Venturi Nozzle DV 700

Application
Venturi nozzles are used as flow elements for flow measurement of aggressive and non-aggressive gases, steam and liquids.

Design
Venturi nozzles consist of a rounded inlet section, a cylindrical throat and an outlet cone. The upstream pressure tapping is usually manufactured as a single bore. The throat pressure tapping usually consists of four bore holes which lead to a ring chamber or annular ring. For some applications it is recommended to design the throat tapping as single bore.

Advantages
Compared to orifice plates, nozzles are recommended for appliances which require low pressure losses. At similar flow values nozzles need less differential pressure which results in less permanent pressure loss. The rounded inlet profile is less susceptible to erosion in comparison to the sharp edge of an orifice plate. Hence, nozzles achieve higher service life times.

Measuring Uncertainty
ca. 1.2% - 1.8% of the discharge coefficient C, depending on the use case

Pressure Loss
The pressure loss depends on the diameter ratio $\beta$ (d/D) and amounts to ca. 5 - 20% of the differential pressure.

Nominal Diameter (ISO 5167)
DN 65 to DN 500 / DN 2,5" to DN 20" (if requested other sizes are possible)

Pressure Rating
PN 6 to PN 400 / 150# to 2500# (ASME)

End Flanges
according to EN 1092-1 / ASME B16.5 / JIS- BS- or DIN-Standards / or other standards
**Flange Facing**

according to EN 1092-1:

- flat (form B1 and B2)
- groove (form D)
- female (form E)

according to ASME B16.5:

- flat (RF and SF)
- groove (small/large)
- female (small/large)
- RTJ female

or according to other flange standards specified by the customer.

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**Installation Length „L“**

The installation length depends on the diameter ratio $\beta$ which needs to be calculated based on the respective process conditions. The following table presents an overview of typical installation lengths for an average diameter ratio.

<table>
<thead>
<tr>
<th>Nominal Diameter DN</th>
<th>Installation length [mm] (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>230</td>
</tr>
<tr>
<td>80</td>
<td>250</td>
</tr>
<tr>
<td>100</td>
<td>280</td>
</tr>
<tr>
<td>125</td>
<td>320</td>
</tr>
<tr>
<td>150</td>
<td>350</td>
</tr>
<tr>
<td>200</td>
<td>410</td>
</tr>
<tr>
<td>250</td>
<td>490</td>
</tr>
<tr>
<td>300</td>
<td>560</td>
</tr>
</tbody>
</table>

(*) diameter ratio $\beta=0.6$

incl. flanges with pressure rating: PN 16 (EN 1092-1)
Bore Diameter "d"
The calculation of the bore diameter is based on the supplied process data. All relevant standards and regulations will be considered. The calculation is part of the scope of supply.

Pressure Taps
Pressure taps will be designed according to customer requirements. Typical tap designs are:

- plain ends for fittings
- butt weld ends
- threaded ends
- flanged ends

The typical tapping length is ca. 100 mm.

Marking
Tag no. of flow element
Pressure rating "PN"
Pipe inner diameter "D"
Bore diameter "d"
Material, direction of flow and tagging of pressure tappings with "+" and "+" 

Materials
The following table shows a selection of typical materials utilized for nozzles. The material is chosen based on process medium, pressure and temperature.

<table>
<thead>
<tr>
<th>Material venturi nozzle</th>
<th>short name</th>
<th>DIN material no.</th>
<th>ASTM / UNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-alloy steels</td>
<td>P250 GH</td>
<td>1.0460</td>
<td>~ A105</td>
</tr>
<tr>
<td></td>
<td>A105</td>
<td>~1.0432</td>
<td>A105</td>
</tr>
<tr>
<td>heat resistant/alloyed steels</td>
<td>16Mo3</td>
<td>1.5415</td>
<td>A182 Gr. F1</td>
</tr>
<tr>
<td>stainless steels</td>
<td>X2CrNiMo17-12-2</td>
<td>1.4404</td>
<td>A182 Gr. 316L</td>
</tr>
<tr>
<td></td>
<td>X6CrNiMoTi 17 12 2</td>
<td>1.4571</td>
<td>A182 Gr. 316Ti</td>
</tr>
<tr>
<td>high corrosion-resistant alloys</td>
<td>Hastelloy C276</td>
<td>2.4819</td>
<td>N 10276</td>
</tr>
<tr>
<td></td>
<td>Monel 400</td>
<td>2.4360</td>
<td>N 04400</td>
</tr>
<tr>
<td>plastics</td>
<td>Polyvinylcloride</td>
<td>PVC</td>
<td>Polyvinylcloride</td>
</tr>
<tr>
<td></td>
<td>Polyethylene</td>
<td>PE</td>
<td>Polyethylene</td>
</tr>
<tr>
<td></td>
<td>PVDF (GRP 25%)</td>
<td>PVDF</td>
<td>PVDF</td>
</tr>
</tbody>
</table>
Installation

For mounting between flanges according to EN 1092-1 / ASME B 16.5 or other standard such as DIN, JIS or BS. The pipe may be positioned horizontally, vertically or sloped.

Quality Control

Manufacture and Test work is done according to the relevant codes and standards such as AD 2000, EN 13480, ASME Codes (without stamp) or customer specifications. Inspection certificates according to EN 10204 3.1 and 3.2. may be furnished. Special inspections are also possible.

Accessories

Pipe flanges, bolts/nuts, gaskets for installation, tap valves, condensate pots, manifolds, mounting accessories may be offered for additional charges.