



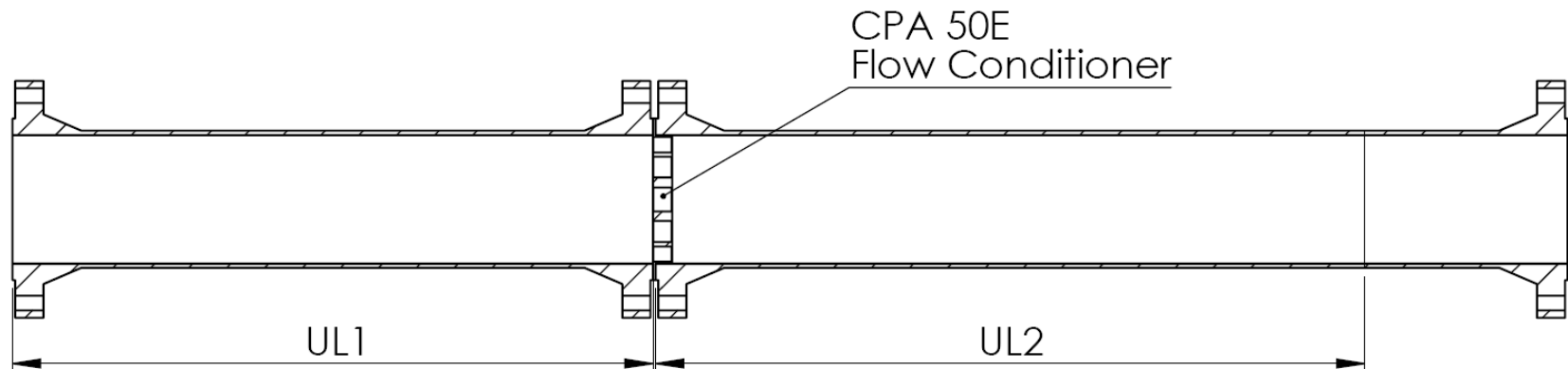
CPA Meter Run Lengths



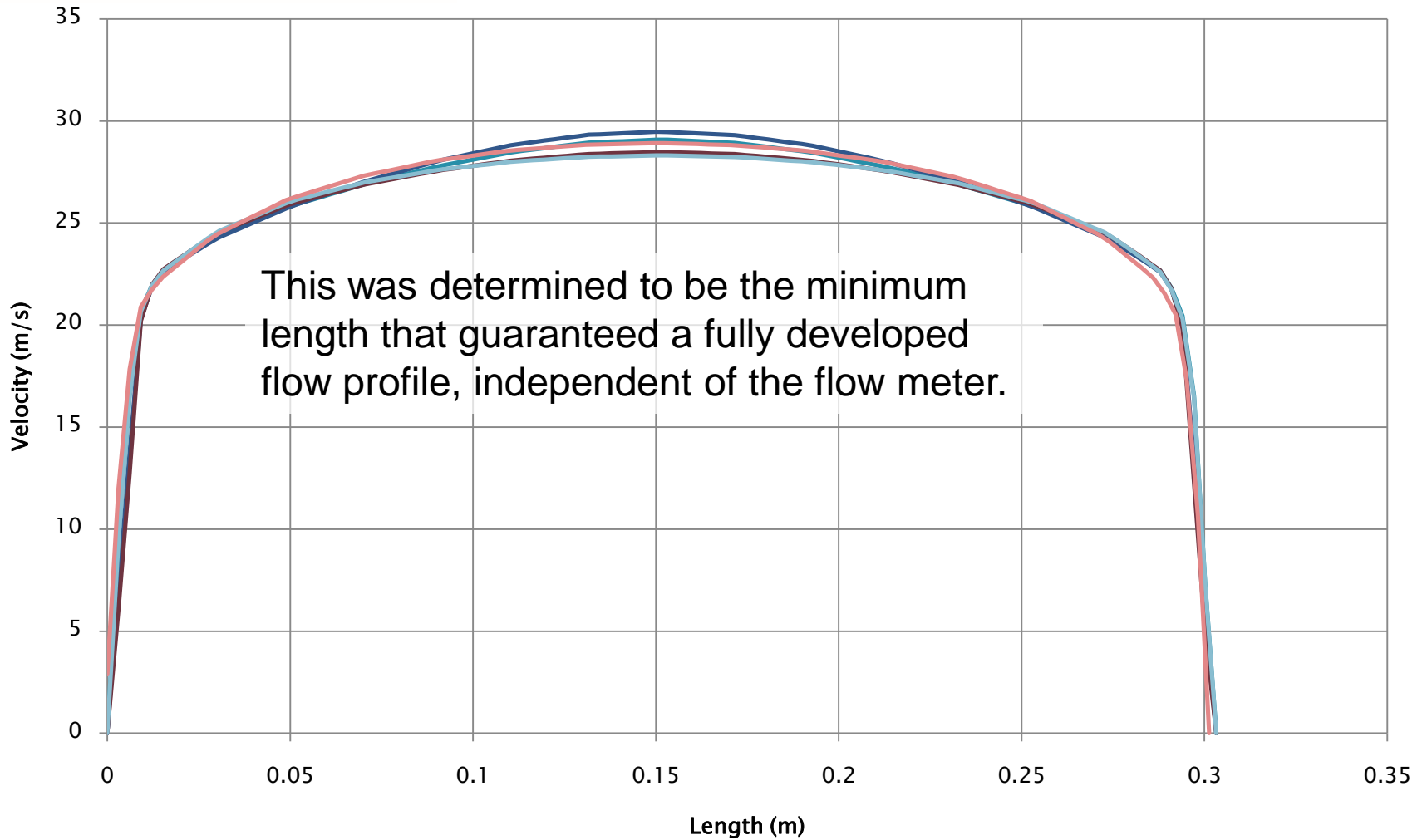
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- ▶ There are 3 important American Gas Association measurement standards that need to be considered:
- ▶ AGA Report 9 is used for Ultrasonic Meter Measurement
- ▶ AGA Report 7 is used for Turbine Meter Measurement
- ▶ **AGA Report 3 is used for Orifice Meter Measurement**

What Does CPA Recommend?

