



Primary Flow Element	Orifice plate	Orifice plate metering run	ISA 1932 Nozzle	(High—Low) Long Radius Nozzle	Venturi Nozzle	Venturi Tube As cast	Venturi Tube Machined	Venturi Tube Welded sheet	Averaging Pitot Tube
<u>Example</u>									
<u>Design Standards</u>	ISO 5167—Part 2, ASME MFC-3M, ISA RP 3.2	ISO 5167—part 2, ASME, BS 1042, DIN 19205	ISO 5167-part 3, DIN 19215	ISO 5167-part 3, DIN 19215 ASME MFC-3M	ISO 5167-part 3, DIN 19215	ISO 5167-part 4 ASME MFC-3M	ISO 5167-part 4 ASME MFC-3M	ISO 5167-part 4 ASME MFC-3M	No ISO standard applicable
<u>Sizes</u>	50 mm < D < 1000 mm 2" < D < 40"	DN 10 < D < DN 100 3/8" < D < 4"	50 mm < D < 500 mm 2" < D < 20"	50 mm < D < 630 mm 2" < D < 25"	65 mm < D < 500 mm 2,5" < D < 20"	100 mm < D < 800 mm 4" < D < 32"	50 mm < D < 250 mm 2" < D < 10"	200 mm < D < 1200 mm 8" < D < 47"	50 mm < D < 8000 mm 2" < D < 315"
<u>Beta Value (d/D)</u>	0,2 < β < 0,75	0,2 < β < 0,75	0,3 < β < 0,80	0,2 < β < 0,80	0,316 < β < 0,775	0,3 < β < 0,75	0,4 < β < 0,75	0,4 < β < 0,70	
<u>Pressure Rating</u>	PN10—400 300—2500 lbs	PN 10—400 150—2500 lbs	PN 10—400 150—2500 lbs	PN 10—400 150—2500 lbs	PN 10—640 150—2500 lbs	PN 10—640 150—2500 lbs	PN 10—640 150—2500 lbs	PN 10—100 150—2500 lbs	PN 16—400 150—2500 lbs
<u>Material</u>	AISI 316, Monel, 6Mo others on request	AISI 316, others on request	CS P250GH, AISI 316, 16Mo3, 13CrMo4-5, 10CrMo9-10, X20CrMoV121, F91, F92	AISI 316	CS P250GH, AISI 316, 16Mo3, 13CrMo4-5, 10CrMo9-10, X20CrMoV121, F91, F92	CS, AISI 316	CS, AISI 316, Duplex, 254 SMO	CS, AISI 316	SS, CrMo, Hast C, Inconel, Monel, Titanium, PVDF
<u>Mounting Style</u>	Between raised face flanges acc to ANSI B16.36 of DIN 19214	Flanges acc. DIN 2526, 2513 or 2512 RF of RTJ acc to ASME B 16.5	Weld ends acc EN 9692-1 or ANSI B16.25 Flange connection acc. DIN or ANSI	Between flanges acc to ANSI B16.5, weld ends	Weld ends acc EN 9692-1 or ANSI B16.25 Flange connection acc. DIN or ANSI	Weld ends acc EN 9692-1 or ANSI B16.25 Flange connection acc. DIN or ANSI Grayloc Clamp connection	Weld ends acc EN 9692-1 or ANSI B16.25 Flange connection acc. DIN or ANSI Grayloc Clamp connection	Weld ends acc EN 9692-1 or ANSI B16.25 Flange connection acc. DIN or ANSI Grayloc Clamp connection	Flange according to pressure rating
<u>Tappings</u>	Single pressure tappings	Single pressure tappings Carrier rings	Single pressure tappings Carrier rings	Included in pipe work	Single pressure tappings External annular rings	Single pressure tappings External annular rings	Single pressure tappings External annular rings	Single pressure tappings External annular rings	
<b>Technical Data</b>									
<u>Accuracy</u>	(0,7-β) % for 0,1<β<0,2 0,5 % for 0,2<β<0,6 (1,667xβ-0,5) % for 0,6<β<0,75	0,5 %	0,8 % (β < 0,6) (2xβ-0,4)% (β > 0,6)	2%	(1,2 + 1,5 x β <sup>4</sup> ) %	0,7 %	1,0 %	1,5 %	1,0 %
<u>Pressure loss</u>	Ca. 60% of diff. Pressure measured	Ca. 60% of diff. Pressure measured	Ca. 60% of diff. Pressure measured	Ca. 60% of diff. Pressure measured	Ca. 15 % of diff. pressure measured	Ca 10-15 % of diff pressure measured	Ca 10-15 % of diff pressure measured	Ca 10-15 % of diff pressure measured	Ca 5 mbar
<u>Limits for Reynolds No.</u>	Re > 1260 x β <sup>2</sup> x D	Re > 1260 x β <sup>2</sup> x D	7x10 <sup>4</sup> ≤ Re(D) ≤ 1x10 <sup>7</sup> (0,3≤ β≤ 0,44) 2x10 <sup>4</sup> ≤ Re(D) ≤ 1x10 <sup>7</sup> (0,44≤ β≤ 0,80)	1x10 <sup>4</sup> ≤ Re(D) ≤ 1x10 <sup>7</sup>	1,5x10 <sup>5</sup> ≤ Re(D) ≤ 2x10 <sup>6</sup>	2x10 <sup>5</sup> ≤ Re(D) ≤ 2x10 <sup>6</sup>	2x10 <sup>5</sup> ≤ Re(D) ≤ 1x10 <sup>6</sup>	2x10 <sup>5</sup> ≤ Re(D) ≤ 2x10 <sup>6</sup>	1x10 <sup>5</sup> ≤ Re(D) ≤ 2x10 <sup>6</sup>



