

## Engineering Data

### Shock Wave

#### The Shock Wave Criterion

*Not only the German but also the CEN Regulations (EN...) under preparation, the international standard ISO 4126 as well as the American ASME Code state, on the one hand, that a pressure loss of 3 % of the set pressure is allowable in the inlet line and, on the other hand, that the difference between the pressure loss in the inlet line and the reseating pressure difference must amount to at least 2 % of the set pressure to safe a proper function. The lower value is valid.*

*Meanwhile, however, a discussion has started about another criterion concerning the sizing of the inlet line, that is the so-called shock wave criterion. According to that criterion, the sizing of the inlet line to the safety valve shall prevent the fluttering of the line due to occurrence of shock waves. The physical background of the shock wave criterion is the following:*

*A shock wave may occur in a system whose medium is in a stationary state, if that state is briefly disturbed. The shock wave may, for example, result from the opening and closing of safety valves and pass through the system in the form of an underpressure or overpressure wave. The shock wave could cause the safety valve to flutter under certain circumstances. In this connection, the following important parameters apply:*

- value of coefficient of discharge,
- flow diameter,
- length and diameter of the inlet line,
- safety valve operation characteristic (full lift / proportional),
- time which the safety valve requires for opening,
- fluid.

*The question concerning the opening or closing time of the safety valve is governed by a number of different parameters and is dependant on the fluid (gas or liquid) and can only be established by test. It is generally true to say that a greater safety opening speed causes a safety valve to flutter or vibrate, in comparison with that of a smaller opening speed. For some plant configurations test figures are available from Manufacturer. Extensive shock wave tests on test laboratories have shown that the hazard of fluttering due to shock waves does not exist with safety valves as long as the 3 % criterion is maintained.*