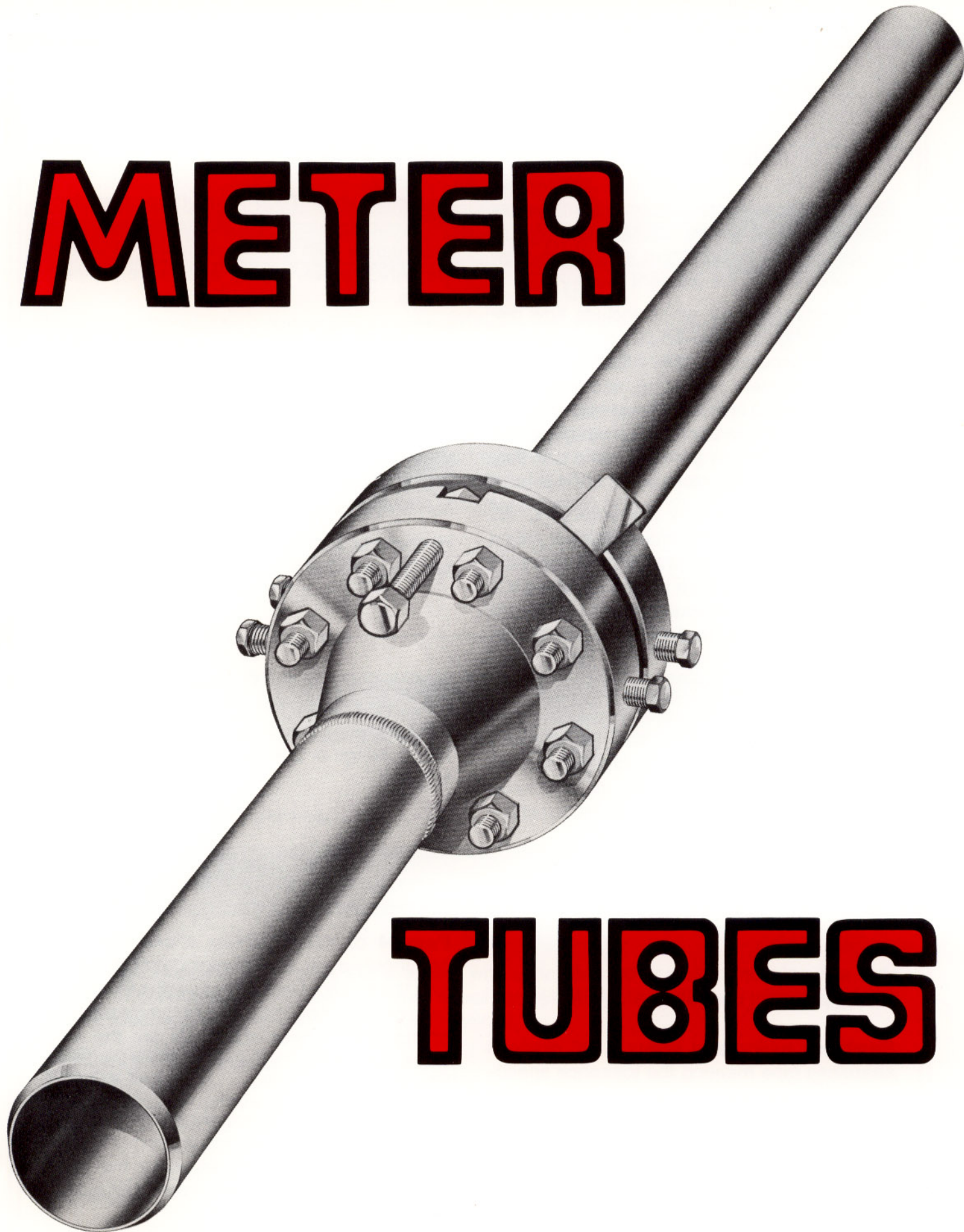


METER



TUBES



TECH TUBE DIVISION
ENERGY FLOW SYSTEMS, INC.

METER TUBES

INTRODUCTION

The location and installation of primary flow elements such as the orifice plate or flow nozzle can be as important in accurate flow measurement as the element itself.

Piping arrangements which include flow disturbing fittings such as elbows or valves, can affect the accuracy of flow measurement for several diameters preceding, and to a lesser extent, following the primary flow element. The internal roundness and surface roughness of the pipe immediately preceding and following the primary element can also affect accuracy.

