

## PROPER FUEL INJECTOR SELECTION INFORMATION

Choosing the proper fuel injector size is critical for the successful use of an electronic fuel injection system whether it be a TBI or Multi-port system. If an injector is too small, not enough fuel will be available when tuning an engine and damage can result. If an injector is selected that is much larger than is needed, the injector pulse width (time the injector is open) at idle may be too low and tuning problems at idle may occur.

**Use the following information as a guide for selecting the correct injectors for an engine:**

Formulas used to determine injector size:

$$\text{Injector Size} = \frac{(\text{Engine HP (Flywheel)}) \times (\text{BSFC})}{(\# \text{ of injectors}) \times (\text{Duty Cycle})}$$

**Injector Size** Flow rate in lbs/hr

**Engine HP** Maximum horsepower at the flywheel

**BSFC** Brake Specific Fuel Consumption (BSFC) is the lbs. of fuel an engine consumes per HP per hour. It is simply a measure of how efficiently an engine is at converting fuel to horsepower. It is very important to use a BSFC number that is close to your actual number. If it is not, the injector will be too small or larger than is necessary.

General guidelines when choosing a BSFC number:

Low to medium performance street engines: 0.50-.55  
 Performance engines with good cyl. heads: 0.45-.50  
 Race engines with very efficient cyl. heads: 0.38 - 0.45  
 Supercharged and Turbocharged engines: 0.55 - 0.65

Supercharged and Turbocharged engines run at richer air/fuel ratios that raise the BSFC number. They require larger injectors for the same horsepower as a naturally aspirated engine.

Add 0.05 for marine applications, as they need to run richer than a comparable automotive application due to continuous wide open throttle use.

**Duty Cycle** The duty cycle is the maximum amount of time you want the injectors to be open at a certain horsepower and injector size. Under most circumstances

you don't want an injector to be open more than 90% of the time at the most. Marine applications shouldn't exceed 80%. Injectors are rated at 100% duty cycle (static flow).

Later on if you want to increase the the engine HP, take that into account when entering the HP number.

When calculating injector size, round up to the next nearest size needed. For example if you calculate 26 lb/hr and have a 24 lb/hr and a 30 lb/hr to choose from, select the 30 lb/hr injector.

### Examples

400 HP street engine  
 Number of injectors = 8

$$\text{Injector size} = \frac{(400 \text{ HP}) \times (0.5 \text{ BSFC})}{(8 \text{ injectors}) \times (0.9)} = 27.7 \text{ lb/hr}$$

600 HP Supercharged engine  
 Number of injectors = 8

$$\text{Injector size} = \frac{(600 \text{ HP}) \times (0.57 \text{ BSFC})}{(8 \text{ injectors}) \times (0.9)} = 47.5 \text{ lb/hr}$$

The following chart provides maximum horsepower levels based on injector size and various BSFC values. Note that this is at 100% duty cycle and 43.5 psi; raising the fuel pressure will increase the maximum horsepower.

Inj. Size	Max. HP at given BSFC (100% duty cycle, 43.5 PSI)				
	0.4	0.45	0.5	0.55	.06
14	280	250	225	203	186
19	380	337	304	276	253
24	480	426	384	349	320
30	600	533	480	436	400
36	720	640	576	523	480
42	840	746	672	610	560
50	1000	888	800	727	666
55	1100	977	880	800	733
65	1300	1155	1040	945	866
75	1500	1333	1200	1090	1000
85	1700	1511	1360	1236	1133
95	1900	1688	1520	1381	1266