

Meter Tubes

Accurate, Quality Instruments for
Natural Gas and Oil Measurement Solutions



DANIEL®


EMERSON.
Process Management

EMERSON. CONSIDER IT SOLVED.

Accurate Instruments or Fabricated Pipe?

The difference is Daniel Meter Tubes

Instruments You Can Trust

Daniel Meter Tubes are more than just fabricated pipe with an orifice fitting. They are accurate, dependable instruments because of Daniel's dedicated approach to quality. Extra steps taken during every phase of meter tube design and production separate Daniel Meter Tubes from all the rest.

Experience

Experienced "code qualified" welders, use internal jigs to insure smooth inlet and outlet surfaces, and expert grinding by quality oriented craftsmen all contribute to the highest quality on each and every meter tube order.

Design

Experience and expertise in designing a wide variety of applications insures that the proper length of tube, type of flow conditioner and orifice fitting will be exactly what is needed for accurate flow measurement.

Knowledge

Individuals from Daniel sit on the boards of more professional standards organizations than any other manufacturer in the oil and gas transmission industry.

What is a Meter Tube?

A Meter Tube consist of an Orifice Fitting (Daniel Senior, Junior, Simplex or Orifice Flange Union), a length of pipe upstream of the fitting and a corresponding length of pipe downstream of the fitting. There is also, in most cases, a flow conditioner (Daniel Flow Conditioning Plate or 19 Tube Concentric Bundle) upstream of the orifice as well. When fluid (gas or liquid) flows through the orifice opening, a pressure drop occurs. Flow rate is proportional to the square root of pressure differential. Flow volume is determined by integrating flow rate, and is typically corrected to "standard conditions" with an associated flow computer.



Daniel 2 Section Meter Tube with Tube Bundle Flow Straightener

All Daniel standard two section meter tubes are available with any style Senior or Junior orifice fitting, Simplex plate holder or orifice flange union. Each tube contains an upstream of the minimum length prescribed by API 14.3, with a line mounted 19 tube concentric tube bundle flow straightener per the standard. Each downstream has one each 1/2" and 3/4" branch connection for thermowell or other uses. Upstream lengths are the minimum recommended by 14.3 table 2-8b for use with plates up to .67 beta ratio for installation in any piping configuration. The downstream is extra long to allow for the installation of additional branch connections in the field, if desired. Beveled ends are standard. Optional ends available on request.

Daniel 3 Section Meter Tube with Tube Bundle Flow Straightener

The 3-section assembly contains an inlet spool of the minimum length prescribed by the 14.3 standard. The second section begins with a concentric, flange mounted tube bundle meeting the 2000 API 14.3 requirements and a 1/2" thick spacer plate to ease tube removal for inspection. The outer end of section 2 contains the orifice flange or fitting. The third or downstream section follows and contains 2 branch connections. Other or additional connections can be supplied in this section on request. The upstream lengths are in compliance with API 14.3 table 2-8b minimum for up to .67 beta ratio and can be used in any piping configuration. Downstream sections are extra long to allow for the addition of extra branch connections in the field, if desired. The standard meter tube has flanged outer ends. Other end connections are available on request.

Daniel Meter Tube with Daniel Flow Conditioner

The three section meter tube with Daniel Flow Conditioner contains an inlet spool of the minimum length determined during testing to the API 14.3 standard. The flange union between the first and second sections contains the Flow Conditioner and a 1/2" thick spacer plate to facilitate tube removal for inspection. The outer end of section 2 contains the orifice flange or fitting. The third or downstream section follows and contains 2 branch connections. Other or additional connections can be supplied in this section on request. The upstream lengths were established during testing of the device in accordance with the 14.3 test requirements. These meter tubes are for use in any piping configuration with beta ratios to .67. Downstream sections are extra long to allow for the addition of extra branch connections in the field, if desired. The standard meter tube has beveled outer ends. Flanges or other end connections are available on request.

The Basics

Daniel's Meter Tube Instrumentation:

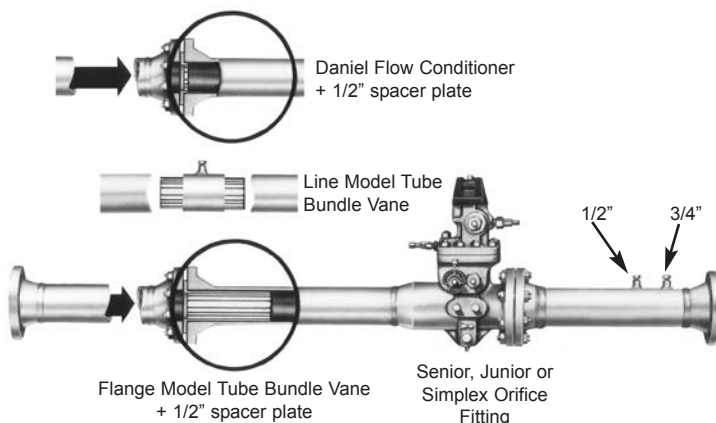
Alignment - Meter tubes using Senior or Junior orifice fittings and Simplex plate holders in 150 and 300# ANSI ratings are supplied with a dowel pin alignment feature at the fitting to meter tube connection. 600# and higher rated tubes use a special, close tolerance large male/female flange alignment method. Either method insures that the bores of both tube sections are matched without offsets. Tubes using orifice flanges utilize a knock-out dowel pin feature to align both pipe sections and center the orifice plate within the flanges.

Connections - Each meter tube is supplied with one 1/2" and one 3/4" branch connection on the downstream for thermowell or other uses. Additional connections are available on request.

