

Water gauge, Flue Plate Stiffeners, and Insulation Systems Design Considerations

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Abstract

Tremendous money is wasted due to the lack of attention to the water gauge and flue plate stiffeners, and their impact on the insulation and lagging design. The design and installation of an insulation and lagging system will depend heavily upon the flue or duct stiffener arrangement. The stiffener arrangement is determined by many factors including the water gauge of the flue or duct plate design. The stiffener pattern and size is the first thing you consider when designing an insulation and lagging system. Therefore, it is imperative to understand how the size, shape and pattern of the external stiffeners are developed. The stiffener sizing of yesterday was based on a much lower water gauge pressure and allowed the insulation to be placed between the stiffeners without having to cut-to-fit. The stiffeners being designed today are quite large and much farther apart. This is due in part to the water gauge number being used in the design calculations and because they have not considered the required insulation thickness and application. A well designed and installed insulation and lagging system will save money and energy at a rate that is essential for an efficient plant operation. This is especially true when adding a selective catalytic reduction system (SCR) or a selective non catalytic reduction system (SNCR) to the back end of a steam-generating unit. The insulation and lagging system is critical for these air pollution systems to operate correctly.

Background

Urban smog is worsened by nitrogen oxide emissions (NO_x), and power plants have been identified as the largest stationary source of nitrogen oxide emissions. Due to regulation, agreement or emission trading, many power plants and municipal waste combustors must lower their NO_x emissions. One way to reduce NO_x emissions is by installing a Selective Catalytic Reactor (SCR) or Selective Non Catalytic Reactor (SNCR) to the back end of their boiler or combustor. An SNCR or SCR system is basically a large box placed in the gas flow that removes NO_x from the flue gas before it exits the stack. Adding an SCR or SNCR system to an existing power plant will also mean adding a large amount of flue plate.

An average SNCR or SCR system being installed at an existing power plant can cost millions of dollars (including insulation and lagging). An

improperly designed and/or installed insulation and lagging system will have an adverse effect upon the SNCR or SCR's ability to operate correctly. If the flue gas temperature drops below the designed operating temperature than the SCR or SNCR will not remove all of the NO_x emissions from the flue gas and you won't meet your NO_x emission requirements. So it will be imperative that these air pollution systems be insulated and lagged correctly.

The design and installation of a lagging and insulation system will depend heavily upon the stiffener arrangement. The very first thing you do when designing a lagging and insulation system is to review the area to be insulated and look at the stiffener size and pattern. The stiffener arrangement will depend upon many factors including the water gauge that the system is to be designed for.