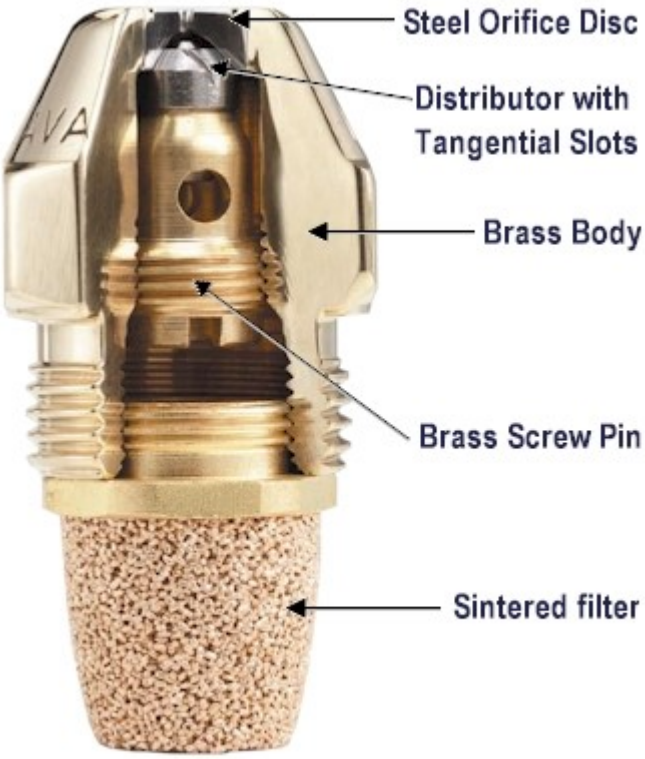
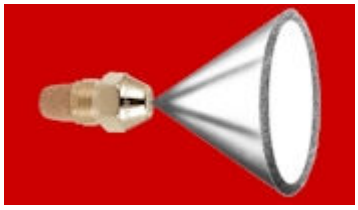
THE INSIDE STORY

At the forefront of nozzle development, Delavan created its nozzle using bi-metal construction. The Brass body and stainless steel metering parts permit machining to close tolerances for precision and consistently high performance. Brass transmits heat fast from the nozzle face to reduce the possibility of varnish and oil residue buildup. Stainless steel provides that extra durability for metering parts where wear is a factor.

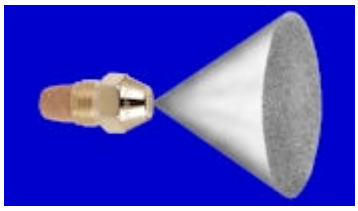


THE BIG THREE



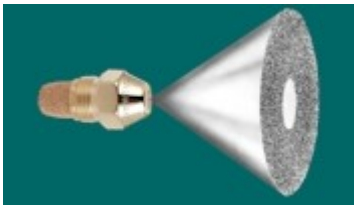
TYPE A - HOLLOW-CONE (RED)

Type A nozzles are mainly used on burners with a hollow cone air pattern and for throughputs up to 2.00 GPH. The droplet distribution is concentrated on the outside of the cone and results in good ignition and low-noise combustion.



TYPE B - SOLID-CONE (BLUE)

Type B nozzles produce a spray that distributes droplets fairly uniformly throughout the complete pattern. The spray pattern becomes progressively more hollow at higher flow rates, particularly above 8.00 GPH. Provides smooth ignition and efficient combustion, particularly in larger burners.

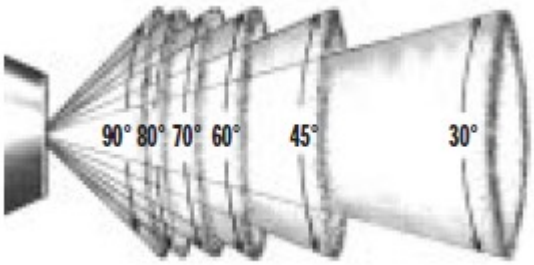


Type W - ALL PURPOSE (GREEN)

Type W nozzles are neither truly hollow nor solid. These nozzles frequently can be used in place of either solid or hollow cone nozzles between 0.40 and 8.00 GPH, regardless of the burner's air pattern. The lower flow rates tend to be more hollow. Higher flow rates tend to be more solid.

SPRAY ANGLE

Spray angles are available from 30◦ through 90◦ in most nozzle sizes to meet the requirements of a wide variety of burner air patterns and combustion chambers.
Usually it is desirable to fit the spray angle to the air pattern of the burner. In today's flame retention burner, it is possible to fire more than one spray angle with good results. Generally, round or square combustion chambers should be fired with 70◦ to 90◦ nozzles. Long, narrow chambers usually require 30◦ to 60◦



FLOW RATE

Atomizing nozzles are available in a wide range of flow rates, all but eliminating the need for specially calibrated nozzles. Between 1.00GPH and 2.00GPH, for example, seven different flow rates are available. Generally, with hot water and warm air heat, the smallest firing rate that will adequately heat the house on the coldest day is the proper size to use and the most economical.

