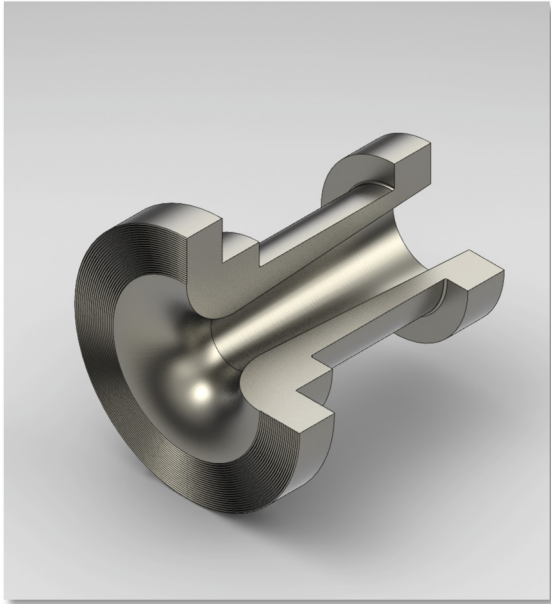


CPA Flow Nozzles

Canada Pipeline Accessories offers sonic and subsonic flow nozzles for use as measurement elements or flow restriction devices. Nozzles for these applications are designed in accordance with the customers preferred industry standards.



Features

- No moving parts, no maintenance required.
- Prevents costly meter over-speed failures.
- Excellent repeatability.
- Flow rate is not affected by downstream flow disturbances.
- Can be used for range extension by changing the pressure at the flow meter.
- Provides effective noise control by moving a problematic pressure drop location away from a control valve.

Available Designs

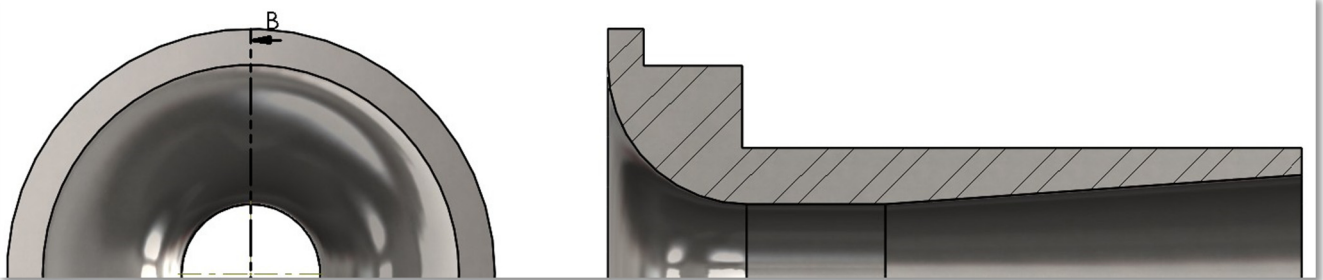
- CPA SubSonic & Sonic Nozzle Profile
- ASME MFC-3M
- ASME MFC-7M
- ASME PTC-6
- ISA 1932
- ISO 5167

Flow Restriction & Overspeed Protection

CPA Sonic Nozzles isolate flow meters from increased flow rates and unsteady flow scenarios that can result in severe meter damage. Due to their reliable and repeatable behavior at sonic (choked) operating conditions, CPA Sonic Nozzles offer excellent protection for turbine, orifice and positive displacement meters.

