V-Temp™ Economizer System for Optimized SCR Temperature Control

Selective catalytic reduction (SCR) is currently the most effective and proven method of post-combustion nitrogen oxides (NO_x) mitigation in power plants.

SCR technology and performance is closely related to boiler operation and is directly influenced by flue gas velocity, distribution and temperature as the gas flows through the system.

Problem recognized at reduced boiler loads

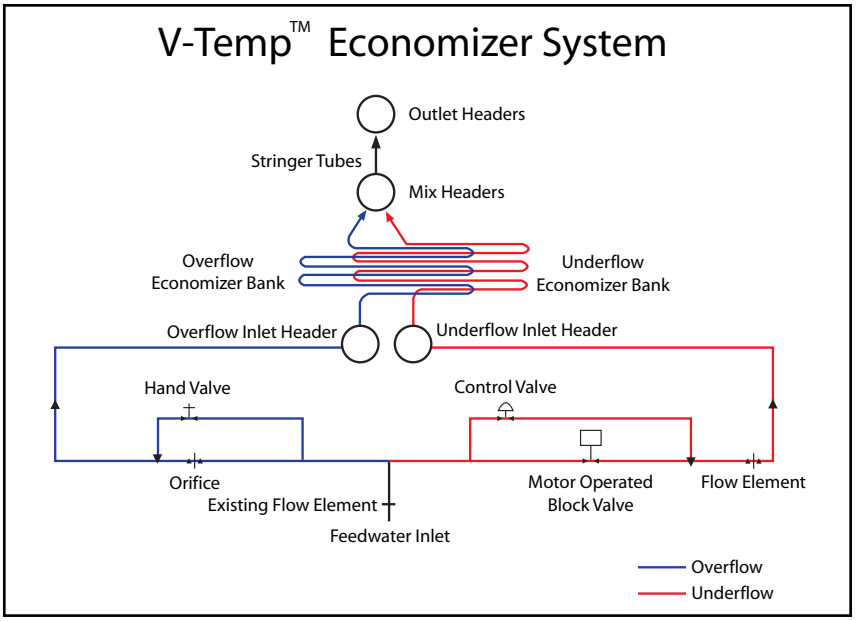
Reduced catalyst activity and/or ammonium bisulfate precipitation are two effects associated with low gas temperatures. Systems are designed for flue gas temperatures within specified temperature ranges for optimum SCR performance during normal load operation.

At reduced boiler loads, it is often difficult to maintain the minimum required flue gas temperature entering the SCR. Typical designs utilize a flue gas bypass system to control the temperature at this location. However, the large dampers associated with a flue gas bypass system are sometimes difficult to operate due to ash buildup.

Solution developed

Responding to this challenge, Babcock & Wilcox (B&W) has developed an alternative solution. The V-Temp™ economizer system is an improved method of controlling SCR flue gas inlet temperatures.

The patented B&W V-Temp system allows the boiler to operate at reduced loads with the SCR in service by maintaining the required minimum flue gas temperature at the SCR inlet. With this system, SCR performance is optimized, regardless of boiler load. The end result is a system that maintains unit efficiency at full load while optimizing SCR operation at reduced loads.



Flow schematic of a typical V-Temp™ economizer system.

Improved SCR performance

The uniquely designed V-Temp system provides these benefits:

Economical

The V-Temp system requires less capital expenditure than alternative methods of flue gas temperature control. Additionally, the overall chemical costs of operating the SCR are reduced with optimized ammonia consumption at reduced loads.

Optimized SCR performance

By maintaining flue gas temperatures above the minimum requirements of the catalyst, ammonium bisulfate salt formation on the catalyst is reduced or eliminated, resulting in longer catalyst life. As a result, fewer catalyst change-outs are needed during the life of the SCR system, reducing overall lifecycle costs. Additional benefits include less outages required to water wash the catalyst and reduced ammonia slip over time.

Improved load control

The V-Temp system controls flue gas temperature to a lower load range than flue gas bypass systems while maintaining unit efficiency at full load.