PROPER FLOW RATES

The proper size nozzle for a given burner unit is sometimes stamped on the nameplate of the unit.
The following guidelines may be used for determining the proper flow rates:

If the unit rating is given in BTU per hour input, the nozzle size may be determined by…

$$\text{GPH} = \frac{\text{BTU INPUT}}{140{,}000}$$

If the unit rating is given in BTU output…

$$\text{GPH} = \frac{\text{BTU OUTPUT}}{(\text{efficiency \%}) \times 140{,}000}$$

On a steam job, if the total square feet of steam radiation, including piping, is known…

$$\text{GPH} = \frac{\text{TOTAL SQ.FT. OF STEAM} \times 240}{(\text{efficiency \%}) \times 140{,}000}$$

If the system is hot water operating at 180◦ and the total square feet of radiation, including piping, is known…

$$\text{GPH} = \frac{\text{TOTAL SQ.FT. OF HOT WATER} \times 165}{(\text{efficiency \%}) \times 140{,}000}$$

EFFECT OF VARIABLES ON ATOMIZATION

Oil Viscosity

The viscosity of domestic fuels generally supplied today is very satisfactory with few exceptions. Any fuel, however, stored above ground in -20◦F weather will be very viscous until it is warmed up. With any high viscosity fuel, the spray pattern of the nozzle tends to collapse or become narrower, resulting in a long, narrow fire. This is corrected by:

- Increasing pump pressure to 120-125
- Add #1 oil to the tank

High viscosity also causes the flow through the nozzle to increase due to the geometric design of an oil burner.

EFFECT OF PRESSURE ON FLOW RATE

Pressure (PSI)	100	125	150	200	250	300
Flow Rate Factor	1.00	1.12	1.23	1.41	1.58	1.73

NOTE: for other nozzle sizes multiply flow rate by factor given for the pressure. Do not use pressure less than 100psi.

FLOW RATE: mean droplet size is larger with higher flow rates. This is the reason for using double and triple adaptors. The smaller droplets with 2 or 3 smaller nozzles give a shorter fire.

SPRAY ANGLE: wider spray angles produce slightly smaller mean droplet diameter than the narrower angles in the same flow rate.

Burner Manufacturer's Recommendations*

Manufacturer	Model	Delavan Nozzle	
Aero Burner	F-AFC	80° W, A or B	
	HF-US	80° W, A or B	
	HF-AFC	80° W, A or B	
	SV-SSV	70° or 80° B	
R.W. Beckett	AF/FG (F)	60°, 70° or 80° A or B (100-150 PSI)	
	AF/AFG (M)	60° or 70° A or B (100-150 PSI)	
	AFII (FB)	45°, 60° or 70° A, W or B (140-200 PSI)	
	AF II (HLX)	45°, 60° or 70° A, W or B (140-200 PSI)	
The Carlin Co.	99 FRD (Std.)	.50-.75 GPH	60°A
		.85-3.00 GPH	45°A, 60°A or B
	100 CRD (Std.)	.50-.75 GPH	60°A
		.85-2.25 GPH	45°A, 60°A or B
		.75-1.10 GPH	60°
	Elite EZ-1	.50-1.00 GPH	70°A
		.50-.85 GPH	60° SS
		1.00-1.65 GPH	60° or 70°
	Elite (EZ-2,3)	All Flow Rates	60° A, B or SS
Riello Burners	Mectron 3M 5M	600 W, B, or Del-O-Flo A (Up to to .85 GPH)	
	F3, F.5	.40-1.25 GPH	60° or 80° W or A
	F10	1.25-2.50 GPH	60° or W or B
	F15, F20	2.00-5.00 GPH	45° or 60° W or B
	R35.3, R35.5	.50-1.25 GPH	60° or 80° W or B
	Press Series	2.00-12.00 GPH	60° or 45° B or W
Intertherm	MAC 1265	P/N 6601-181 or .55 GPH 90° W or .579 MH	
	MSH 066	.50 - 80°A	
	MSH 086	.65 - 80° A	
Wayne Home Equipment	P100	.50-1.00 GPH	60°, 70°, 80° A or B
	EHASR	.75-3.00 GPH	80°, 70°, 60° **
	MSR	.75-2.75 GPH	80°, 70°, 60° **
	HS	.50-2.50 GPH	80°, 70°, 60° **
	HS	.50-3.00 GPH	80°, 70°, 60° B
	EG-1	.50-3.00 GPH	88°, 70°, 60° **
		**Under 1.00 GPH use A; above 1.00 use B.	
Weil-Mclain	QB180 (150 PSI)	.55-1.80 GPH	45°, 60°, 70°, 80° A or B
	QB300 (140 PSI)	1.75-3.00 GPH	45°, 60°, 70°, 80° B

*Effective February 1997. Subject to updating by burner manufacturers. For models not listed, contact burner manufacturer. Always follow the appliance manufacturer's instructions for the correct nozzle specification.

Nozzle Interchange

Delavan Recommended Interchange

Nozzle Interchange Chart	
Spray Angles 30° through 90°	
HAGO/SID HARVEY	**DELAVAN**
H	A
SS (up to 2.0)	SS
SS (over 2.0)	A or W
ES/P	B*
B	B*
MONARCH	**DELAVAN**
NS/PL	A
R/AR (up to 2.0)	R-D/AR-D
R/AR (over 2.0)	A/A or W
PLP	B*
DANFOSS	**DELAVAN**
AS	W or B
AH	A