To insure accurate flow measurement, the fluid should enter the primary element with a fully developed velocity profile free from swirls and vortices. To achieve such a condition it is necessary to have adequate lengths of straight pipe both preceding and following the primary element.

As a manufacturer of primary flow elements, Tech Tube offers complete fabrication and design of precision orifice and nozzle meter tubes in a wide variety of configurations. All meter tubes are designed and manufactured to meet or exceed the recommendations of the AGA and ASME where applicable.

MATERIALS OF CONSTRUCTION

Seamless tubing and select A106 grade B seamless pipe meeting the tolerance specifications as outlined in AGA Gas Measurement Committee Report Number 3 are used in manufacturing meter tubes unless otherwise specified by the customer. Meter tubes can be fabricated from stainless steel or other special alloys to suit particular applications.

FABRICATION

As a code shop, Tech Tube utilizes manufacturing methods and inspection procedures in accordance with the requirements of ASME and ANSI power piping and refinery piping codes.

Fabrication is accomplished using highly skilled code welders and automatic welding equipment with rotating positioners.

INSPECTION — TESTING

Rigid inspections are maintained on all meter tubes. Micrometer readings are recorded and can be supplied on request.

Hydrostatic testing and weld x-raying of tubes can be provided on request.

PAINTING — COATING

Each tube is thoroughly cleaned after manufacturing and given a primer paint coat utilizing airless spray guns for uniform coverage. Custom coatings or painting can be applied upon request.

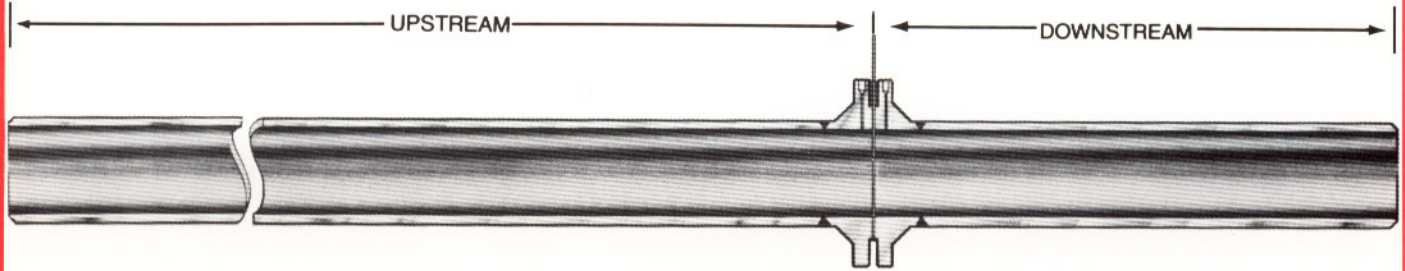
DESIGN OF METER TUBES

The size of meter tubes can be determined from data published by the AGA, ASME and ISA.

Page 4 of this brochure shows the most commonly encountered piping configurations and the required minimum lengths for various beta ratios according to the recommendations of the AGA. These standards are the most widely accepted and used in all the industries in this country.

If desired, Tech Tube's engineering department, utilizing an in-house computer will quickly and accurately determine the meter tube size and beta ratio when provided with the flow media and conditions.