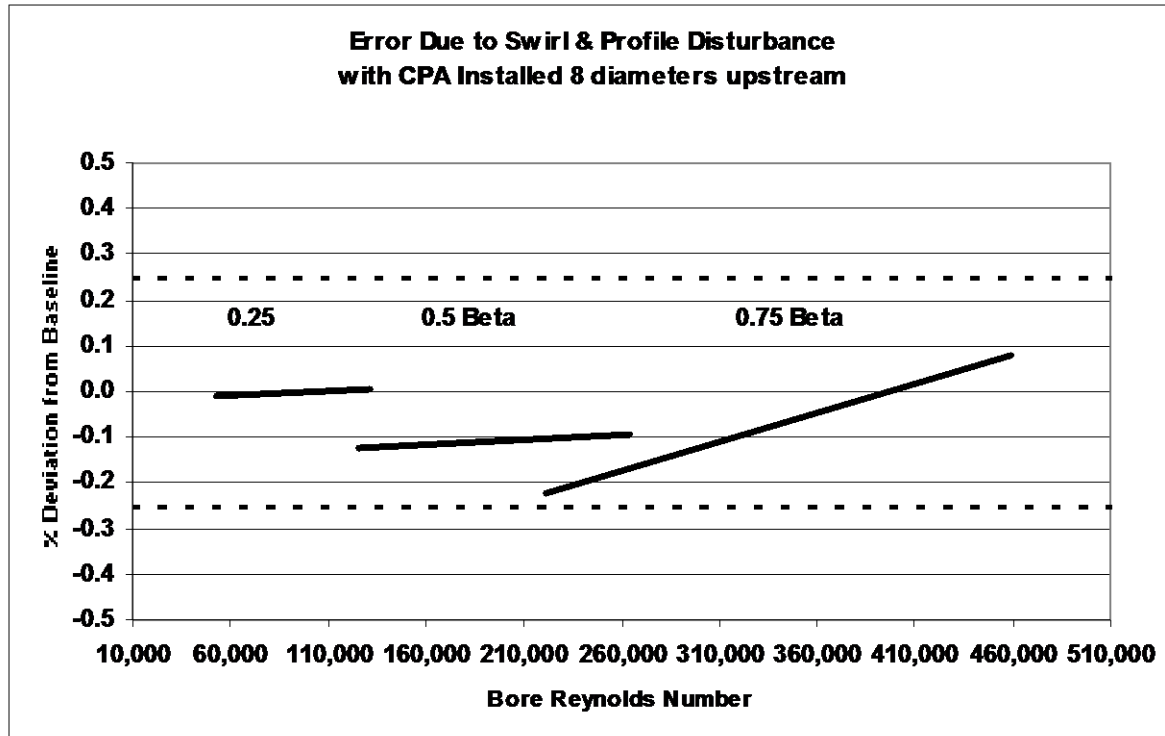


- ▶ CPA **always** recommends **at least 13D** (UL1 = 5D, UL2 = 8D) if minimum lengths in the standard are shorter.
- ▶ If the minimum lengths in the standard are longer (such as