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Car Finance with great rates & no payout penalties - click <u>here</u> 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



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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 <a href="http://www.wolfems.com.au">http://www.wolfems.com.au</a>

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 <a href="mailto:steve@aems.com.au">steve@aems.com.au</a> 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
- Ibs 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 = Ibs per hour x 2.04

## **Fuel Injector Flow Rates**

Injectors listed by flow rate, from lowest to highest

1	r	1	<u> </u>	r			
cc per			lbs				
minute	Colour	Ohms	per			Vehicles	Engine
			hour	each	kPa		
133			13.0	26.6	300	BMW	323
134			13.1	26.8	300		
145	light green	2.4	14.2	29.0	255	Toyota	4KE
145	green	2.4	14.2	29.0	255	Toyota	1GE
146	-		14.3	29.2	300		
147			14.4	29.4	270	Ford	1.6L
147			14.4	29.4	300		Startlet
149			14.6	29 R	300		
			14.0	27.0	500		
155	red/	13.8	15.2	31.0	290	Toyota	3EE
						-	
							3EE, 2EE
	sky-blue	·				Toyota	1GFE
155	violet	13.8	15.2	31.0	290	Toyota	4AFE
164			16.1	32.8	300	Buick	3.0
164			16.1	32.8	250	Renault	
170			16.7	34.0	300		
176			17.3	35.2	300	Volvo	B200,B230
176	light	13.8	17.3	35.2	290	Toyota	4AFE
176		13.8	17.3	35.2	290	Tovota	4AFE
	5-5						
182	dark grev	2.0	17.8	36.4	255	Tovota	4AGE
182	grey	2.4	17.8	36.4	255	Toyota	4ME,5ME, 5MGE
185			18.1	37.0			SMOL
<b> </b>		ļ	ļ		ļ		
185			18.1	37.0	300		
195			10 1	27.0			
105			10.1	37.0			
185			10 1	27.0			
	1	1	18.1	37.0			
105							
	cc per         133         134         145         145         1445         145         144         147         147         147         147         155         155         164         170         176         178         182	Cc per minute         Colour           133         -           134         light green           145         light green           145         green           146         -           147         -           147         -           147         -           147         -           147         -           147         -           150         red/ dark blue           155         violet           155         violet           164         -           170         -           170         -           176         grey           178         -           182         dark grey           185         -	Cc per minute         Colour         Ohms           133         .         .           133         .         .           134         .         .           134         .         .           145         light green         2.4           145         green         2.4           145         green         2.4           145         green         2.4           146         .         .           147         .         .           147         .         .           147         .         .           155         red/ dark blue         13.8           155         violet         13.8           155         violet         13.8           164         .         .           170         .         .           170         .         .           176         green         13.8           178         .         .           182         dark grey         2.0           182         grey         2.4           185         .         .	Cc per minute         Colour         Ohms         Ibs per hour           133         13.0         13.0           134         2.4         13.1           145         light green         2.4         14.2           145         green         2.4         14.2           145         green         2.4         14.2           145         green         2.4         14.2           146         14.3         14.3           147         1         14.3           147         1         14.4           147         1         14.4           147         1         14.4           147         1         1.5         14.4           149         1         1.5.2         15.5         13.8         15.2           155         violet         13.8         15.2         15.5         16.1           155         violet         13.8         15.2         16.1         16.1           164         1         1         1.6         1         1.1           164         1         1         1.6         1         1           170         1         1         1.7	Cc per minute         Colour         Ohms hour         per hour         hp. hour           133         I	Cc per minute         Colour         Ohms         Ibs per hour         Est. hp. each         Test press. kPa           133         I         I         I3.0         26.6         300           134         I         I         I3.0         26.6         300           145         light green         2.4         14.2         29.0         255           145         green         2.4         14.2         29.0         255           146         Green         2.4         14.2         29.0         255           146         I         I.4.3         29.2         300           147         I         I.4.4         29.4         270           147         I         I.4.4         29.4         300           147         I         I.4.8         14.4         29.4         300           149         I         I.4.8         15.2         31.0         290           155         red/ dark blue         13.8         15.2         31.0         290           155         sky-blue         13.8         15.2         31.0         290           164         I         I.6.1         32.8         300      1	Cc per minute         Colour         Ohms         Ibs per hour         Est. peach         Test RPass.         Vehicles           133         13.0         26.6         300         BMW           134         13.0         26.6         300         BMW           134         13.0         26.6         300         BMW           145         light green         2.4         14.2         29.0         255         Toyota           145         green         2.4         14.2         29.0         255         Toyota           145         green         2.4         14.2         29.0         255         Toyota           146         14.3         29.2         300         Ford         14.4           147         14.4         29.4         300         Ford           147         13.8         15.2         31.0         290         Toyota           155         red/ dark blue         13.8         15.2         31.0         290         Toyota           155         violet         13.8         15.2         31.0         290         Toyota           164         16.1         32.8         300         Buick         16.1