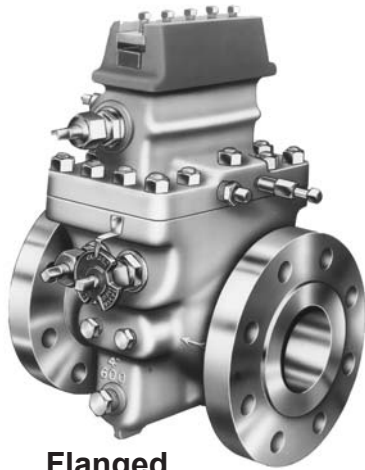
Testing - Each meter tube is hydrostatically tested after manufacture. Each orifice fitting is tested for tap hole and orifice plate seal integrity after the meter tube has been pressure tested.

Material Selection: Daniel uses special cold drawn seamless tubing or honed pipe in the fabrication of meter tubes. The strict requirements for internal roundness and surface finish preclude the use of standard commercial pipe in most cases. Daniel maintains a large inventory of this special pipe to rapidly complete your order.

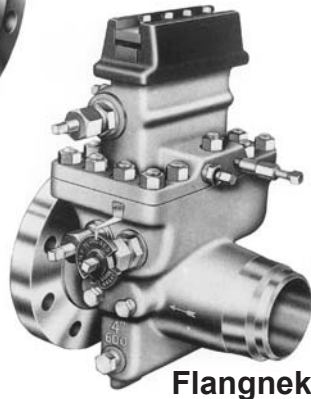
Typical Meter Tube



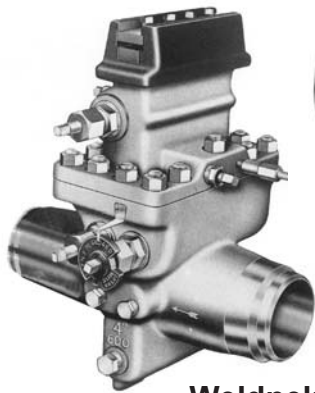
Orifice Fitting Styles



Flanged



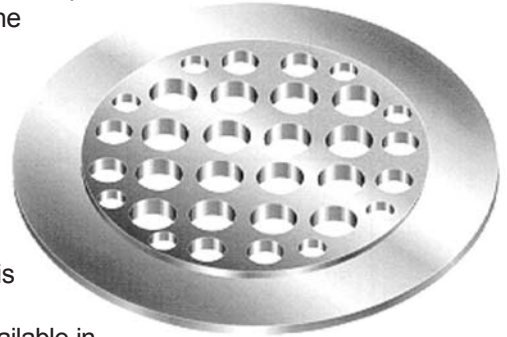
Flangnek



Weldnek

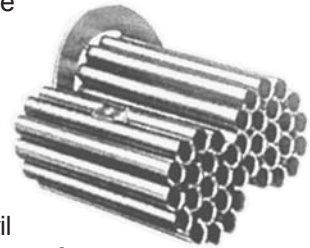
Daniel Flow Conditioning Plate

The Daniel FLOW Conditioning Plate has been tested and shown to be in full compliance with the requirements of API 14.3 April 2000. The Profiler both removes swirl and creates a fully developed flow profile at the orifice. Use of this unit allows shortened upstream straight pipe lengths of 17 diameters. Beta ratio limit is .67 as with the tube bundle. Available in flange mounted model only.



19 Tube Concentric Bundle

Available in either line mounted or flange mounted styles. These units effectively remove swirl that has been introduced by upstream piping components. Individual tubes and bundle diameter are sized to meet the requirements of API 14.3 April 2000. These units allow the use of a 29D upstream meter tube section in any piping configuration with a .67 beta ratio limit.



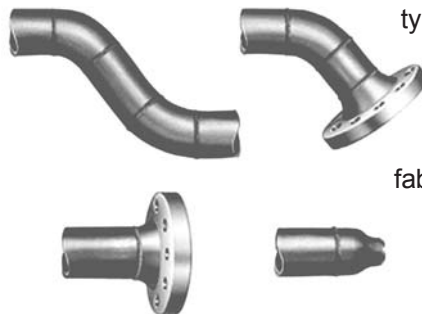
Inspection: Daniel maintains rigid inspection procedures during manufacturing of meter tubes. Micrometer and internal surface roughness readings are recorded and supplied with each meter tube. Customer or third party inspectors are welcome to verify these readings. Radiography of welds is available on request.

Packing/Shipping: Daniel bolts together all meter tubes, when size permits, before shipment. This saves the user time and field labor costs. Fittings are protected by heavy lumber, and the tube flanges by special-cut protectors.

A SPECIAL NOTE: The use of genuine Daniel parts will assure your Senior, Junior and Simplex Orifice fittings will stay within original specifications and operate properly.

Meter Tube End Modifications

Several common and frequently used end modifications are shown here to illustrate types available. Daniel will custom build risers, flanges, ells, reducers and couplings, expertly fabricated to meet your specifications. When ordering special end tube modifications, please specify full information for both upstream and downstream tube sections.



Daniel Division Headquarters

Houston, Texas, USA, T: (713) 467-6000, F: (713) 827-3880
 Calgary, Alberta, Canada, T: (403) 279-1879, F: (403) 236-1337
 Stirling, Scotland - UK, Mid-East & Africa, T: +44 01786 433400, F: +44 01786 433401
 Singapore - Asia Pacific, T: +65-6777-8211, F: +65-6770-8001

USA Toll Free 1-888-FLOW-001 www.daniel.com

Daniel is a wholly owned subsidiary of Emerson Electric Co., and a division of Emerson Process Management

The Daniel logo is a registered trademark of Daniel Industries, Inc. The Emerson logo is a registered trademark and service mark of Emerson Electric Co.

