



# PRODUCT bulletin

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## 5 LINE MUFFLERS

Earlier this year, Carlyle announced in our OEM-37 Bulletin that it was changing to a new 05HY muffler model that is applied on our 5P, H compressors. Since this muffler has been introduced, we have received several reports of muffler and discharge line vibration problems.

While these reports have been infrequent, we would like our customers to be aware of this potential problem and some of its causes and solutions.

First, vibration problems are extremely difficult to predict. Even using computer technology to model unit piping designs, it is not always possible to predict how certain designs will react because of the complexity of the model. The most common cause of discharge line vibration problems is normally referred to as "Structural Resonance". This type of vibration occurs when a mechanical natural frequency of the piping system (i.e., one related to its structural properties, not the gas within it) coincides with an exciting frequency. When this happens, the vibration resulting from a given force (usually pressure pulsations) is greatly amplified, creating the potential for failure. In other words, if the discharge piping system is "tuned" into one of the compressor's excitation frequencies (normally a multiple of the operating speed) excessive discharge line movement can occur with resulting piping ruptures possible.

While the new muffler design performs the same function as the present design, there are several changes in dimensions and weight which may affect the vibration characteristics of the muffler and discharge line assembly. The substitution of the new muffler will definitely cause a change in the natural frequency of the new discharge line assembly and it appears that in at least a small percentage of cases, this change has resulted in matching one of the compressor's excitation frequencies.

In most cases we do not expect any unusual vibration problems to occur. We do suggest, though, that several of the first installations of the new muffler in your new discharge line assembly be checked to ensure this muffler substitution has not resulted in vibration problems. If excessive vibration does occur several suggested changes are:

1. Support the muffler and discharge line assembly with sturdy clamps or brackets. To be effective, it is important that the clamps or brackets must be stiffest in the direction of maximum motion of the vibration.

2. Relocate the muffler. Typically, moving the muffler close to the compressor helps maximize the stiffness of the discharge line assembly. Even this though, is a trial and error process. Check to insure this is an improvement.
3. Add mass to the muffler or discharge line assembly to lower its natural frequency. Note that in some cases there is the danger of lowering it into another critical frequency region; so overkill should be avoided.

Hopefully, no additional vibration problems will be experienced. But, if any are, the above suggestions should be useful in helping eliminate the problem.