

#### **HO NOZZLES**

The HO series is offered to meet the requirement for Nozzles to be used on higher viscosity oils at elevated operating pressures. It is a redesignation of the PLP-HO, PL-HO and R-HO series to simplify specifications for ordering. These Nozzles (as with all Monarch Nozzles) are stamped with their nominal flow rate at 100 PSIG on No. 2 fuel oil and are available in capacity sizes from 1.00 through 100.0 GPH.

200 PSI: When regular light oil Nozzles are used on more viscous oil, their sprays tend to "flutter", they produce a narrower spray angle and often develop streaks in the spray. Accordingly, the standard "HO" Nozzles are specially tested for spray quality and rated for spray angle at a pressure of 200 PSIG (14 bars) on 70 SSU (13 Centistoke) operating viscosity oil. This special testing assures that the Nozzles will perform properly under heavy oil operating conditions.

430 PSI: For very high pressure operation, the HO Nozzles are also tested for spray angle and spray quality at 430 PSIG (30 bars) on 70 SSU operating viscosity oil. The special additional testing is necessary to be sure that no streaks, voids, or flutter appear in the spray at these pressures that would not appear at 200 PSIG.

The accompanying chart shows approximate flow rates when operating from 200 PSIG through 450 PSIG on 70 SSU operating viscosity oil, specific gravity .846. Note that the nominal flow rates stamped on the Nozzles are based on 100 PSIG using U.S. No. 2 fuel oil, subject to a flow tolerance of plus or minus 5%. Flow rates shown at 300 PSIG on 70 SSU operating viscosity oil are from actual tests. Flow rates at higher and lower pressures are rates predicted from the 300 PSIG data. Actual flow rates may vary, depending on exact operating conditions.

Nozzles for operation at 200 PSIG are available in 45°, 60° and 80° spray angles in sizes of 2.25 GPH up to and including 45.00 GPH, and sizes of 50.00 GPH and up are available only in 60° and 80°. Nozzles for operation at 430 PSIG are available in 45°, 60° and 80° in sizes 1.00 GPH up to and including 45.00 GPH. Sizes of 50.00 GPH and up are available only in 80°. Strainers are not included with Nozzles but 120 mesh Monel Strainers may be ordered separately. Strainers are specifically not recommended for use on sizes over 50.00 GPH, as restriction may occur.

Ordering: Specify flow rate, spray angle, Series (HO) and quantity desired. If adaptors or 120 mesh strainers are desired they must be ordered separately.

