Noise Emission

Used Symbols

Formel-zeichen *Symbols*	Benennung	*Designation*	Einheiten *Units*
L_w	Schalleistungspegel	*Sound capacity level*	dB (A)
q_m	max. möglicher Massenstrom, gerechnet mit p • 1,1 und α_d/0,9	*max. mass flow, calculated with p • 1,1 and α_d/0,9*	kg/h
p	Ansprechdruck	*Set pressure*	bar
α_d	Ausflußziffer	*Coefficient of discharge*	–
T	Temperatur	*Temperature*	K
L_A	Schalldruckpegel in r Meter Abstand	*Sound pressure level at a distance of r meters*	dB (A)
r	Radius der „gedachten Halbkugel“ als Meßabstand von der Schallquelle	*Radius of the “imaginary hemisphere“ as the measurement distance from the source of the noise*	m
A	Oberfläche der „gedachten Halbkugel“ mit dem Radius r	*Surface of the “imaginary hemisphere“ with the radius r*	m^2

The sum emission of noise in a plant is not only attributable to machinery and generators, etc., it also includes noises which can be caused by the depressurising of vapours or gases, the cavitation of liquids, as well as by flowing or discharging through valves.

Whilst the response of safety valves is not a primary issue in examining whether or not a plant or system is operating as intended, safety valves are also being assessed more and more often on the basis of the levels of noise which they emit. Safety valves discharging into the open air can cause considerable noise pollution (if only for a short period of time); the refore the potential noise level has to be evaluated.

Safety valves which discharge into closed systems can, if necessary, be fitted with a silencing insulation (important: the bonnet must not be covered! Please also refer to page 3/10...) this alone can bring about a clear reduction in the noise levels. Pipe walls can cause free-jet noise levels to drop by about 25-35 dB(A) if the safety valve and the discharge pipe mouth are detached from one another; in other words, the discharge pipe mouth will not have any effect on the valve. If greater demands are placed on silencing, a silencer shall be used.

When the noise (characterized by the sound capacity level) of a safety valve is being assessed, only the physical values (mass flow, temperature, etc.) are of any significance in the formula on which the sound capacity level is based. Specific valve characteristics, such as the shape or outlet chamber geometry of the safety valve, are currently not taken into consideration.

The sound capacity level of safety valves can be estimated, for example, on the basis of VDMA-Richtlinie 24422, VDI-Richtlinie 2713, DIN/EN 60534, part 8-4 and a host of empirically derived formulae. The results ascertained may differ, depending on the formula chosen. use the following formula to ascertain the sound capacity level of steam:

$$L_w = 17 \cdot \lg \left(\frac{q_m'}{1000}\right) + 50 \lg T - 15$$ *(refer to VDI 2713),*

the distance-dependent sound pressure level can be calculated as follows:

$$L_A = L_w - [10 \cdot \lg A]$$ *(refer to VDI 2713)*