney flue.

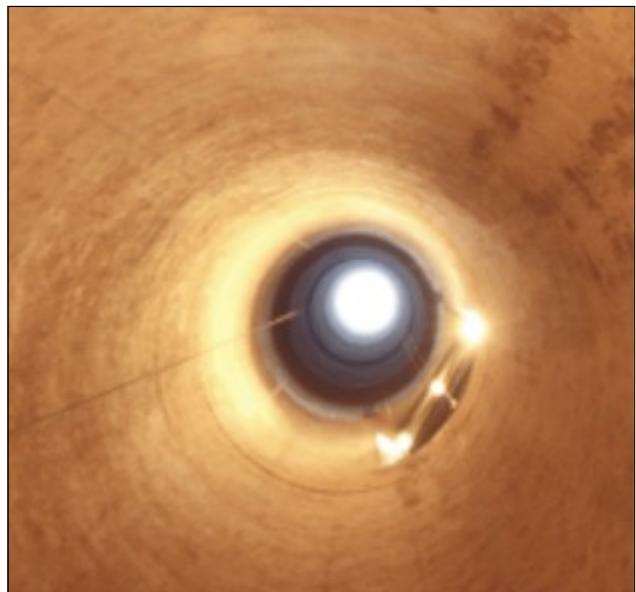


Figure 4: Inside surface of brick chimney flue.



Figure 5: Acidic deposits on the outside surface of brick chimney flue.



Figure 6: Core sample

After 15 years of service the Pennguard Block Lining System appears to be in excellent condition.

After 15 years of service, the Pennguard Block Lining System in the lower 75 m of the chimney appears to be in excellent condition.

5. Pennguard linings chosen as the best lining material to prepare the chimney for “wet stack” operation

More than 25 years of field experience has been gathered with the use of Pennguard linings onto brick substrates. Based on this field experience and its technical properties, Essent selected Pennguard linings to seal the upper 60% (2.518 m²) of the brick chimney flue from continuous condensate formation.

6. The Project

First contact was made with the Client, Essent in April 2012. Following receipt and perusal of the initial Inquiry Documents, visits were made to Amer 9 to discuss in more detail the situation and Client requirements.

Based upon the assessment of the condition of the liner area to be treated, the condition of the existing Pennguard installed in 1997 in the lower part and the future operating conditions as a “wet stack”, we Züblin Chimney and Refractory GmbH undertook the preparation of proposals in accordance with the recommendations of the VGB PowerTech Advisory Sheet – “Chimney Operation without re-heating of the waste gas from the FGD unit”.

After preparation of the proposals using the VGB Table 2 as a reference for selection of materials for a life of at least 10 years - varying from GRP coating, cassettes, and other such alternatives including the Pennguard block lining, meetings were held with the Client in order to consider time requirements, execution procedures, suitability, cost and guarantee periods etc.