in AGA 3 or AGA9), then **follow** the standard.



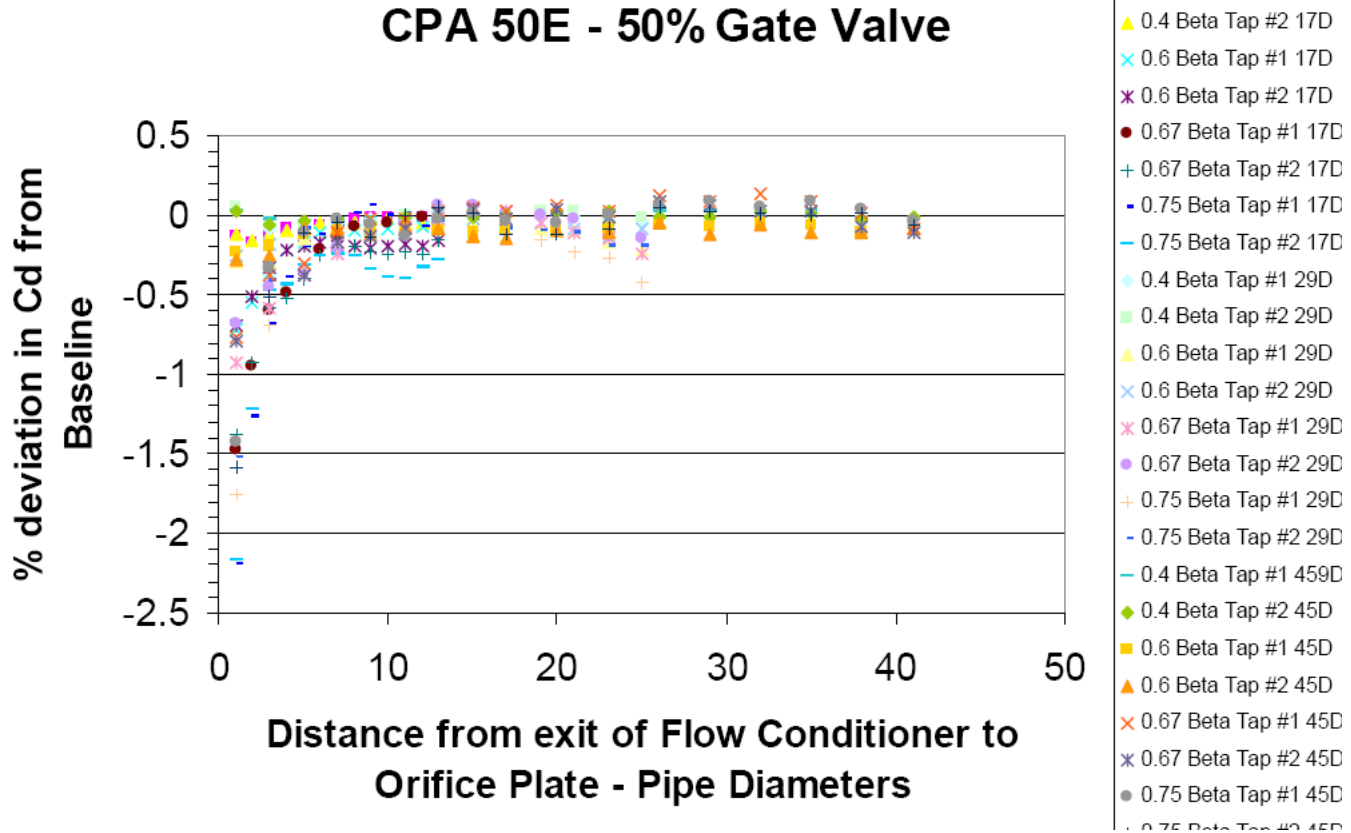
- 10D Horizontal@Line1_1
- 7.5D Horizontal@Line1_1
- 15D Horizontal@Line1_1
- 20D Horizontal@Line1_1
- 45D Horizontal@Line1_1

