SIX STAR SPEED
Subaru Performance Specialists
6920 BRADDOCK RD STEB 633, ANNANDALE VA 22003

Subaru Technical Guide Series

006

Subaru Stroker Guide – Increasing Displacement And Power In Turbocharged EJ Boxer Engines

Six Star Enterprises LLC

April 1, 2013

Subaru Stroker Guide – Increasing Displacement And Power In Turbocharged EJ Boxer Engines

Introduction

Since the introduction of the turbocharged 2 liter EJ205 to the USA market in 2002 Subaru enthusiasts have been in a constant search for more and more power. From simple bolt-ons to all out multi-ten thousand dollar engine and turbo upgrades. The plain fact is that most Subaru owners are in search of more power and what this guide will develop is some useful knowledge for the average consumer in choosing some higher displacement options for their EJ turbo engine.

This guide is written for consumers and not hard core engine builders or technical people. The point is to share some basic knowledge that the educated consumer can use to work with the professional who is building their motor of choice. This guide will not go into the specifics of machine work, assembly, or tuning of the engine however we will discuss what the expectations should be when putting together a performance motor for your Subaru.

Stroker Concept And Application

Now obviously you are reading this because you are the owner of a Subaru interested in increasing the power of your car. You may have a 2 liter of 2.5 liter engine or even a 2.2 liter engine and you are wondering what your options are. Let's talk about some basics first. The Subaru 'EJ' engine series is basically a "LEGO" type collection of internal parts of which some are interchangeable. In order to create a stroker motor the basic part we will be changing is the crankshaft. The great thing about that is that there is both an OEM option and a number of aftermarket options for changing the crank.

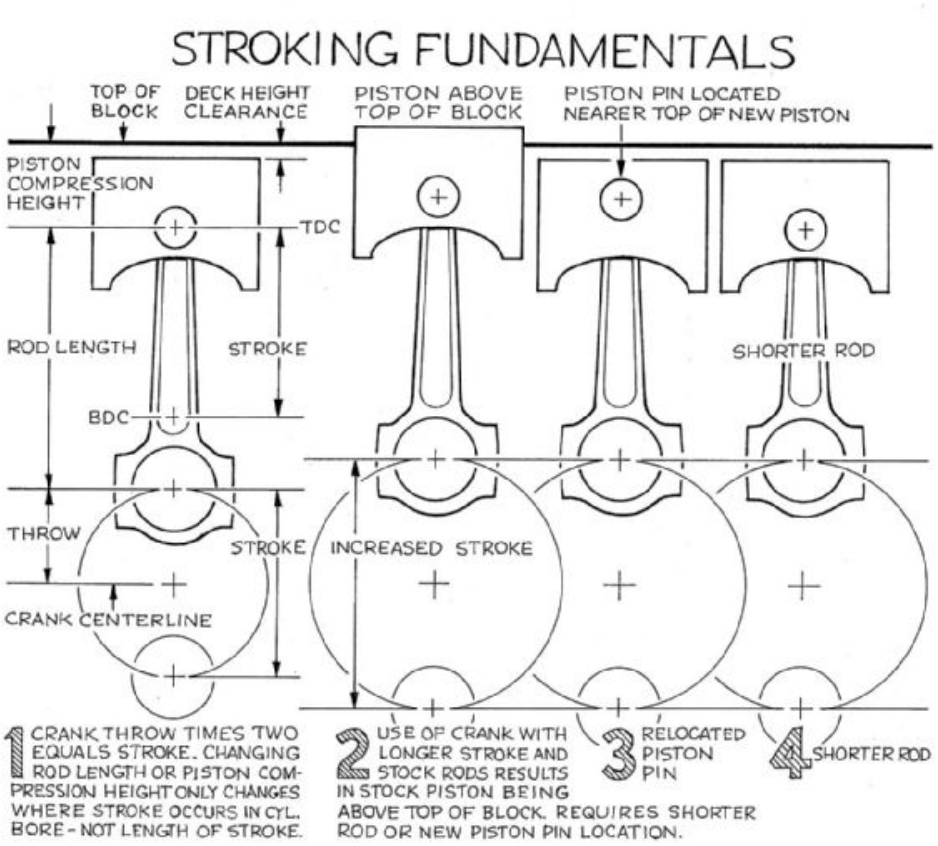
The OEM option is to go from a 75 mm stroke crankshaft as in the EJ20 and EJ22 engines to the 79 mm crankshaft found in the EJ25 engines. Changing the stroke of the crankshaft has the immediate affect of increasing displacement by itself:

ENGINE	OEM CYLINDER BORE	DISPLACEMENT W/75 mm STROKE	DISPLACEMENT W/79 mm STROKE
EJ20	92.0 mm	1,994 cc	2,101 cc
EJ22	96.9 mm	2,212 cc	2,330 cc