ORIFICE METER TUBES SERIES OMT

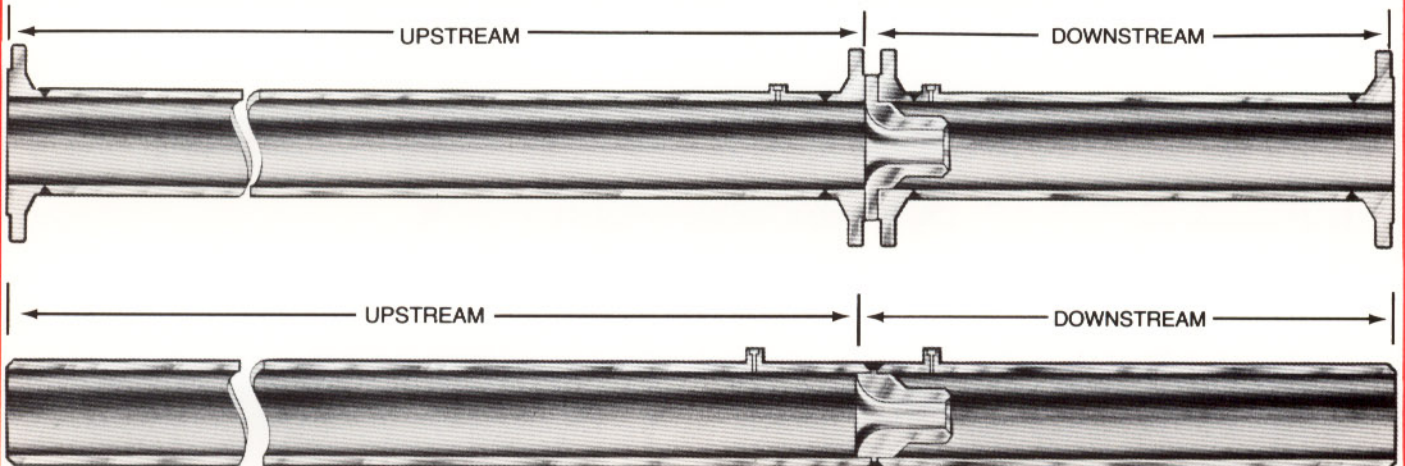


Tech Tube Orifice Meter Tubes are available in a wide variety of configurations manufactured to customer specifications using AGA and ASME recommendations.

When ordering please specify:

Nominal line size ___ pipe schedule ___ pipe I.D. ___ upstream dimension ___ downstream dimension ___ orifice flange rating ___ type of orifice flange ___ pressure tap location ___ pressure tap connections ___ upstream end termination ___ downstream end termination ___ material of construction ___ type of orifice plate ___ orifice plate material ___ orifice bore dimension _____. If Tech Tube is to calculate bore, please provide flow conditions.

NOZZLE METER TUBES SERIES NMT



Tech Tube Nozzle Meter Tubes are available with either flanged or weld-in nozzles in a wide variety of configurations to meet customer specifications. All meter tubes are manufactured to ASME recommendations unless otherwise specified.

When ordering please specify:

Nominal line size ___ pipe schedule ___ pipe I.D. ___ upstream dimension ___ downstream dimension ___ upstream end termination ___ downstream end termination ___ meter tube material ___ nozzle material ___ type of flow nozzle ___ If flanged nozzle, specify flange rating ___ If weld-in nozzle, specify weld-in or holding ring type ___ Pressure tap connections ___ Nozzle bore dimension _____. If Tech Tube is to calculate bore, please provide flow conditions.

METER TUBE LENGTHS

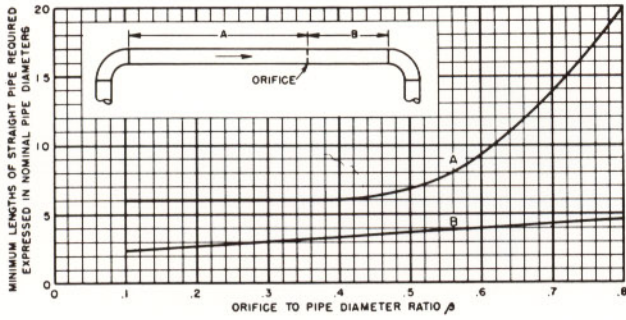


Figure 1 Orifice Preceded by a Single Elbow.

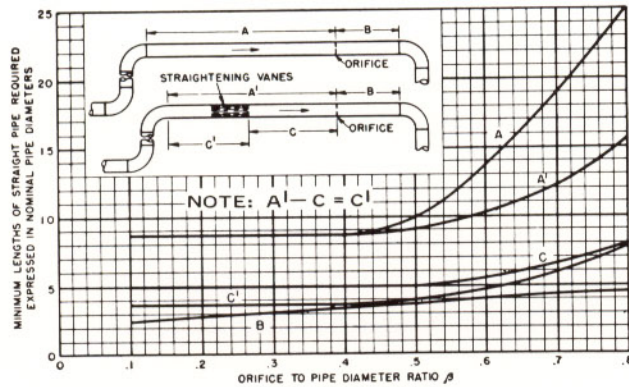


Figure 2 Orifice Preceded by Two Elbows in One Plane.

