Line Silencer

APF-LSI

APADANA PETRO FARAYAND

Knowledge is our difference

The Apadana Petro Farayand round silencers are suitable for controlling medium- and high frequency noise in pressure regulating stations, by absorbing a significant amount of incident energy emitted by valves and fittings. Our silencers reduce low frequency noise by shifting the noise to higher frequency by flowing through the diffuser. High frequency noise is then efficiently absorbed by the acoustic packing in the tube module, resulting in a much quieter venting to atmosphere. Because Apadana's Line Silencer combines the acoustic benefits of diffusive and absorptive silencing, maximum attenuation can be achieved in a shorter silencer length.

Introduction

Recently, there has been a great deal of emphasis placed on the importance of noise control; not only for human comfort but also for protection against the possibility of permanent ear damage due to high sound levels. Probably the best-known problem areas are regulating stations with capacities higher than 20,000 m3/hr, discharge areas of safety relief valves, blow down stations and venting valves of pressure vessels. Control valves, or pressure regulating valves often generate high levels of noise that can be a danger to nearby workers, or disturb nearby residences. The noise levels at these valves will usually be at its worst when there is a high flow rate and a high-pressure ratio across the valve. Noise levels from control and pressure regulating valves will typically be between 90 to 100 dB(A) at 1 metre from the valve, but at their very worst they may reach 115 dB(A). There are many ways to solve this problem, from expensive quiet trims for the valves, to splitting the flow into multiple streams. Apadana Petro Farayand answer to this problem is to provide a purpose built in-line silencer that will attenuate the noise emitted by the control valve or regulator and prevent it from entering the downstream line to be re-radiated. Sound may be radiated directly from the piping at the source of vibration. In addition, such vibration may be transmitted mechanically throughout a building and often radiated acoustically in a number of ways. These usual paths are as follows:

- Floor and walls
- Piping
- Air transmission

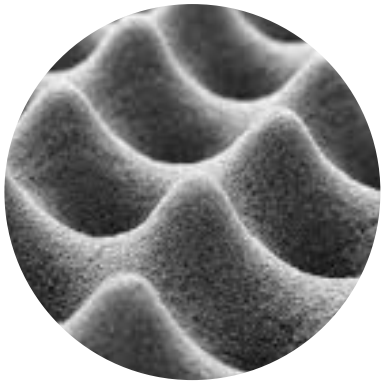
Sound absorbing materials

Sound absorbing materials are designed to reduce the reverberant sound build-up within an enclosure containing a sound source. Such materials are not intended as a surefire remedy for all sound reduction problems, although attempts have been made to use them as such. Frequently they are used as wrappings for noise source. More often than not, the results of such sound proofing attempts are discouraging, and the reason lies not in faulty materials, but in faulty application. The mechanism of absorption within a material is usually a combination of acoustical and material damping. In this capacity, porous elements made up of fibrous materials with a multiplicity of small air pockets have proven the most effective. The dissipation then takes two forms: a) flexing of fibers results in mechanical dissipation, and b) small pockets entrap sound and form acoustical dissipative elements. In general, this acoustical dissipation increases as the square of the frequency and inversely as the cube of the hole size; hence, small holes and high frequencies provide the best conditions for sound absorption.

Thus, to reiterate, sound absorbing materials should not be used in an attempt to prevent the passage of sound through a wall or partition. These materials may be very useful in reducing the level within an enclosure such as factory or compressor station, but they probably will not do the best job for sound isolation unless the spectrum consists only of high frequencies.

There are some factors that should be considered in the selection of materials:

- Fire resistance
- Structural strength
- Ease of construction
- Maintenance required
- Deterioration due to sun, heat, moisture, oil, etc.
- Thermal insulation
- Cost and availability



