



## Injector Flows

The best guide to the flows of different injectors that we can find.

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We've found detailed specs for nearly 100 different injectors and summarised that information in a single comprehensive table. The information is rare and useful! So why would you want to know all of the stuff in the table anyway? It's damn important to know injector flow rates when you are sizing injectors for either a new system or an upgrade to an existing system. The flow rates shown in the table are those achieved at 100 per cent duty cycle, that is, with the injectors held fully open. In a well-sized system the injector duty cycle should not rise this high - a duty cycle maximum of about 90 per cent or so is about right.

For example, the Bosch 0 280 150 100 is listed as flowing a maximum of 185cc (cubic centimetres or millilitres) per minute when tested at a fuel pressure of 300kPa (~43psi).

So, how much power is this injector good for? That depends on the air/fuel ratio that is used, but a good rule of thumb is to divide this flow figure by 5 to get a hp capability. So, 185cc divided by 5 = 37hp maximum fuel flow with this injector. If you want to be pedantic, it's the mass of the fuel (not the volume) which is the critical factor. Assuming a "normal" fuel density, the mass of the fuel in pounds per hour can be worked out by multiplying the cc per minute figure by 10.2. For this Bosch injector, that gives a mass flow of 18.1 pounds/hour. To convert from pounds/hour to horsepower capability, multiply the figure by 2.04. So 18 pounds/hour multiplied by 2.04 gives a horsepower capability of 37hp - the same as we got from the cc/minute figure.

Incidentally, if all of this mixing of units (pounds/hour, cc/minute, hp, kPa and psi) gives you the horrors, don't worry about using them all. Instead just pick the system you're happiest with (eg cc/minute and hp) and stick to that.

The power ratings discussed above are for **each** injector. This means that you need to multiply this rating by the number of injectors that are to be used. So, if you were using the Bosch 0 280 150 100 injectors in an eight cylinder engine (with one injector per cylinder) the max power that the injectors could deliver fuel for would be about 300hp.

In addition to the variations in fuel flow from injector to injector, you will also notice that the injector resistance (ohms) varies. Injectors fall into two broad classes in terms of their coil resistance - "low" and "high". Low resistance injectors have 2-3 ohm coils, while high resistance injectors are up around 14-16 ohms. If you are upgrading a car to larger injectors, the new injectors should be of the same resistance class as those being replaced. If you are fitting programmable management, you must make sure that the ECU will be happy with the coil resistance of the injectors that you have selected.

Note also that injectors vary substantially in their size and shape. Some cars run side-feed injectors, while others are end-feed O-ring types, where the fuel rail holds the injectors in place. Still others use barbed hose fittings. Unless you are prepared to do custom machining and fabrication work, you need to be aware of the required injector size and shape before you make the selection. Finally, injector wiring plugs also vary; however, it's usually not much drama to wire in new plugs - assuming that you can get them!

The following table is provided courtesy of **Advanced Engine Management**, the makers of Wolf programmable systems. They have collated the test results of nearly 100 different injectors. You'll find lots more interesting information on fuel injection and the Wolf range at <http://www.wolfems.com.au>

A final note: the data in the following table is provided only as a guide. When installing new injectors you should always proceed with care, testing flow rates and measuring actual air/fuel ratios if you are at all unsure of the injectors that you have selected.

If you have any information that would help in increasing the quality of this data base, please email Advanced Engine Management at [steve@aems.com.au](mailto:steve@aems.com.au) Providing additional accurate information will help everyone!

## Conversions

- 500cc per minute is approximately equal to 49lbs per hour which is equal to approximately 100hp.
- lbs/hour = cc per minute / 10.2
- lbs per hour = HP / 2.04
- cc per minute = lbs per hour x 10.2
- cc per minute = HP x 5
- HP = cc per minute / 5
- HP = lbs per hour x 2.04

