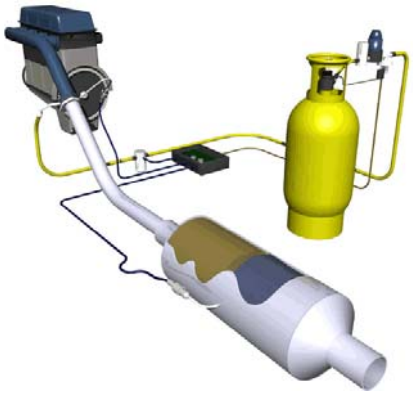
VI. SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

TECHNOLOGY OVERVIEW AND DESCRIPTION

As noted previously, conventional three-way catalyst technology will not function effectively in the oxygen-rich environment of diesel exhaust. SCR and LNC technologies employ a reducing agent in combination with catalyst technology to achieve a reduction in NO_x emissions. Another approach for achieving NO_x reductions in diesel exhaust is selective non-catalytic reduction or "thermal $DeNO_x$" as it is sometimes called. With SNCR, a reducing agent such as ammonia, is added to the high temperature (greater than 925°C) area of the exhaust stream of a diesel engine. It is reported that for NO_x reduction to occur, the engine exhaust temperature must be strictly controlled to within a narrow temperature window of 925°C to 1,125°C in order to maintain the NO_x reduction selectivity of the SNCR process. Some NO_x reduction can also occur in the 725°C to 925°C temperature range. SNCR has been widely used in stationary source applications, but as a stand-alone approach, it is not well suited for mobile source applications where exhaust temperatures as low as 125°C are often found (e.g., at idle).

SNCR combined with SCR technology has been evaluated on mobile sources with NO_x emission reductions in the range of 80% or more. In an SCR/SNCR system, a control system meters the ammonia into the high temperature exhaust stream, allowing the non-catalytic chemical reduction of the NO_x to occur. The exhaust then enters the SCR catalyst where NO_x is further reduced. One study reported that an SCR/SNCR system installed on a Cummins 5.9 liter engine, achieved reductions of 78% for NO_x, 27% for PM, 65% for HC and 76% for CO. There is very limited experience in the U.S. with SCR/SCNR systems for mobile applications.



Courtesy of KleenAir