Low maintenance

Only minimal physical changes to the boiler are required with a V-Temp system installation. The large dampers associated with a flue gas bypass system, which tend to be difficult to operate due to ash buildup, are not required.

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Reduced emissions

The V-Temp system allows the SCR to operate more efficiently and effectively at reduced loads which reduces the overall NO_x emissions of the boiler.

System overview

The V-Temp economizer system maintains a specified minimum economizer exit gas temperature (EEGT), which is the project-specific minimum gas temperature for spraying ammonia without risk of ammonium bisulfate formation in the downstream flue, SCR inlet or SCR catalyst.

The V-Temp system modifies the existing feedwater system and if necessary, replaces the existing economizer. The system consists of feedwater piping, two economizer inlet headers, economizer tube sections, and a level of mix headers.

The feedwater piping begins as a common feed before splitting into two paths: an overflow path and an underflow path. The overflow path is used for full load pressure balance. The underflow path is used for EEGT control at reduced loads. Both feedwater circuits then feed separate economizer inlet headers.

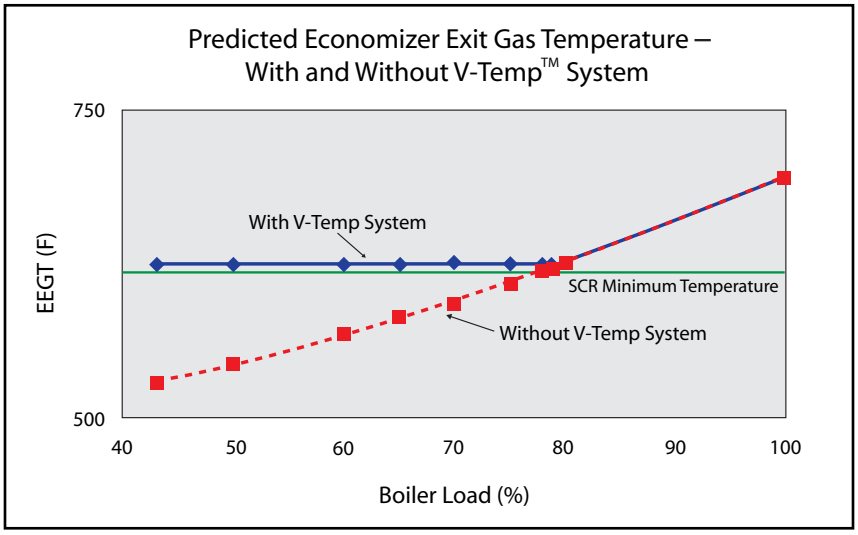
The economizer tube bank consists of a mix of underflow and overflow tube sections fed from the underflow and overflow headers. Feedwater exits the economizer sections and combines in the mix headers. EEGT control is achieved using feedwater piping valves to control feedwater flow distribution through the economizer sections.

Scope of supply

A typical scope of supply for the B&W V-Temp system includes:

- One overflow inlet header
- One underflow inlet header
- Two intermediate mix headers
- Economizer (if necessary)
- Feedwater piping
- System piping and valves
- Flow measurement devices
- Engineering

For more information on how we can help improve the performance of your SCR system at all operating loads, contact your nearest B&W Sales or Service office, call 330-753-4511, or visit www.babcock.com.



B&W's V-Temp™ system allows a boiler to operate at reduced loads while still maintaining the required minimum flue gas temperature at the SCR inlet.

Babcock & Wilcox
20 S. Van Buren Avenue
Barberton, Ohio 44203 USA
Phone: 330.753.4511
Fax: 330.860.1886

Established in 1867, Babcock & Wilcox is a global leader in advanced energy and environmental technologies and services for the power and industrial markets, with operations, subsidiaries and joint ventures worldwide.

For more information, or a complete listing of our sales and service offices, send an e-mail to info@babcock.com, or access our website at www.babcock.com.

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