## Fuel Injector Flow Rates

Injectors listed by flow rate, from lowest to highest

Manufacturer Part Number	cc per minute	Colour	Ohms	lbs per hour	Est. hp. each	Test Press. kPa	Vehicles	Engine
Bosch 0 280 150 208	133			13.0	26.6	300	BMW	323
Bosch 0 280 150 716	134			13.1	26.8	300		
Nippon Denso	145	light green	2.4	14.2	29.0	255	Toyota	4KE
Nippon Denso	145	green	2.4	14.2	29.0	255	Toyota	1GE
Bosch 0 280 150 211	146			14.3	29.2	300		
Lucas 5207007	147			14.4	29.4	270	Ford	1.6L
Lucas 5206003	147			14.4	29.4	300		Startlet
Bosch 0 280 150 715	149			14.6	29.8	300		
Nippon Denso	155	red/ dark blue	13.8	15.2	31.0	290	Toyota	3EE
Nippon Denso	155	violet	13.8	15.2	31.0	290	Toyota	3EE, 2EE
Nippon Denso	155	sky-blue	13.8	15.2	31.0	290	Toyota	1GFE
Nippon Denso	155	violet	13.8	15.2	31.0	290	Toyota	4AFE
Lucas 5207003	164			16.1	32.8	300	Buick	3.0
Lucas 5208006	164			16.1	32.8	250	Renault	
Bosch 0 280 150 704	170			16.7	34.0	300		
Bosch 0 280 150 209	176			17.3	35.2	300	Volvo	B200,B230
Nippon Denso	176	light green	13.8	17.3	35.2	290	Toyota	4AFE
Nippon Denso	176	grey	13.8	17.3	35.2	290	Toyota	4AFE
Bosch 0 280 150 121	178			17.5	35.6			
Nippon Denso	182	dark grey	2.0	17.8	36.4	255	Toyota	4AGE
Nippon Denso	182	grey	2.4	17.8	36.4	255	Toyota	4ME,5ME, 5MGE
Bosch 0 280 150 203	185			18.1	37.0			
Bosch 0 280 150 100	185			18.1	37.0	300		
Bosch 0 280 150 114	185			18.1	37.0			
Bosch								

0 280 150 116	185			18.1	37.0			
Bosch 0 280 150 125	188			18.4	37.6			
Lucas 5207002	188			18.4	37.6	250	Chev	5.0L
Lucas 5204001	188			18.4	37.6	250	Fiat	
Lucas 5208003	188			18.4	37.6	250	Alfa	
Lucas 5206002	188			18.4	37.6	250	Toyota	
Lucas 5208007	188			18.4	37.6	250	BMW	325E
Lucas 5202001	188			18.4	37.6	250	914	1.8L
Lucas 5208001	188			18.4	37.6	250	Nissan	280ZX
Bosch 0 280 150 614	189			18.5	37.8	300		
<b>Manufacturer Part Number</b>	<b>cc per minute</b>	<b>Colour</b>	<b>Ohms</b>	<b>lbs per hour</b>	<b>Est. hp. each</b>	<b>Test Press. kPa</b>	<b>Vehicles</b>	<b>Engine</b>
Lucas 5207013	201			19.7	40.2	270	Jeep	4.0L
Nippon Denso	200	dark grey	1.7	19.6	40.0	290	Toyota	3SFE
Nippon Denso	200	beige	1.7	19.6	40.0	290	Toyota	4YE
Nippon Denso	200	orange	1.7	19.6	40.0	290	Toyota	22RE
Nippon Denso	200	brown	1.7	19.6	40.0	290	Toyota	3VZE
Nippon Denso	200	pink	2.7	19.6	40.0	290	Toyota	4AGE
Nippon Denso	200	dark blue	13.8	19.6	40.0	290	Toyota	3SFE
Nippon Denso	200	orange/ blue	13.8	19.6	40.0	290	Toyota	22RE
Nippon Denso	200	brown	13.8	19.6	40.0	290	Toyota	3VZFE
Nippon Denso	200	red	13.8	19.6	40.0	290	Toyota	2VZFE
Nippon Denso	210	blue	2.4	20.6	42.0	255	Toyota	4AGE
Nippon Denso	213	sky blue	13.8	20.9	42.6	290	Toyota	3FE
Nippon Denso	213	beige	13.8	20.9	42.6	290	Toyota	4AGE
Nippon Denso	213	yellow	13.8	20.9	42.6	290	Toyota	5SFE
Bosch 0 280 150 706	214			21.0	42.8	250		
Bosch 0 280 150 712	214			21.0	42.8	250	Saab	2.31 Turbo
Bosch 0 280 150 762	214			21.0	42.8	300	Volvo	B230F
Bosch 0 280 150 157	214			21.0	42.8	250	Jaguar	4.2L
Lucas 5207011	218			21.4	43.6	300	Chev	5.7L
Bosch 0 280 150152	230			22.5	46.0	?	Alfa	Turbo
Bosch 0 280 150 201	236			23.1	47.2	300		