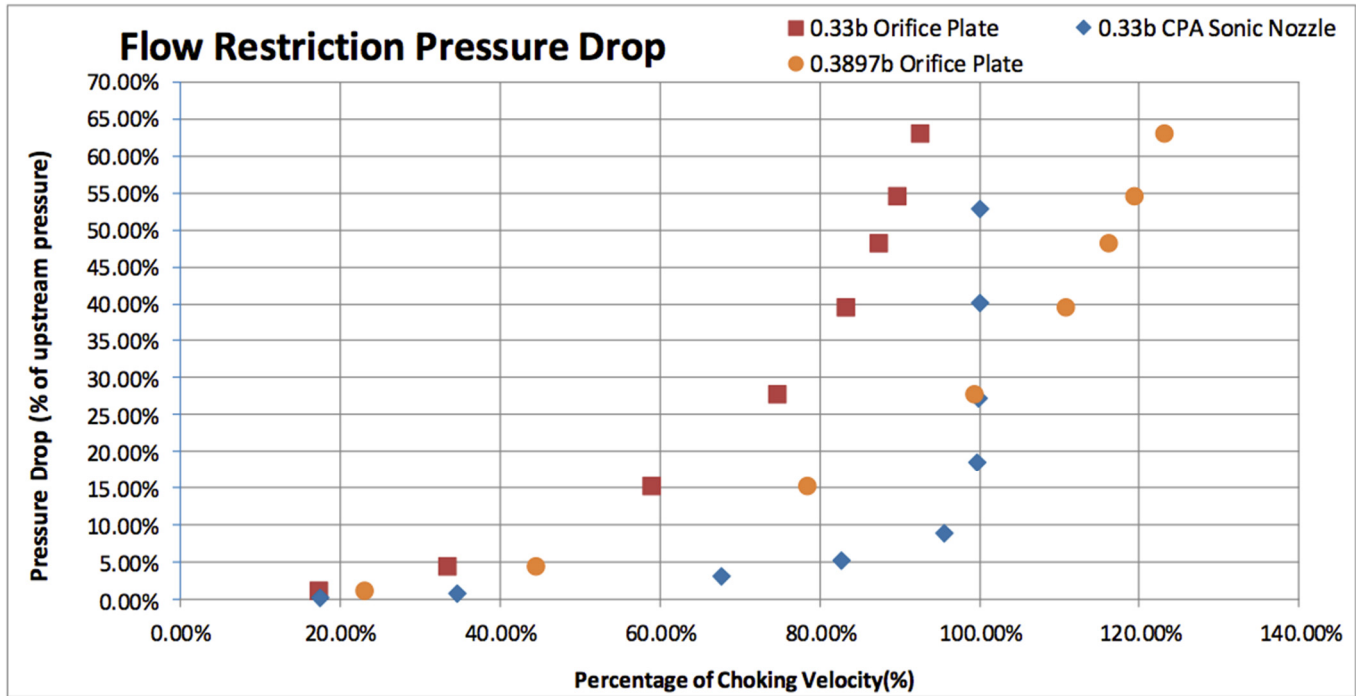
Nozzles vs Orifice Plates

Orifice plates cannot offer the same choking performance as an ASME 7M based critical flow nozzle. CPA Sonic Nozzles are designed for a fixed mass flow rate once the choking conditions have been met; further increases in the downstream velocity or suction will not result in a increased mass flow rate. Through testing, it has been found that orifice plates do not properly choke and cannot result in a fixed mass flow rate. The orifice plate has to be designed for a desired mass flow rate at a specific downstream pressure. Further increases in the flow velocity or downstream suction will cause the mass flow rate to increase significantly.



CPA Sonic Nozzles

While having exceptional performance and stability at critical flow conditions, CPA Sonic Nozzles also offer superior pressure recovery at sub-sonic flow conditions when compared against traditional restriction orifice plates.



Sonic Nozzle vs Orifice Plate

The above figure compares a CPA Sonic Nozzle designed using the ASME MFC-7M critical flow guidelines against two orifice plates. The 0.33b orifice plate was used to show the pressure drop performance when the flow elements have the same throat bore diameter. The 0.3897b orifice plate is sized to choke at the same flow rate as the 0.33b nozzle according to AGA 7.

In the case of the 0.33b elements, it was found that for comparable velocities upstream of the flow restriction, the orifice plate created a significantly higher-pressure drop. While the 0.3897b orifice plate has slightly better pressure drop performance, its choking behavior is problematic for over speed scenarios.

