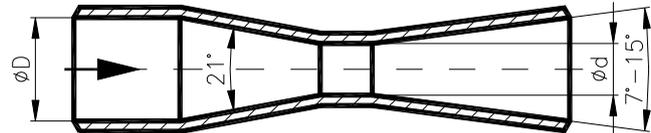


Venturi Tubes H 800

Application

Venturi tubes are used as flow elements for flow measurement of aggressive and non-aggressive gases, steam and liquids where a very low pressure loss is required.



Design

Venturi tubes consist of a cylindrical inlet and an inlet cone followed by a cylindrical throat and an outlet cone. There are three types of venturi tubes which are being differentiated by their inner surface contour:

- Venturi tubes with an as cast convergent section
- Venturi tubes with a machined convergent section
- Venturi tubes with a rough-welded sheet-iron convergent section

Generally, the pressure tapings are designed with 4 bore holes which connect to a ring chamber or an annular ring. For some applications, however, it is recommended to design them with single bore pressure tapings. In special cases, venturi canals with a rectangular cross-section may be furnished, which are being manufactured from sheet-iron and which are not part of the calculation standard.

Advantages

Due to their design, venturi tubes generate very low pressure losses. In comparison to orifice plates and nozzles, they only need short inlet straight pipe sections. Venturi tubes with an as acast convergent section offer the lowest uncertainty of all venturi tube designs, which results from the special processing of the inner edges in between the different sections (edge radius).

Measuring Uncertainty

ca. 0,7% - 3% of the discharge coefficient C, depending on the use case

Pressure Loss

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

Nominal Diameter (ISO 5167)

Venturi tubes with a machined convergent section

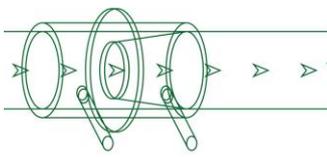
DN 50 to DN 250 (DN 2" to DN 10")

Venturi tubes with a rough-welded sheet-iron convergent section

DN 200 to DN 1200 (DN 8" to DN 48")

Venturi tubes with an as cast convergent section

DN 100 to DN 800 (DN 4" to DN 32")



Pressure Rating

up to PN 400 / up to 2500# (ASME)

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. In general, the throat section will be machined to achieve the required surface roughness and curvature.

Pressure Taps

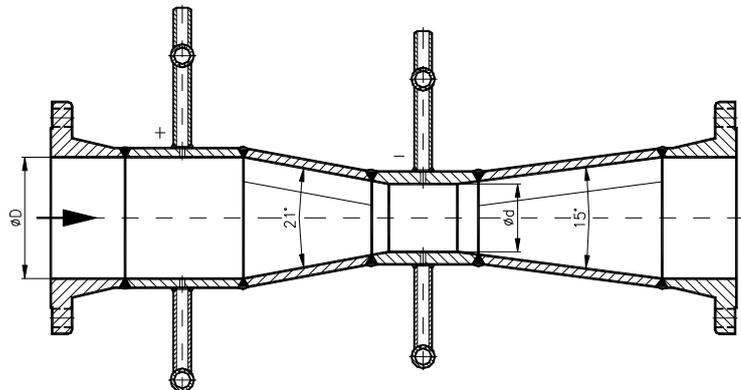
Pressure taps will be designed according to customer requirements. Typical tap designs are:

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

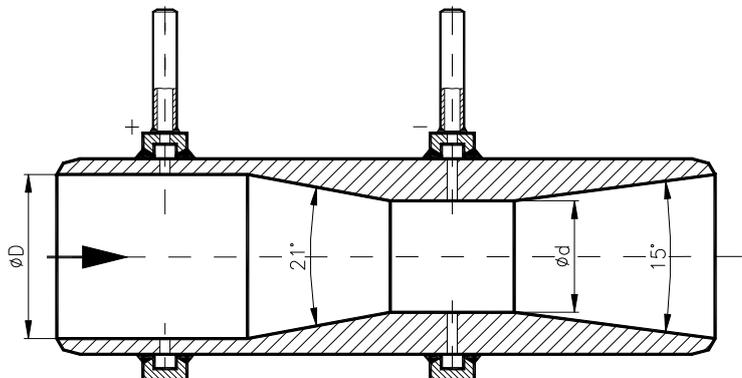
The typical tapping length is ca. 100 mm.

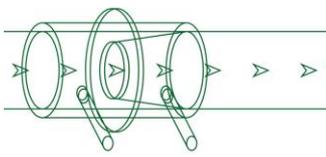
Example Designs

mountable between flanges; with a rough-welded sheet-iron convergent section; 4 pressure bore holes with an annular ring



to be welded into the pipe; with a machined convergent section; 4 pressure bore holes with a ring chamber





Installation Lengths

Due to the fixed inlet and outlet angles, the installation length depends on the diameter ratio β which needs to be calculated based on the respective process conditions. The following table presents an overview of typical installation lengths (in mm) for an average diameter ratio β (d/D) of ca. 0,6.

DN	50/2"	100/4"	200/8"	300/12"	400/16"	500/20"	600/24"	700/28"	800/32"	900/36"	1000/40"
weld-in	250	500	950	1400	1900	2400	2800	3300	3800	4250	4700
flanged	350	550	1050	1550	2050	2600	3000	3500	4000	4500	5000

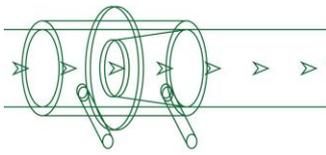
Marking

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

Materials

The following table shows a selection of typical materials utilized for venturi tubes. The material is chosen based on process medium, pressure and temperature. The pressure tapplings are manufactured from the equivalent pipe material.

Material venturi tube	short name	DIN material no.	ASTM / UNS
non-alloy steels	P250 GH (C22.8)	1.0460	~ A105
	P265 GH	1.0425	-
	A105	~1.0432	A105
	A516 Gr.60	~1.0426	A516 Gr.60
	A516 Gr.70	~1.0473	A516 Gr.70
heat resistant/alloved steels	16Mo3	1.5415	-
	13CrMo45	1.7335	A182 Gr. F11/F12
	10CrMo910	1.7380	A182 Gr. F22
	15 NiCuMoNb 5	1.6368	-
	X10CrNiMoNb91	1.4903	A182 Gr. F91
stainless steels	X2CrNiMo17-12-2	1.4404	316L
	X6CrNiMoTi 17 12 2	1.4571	316Ti
high corrosion-resistant alloys	Hastelloy C276	2.4819	N 10276
	Monel 400	2.4360	N 04400



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. Weld-in connection also possible.

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, calibration may be offered for additional charges.