INTRODUCTION

The seemingly endless possibilities, which are offered for the refractory lining in WTE plants, have effected that new lining concepts have been developed and introduced again and again during the last decades. The objective of all lining systems from the start has been to reduce corrosion on the boiler walls to a minimum and to regulate heat loss in the first flue in such a way that all requirements according the 17th Federal Emission Laws are fulfilled. The last mentioned demand has always been less of a problem. The prevention of corrosion on the boiler tube walls has been the far more difficult problem over several years. This was specifically the case if the incineration boiler was operated with increased saturated steam temperatures and corresponding pressures. In addition, variations in regard to the refuse composition with steadily increasing loads of chlorine have effected a growing importance in trying to prevent boiler tube corrosion.

Various refractory lining systems have been installed in the WTE plant of the Zweckerverband Müllverwertung Schwandorf (ZMS) in Schwandorf, Germany, since it was first built. All these systems were carefully controlled and assessed. Due to the detailed and systematic documentation and observation of the rear-ventilated tile system by ZMS, after eight years of operation of the tube wall protection system it is now possible to obtain and present long-term results and make reliable statements on the performance of a rear-ventilated tile system.

1. The WTE Plant Operated by Zweckverband Müllverwertung Schwandorf (ZMS) in Schwandorf, Germany

The refuse incineration plant operated by ZMS has 4 incineration lines with a total throughput of approx. 450,000 t/a refuse. The incineration lines 1 to 3 have a capacity of 12.5 t/h and line 4 has a capacity of 28.0 t/h. The refuse is mainly composed of household and bulky refuse plus industrial refuse of similar portions. The calorific value is on the average 10.5 kJ/kg during the year and, consequently, within the normal range.

The incineration lines 1-3 were built by the Steinmüller company (today Fisia Babcock). Concerning the grate systems they have a counter-flow overfeed grate which was supplied by W + E. Today the technology rights are the property of the company Martin in Munich, Germany. Boiler 4 was supplied be the Baumgarte company and also equipped with a W + E grate system.

The steam parameters of the boilers are at 72 bar and a live steam temperature of 410 °C. Consequently, these parameters are in the upper range for standard boilers in WTE plants. The steam amount of all four boilers is 216 t/h. The incineration temperatures above the grate are at approximately 1100 °C, in the area of the boiler roof 850 °C and at the inlet to the horizontal flue 600 °C. Figure 1 shows the cross-section of the plant in Schwandorf. As usual, the refractory lining is installed in the area of the incineration chamber and first flue.

2. History of the Refractory Lining in Schwandorf WTE Plant

The first lining of the boiler walls in the incineration chamber area and in the 1st pass was out of refractory patching mixes based on 90% silicon carbide (SiC) with a chemical phosphate bonding. For anchoring the SiC mix with this lining method approx. 500- 550 Sicromal 10 boiler studs per square meter boiler wall were installed by the stud welding method. Next SiC caps were glued on the studs to ensure higher