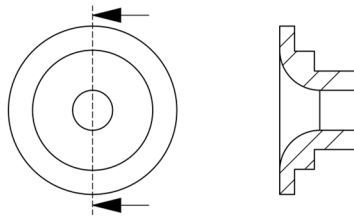
The CPA Sonic Nozzle reached its critical flow point and choked at exactly its designed velocity while offering pressure drop behavior that is vastly superior to both orifice plates.

CPA dP Flow Nozzle Types

CPA offers flow nozzles for differential pressure measurement in a variety of geometry layouts and tap configurations. Use the below diagram to help indicate which design you or your customer wish to use.

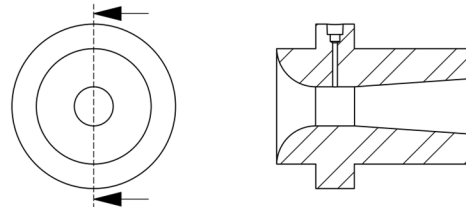
CPA Flow Nozzle

The basic CPA flow nozzle is simply clamped between two ANSI raised face or RTJ flanges. The nozzle geometry only consists of an inlet contour and a throat. Pressure measurements will be taken from pipe taps that are placed upstream and downstream of the nozzle body.



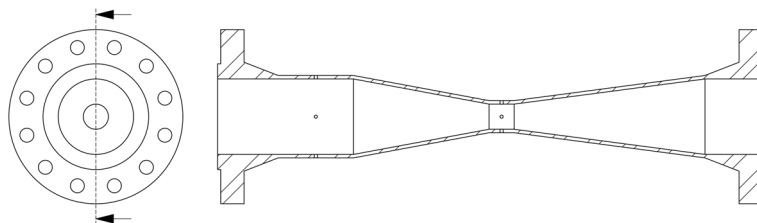
CPA Venturi Nozzle

The CPA Venturi nozzle is also clamped between two ANSI raised face or RTJ flanges. This nozzle design has the same upstream geometry as the CPA Flow Nozzle, but also includes a diffuser cone on the outlet to help increase pressure recovery. The throat pressure is taken using the included pressure tap in the flange while the upstream pressure measurements will need to be taken from a pipe tap. CPA also recommends use of a downstream tap for added diagnostics. Additional upstream & downstream taps can be added to the flange itself if required.



Venturi Tube

The CPA venturi tube is a typical ASME-3M venturi tube style nozzle. Depending on the size and application conditions, the device can be fabricated and welded, or machined out of a single piece of material. Pressure measurements are taken at the upstream and throat tap locations.



All CPA nozzles are custom designed per application. Many material options, tap locations and tap types are available.

CPA Flow Nozzle Quote Request Form

Date _____	Contact _____
Company _____	Email _____
Phone _____	

General Nozzle Information

Pipe NPS _____	Pipe Sch/Inside Diameter _____
Flange Pressure Rating _____	Installation Type _____ <i>(Flanged, Weld In, Insert, etc)</i>
Flange Standard _____ <i>(ANSI, API, Norsok, etc)</i>	Material _____ <i>(304SS, 316SS, CS, etc)</i>
Material Compliance _____ <i>(Nace MR0175, Norsok M650, etc)</i>	Process Gas/Fluid _____
Minimum Design Temp _____	Calibration Required _____ <i>(Accuracy %)</i>

CPA Sonic Nozzle

Choking Rate _____ <i>(Meter QMAX)</i>	Meter Size/Type _____
Flange Location _____ <i>(Inlet or Outlet)</i>	Flange Thickness _____
Operating Temp _____	Max Design Temp _____

CPA Venturi Nozzle/Tube

Design _____ <i>(Please refer to CPA Nozzle Handout)</i>	Beta Ratio/Desired DP _____
Pressure Tap Style _____ <i>(TOL, WOL, NPT, Socket Weld)</i>	Pressure Tap Location _____ <i>(Nozzle Body or Pipe)</i>
Operating Temp _____	Max Design Temp _____
Flowing Pressure _____	Maximum Pressure _____
Testing Required _____ <i>(Hydro, PMI, Xray, etc)</i>	

Once complicated, please email to info@cpacl.ca or fax to 403.236.0019.