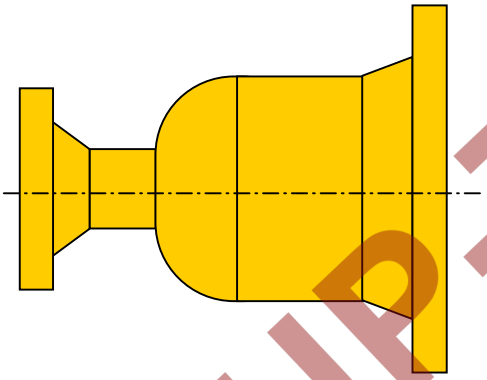
Absorption Silencer for Natural Gas

IGA

Complete Gas Measurement
and Control Systems

Introduction

Natural Gas is one of the major energy sources for industry, commerce and domestic use. This means that pressures and flow rates are rising in transmission and distribution networks. As a consequence higher noise levels are being experienced particularly at Above Ground Regulator Stations. As industrial zones and residential areas are closer together the influence of noise pollution is an increasing problem, not only on people at work but also the permanent residents of the area. Continuous noise on people at levels of high intensity soon passes the limit of tolerance and not only gives rise to operational problems but also



constitutes a serious health hazard. In extreme cases it could lead to claims for considerable sums in compensation.

The authorities are more and more empowered to control noise pollution with the result that the level of noise that is allowed is strictly limited and that the penalties for exceeding these limits are considerable. Thus noise abatment is a new and additional challenge facing industry in the field of pollution control. IGA, with many years of experience in the solution of noise problems in gas systems would be pleased to assist you in resolving your noise problems.

Sources of noise 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 unfavourable pressure and flow conditions 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 this 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 the 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 a known feature of the 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 or 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 unfavourably arranged internals, lever systems, walls, etc, this will give rise to further turbulence packages, contributing again to an increase of the development of noise and vibrations.

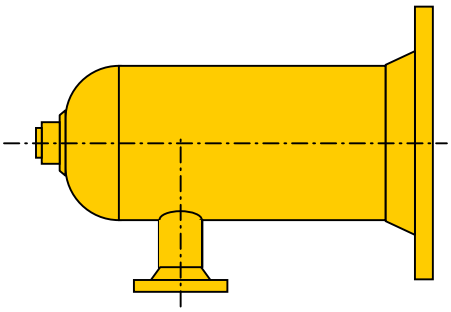


figure 1, Silencer with right angled inlet

Silencer as a measure for noise abatement

The most efficient and economic solution for these major noise problems is a silencer. Silencers 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. With the IGA Silencers generally noise reduction by 20 dB (A) can be realized. In case a more stringent reduction is needed the IGA engineers can assist you to get the optimal solution.

Construction

The silencers are, unless otherwise specified, designed and constructed to the AD specification sheets, pressure vessel code and in compliance with PED ruling. Other pressure vessel codes for the construction can be taken into account on customer specification.

Connections

Connections are provided by flanges to DIN or to ANSI. Other connections are available on request

Ordering information

When sending enquiries or ordering please state:

1. Type
2. DN inlet/DN outlet and type flanges (DN, ANSI)
3. Pressure rating (e. g. PN 40, ANSI 600)
4. Acceptance (e. g. works acceptance, TÜV, ASME-Code, etc.)
5. Outlet pressure p_a on the gas pressure regulator (bar)
6. Rate of flow Vn max (m^3/h)
7. Standard density of gas (kg/m^3) and gas analysis
8. Gas temperature at the orifice outlet t_a min (°C) and t_a max (°C)

Noise level reduction required in dB (A), when possible a drawing of the station.