		1					1	
0 280 150 125 Lucas	188			18.4	37.6	250	Chev	5.0L
5207002	100			10.4	37.0	230	Chev	5.0L
Lucas	188			18.4	37.6	250	Fiat	
5204001								
Lucas	188			18.4	37.6	250	Alfa	
5208003								
Lucas	188			18.4	37.6	250	Toyota	
5206002	ļ		ļ	ļ		ļ		
Lucas	188			18.4	37.6	250	BMW	325E
5208007	100			10.4	27.4	250	014	1.01
Lucas 5202001	188			18.4	37.6	250	914	1.8L
Lucas	188			18.4	37.6	250	Nissan	280ZX
5208001	100			10.4	07.0	200	NISSUIT	2002/
Bosch	189			18.5	37.8	300		
0 280 150 614								
		ĺ		lbs	Est.	Test		
Manufacturer		Colour	Ohms				Vehicles	Enaine
Part Number	minute				each			3
Lucas	201			19.7	40.2	270	Jeep	4.0L
5207013								
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/	13.8	19.6	40.0	290	Toyota	22RE
		blue						
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	214			21.0	42.8	250		
0 280 150 706	014			21.0	40.0	25.0	C h	0.01 Turk -
Bosch 0 280 150 712	214			21.0	42.8	250	Saab	2.31 Turbo
Bosch	214			21.0	42.8	300	Volvo	B230F
0 280 150 762	217			21.0	72.0	500	10110	02001
Bosch	214			21.0	42.8	250	Jaguar	4.2L
0 280 150 157							Ŭ	
Lucas	218	1		21.4	43.6	300	Chev	5.7L
5207011								
Bosch	230			22.5	46.0	?	Alfa	Turbo
0 280 150152						ļ		
Bosch	236			23.1	47.2	300		
0 280 150 201								
Lucas	237			23.1	47.2	250	Chrysler,	
5208005 Lucas	237			23.1	47.2	250	BMW Ford	98CID
5208004	237			23.1	47.2	250	roiu	900ID
Bosch	240			23.5	48.0	?	BMW	633
0 280 150 151				_0.0		ľ		
Nippon Denso	250	yellow/	1.7	24.5	50.0	255	Toyota	22RTE
		orange						
	250	green	13.8	24.5	50.0	290	Toyota	4AGE
Nippon Denso			r		r -	200	Toylata	4AGE
	250	violet	13.8	24.5	50.0	290	Toyota	TAOL
Nippon Denso	250 250	violet brown	13.8 13.8	24.5 24.5	50.0 50.0	290	Toyota	3SGE
Nippon Denso Nippon Denso Nippon Denso Nippon Denso							1	

0 280 150 001								
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
	284			27.8	56.8	300		B200Turbo J7R Turbo
Nippon Denso	295	vellow	2.7	28.9	59.0	255	Toyota	7MGF
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	298	5		29.2	59.6	350	Porsche	944 Turbo
0 280 150 811								
Manufacturer	cc per			lbs	Est.			
Part Number		Colour	Ohms	L."	hp. each		Vehicles	Engine
Bosch	300			29.4	60.0	300	BMW	
0 280 150 200								
Bosch	300			29.4	60.0	300	Volvo	B230
0 280 150 335	ļ							Turbo
Bosch 0 280 150 945	300	red/ brown		29.4	60.0		Ford	MotorSpor
Nippon Denso	315	pink	13.8	30.9	63.0	290	Toyota	3SGE
Nippon Denso	315	r light green	13.8	30.9	63.0	290	Toyota	7MGE
Bosch	337	green		33.0	67.4	300	Peugot	505 Turbo
0 280 150 804			ļ		ļ			
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	380	orunge		37.3	76.0	300		
0 280 150 003 Bosch	380			37.3	76.0	300		
0 280 150 015 Bosch	380			37.3	76.0	300	Volvo	B30E
0 280 150 024								
Bosch 0 280 150 026	380			37.3	76.0	300		
Bosch 0 280 150 036	380			37.3	76.0	300	МВ	4.51
Bosch 0 280 150 043	380			37.3	76.0	300	BMW	
Bosch	384			37.6	76.8	300		
0 280 150 814 Bosch	397			38.9	79.4	300		
0 280 150 834 Bosch	397			38.9	79.4	300	Chrysler	
0 280 150 835					<u> </u>		ļ	
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	437			42.8	87.4	300	Ford	
0 280 150 401								

0 280 150 041								
Bosch	503	blue	0.5	49.3	100.6	300	Ford	
0 280 150 403								

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