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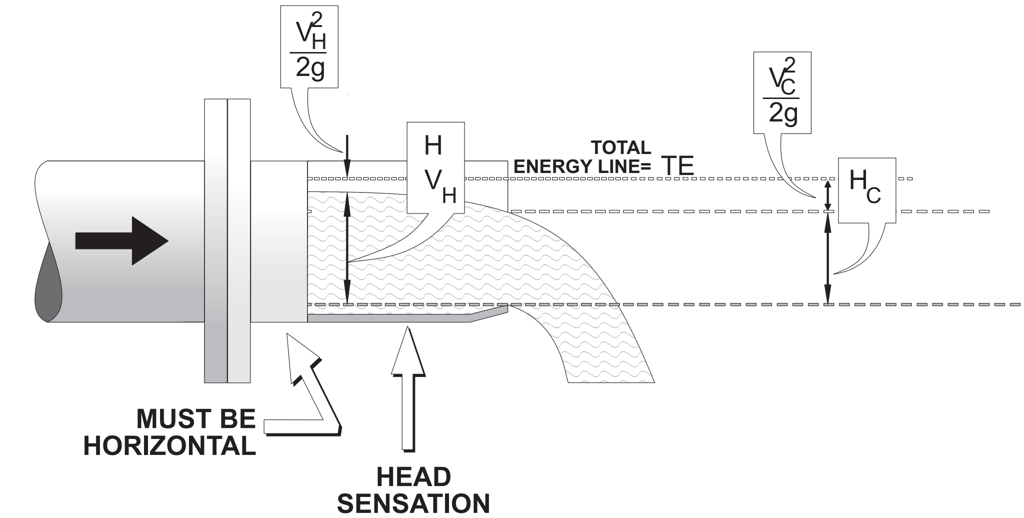
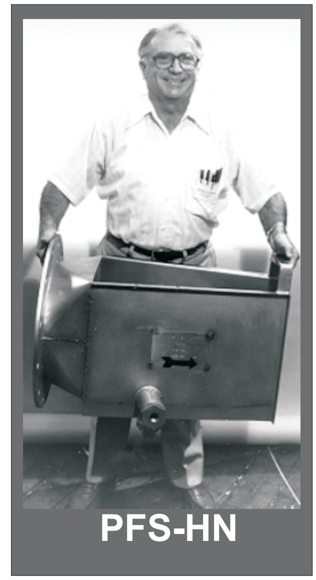
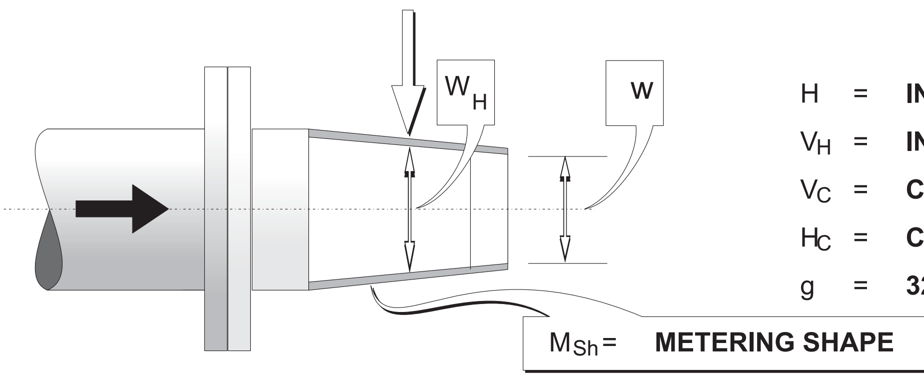
The Halmi Nozzle
Flowmetering Mechanism-The Idealized Case.







H	=	**INLET HEAD, FT**
V_H	=	**INLET VELOCITY, FT/SEC**
V_C	=	**CRITICAL VELOCITY, FT/SEC**
H_C	=	**CRITICAL HEAD, FT.**
g	=	**32.174 FT/SEC^2**

- $TE = H + \frac{V_H^2}{2g} = H_C + \frac{V_C^2}{2g}$
- $TE = 2/3 \left[H + \frac{V_H^2}{2g} \right]$
- $CFS_{ideal} = 3.0876 \left[H + \frac{V_H^2}{2g} \right]^{1.5} w$
- $TE = H + \frac{V_H^2}{2g} = H_C + \frac{V_C^2}{2g}$
- $CFS_{real} = CFS_{ideal}$ + REAL FLOW EFFECTS
- $CFS = H\, V_H W_H = H_C V_C\, w$
- $V_C = \sqrt{2/3\, g \left[H + \frac{V_H^2}{2g} \right]}$
- $CFS_{base} = 3.0876\, H^{1.5}\, w$
- $TE = H + \frac{V_H^2}{2g} = H_C + \frac{V_C^2}{2g}$