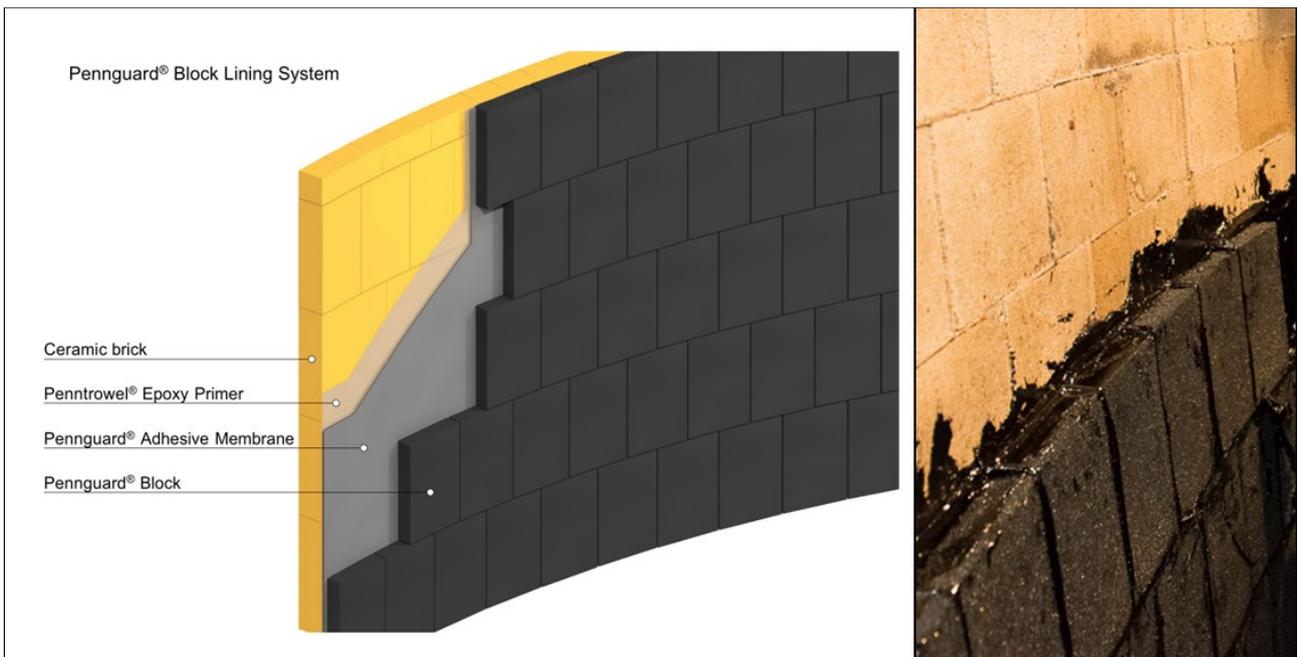


Figure 7: Cross section Pennguard Block Lining System

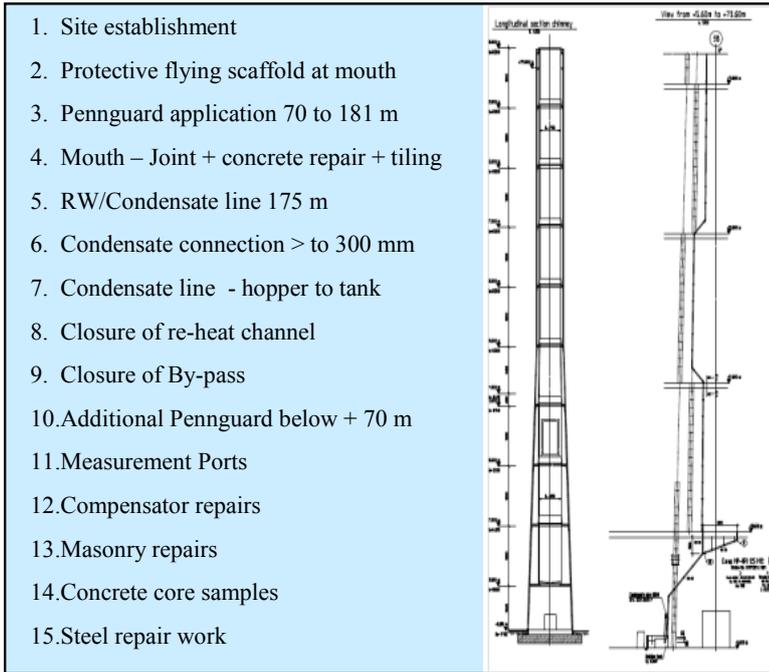


Figure 8: Work Scope

As the lining of the existing brick stack was only a part of the stop-out scope, coordination measures with other sub-contractors were also discussed in meetings arranged by the Client to ensure safety aspects and coordination of access to the areas in question.

Safety induction, Site Establishment etc. all took place prior to the start of the stop-out and following the access to the chimney on Monday 29th May, 2013 at 9.00 am – 28 days later at 23.00 pm on the Sunday evening the works were inspected.

The tickle in the project execution was to also undertake certain additional measures that became apparent – these were also discussed, defined and awarded by the Client to ensure completion within the defined period. These measures are shown on the enclosures Fig. 6 + 7 together with Fig. 8 giving an overall appraisal of work undertaken and the Fig. 9 showing the work to the mouth slab area – with Fig. 10 showing the man-cage traveling through the Pennguard tunnel.

The outcome of the discussions with the Client in view of the lining system came out in favour of the Pennguard solution. This was mainly due to the certainty of success of the application and the ability to undertake the work in the 4 week shut-down, together with consideration of the guarantee period given by Hadek. The Project was awarded on 1st February 2013 to allow adequate time for the procurement, preparation of method statements, risk analyses etc.

7. Summary and Conclusion

The Daily Reports prepared by the Hadek Supervisors confirming the block application etc. and the protocols agreed with the Client were incorporated in the Final Documentation handed to Essent.

The complete work scope was successfully completed and also on time to the satisfaction of the Client

8. References:

[1] VGBPower Tech Merkblatt – VGB-M 643 U – Issue 2007



Figure 9: Mouth Slab + Parapet repair



Figure 10: The black hole – Pennguard lined