

THE APPLICATION OF A LOW TEMPERATURE SELECTIVE CATALYTIC REDUCTION SYSTEM FOR MUNICIPAL & HAZARDOUS WASTE COMBUSTORS

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ABSTRACT

In Central Europe during the late 1980's and through the early 1990's, emission regulations on municipal and hazardous waste combustors (MWCs and HWCs) were tightened drastically. Among other pollutants, NO_x emissions had to be limited to an extent that required the installation of special NO_x control technologies and $70 \text{ mg NO}_x/\text{Nm}^3$ (56 ppm_{dv}) (corrected to 11% O_2 if the measured value exceeded 11% O_2). This became a commonly accepted value for most permitting agencies in Germany, Holland, Austria and Switzerland. The Selective Catalytic Reduction (SCR) technology became the preferred NO_x control technology for retrofitting existing MWCs and HWCs, as well as for new facilities.

This paper presents the Low Temperature SCR technology (LTSCR) as a major new development in SCR technology adapted to MWCs and HWCs. LTSCR's can be operated at temperatures as low as 150°C (302°F) while SCR's operate at temperatures above 280°C (536°F). The paper outlines the specific needs and restrictions of LTSCR, as well as its advantages. A detailed description of the correlation between required volume of catalyst, temperature, and specific catalytic activity is given. The application of LTSCR is shown for MWCs and HWCs, and for each case, one retrofit and one new facility are introduced. Finally, the paper reports on some two and a half years of operating experience with LTSCR and gives an outlook on further applications.

INTRODUCTION

The emission of NO_x is currently by far the largest single air pollutant contributing to the acid rain problems in Germany since

FGD systems were installed on all coal-fired utility boilers above 50 MW (thermal). In order to reduce NO_x emissions in Germany, several legislative steps were taken during the 1980's and early 1990's. The emissions from power plants and other large sources were limited to such an extent that almost all facilities had to be equipped with low- NO_x burners, SCR-De NO_x systems, or other NO_x reduction technologies.

For municipal and hazardous waste combustors (MWCs and HWCs) emission limits were also tightened drastically. Table 1 gives an overview of German NO_x legislation for MWCs and HWCs between 1974 and the present, and a comparison with U.S. Environmental Protection Agency (EPA) emission limits.

As noted in Table 1, the NO_x emission guarantees required from vendors of air pollution control (APC) equipment are a factor of four or more below the German Federal Standard. This is a result of political intervention caused by public pressure on local permitting agencies by groups such as the Green Party followed by Regions requiring the Best Available Control Technology (BACT).

Known and well proven from power plant applications, SCR soon became the predominant choice for retrofitting existing MWCs and HWCs, as well as for new facilities. The first two MWCs retrofitted with SCR plants in Germany were the Munich-South plant and the Stuttgart-Münster plant. In both cases, the same circumstances led to choosing SCR as the only feasible option for NO_x reduction. These circumstances are summarized as:

- Both plants were located and operated together with a power plant equipped with SCR;