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APPLICATION GUIDE

SPONSLER

FLOW STRAIGHTENERS AND TRANSITION PIPING FOR TURBINE METERS

A technical review

In most meter installations, the meter is the same size as the pipe/line size, and the meter is located in a long section of straight pipe. In these ideal conditions, no special transition piping is normally needed.

In other applications, where space is tight, meters are a different size than the line size, or temperature and pressure sensors are employed, customers need to be guided by good engineering considerations to be sure published accuracy of a costly meter is protected.

We discuss here some important considerations regarding Flow Straightness and Transition Piping because all straighteners and transition piping are not equal.

Let us start with what we consider good piping engineering.

For LIQUIDS: 10 Diameters (10D) of meter size straight pipe before and 5 Diameters (5D) of meter size straight pipe after the meter is considered the minimum to maintain published accuracy.

For ALL GASES, STEAM, and LIQUIDS METERS 1/2" and SMALLER 10D of meter size straight pipe before and after the meter is considered the minimum to maintain published accuracy.

For meters/lines 2" and larger, if flow straighteners are needed, most customers just fabricate the straight lengths locally out of schedule 40 pipe. Is that good enough? In many cases, yes. However, the petroleum industry for a long time has considered the effects of in-line strainers, tees, elbows, etc. These have the effect of adding to the 10D/5D requirement. To eliminate the need to go to a 20D or 40D, flow straighteners are used. Sponsler offers a complete line. In industrial applications where piping usually has restricted straight runs, and the excellent accuracy of a precision turbine meter is needed, flow straighteners may be the best answer. When made by a manufacturer, these flow straighteners are mated to the meter. If the application accuracy is especially critical (as in premium calibrations) Sponsler can add pins that will align the meters and straighteners. There is an additional cost and a special quotation from Tryon Trading is needed. These measures assure preservation of the meters published accuracy. Turbines are a velocity driven device. A mis-aligned straight pipe before a meter can cause a measurement error. It may be as high as 1-5%. The upstream straighteners have special flow tubes (straightener bundles) to improve the laminar fluid flow. Downstream is less critical and straight pipe may be used. We recommend review of applications where accuracy is important and consideration be given to offering flow straighteners before and after the meters.

For meters/lines less than 2" the need for laminar flow becomes greater as the line size decreases. Manufacturers like Sponsler offer special transition piping. This transition piping is made from heavy walled seamless tubing and each is matched to the meter before shipment. The seamless tubing offers better flow characteristics than standard schedule 40 pipe fabricated in the field. While relatively inexpensive, the factory supplied transition piping assures best meter accuracy and factory responsibility for the combination of the meter and transition piping. In addition, if the meter is smaller than the line size, transition piping may include pipe reduction.

When using factory transition piping, we use AN flare meter end connections, and Pipe End fittings as required. There is an added benefit in using the AN Flare meter connections: Removal from the Line is easy (no pipe disconnecting). A Spool piece may be inserted if the line must continue operating while the meter is repaired.

For Gas applications, if pressure and temperature sensors are needed, the Factory can add the wells in the transition piping. This simplifies installation.

Finally, there is the unusual situation where there is simply just not enough room for a Flow straightener or Transition piping. This usually occurs in existing installations when trying to upgrade older equipment with newer more accurate meters. Sponsler offers a special product called a CONDITION PLATE. They are available in size from 2" to 10" pipe size. The 2" is only 3/4" wide, and the 10" is only 1 1/2" wide. They are placed just up-stream from the meter. This is a good solution when space is just not available.

The above information should assist in proper piping selection of these items in the field.