- ▶ The CPA 50E (Nova 50E) was originally designed specifically for a 13D meter run.
- ▶ This consisted of a minimum of 5D upstream of the flow conditioner and 8D downstream.
- ▶ Actual testing went down to a minimum of 6.5D from the flow conditioner for repeatable, fully developed flow profile performance.

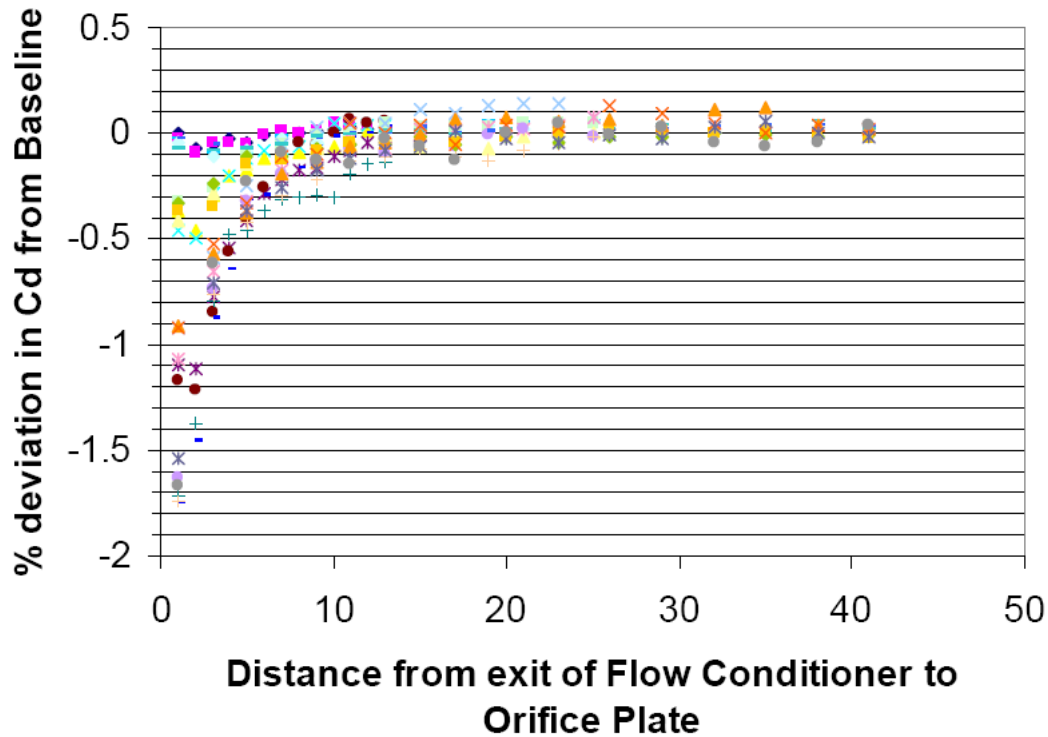


- ▶ CPA has a comprehensive amount of testing data available using the AGA 3, Appendix 2D Type Approval Test guidelines.
- ▶ This tested the flow conditioner performance in a variety of installations at SouthWest Research Institute.
- ▶ Generation of this data gives the CPA50E full AGA3 compliance for beta ratios up to 0.75 in a variety of installation configurations.
- ▶ Through years of testing, it was found that the orifice meter uncertainty dropped within the AGA3 limits at a distance of 5 – 7D between the CPA 50E and the meter.
- ▶ There is no one size fits all design! Context is important when discussing meter run lengths.

