

1. General Information

This document describes the procedures required to install, and maintain the Vortab Insertion Sleeve (VIS), Vortab Meter Run (VMR), Vortab Short Run (VSR) and Vortab Field Kit (VFK) Flow Conditioners.

Description

The plumbing of a typical industrial process includes many elbows, expansions, reductions, branches, valves, pumps and blowers. All of these items are usually interconnected with short lengths of pipe or duct. Consequently the fluids moving through these pipes or ducts experience complex disruptions: profile distortion, swirl and stratification.

The presence of fluid disruptions in pipe and duct flows can be detrimental to the performance of flowmeters. Although a flowmeter might potentially be calibrated to account for a known amount of profile distortion, swirl, or stratification, usually such measures are impractical since these disruptions can vary widely, even for seemingly similar pipe or duct arrangements.

A flow conditioner can isolate a flowmeter from varying fluid disruptions by providing a consistent outlet flow condition regardless of inlet condition. Because of its unique tab design, the Vortab flow conditioner is able to provide excellent flowmeter isolation, yet it creates very little pressure loss and is virtually immune to fouling.

Vortab flow conditioners come in four basic forms: Insertion Sleeve (VIS), Meter Run (VMR), Short Run (VSR), or Field Kit (VFK). The VIS is sized so that it slides into the existing process pipe or duct. The VMR is a stand alone section of pipe that includes both the conditioning tabs as well as the recommended settling distance. The VSR is a stand alone section of pipe that includes only the conditioning tabs. The VFK contains all of the tab pieces that are needed to assemble a large size or square geometry Vortab flow conditioner.

Theory of Operation

Vortab flow conditioners are passive mechanical devices which effectively establish a consistent outlet fluid condition regardless of the fluid's inlet condition. These conditioners use a series of tabs to amplify and accelerate the beneficial boundary layer behavior of long pipe, fully turbulent flow. The basic principles involved are vorticity generation, force cancellation, and diffusion. The Vortab flow conditioner is able to produce uniform, non-swirling fluid flow within seven pipe diameters with minimal pressure loss.

The upstream three pipe diameters (3D) of a Vortab installation contains the conditioning tabs. The next four pipe diameters (4D) downstream of the tabs is the fluid settling distance. Depending upon the severity of the downstream disturbance, one to five diameters (1 to 5D) of straight pipe are required after the flowmeter outlet. Figure 1-1 illustrates a typical Vortab installation.

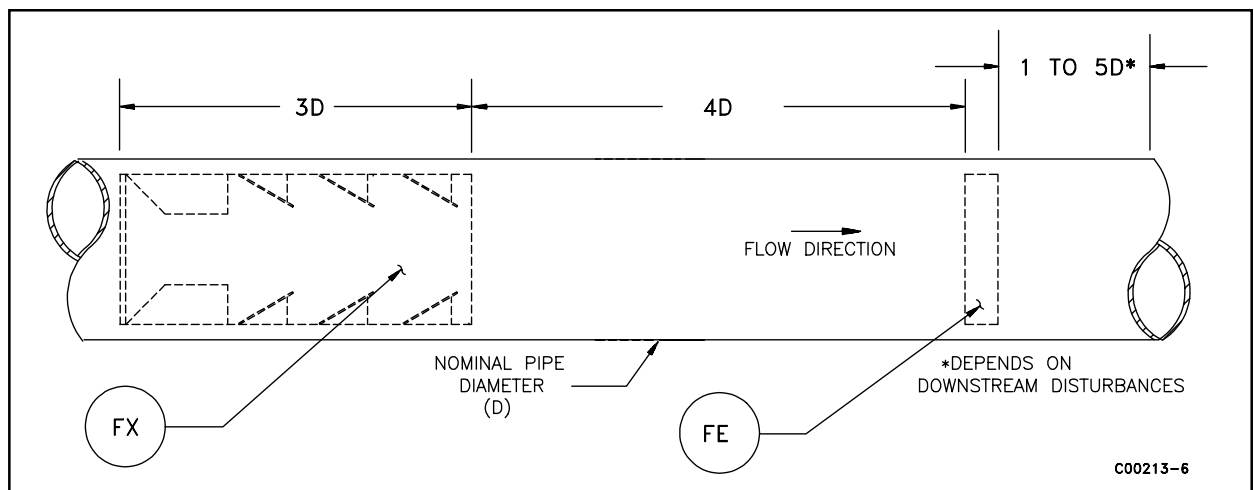


Figure 1-1. Typical Vortab Installation

Technical Specifications

Vortab Insertion Sleeve (VIS)

Process Pipe or Duct Inside Diameter

Customer specified [(must be between 0.90 and 48 inches (23 and 1220 mm)].

Material of Construction

316L stainless steel. Carbon steel, or Hastelloy C-276 are also available.

Outside Diameter

Outside diameter is undersized to fit the process pipe inside diameter.

Length

3 times the outside diameter.

Process Connection

Captured flange or welded to the pipe or duct inside diameter.

Vortab Meter Run (VMR)

Material of Construction

316L stainless steel. Carbon steel, or Hastelloy C-276 are also available.

Pipe Size

Available in 2, 3, 4, 6, 8, 10 and 12 inch; Standard Wall..

Length

7 times the pipe outside diameter.

Process Connection

Butt weld preparation, male NPT or flanges (150 or 300 lb., raised face).

Port For Customer Applications (i.e., flow element)

Threaded 3/4, 1, or 1-1/4 inch female NPT, or flanged 1-1/2 in. 150, or 300 lb., raised face.

Vortab Short Run (VSR)

Material of Construction

316L stainless steel. Carbon steel, or Hastelloy C-276 are also available.

Pipe Size

2, 3, 4, 6, 8 . . . 24 inch; Standard Wall.

Length

3 times the nominal diameter.

Process Connection

Butt weld preparation or flanges (150 or 300 lb., raised face).

Vortab Field Kit (VFK)

Material of Construction

316L stainless steel. Carbon steel, or Hastelloy C-276 are also available.

Process Pipe or Duct Inner Diameter

Customer specified [(must be greater than 34 inches (864 mm))].

Assembled Length

3 times the pipe inner diameter.

Attachment Method

Welded to the pipe or duct inner diameter. (32 pieces).