Lucas 5208005	237			23.1	47.2	250	Chrysler, BMW	
Lucas 5208004	237			23.1	47.2	250	Ford	98CID
Bosch 0 280 150 151	240			23.5	48.0	?	BMW	633
Nippon Denso	250	yellow/ orange	1.7	24.5	50.0	255	Toyota	22RTE
Nippon Denso	250	green	13.8	24.5	50.0	290	Toyota	4AGE
Nippon Denso	250	violet	13.8	24.5	50.0	290	Toyota	4AGE
Nippon Denso	250	brown	13.8	24.5	50.0	255	Toyota	3SGE
Nippon Denso	251	violet	13.8	24.5	50.2	290	Toyota	1UZFE
Bosch 0 280 150 001	265			26.0	53.0	300		
Bosch 0 280 150 002	265			26.0	53.0	300		
Bosch 0 280 150 009	265			26.0	53.0	300		
Nippon Denso	282	light green	13.8	27.6	56.4	290	Toyota	2RZE
Nippon Denso	282	violet	13.8	27.6	56.4	290	Toyota	2TZFE
Bosch 0 280 150 802	284			27.8	56.8	300	Volvo, Renault	B200Turbo, J7R Turbo
Nippon Denso	295	yellow	2.7	28.9	59.0	255	Toyota	7MGE
Nippon Denso	295	pink	1.6	28.9	59.0	255	Toyota	22RTE
Nippon Denso	295	green	13.8	28.9	59.0	255	Toyota	3SGE
Bosch 0 280 150 811	298			29.2	59.6	350	Porsche	944 Turbo
<b>Manufacturer Part Number</b>	<b>cc per minute</b>	<b>Colour</b>	<b>Ohms</b>	<b>lbs per hour</b>	<b>Est. hp. each</b>	<b>Test Press. kPa</b>	<b>Vehicles</b>	<b>Engine</b>
Bosch 0 280 150 200	300			29.4	60.0	300	BMW	
Bosch 0 280 150 335	300			29.4	60.0	300	Volvo	B230 Turbo
Bosch 0 280 150 945	300	red/ brown		29.4	60.0		Ford	MotorSport
Nippon Denso	315	pink	13.8	30.9	63.0	290	Toyota	3SGE
Nippon Denso	315	light green	13.8	30.9	63.0	290	Toyota	7MGE
Bosch 0 280 150 804	337			33.0	67.4	300	Peugot	505 Turbo
Bosch 0 280 150 402	338			33.1	67.6	300	Ford	
Bosch 0 280 155 009	346			33.9	69.2	300	Saab Turbo	
Bosch 0 280 150 951	346			33.9	69.2	300	Porsche	
Nippon Denso	365	red/ orange	2.9	33.9	73.0	255	Toyota	4AGZE
Bosch 0 280 150 003	380			37.3	76.0	300		
Bosch 0 280 150 015	380			37.3	76.0	300		
Bosch 0 280 150 024	380			37.3	76.0	300	Volvo	B30E

Bosch 0 280 150 026	380			37.3	76.0	300		
Bosch 0 280 150 036	380			37.3	76.0	300	MB	4.51
Bosch 0 280 150 043	380			37.3	76.0	300	BMW	
Bosch 0 280 150 814	384			37.6	76.8	300		
Bosch 0 280 150 834	397			38.9	79.4	300		
Bosch 0 280 150 835	397			38.9	79.4	300	Chrysler	
Nippon Denso	430	black	2.9	42.2	86.0	255	Toyota	7MGTE, 3SGTE
Bosch R 280 410 144	434			42.5	86.8	300	Bosch R Sport	
Bosch 0 280 150 400	437			42.8	87.4	300	Ford	4.51
Bosch 0 280 150 401	437			42.8	87.4	300	Ford	
Bosch 0 280 150 041	480			47.1	96.0	300	MB	6.91
Bosch 0 280 150 403	503	blue	0.5	49.3	100.6	300	Ford	

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