The concept is quite simple really however it gets more complicated. For one thing the builder can not simply drop in a new crank and bolt the engine back together. Now that we have changed the crankshaft stroke, how far the pistons move up and down, we have to alter other internal engine parts to make it fit and work together. In the above examples the pistons would be poking out of the top of the block! Here's why:

All Subaru EJ motors share the same "deck height" of 201 mm. The deck height is simply the distance from the crankshaft center line to the top edge of the cylinder block. Let's call the deck height 'H'. Required H can be found by taking ½ the stroke + the rod

length + the compression distance. Compression Distance? Rod length? What are those? Very simply the compression distance is the distance between the piston pin center and the top edge of the piston and the rod length is the distance between the centers of the pin and the crank throw.



Let's take a minute to look at some of the detailed specifications for some common Subaru EJ series engines:

Main Engine Specifications

	UNITS	EJ205	EJ22E*	EJ257
BORE	mm	92.00	96.90	99.50
STROKE	mm	75.00	75.00	79.00
BORE/STROKE RATIO	:1	1.227	1.292	1.259
DISPLACEMENT	cc	1,994	2,212	2,457
PISTON DECK HEIGHT	mm	201.0		
BORE SPACING	mm	113.0		
BANK OFFSET	mm	54.5		
COMPRESSION HEIGHT	mm	32.70		30.70
ROD LENGTH	mm	130.5		
JOURNAL DIAMETER	mm	60.0		
CRANK PIN DIAMETER	mm	52.0		
ROD/STROKE RATIO	:1	1.74		1.65

What we have above are the basic engine specifications of the common Subaru EJ engines. As you can see deck heights and rod lengths are the same among all engines. The main change other than Bore diameter is the compression height. Changing the compression height of the piston is what enables us to make a stroker engine easily and economically. We can keep the dimension of the connecting rods the same while reducing the height of the piston pin when we increase the length of the stroke.

Sounds easy? Well basically it is as long as we reduce the height of the piston pin we can keep everything inside the block where it belongs. So what are our options? That all depends on your ambition and your budget there are a number of stroker options depending on the engine you are starting with.

EJ Engine Displacement Matrix

		ENGINE BORE mm							
		92.00*	92.50	93.00	**96.90***	97.50	**99.50***	99.75	100.00
STROKE mm	75	1,994	2,016	2,038	2,212	2,240	2,333	2,344	2,356
	79	2,101	2,124	2,147	2,330	2,359	2,457	2,469	2,482
	81	2,154	2,177	2,201	2,389	2,419	2,519	2,532	2,545
	83	2,207	2,231	2,255	2,448	2,479	2,582	2,595	2,608

*** Standard bore**

The above table gives us a basic guideline using common available bore sizes and crankshaft strokes. There are another myriad of options for bore sizes if you decide to use new and thicker cylinder sleeves however that is beyond the scope of this guide

When boring cylinders however there are some limits to recognize. Subaru advises no more than .5 mm over the standard bore. There are some commonly available +1 mm piston sizes on the market however we strongly recommend using thicker cylinder sleeves for over bores of more than .5 mm.

As far as components for stroker engines most every part can be purchased off the shelf (OTS). The Subaru 79 mm crankshaft is standard issue in all EJ25 engines. We recommend the nitride-treated version found in the STI engine from 2008 onwards. The nitride treatment makes the crankshaft stronger and prevents corrosion as well.

Going beyond the 79 mm stroke there are 81 mm and 83 mm tuner crankshafts available. Tuner crankshafts are usually machined from high spec billet steel vs the forgings of OEM Subaru crankshafts. These crankshafts are noticeably lighter and have better oiling than OEM crankshafts. For the highest performance builds tuner crankshafts are the best options.

Engine bearings are a hot topic in the Subaru performance world. Noticeably because EJ engines are notorious for bearing failures. In our experience we have found that most bearing failures can be attributed to wear caused by detonation and oil starvation. When we are given the chance to build a motor from the ground up we can actually modify the oil clearance to enhance performance and reliability. While main bearing clearances in the standard range are fine for most builds, even those exceeding 500 BHP, we want to modify the rod bearing clearance to increase oil flow and cooling performance.