Sources of noises and causes

Contrary to the widespread assumption, the source of noise is not only caused by the flow pattern of the gas downstream of the regulating orifice, but also in part, due to the unfavorable pressure and flow condition of the gas in the system. This is to say that the main sources of noise and vibration will be encountered, above all, in the regulator orifice. At the very point, the gas flows, with critical pressure drop, at the velocity of sound, through the opening of the orifice. This leads to fluctuating compression shocks and surges in the gas stream, causing pressure fluctuations that may be cause for stimulating vibrations in the closely-spaced parts of the orifice disc or cone and seat, and eventually to the final control element. Another source of noise and vibration resides in the mixing of gas streams. It is known feature of Prandtl theory of turbulent mixture that many 'turbulence packages' of variable size are formed thereby, i.e., amounts of gas moving at a velocity differing to the velocity of the surrounding gas flow. At the moment of their impact on the wall of the final control element they are de-composed forming packages continually smaller and smaller being eventually destroyed by molecular friction. This process is initiated immediately after penetration of the gas stream into the orifice space down stream of the orifice seat of in regulators without stream deflectors in the immediate down stream pipeline. The pressure fluctuations caused by the turbulence packages are the main cause for the well-known pressure reducing noises. The frequency spectrum of this noise is spread over a wide range, the maximum is encountered in the frequency band between 1 and 8 kHz.

Hit such a without impediment decomposing stream unfavorably arranged internals, lever systems, walls, etc., this will give to further turbulence packages, contributing again to an increase of the development of noise and vibrations.

Silencer as a measure for noise abatement

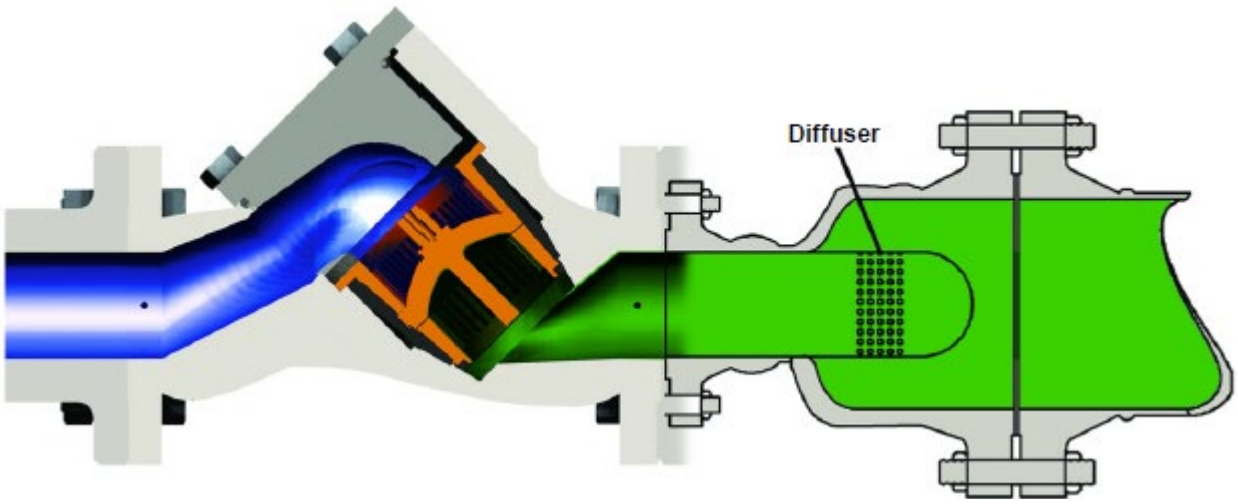
The most efficient and economic solution for this major noise problem is a silencer. Silencer are manufactured from various types of carbon steel and stainless steels. Other materials can be provided for gases with specific problems. In order to achieve optimal efficiency, the silencer should be mounted immediately at the outlet side of the regulator orifice. Connecting flanges may be provided to customer's specification.

Usage

- All natural gas regulator applications
- May be specified for new regulator applications
- Easily retrofit to existing regulator stations to eliminate noise problems
- Compact Designs available for retrofit with minimal piping alterations

Features

- Reduces noise by up to 15 dBA
- Minimal pressure drop and maximum flow capacity
- Effective over full range of flows and pressures
- Easily retrofit to existing regulators
- Inexpensive noise reduction
- Zero maintenance and long life
- Slim design available to fit between control valve outlet flange and downstream pipe flange
- Custom engineering ensures minimal pressure drop resulting in maximum flow capacity
- Durable Materials



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