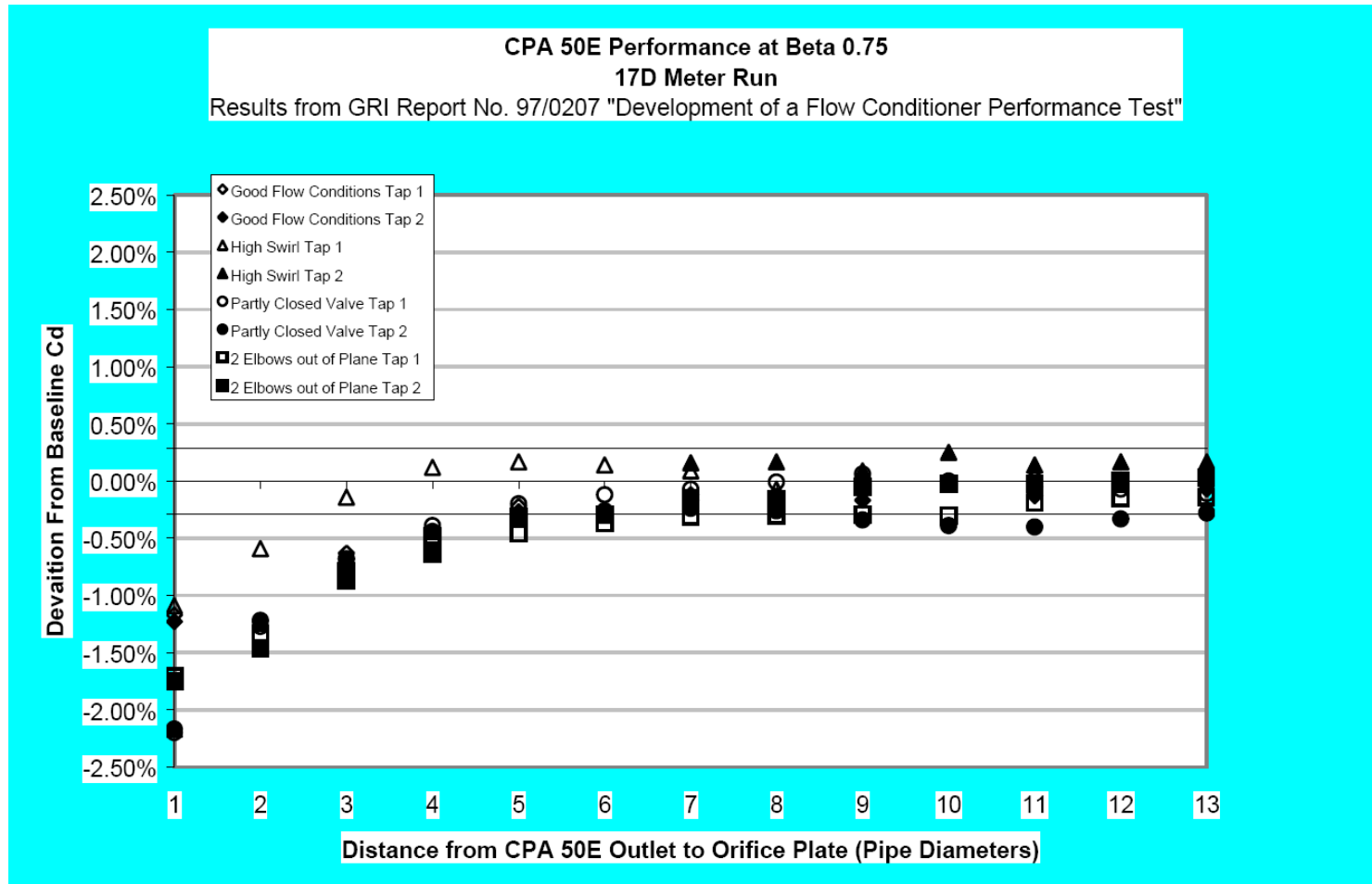
Type Approval Test (ΔC_d not to exceed $\pm 0.2\%$) *=required					
	(a) Test Facility Baseline Evaluation	(b) Ideal Flow Conditions (Fully Developed Flow Profile)	© 50% Gate Valve (non- symmetrical velocity profile)	(d) Chevron Swirl Generator	(e) Two Elbows Out of Plane
Disturbance	* at some Re such that $1 \times 10^4 \geq Re \leq 1 \times 10^6$ or $Re \geq 1 \times 10^6$ and some pipe diameter $D \leq 4"$ or $D \geq 8"$	* at same Re and D	* at same Re and D	* at same Re and D	* at same Re and D
Scaling	* at $D \leq 4"$ or $D \geq 8"$ and at same Re as above	One of b,c,d,e same D and Re	One of b,c,d,e same D and Re	One of b,c,d,e same D and Re	One of b,c,d,e same D and Re
Re Sensitivity	* at $D \leq 4"$ or $D \geq 8"$ as above and at TWO Re such that $1 \times 10^4 \geq Re \leq 1 \times 10^6$ or $Re \geq 1 \times 10^6$	One of b,c,d,e same D and two Re	One of b,c,d,e same D and two Re	One of b,c,d,e same D and two Re	One of b,c,d,e same D and two Re