NOMINAL RATING #2 FUEL	U.S. Gallons Per Hour on 70 SSU Operatin Viscosity Oil Line Pressure (PSIG)						
100 PSIG	200	250	300	350	400	430	450
1.00 1.20 1.25 1.35 1.50	Not Recommended		1.91 2.14 2.45 2.70 2.90	2.06 2.31 2.60 2.90 3.15	2.21 2.47 2.80 3.10 3.35	2.29 2.56 2.90 3.25 3.50	2.34 2.62 3.00 3.30 3.55
1.50 2.00 2.25	2.90 3.90	3.25 4.35	3.15 3.50 3.55 4.75	3.40 3.80 3.85 5.15	4.05 4.10 5.50	4.20 4.25 5.70	3.85 4.30 4.35 5.80
2.50	4.10	4.60	5.05	5.45	5.80	6.00	6.15
3.00	4.85	5.45	5.95	6.45	6.85	7.10	7.30
3.50	5.80	6.45	7.10	7.65	8.20	8.50	8.65
4.00	6.60	7.40	8.10	8.75	9.35	9.70	9.95
4.50	6.75	7.55	8.25	8.90	9.55	9.90	10.10
5.00	7.45	8.35	9.15	9.85	10.55	10.95	11.20
5.50	8.3	9.3	10.2	11.0	11.8	12.2	12.5
6.00	9.5	10.6	11.6	12.5	13.4	13.9	14.2
6.50	10.0	11.3	12.3	13.3	14.2	14.8	15.1
7.00	10.6	11.8	12.9	14.0	14.9	15.5	15.9
7.50	11.3	12.6	13.9	15.0	16.0	16.6	17.0
8.00	11.4	12.8	14.0	15.1	16.2	16.8	17.1
8.50	11.7	13.1	14.3	15.4	16.5	17.1	17.5
9.00	12.7	14.1	15.5	16.7	17.9	18.6	19.0
9.50	13.6	15.2	16.6	17.9	19.2	19.9	20.3
10.50	14.1	15.8	17.3	18.7	20.0	20.7	21.2
12.00	15.8	17.7	19.4	20.9	22.4	23.2	23.7
13.50	18.3	20.4	22.4	24.2	25.9	26.8	27.4
15.50	21.2	23.7	26.0	28.1	30.0	21.1	31.8
17.50	25.5	28.5	31.2	33.7	36.1	37.4	38.2
19.50	27.3	30.2	33.1	35.8	38.2	39.7	40.6
21.50	30.3	33.5	36.7	39.7	42.4	4.0	45.0
24.0	35.1	39.3	43.0	46.5	49.7	51.5	52.7
28.0	41.7	46.6	51.0	55.1	58.9	61.1	62.5
30.0	45.0	50.3	55.1	59.5	63.6	66.0	67.5
35.0	49.7	55.5	60.8	65.7	70.2	72.8	74.5
40.0	59.1	66.1	72.4	78.2	83.6	86.6	88.6
45.0	65.2	72.9	79.9	86.3	92.2	95.6	97.8
50.0 55.0 60.0 70.0	66.5 74.5 85.5	74.4 83.5 95.5	81.5 91.5 104.5	88.0 99.0 113.0	94.1 10.55 120.5	97.6 107.5 125.0	99.8 112.0 128.0
80.0	107.5	1205	132.0	142.5	152.5	158.0	161.5
90.0	119.0	133.0	145.5	157.0	168.0	174.0	178.0
100.0	135.0	151.0	165.0	178.5	190.5	198.0	202.5

Specifications: Tip, disc and locknut fabricated of high chrome, heat resisting stainless steel.

## Flow Rates

Test Oil Specifications: U.S. No. 2 FUEL OIL: 4-36 SSU @ 1000 F.

32-38 API Gravity @ 60oF

HEAVY OIL: 66-77 SSU Operating Viscosity

Oil, 34-36 API Gravity @ 60oF

Flow Tolerance: +/\_ 5% from stamped nominal rating @ 100

PSIG on U.S. No. 2 Fuel Oil as specified at left.

# Only Monarch completely tests each and every nozzle...

## ...individually.

Sure , other manufacturers may say they test every nozzle. We know better and so should you. Only Monarch invests the time and money to perform 100% testing. That means each and every nozzle we make without exception. It's simply impossible to buy a Monarch nozzle that hasn't been tested and passed by our testing experts.



Only Monarch tests each and every nozzle in oil and under pressure in these five ways:



#### 1. Flow Rate/Capacity.

One by one, nozzle tips are tested at 100psi against calibrated matter samples. Flow must register within strict limits.



#### 2. Spray Angle.

Our testers check every nozzle to be certain it's spray angle is within tolerance. Whether 30° or 90° or any angle in between is called for, Monarch nozzles meet all burner manufacturer's recommendations.



#### 3. Spray Balance.

The nozzle is rotated 360° to be observed from every direction. Testers assure that the spray is symmetrical about its axis.



#### 4. Spray Quality.

A high intensity light is used to illuminate the spray. If shadows or streaks are observed, if there is a speck of dirt or surface defect at the orifice...that nozzle is rejected.



#### 5. High Pressure Flutter.

Pressure is boosted to 150 psi to magnify any defect and to be certain there is no pulsation or "flutter" that might otherwise escape detection. If our nozzles are "perfect" at both 100 and 150 psi, you can be certain they will perform for you.

At Monarch, we even have supervisors whose job is to test our testers. On a regular basis, they retest the output of every tester to make certain inferior nozzles don't slip through our system.

Finally, at the packing and shipping point, orders are double-checked for accuracy and completeness. Each and every nozzle is examined once more to make sure it is clearly stamped with capacity, spray angle, and spray pattern designation.

### That's what we mean by complete 100% testing!