A stable oil film or cushion is the layer of oil between the components of a bearing. In addition to keeping two surfaces from contacting each other and welding themselves together, this oil pressure wedge helps cushion vibration energy that would otherwise be directly translated into the stationary portion of the machine. An unstable oil film is unable to establish a continuous pressurized wedge of oil to separate the stationary and rotating surfaces. Instead, the oil wedge builds and collapses in an erratic manner. This fluid instability potentially results in a variety of mechanical problems. The flow path of oil through an EJ series Subaru engine demonstrates that the #2 and #3 rod journals get their oil from the same port on the crankshaft (#3 main journal) while the other rods have their own independent supply. To expand on the example above, if the #2 bearing clearance is 0.0018 and #3 is 0.0007, #2 gets 2.6 times more oil. In real-world conditions, oil pressure depends on demand—as demand increases with a steady supply, pressure decreases. In this example the oil's ability to lubricate is compromised. Not only does #3 get less oil, but it also has a lower pressure oil wedge. This situation produces premature wear on the bearing especially in the presence of detonation. In order to further accommodate the higher oil demands in the high horsepower, high rpm, performance application we recommend the use a Subaru oil pump that provides higher flow and higher pressure than than the 10 mm units that come standard on the EJ205 engines. Stepping up to an 11 mm or even 12 mm pump is a good idea when building a stroker motor.

Oil is also the primary coolant for the motor as it is the only fluid to actually come into direct contact with the higly heated internal components. More flow means better cooling however we can't simply slap on a bigger pump without other modifications. To get more flow we have to increase the bearing clearances a bit. We recommend rod bearing clearances in the range of .0016 - .0022 inches for any performance built EJ engine. The higher clearance enables higher flow rates and normal operating oil pressures can be more easily "tuned" by changing the oil viscosity used. The result of the slightly increased oil clearances is an engine that will last longer and be able endure the higher cylinder pressures that increasing power creates.

High performance engine bearings are available from manufactures such as ACL, Cosworth and King. Six Star Speed feels comfortable with use of bearings from any of those manufacturers. Cosworth offers engine bearings in three standard oil clearances while ACL and King offer two. ACL is the manufacturer of higher spec engine bearings from Manley and produces the Cosworth bearings as well. The recommended combination of bearings is standard clearance main bearings and +.001 in for rod bearings. All three manufacturers have these available. With the extra oil clearance we can realize the benefits of increased oil capacity.

There are also a number of connecting rod choices for our stroker motors as well. OEM STI (EJ257), Manley and Eagle aftermarket connecting rods are prime choices and recommendations for your build. The OEM STI connecting rods offer a strengthened cap bolt design over the OEM EJ20 and EJ22 rods. There are many examples of them being used in 500+ HP motors with no issues. The only drawbacks we can mention about the OEM rods is that they are not suitably balanced from the factory to build a reliable 7,000+ RPM high performance engine. Aftermarket tuner rods come in tightly balanced sets, are lighter and use stronger materials. Even the basic spec Manly or Eagle H-beam rods are suitable for up to 600 HP.

Compression ratio and piston design are also important items when building a stroker engine. If we left piston dish volumes the same we would easily exceed safe compression ratios for our stroker engine. Thankfully the aftermarket piston manufactures such as Mahle, Manley and Wiseco have taken care of this and offered a number of OTS options to help us out.

STROKER ENGINE COMPRESSION RATIOS WITH USDM EJ205 CYLINDER HEADS

	BORE	STROKE	DISPLACEMENT	PISTON DISH VOLUME	COMPRESSION HEIGHT	COMPRESSION RATIO*
MANLEY	92.00	79.00	2,101	-16.00	30.70	8.3
	92.50	79.00	2,124	-16.00	30.70	8.4
	93.00	79.00	2,147	-16.00	30.70	8.5
MAHLE	92.50	79.00	2,124	-16.00	30.30	8.1
WISECO	97.50	79.00	2,359	-22.00	30.25	8.2

* OEM Gasket thickness .7 mm

STROKER ENGINE COMPRESSION RATIOS WITH USDM EJ257 CYLINDER HEADS

	BORE	STROKE	DISPLACEMENT	PISTON DISH VOLUME	COMPRESSION HEIGHT	COMPRESSION RATIO*
MANLEY	99.50	83.00	2,582	-26.00	28.70	8.5
	99.75	83.00	2,595	-26.00	28.70	8.5
	100.00	83.00	2,608	-26.00	28.70	8.6

* OEM Gasket thickness .7 mm

Piston material is also a consideration and here the aftermarket is kind of thin on choices. Mahle is the only manufacturer of OTS Subaru stroker pistons. There are two alloys of forged pistons to choose from: 4032 low expansion alloy and 2618 high tensile strength alloy. The former allows tighter piston to wall clearances for quieter engine operation and less wear under normal conditions while the 2618 allow is higher strength, expands more and requires higher piston to wall clearances. The clearance differences between the two alloys can be .001 or slightly more and while this seems like a small difference it can be huge if used in the wrong application.

Our recommendation is if the piston allow can be chosen you should select 4032 alloy for applications up to 450 HP and 2618 for applications producing 450 HP and above. The reason why is that the 2618 alloy is going to be stronger and able to endure the heat and stress without failure which is of greater potential in the high HP engines.