CPA 50E - Two Elbows out of Plane



- ◆ 0.4 Beta Tap #1 17D
- ◆ 0.4 Beta Tap #2 17D
- ▲ 0.6 Beta Tap #1 17D
- × 0.6 Beta Tap #2 17D
- × 0.67 Beta Tap #1 17C
- 0.67 Beta Tap #2 17C
- + 0.75 Beta Tap #1 17C
- 0.75 Beta Tap #2 17C
- 0.4 Beta Tap #1 29D
- ◆ 0.4 Beta Tap #2 29D
- ◆ 0.6 Beta Tap #1 29D
- ▲ 0.6 Beta Tap #2 29D
- × 0.67 Beta Tap #1 29C
- × 0.67 Beta Tap #2 29C
- ◆ 0.75 Beta Tap #1 29C
- + 0.75 Beta Tap #2 29C
- 0.4 Beta Tap #1 459C
- 0.4 Beta Tap #2 45D
- ◆ 0.6 Beta Tap #1 45D
- ▲ 0.6 Beta Tap #2 45D
- ▲ 0.67 Beta Tap #1 45C
- × 0.67 Beta Tap #2 45C
- × 0.75 Beta Tap #1 45C
- 0.75 Beta Tap #2 45C



- ▶ CPA's recommended meter run minimums that are posted online are simple suggestions for starting meter run design.
- ▶ There is no perfect, one size fits all design. Many different lengths and configurations can be AGA3 legal if the flow conditioner manufacturer has the required testing data.
- ▶ CPA's AGA3 data allows customer to use a variety of lengths with a variety of layouts in a beta ratio range of 0.2 – 0.75.
- ▶ When in doubt, please contact CPA. We are always more than happy to help with meter run length discussions and give suggestions and assistance in designs.



Thank You

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