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<u>Example</u>									

Installation Requirements : straight runs before / after Measurement

<u>Single 90° bend</u>	22 x ID ( $\beta=0,5$ ) 42 x ID ( $\beta=0,6$ )	22 x ID ( $\beta=0,5$ ) 42 x ID ( $\beta=0,6$ )	10 x ID ( $\beta=0,3$ ) 14 x ID ( $\beta=0,5$ ) 18 x ID ( $\beta=0,6$ )	10 x ID ( $\beta=0,3$ ) 14 x ID ( $\beta=0,5$ ) 18 x ID ( $\beta=0,6$ )	10 x ID ( $\beta=0,3$ ) 14 x ID ( $\beta=0,5$ ) 18 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 9 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 9 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 9 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	9 x D
<u>Two 90° bends</u>	22 x ID ( $\beta=0,5$ ) 42 x ID ( $\beta=0,6$ )	22 x ID ( $\beta=0,5$ ) 42 x ID ( $\beta=0,6$ )	16-34 x ID ( $\beta=0,3$ ) 20-40 x ID ( $\beta=0,5$ ) 26-48 x ID ( $\beta=0,6$ )	16-34 x ID ( $\beta=0,3$ ) 20-40 x ID ( $\beta=0,5$ ) 26-48 x ID ( $\beta=0,6$ )	16-34 x ID ( $\beta=0,3$ ) 20-40 x ID ( $\beta=0,5$ ) 26-48 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 10 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 10 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,3$ ) 10 x ID ( $\beta=0,5$ ) 10 x ID ( $\beta=0,6$ )	14 x D
<u>Reducer</u>	8 x ID ( $\beta=0,5$ ) 9 x ID ( $\beta=0,6$ )	8 x ID ( $\beta=0,5$ ) 9 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 9 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 9 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 9 x ID ( $\beta=0,6$ )	4 x ID ( $\beta=0,3$ ) 4 x ID ( $\beta=0,5$ ) 4 x ID ( $\beta=0,6$ )	4 x ID ( $\beta=0,3$ ) 4 x ID ( $\beta=0,5$ ) 4 x ID ( $\beta=0,6$ )	4 x ID ( $\beta=0,3$ ) 4 x ID ( $\beta=0,5$ ) 4 x ID ( $\beta=0,6$ )	
<u>Thermometer Pocket</u>	5 x ID ( $\beta=0,5$ ) 5 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,5$ ) 5 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 5 x ID ( $\beta=0,5$ ) 5 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 5 x ID ( $\beta=0,5$ ) 5 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 5 x ID ( $\beta=0,5$ ) 5 x ID ( $\beta=0,6$ )				
<u>Downstream</u>	6 x ID ( $\beta=0,5$ ) 7 x ID ( $\beta=0,6$ )	6 x ID ( $\beta=0,5$ ) 7 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 7 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 7 x ID ( $\beta=0,6$ )	5 x ID ( $\beta=0,3$ ) 6 x ID ( $\beta=0,5$ ) 7 x ID ( $\beta=0,6$ )	4 x throat D	4 x throat D	4 x throat D	3 x D

Pipe Information

<u>Roughness pipe</u>	see ISO 5167-part 2 Depending on $\beta$ value and $Re(D)$ (applicable 10 D upstream)	see ISO 5167-part 2 Depending on $\beta$ value and $Re(D)$ (applicable 10 D upstream)	see ISO 5167-part 3 Depending on $\beta$ value (applicable 10 D upstream) Ex. $\beta=0,6 \rightarrow Ra/D \leq 1,4 \times 10^{-4}$	see ISO 5167-part 3 (applicable 10 D upstream) $Ra/D \leq 3,2 \times 10^{-4}$	see ISO 5167-part 3 Depending on $\beta$ value (applicable 10 D upstream) Ex. $\beta=0,6 \rightarrow Ra/D \leq 1,4 \times 10^{-4}$	see ISO 5167-part 4 (applicable 2 D upstream) $Ra/D \leq 3,2 \times 10^{-4}$	see ISO 5167-part 4 (applicable 2 D upstream) $Ra/D \leq 3,2 \times 10^{-4}$	see ISO 5167-part 4 (applicable 2 D upstream) $Ra/D \leq 3,2 \times 10^{-4}$	No Info
<u>Circularity of the pipe</u> <u>Cylindricality of the pipe</u> <u>UPSTREAM</u>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 0.3 % of D</li> <li>Between 2xD and 10xD upstream = better than 0.3 % of D</li> <li>Further then 10 D = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 2 % of D</li> </ul>	<ul style="list-style-type: none"> <li>2xD upstream = better than 2 % of D</li> </ul>	No Info
<u>Circularity of the pipe</u> <u>Cylindricality of the pipe</u> <u>DOWNTREAM</u>	Over at least 2 D = better than 3 % of D	Over at least 2 D = better than 3 % of D	Over at least 2 D = better than 3 % of D	Over at least 2 D = better than 3 % of D	Over at least 2 D = better than 3 % of D	NA	NA	NA	No Info