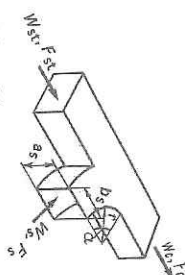


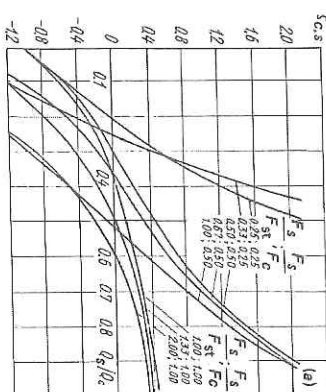
Diagram
7-11
$$\xi_{Cs} = \frac{\Delta p_s}{\rho w_c^2/2} = a_1 \left(\frac{Q_s}{Q_c} \right)^2 + b_1 \frac{Q_s}{Q_c} + c_1$$

see graph a; for a_1 , b_1 , and c_1 , see the table

$$\xi_s = \frac{\Delta p_s}{\rho v_s^2/2} = \frac{\xi_{c,s}}{(Q_s F_c / Q_c F_s)^2}$$

Values of $\xi_{c,s}$

T_e, T_s		Q_0/Q_c								
F	F_c	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.25 (0.25)	-0.50	0	0.50	1.20	2.20	3.70	5.80	8.40	11.40	
0.33 (0.33)	-1.20	-0.40	0.40	1.25	3.00	4.80	6.80	8.90	11.00	
0.50 (0.50)	-0.50	-0.20	0	0.95	0.55	-0.70	1.00	1.50	2.00	
0.67 (0.50)	-1.00	-0.80	-0.50	0.10	0.30	0.60	1.00	1.45	2.00	
1.00 (0.50)	-2.15	-1.80	-0.95	-0.50	0	0.40	0.80	1.30	1.90	
1.30 (1.00)	-1.20	-1.30	-1.00	-0.24	0.13	0.29	0.29	0.36	0.42	
1.50 (1.00)	-1.00	-0.80	-0.60	0	0	0.16	0.24	0.32	0.38	
2.00 (1.00)	-2.10	-1.40	-0.90	-0.50	-0.20	0	0.20	0.25	0.30	



Straight passage

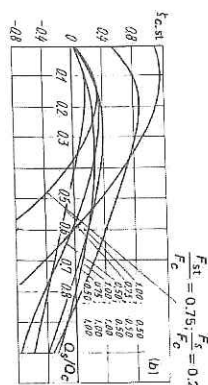
$$\xi_{\text{cst}} = \frac{\Delta p}{\rho v_c^2/2} = a_2 \left(\frac{Q_s}{Q_c} \right)^2 + b_2 \frac{Q_s}{Q_c} + c_2$$

See graph b; for a_2 , b_2 , and c_2 , see the table

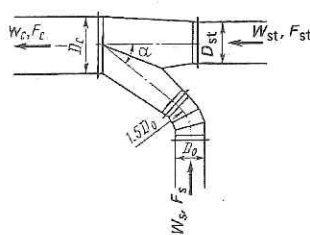
$$\xi_{st} = \frac{\Delta p_{st}}{\rho w_{st}^2/2} = \frac{\gamma_{c,st}}{(1 - Q_s/Q_c)^2 (F_c/F_{st})^2}$$

Values of Σc_i at

$\frac{F_{st}}{F_c}$		Q_{st}/Q_c								
F_c	F_{st}	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.75	0.30	0.30	0.20	-0.10	-0.45	-0.92	-1.45	-2.00	-2.60	
1.00	0.50	0.17	0.16	0.10	-0.08	-0.18	-0.27	-0.37	-0.46	
0.75	0.50	0.27	0.35	0.32	0.25	0.12	-0.03	-0.42	-0.58	
0.50	0.50	1.15	1.10	0.90	0.65	0.35	0	-0.80	-1.30	
1.00	1.00	0.18	0.24	0.27	0.26	0.25	0.18	0	-0.10	
0.75	1.00	0.75	0.36	0.38	0.35	0.27	0.18	0.05	-0.08	
0.50	1.00	0.80	0.87	0.80	0.68	0.40	0.25	0.08	-0.10	



	F_{ST}/F_{ST}	F_{ST}/F_C	a_1	b_1	c_1	a_2	b_2	c_2
0.25	1.00	0.25	19.82	-5.27	-0.03	-4.38	0.65	0.33
0.33	0.75	0.25	1.93	-1.76	-0.45	-0.59	0.22	0.22
0.50	0.50	0.25	1.98	-1.02	-0.58	-1.70	0.37	0.22
0.50	1.00	0.50	1.96	1.66	-1.05	-0.68	0.42	1.21
0.57	0.75	0.50	-0.63	5.65	-2.65	-1.27	0.88	0.11
1.00	1.00	1.00	-1.55	2.68	-0.60	0.16	-1.30	0.85
1.33	0.75	1.00	-1.64	4.54	-1.90	-0.68	-0.42	1.12
2.00	0.50	1.00	-4.34	-7.41	-2.77			

Diagram
7-12

Side branch with $\bar{f}_{st} = \frac{F_{st}}{F_c} \geq 0.5$;

$$\xi_{c,s} = \frac{\Delta p_s}{\rho w_c^2 / 2} = x_s - \frac{0.1}{x_s} - 0.3 + \beta_s$$

$$\text{where } x_s = c_s \left(\frac{1}{\bar{f}_s} \right)^{(c_s - 0.2)/(c_s^{1.2} + 0.5)} \left(\frac{0.25}{\bar{f}_s + 0.006/\bar{f}_s} \right)^{(c_s - \bar{f}_s - 0.3)/(c_s^{0.5} + 2.2\bar{f}_s)}$$

$$c_s = \left(\frac{w_s}{w_c}\right)^2 \quad \bar{f}_{st} = \left(\frac{Q_s F_c}{Q_c F_s}\right)^2 \frac{F_{st}}{F_c} \quad \bar{f}_s = \frac{F_s}{F_c} \quad \beta_s = \left(\frac{Q_s F_c}{Q_c F_s}\right)^2 \{0.95 \exp[-15(\bar{f}_s - 0.38)^2] - 0.5\}$$

Straight passage with $c_{st} \bar{f}_{st} = \left(\frac{Q_{st}}{Q_c} \right)^2 \frac{\bar{f}_s}{\bar{f}_{st}} \leq 0.5$:

$$\xi_{c,st} = \frac{\Delta p_{st}}{\rho w_c^2/2} = \frac{0.4x_s^{0.5} - 0.13}{x_{st}^{0.5} \int_{x_{st}}^{x_s} (x_{st} - 0.02)/(x_{st}^3 - 0.11)} - \beta_{st}$$

where

$$x_{st} = c_{st} \bar{f}_{st} \left(\frac{0.5}{\bar{f}_s} \right)^{(c_{st} \bar{f}_{st} - 0.12) / (c_{st} \bar{f}_{st} + 0.12)} \quad \beta_{st} = \frac{1 - \bar{f}_{st}}{1 + 10 \bar{f}_{st}^5} \quad \xi_s = \frac{\Delta p_s}{\rho w_s^2 / 2} = \frac{\xi_{c,s}}{(Q_s Q_c / F_c F_s)^2}$$

$$\zeta_{st} = \frac{\Delta p_{st}}{\rho w_{st}^2 / 2} = \frac{\zeta_{c,st}}{(1 - Q_d/Q_c)^2 (F_c/F_{st})^2}$$