

Partial vs. Full Acoustic Treatment of Conventional Gas Compression Facilities Part 1 – Engines and Coolers

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Introduction

Oilfield operators (Producers) need to be careful in selecting noise attenuation equipment to ensure they apply solutions that properly attenuate their noise sources. In the desire to minimize capital expenses it can be tempting to select smaller, low-cost noise control equipment. However, failure to adequately assess and attenuate noise sources such as engine exhaust or gas coolers can leave the operator and their neighbors with residual noise sources. These situations lead to deteriorating landowner relations and costly retrofits. Further, these partial solutions can also result in substandard performance of oil and gas processing equipment.

Cooler Silencers

A common tactic in cooler silencing is to silence only the fan inlet and outlet, leaving the cooler side and end walls exposed. Further, these fan-only inlet silencers are often mounted above grade to cover just the fan in both horizontal and vertical directions.

This is an attractive solution to Producers because the costs are clearly less than required to fully treat the entire cooler, yet the large surface areas of the untreated side and end walls can allow significant sound power to continue to emanate from the overall assembly. Further, failure to seal to grade enables cooler and engine noise to exit the front of the building structure.

The problem for Producers in understanding and evaluating these trade offs is exacerbated by the lack of supplemental detail in most Noise Impact Assessments on the impact of cooler frame side and end wall noise. Some NIAs will recommend either full or partial cooler silencing as required to meet PSL targets, but the residual noise left over from untreated cooler frames is not normally quantified.

Engine Exhaust Silencers

Many Producers and Compressor Packagers continue to select engine exhaust silencers on the basis of brand names, inferring levels of noise reduction from this equipment without fully comprehending their capabilities and limitations.

Engine exhaust manufacturers are generally very good at providing the Insertion Loss capabilities of this equipment, with the exception of the 31.5 Hertz frequency band, which is seldom mentioned. One challenge for the acoustic industry is to ensure Packagers and Producers incorporate target noise levels in their overall package design and select engine exhaust silencers on that basis, rather than simply use equipment with which their familiar.

A second issue is the residual shell noise that conventional mufflers create. Muffler manufacturers typically do not publish that data, nor do all acoustic consultants incorporate its impact into Noise Impact Assessments. As a result, Producers and Packagers frequently equip their facilities with mufflers that create secondary noise sources they don't even know exist.

The acoustic industry needs to move towards full disclosure of:

- The entire frequency spectrum in its DIL data, including the 31.5 Hertz octave band.
- Radiated muffler shell noise as well as muffler outlet noise.
- NIAs that identify engine exhaust muffler outlet and muffler shells as two separate noise sources.

Conclusions

Producers need to ensure they're aware of all the elements of cooler fan silencer and muffler acoustic capabilities – what is and is not treated with each solution. They need to be asking these questions when designing their facilities and the acoustic industry needs to help them by quantifying both the treated and untreated components when quoting solutions.

Producers also need to ensure they address the back pressure implications of their cooler fan silencer and muffler selections. For example, some mufflers use multiple baffle plates for attenuation, which improves noise suppression but increases engine back pressure. And some cooler fan silencers reduce inlet flow area to minimize product costs for the Producer. Are Producers considering the resultant reduction in engine horsepower and process cooling ability and in turn the impact on their production revenue when considering the lower cost capital option?