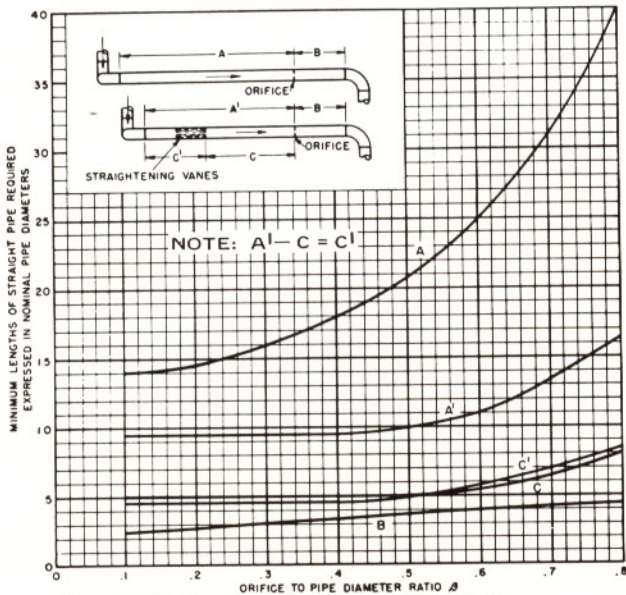


Figure 3 Orifice Preceded by Two Elbows in Different Planes.

Note: When the two elbows shown above are preceded by a third which is not in the same plane as the one immediately following, recommendations A above should be doubled.

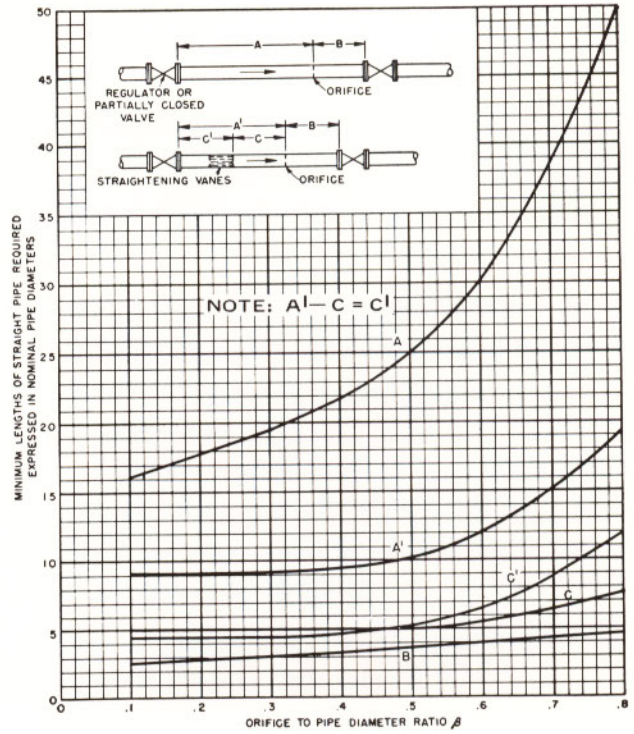


Figure 4 Orifice Preceded by a Throttled Valve or Regulator.

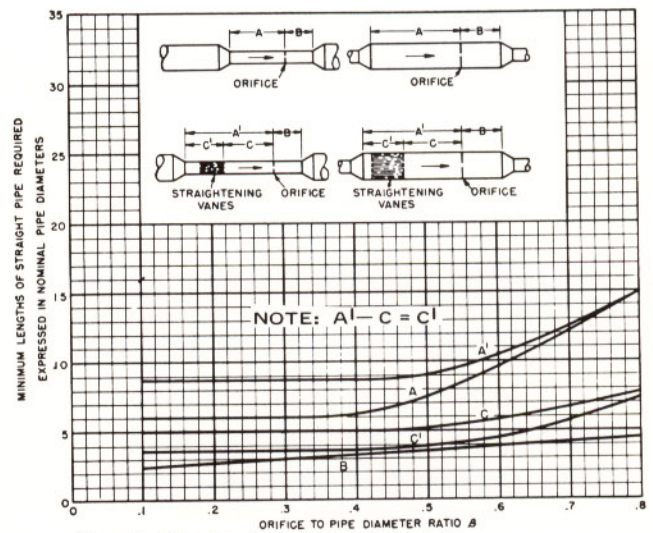


Figure 5 Orifice Preceded by a Change in Pipe Size.

Note: Figures 1 through 5 are recommended meter tube lengths AGA report 3. These standards are the most widely used in industry.



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