Or In Practice:

- $CFS_{real} = CFS_{base} \times CFS_{real} + \left[\begin{matrix} C \\ \text{Accuracy} \end{matrix} \right]$

- CFS_{real} = REAL DISCHARGE COEFFICIENT = $\frac{CFS_{real}}{3.0876\, H^{1.5} w}$

- C_F = FLOW CALIBRATED C = C_{real} + FLOW CALIBRATION ERRORS
- C_B = BENCH CALIBRATED C = C_{real} + FLOW CALIBRATION ERRORS + BENCH CALIBRATION ERRORS
- A_F = FLOW CALIBRATED C ACCURACY = ESTIMATE OF FLOW CALIBRATION ERRORS
- A_B = BENCH CALIBRATED C ACCURACY = A_F + BENCH CALIBRATION ERRORS

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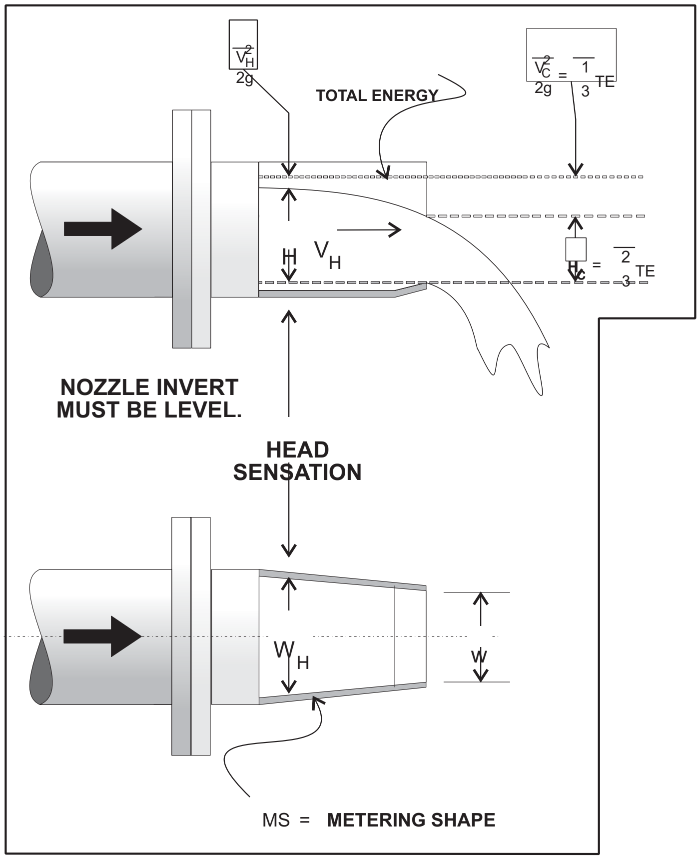
Figure 1: The Halmi Nozzle(PFS-HN) Flowmetering Mechanism



- $CFS = H\,V_H W_H = H_C V_C\,w$
- $TE = H + \frac{V_H^2}{2g} = H_C + \frac{V_C^2}{2g}$
- $H_C = \frac{2}{3}\left[H + \frac{V_H^2}{2g}\right]$
- $V_C = \sqrt{\frac{2}{3}g\left[H + \frac{V_H^2}{2g}\right]}$
- $CFS_{ideal} = 3.0876\left[H + \frac{V_H^2}{2g}\right]^{1.5} w$
- $CFS_{base} = 3.0876\,H^{1.5}\,w$
- C = DISCHARGE COEFFICIENT = $\frac{CFS_{real}}{3.0876\,H^{1.5}w}$
- $CFS_{real} = CFS_{ideal}$ + REAL FLOW EFFECTS
- ***Or In Practice:*** $CFS_{real} = CFS_{base} \times C \pm \left[C\ \text{Accuracy}\right]$

- C_F = FLOW CALIBRATED C = C_{real} + FLOW CALIBRATION ERRORS
- C_B = BENCH CALIBRATED C = C_{real} + FLOW CALIBRATION ERRORS + BENCH CALIBRATION ERRORS
- A_F = FLOW CALIBRATED C ACCURACY = ESTIMATE OF FLOW CALIBRATION ERRORS
- A_B = BENCH CALIBRATED C ACCURACY = A_F + BENCH CALIBRATION ERRORS

W_H = **WIDTH AT HEAD SENSATION CROSS SECTION, ft**

w = **WIDTH AT NOZZLE DISCHARGE, ft**

TE = **TOTAL ENERGY SENSED, ft**

H = **INLET HEAD, ft**

V_H = **INLET VELOCITY, ft/s**

V_C = **CRITICAL VELOCITY, ft/s**

H_C = **CRITICAL HEAD, ft**

g = **32.174 ft/s^2**

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