ORIFICE THEORY

UNDERSTANDING FLOWS OF AN ORIFICE:

Flow of an orifice is what is important, if Kinsler has flowed a Hilborn nozzle, that flow can be compared to the flows of a Kinsler flowed piece. You ***CAN NOT*** compare the diameter/area of two different pieces.

For Example: The diameter/area of a .040" nozzle and the diameter/area of a .040" jet.
The diameter/area of a .038" Enderle nozzle and the diameter/area of a .038" Kinsler nozzle.

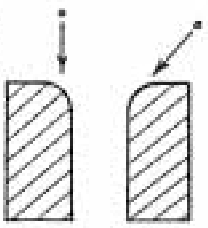
Many things affect the flow through an orifice: size, length, orifice entrance, orifice exit, etc. If two orifices have the same entry and exit, the same diameter, but one orifice is .050" thick and the second orifice is .250" thick, the .050" thick orifice will flow more. These theories apply to any orifice: plumbing lines, ramtubes, exhaust pipes, etc.

FOR NOZZLE, BYPASS JETS, CARBURETOR JETS, ETC.:

A sharp edge at the orifice entrance causes the flow stream to converge. The smallest flow cross section, termed the vena contracta, is the point of lowest pressure. The vena contracta results in less flow through a given orifice than a piece with a rounded entrance.

Fig. 26.0

BEST

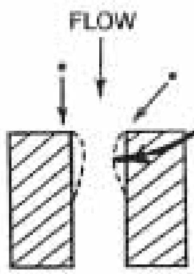


The particle of fuel coming straight down a bit off to the left or in at an angle at the right both find their way into the orifice, see Fig. 26.0.

This design is the least sensitive to machine marks, but the blend of the radius to the orifice is very important. Not easily damaged, as nicks from handling tend to be on the top surface.

Fig. 26.1

FAIR

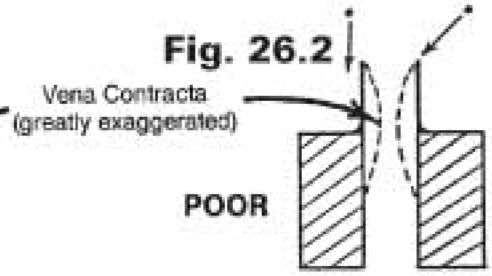


The particle a bit off to the left tends to hit the top surface; may bounce off to the left, or into the orifice. The particle coming in from the right will go into the orifice, see Fig. 26.1.

This design is quite difficult to make as the sharp edge must be the same on all the orifices, with no nicks. It is easily damaged by nicking the edge.

Fig. 26.2

POOR



The particle a bit off to the left will not enter the orifice. The particle coming in from the right may not enter the orifice, see Fig. 26.2.

This design would never really be seen in a jet, but it is exactly like a ramtube without a bell. The top edge is easily damaged.

FLOW THROUGH AN ORIFICE:

Pressure rises as the square of the flow through an orifice, so to double the flow through a jet or nozzle takes four times the pressure, see Fig. 27.0:

$$\text{New Press} = \text{Old Press} \times \left(\frac{\text{New Flow}}{\text{Old Flow}}\right)^2$$

Knowing the flow of a jet or nozzle at some pressure, the flow at a new pressure can be calculated:

$$\text{New Flow} = \text{Old Flow} \times \sqrt{\frac{\text{New Press}}{\text{Old Press}}}$$

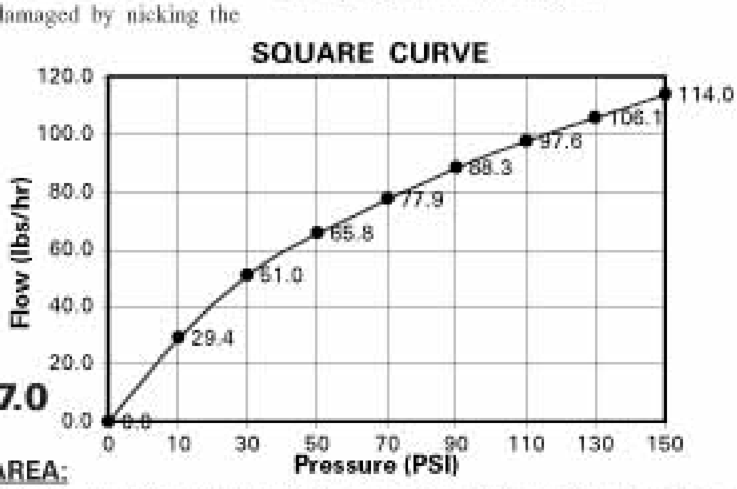


Fig. 27.0

UNDERSTANDING AN ORIFICE — DIAMETER VERSUS AREA:

The flow of an orifice CAN NOT be interpolated by the ratio of the diameter, an .080" diameter orifice does not flow twice that of a .040".

The diameter can be converted by the formula: flow can be interpolated by the ratio of the area in square inches of an orifice.
(radius x radius) x 3.14159 (Pi) = area

The area of .040" is .001257 in² and .080" is .00527 in²

$$\frac{.005027 \text{ in}^2 \text{ (.080" dia.)}}{.001257 \text{ in}^2 \text{ (.040" dia.)}} = 3.999 \text{ ratio}$$

So an .080" diameter orifice flows 3.999 times more than a .040" diameter orifice.

This fomula can be used for Kinsler's electric enrichment or lean-out valve.
Example for lean-out valve; If a .116" main jet is good for the basic mid-range and .124" is best when on transbrake, two-step, etc.
You can calculate the K-jet for the lean-out by the following:
.012076 in² (area of .124") - .010568 in² (area of .116") = .001508 in² (the difference in area of the two jets).
Which converts back to a .044" diameter jet.

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