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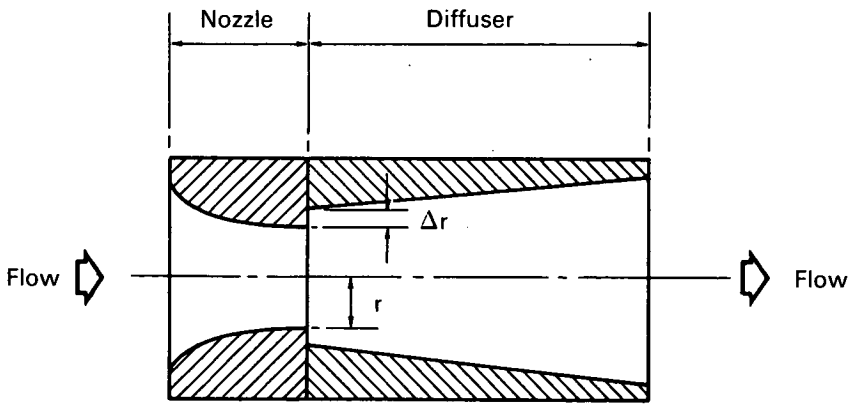
AEC-NASA TECH BRIEF

Venturi Meter with Separable Diffuser



Conventional venturi meters of one-piece construction require precise fabrication. For maximum efficiency (maximum pressure recovery), the divergent half-angle of the diffuser is uaually about three or four degrees. If the venturi meter is constructed from a single piece of material, it is difficult to machine this small divergent angle so that the beginning of the diffuser is at the desired axial location. Imprecision may create adverse effects on meter performance.

Fabrication is much easier when the diffuser and nozzle can be made as separate pieces, particularly if reasonable manufacturing tolerances in matching the diffuser entrance diameter with the nozzle exit diameter are permissible.

An investigation was conducted to determine the effect on venturi meter efficiency when the diffuser inlet diameter was larger than the throat diameter. Diffuser inlet diameters investigated ranged from equal, to twelve percent larger than the throat diameter, as shown in the figure. The results show that the diffuser inlet diameter can be up to two percent greater than the throat diameter without significantly affecting meter efficiency.

A 1/2-inch throat-diameter venturi with an ASME long-radius model nozzle was used in this investigation. The conical diffuser had a half-angle of four degrees. Data were obtained with air as the flowing medium, over a nozzle Reynolds number range from 1×10^4 to 5×10^5. The Mach number range was 0.2 to 1.0. Temperature was near ambient.

Venturi meter efficiency is dependent on Reynolds number, Mach number, and diameter differences ("steps") greater than two percent. A representative plot of meter efficiency as a function of "step" size is shown in the figure overleaf.

(continued overleaf)

Note:

Inquiries concerning this innovation may be directed to:

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Reference: B68-10295

Patent status:

No patent action is contemplated by NASA.

Source: T. J. Dudzinski, R. C. Johnson, and L. N. Krause (LEW-10483)