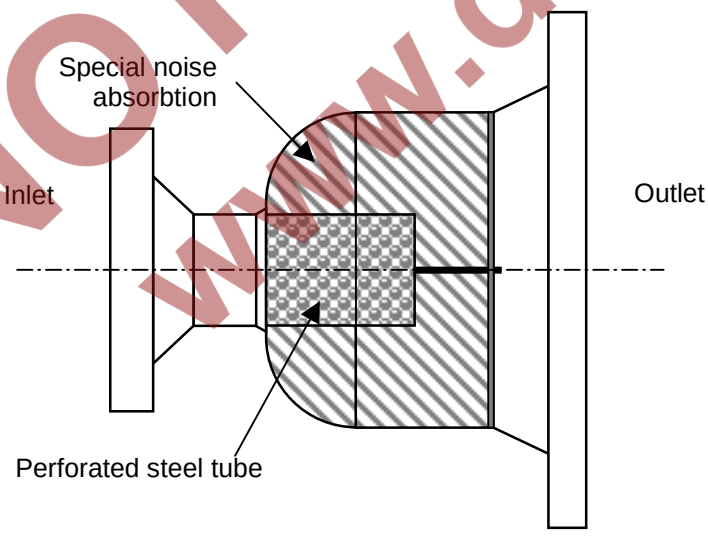


figure 2, main parts of the IGA silencer

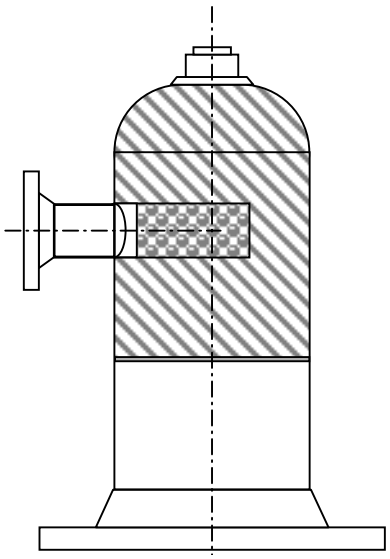
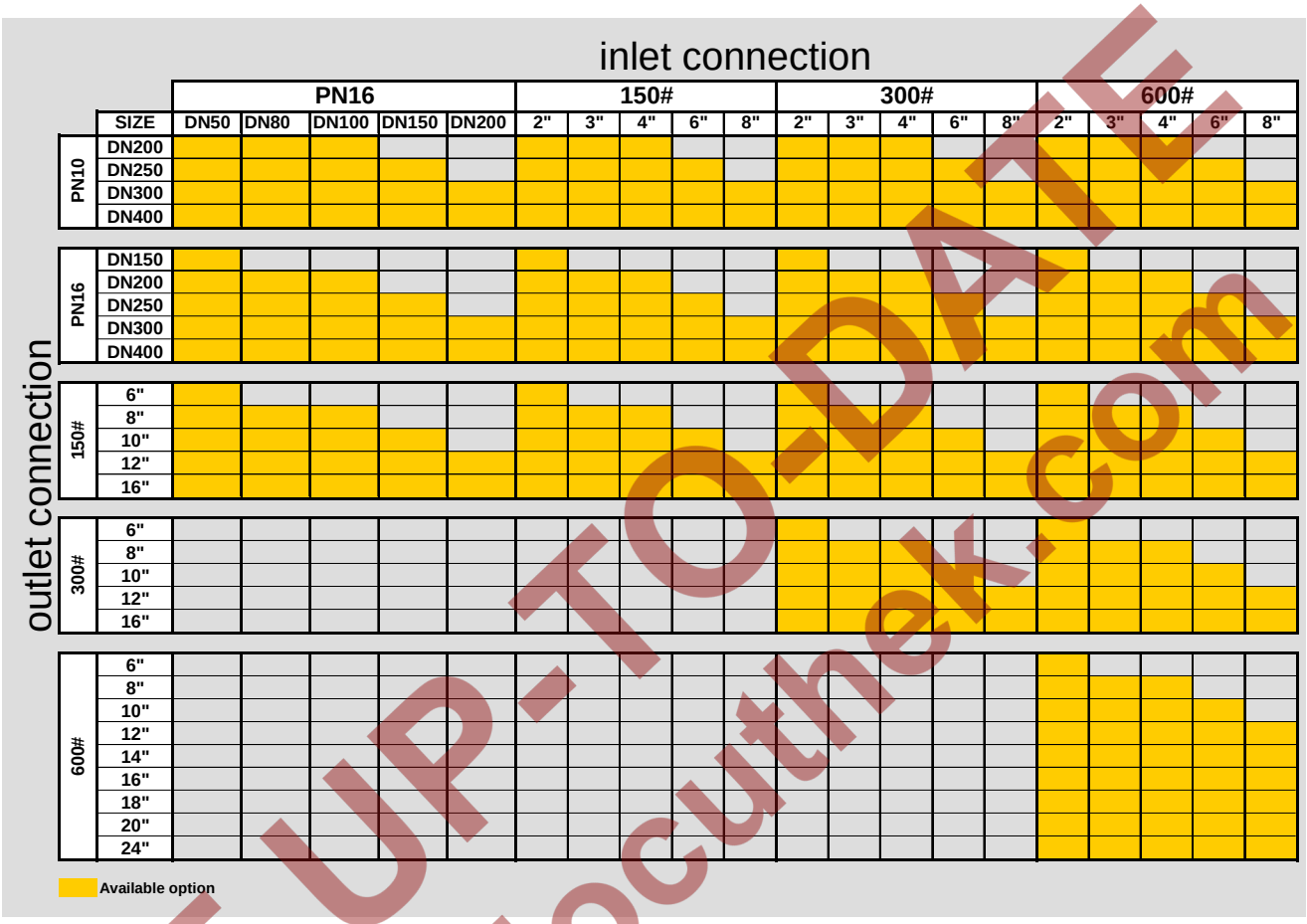


figure 3, right angled version

Available versions



Special versions, including right angled, are available on request.

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