

C Accuracy and Reliability

Summary of Calibration Data

Nominal Inlet Diameter	Beta Ratio	Flow Calibration Facility	Standard HVT Discharge Coefficient	Inlet Tap Factor	Actual Discharge Coefficient	Flow Calibrated Discharge Coefficient	Discharge Coefficient	Deviation	n
2.00	0.4822	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9888	-0.12%	1	
2.00	0.5018	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9919	+0.19%	2	
6.00	0.3142	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9935	+0.35%	3	
6.00	0.4730	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	0.9884	0.9785	0.9748	-0.38%	4	
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9906	+0.06%	5	
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9899	-0.01%	6	
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9814	0.9716	0.9728	+0.12%	7	
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9814	0.9716	0.9720	+0.04%	8	
10.00	0.3601	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9868	-0.32%	9	
10.00	0.4738	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9907	0.9808	0.9827	+0.19%	10	
10.00	0.7059	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9912	+0.12%	11	
10.00	0.7060	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9907	+0.07%	12	
10.00	0.7060	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9917	+0.17%	13	
10.00	0.7507	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9452	0.9357	0.9365	+0.08%	14	
10.00	0.7507	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9452	0.9357	0.9362	+0.05%	15	
10.00	0.7555	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9432	0.9338	0.9364	+0.28%	16	
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9934	+0.34%	17	
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9779	0.9681	0.9716	+0.36%	18	
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9865	-0.35%	19	
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9916	0.9817	0.9805	-0.12%	20	
20.00	0.6307	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9922	+0.22%	21	
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9899	-0.01%	22	
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	0.9897	0.9798	0.9790	-0.08%	23	
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9923	+0.23%	24	
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9874	-0.26%	25	
24.00	0.5263	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9909	+0.09%	26	
24.00	0.5378	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9832	0.9734	0.9755	+0.22%	27	
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9898	-0.02%	28	
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9902	0.9803	0.9812	+0.09%	29	
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9891	-0.09%	30	
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9812	+0.11%	31	
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9897	-0.03%	32	
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9798	-0.03%	33	
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9867	-0.33%	34	
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	0.9836	0.9738	0.9721	-0.17%	35	
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9895	-0.05%	36	
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	0.9894	0.9795	0.9778	-0.17%	37	
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9894	-0.06%	38	
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	0.9893	0.9794	0.9829	+0.36%	39	

Reynolds Number Range: 60 000 to 4 300 000

- σ = Standard Deviation = $\pm \sqrt{\frac{\sum \Delta C^2}{n - 1}}$ = $\pm 0.202\%$ of C
- R = Reproducibility of C for a New Meter = 2σ = $\pm 0.404\%$ of C
- P = C Precision = $\pm \frac{t \times \sigma}{\sqrt{n}}$ = $\pm 0.065\%$ of C
 $t = 2.02$ = Student's t for 95% confidence level for 38 (n - 1) degrees of freedom
- A_B = Bench Calibrated C Accuracy = $\pm \sqrt{P^2 + R^2}$ = $\pm 0.41\%$ of C

Certified by:



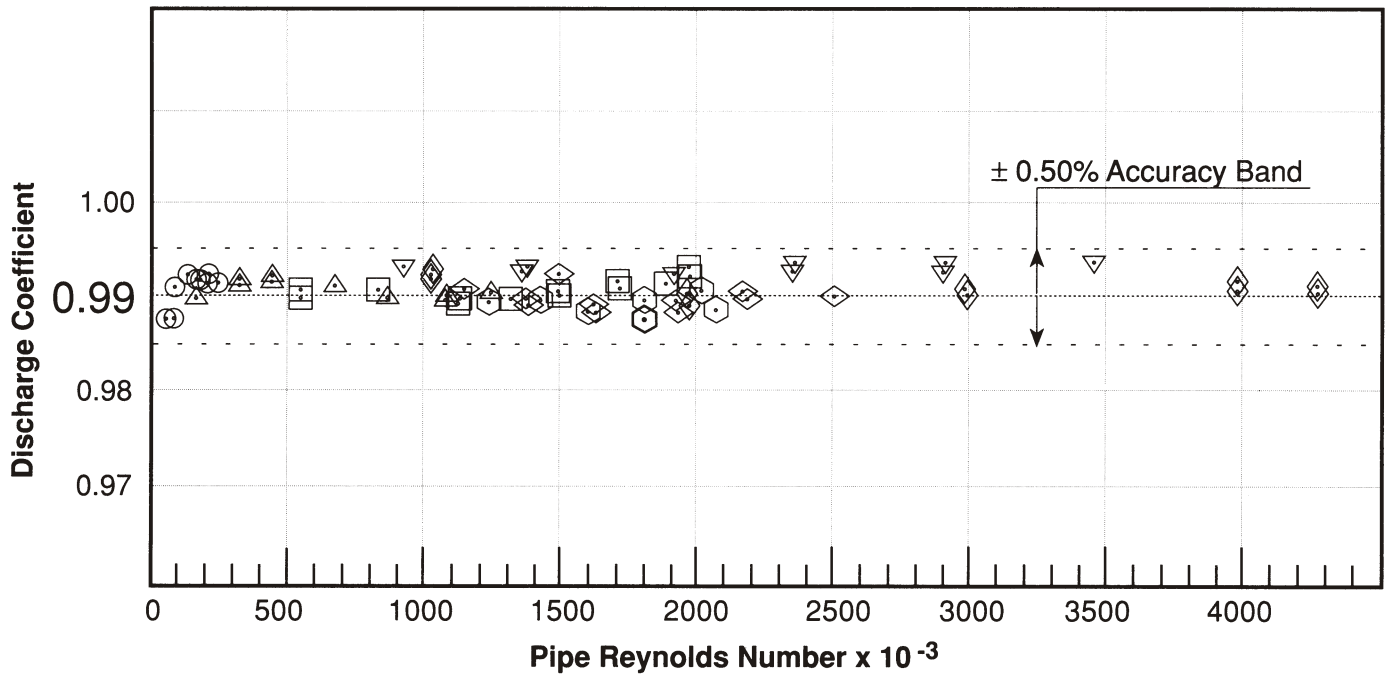
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Section E
C Accuracy and Reliability

HVT Discharge Coefficient
Pipe Reynolds Number Behavior



- ⊙ 2" HVT-FV $\beta = 0.5018$ 10 000 lb Facility, 47°
- △ 6" HVT-FV $\beta = 0.5999$ 50 000 lb Facility, 79°
- ◇ 10" HVT-CI $\beta = 0.7060$ 100 000 lb Facility, 98°
- ▽ 12" HVT-PS $\beta = 0.5875$ 100 000 lb Facility, 93°
- 24" HVT-CI $\beta = 0.5263$ Master Facility, 72°
- ◇ 30" HVT-CI $\beta = 0.5184$ 100 000 lb Facility, 80°
- ⬡ 48" HVT-CI $\beta = 0.5271$ Master Facility, 70°

Note:
Flow calibrations were performed at Alden Research Laboratory, Inc.,
Holden, Massachusetts in the flow calibration facilities shown.