When topping off our stroker motor with the cylinder head we want to make sure everything is properly done. When we selected our pistons we are also considering the 'quench height' or distance between the top of the piston and the cylinder head deck at top dead center. Basically we want to keep this distance at between 1 – 1.5 mm in an EJ engine. The quench height is important as too much quench will reduce combustion efficiency and lead to issues with detonation which can quickly destroy a motor no matter how strongly its built. The way we maintain proper quench is by the use of appropriate gasket thickness. The Six Star Speed recommendation is to use the thinnest gasket required to create the correct geometry. In most cases the OEM gasket will be fine. In some cases slightly thicker or slightly thinner gaskets may be necessary depending on your application.

New Engine Break-In Supplement

F.H.I. (Subaru Japan) have advised that they only require the engine oil used in Subaru vehicles to comply with the A.P.I. (American Petroleum Institute) classification for oil Quality and the S.A.E. (Society of Automotive Engineers) rating for oil viscosity as listed in your vehicle Owners Manual. F.H.I. do not differentiate between mineral and synthetic oils nor recommend a specific brand. Subaru Australia recommends staying with mineral engine oil until approximately 5000 to 6000kms to reduce the time and mileage taken to run in the engine. Synthetic oil generally produces less friction and therefore the engine run in time may be greater than mineral oil.

There is a lot of controversy, misinformation and angst surrounding the topic of engine break-in. Proper break-in is very important to engine life and performance however following the recommendations in the owners manual may lead to an engine that has reduced performance and life expectancy. Especially if we are talking about a newly rebuilt engine that has not had the benefit of being run-in at the factory. Run in at the factory!? Yes every car manufacturer tests the driveline performance as part of the basic QC (quality control) procedures before shipping and delivery.

What do they do in this test? Well typically the engine is filled with the spec amount of fluids and fuel, started, warmed up and "driven" on a rolling road. The rolling road tests the functionality of the transmission, engine as well as interior component functionality. The procedure on the rolling road is to give the car full throttle in all gears, usually going completely up and down the range at least once. What do they do this for? Well this may be the hardest running the car ever gets and will expose defects in the driveline immediately before they become an issue for the future owner. It also sets in motion the process of breaking in the engine.

What happens to the engine doing break-in? Honestly not much but it's very important that one particular thing happens correctly. The most important aspect for engine break-in is to have the rings seat properly. This sets up the fate of the engine if you will. Will your engine smoke, consume oil excessively, and not make expected power, or will it have minimal consumption and make more than expected power? The choice is up to you and what you do with your newly rebuilt engine.

How the owner's manual fails you

In the US many owners manuals state something like "for the first 1,000 miles do not give the engine full throttle". The question you have to ask is why is this? Especially given the fact that the manufacturer has already given the vehicle full throttle in every gear at the factory! Especially given the fact that the owner's manuals for the same car printed in languages other than English don't even mention engine break-in. Quite honestly the reason why cars sold in the USA have this basic obligatory statement is to avoid litigation. Think about it, new car, happy new driver get's a little too enthusiastic about his new and powerful car before getting familiar with the handling and performance and does something like runs into something injuring or killing himself. It's a sure thing that the owner or someone related is going to sue the manufacturer for not telling drivers to take it easy until being familiar with the car. Why don't they just come out and say that? Because telling you it's about engine break-in covers their buts on both the personal injury side and engine defects. If you break the motor because you "raced" it or gave it full throttle then the OEM can still deny the warranty repair.

Proper Break-In On The Road

With modern piston ring materials break-in happens quite quickly so no need to baby the car. Use mineral oil, start the car, drive normally until everything is up to operating temperature then use cycles of full throttle acceleration and maximum deceleration over a distance of 20-30 miles. Come back home drain the oil, put in a fresh fill of mineral based oil and drive normally still using occasional full throttle and maximum braking for another 250-300 miles and change the oil again. Drive as you like but include hard acceleration and maximum breaking changing the oil every 250-300 miles with mineral oil until you reach 1,500 miles. After that change to the synthetic oil that works best for your particular motor. Break in complete.

The reality is that the break-in basically happens the first 20-30 miles. This determines how well your rings will seat. Rings need pressure to abrade against the cylinder cross hatching. Newer ring material such as plasma-moly make this process easier and less likely to produce poor ring seal but you still need to give the motor hard acceleration and vacuum to ensure the job is done correctly. Extending the wear in of piston rings reduces ring seal as the cross hatching in the bores gets knocked down and loses its ability to abrade the rings and form a good seal.

Never mind going soft to make sure nothing is broken, if something is broken or not right the motor is doomed anyway. And nothing changes inside the motor during break-in except ring seating so your motor is just as capable of handling full throttle at 0 miles as it would be at 1,000 miles if it is assembled correctly.

Subsequent oil changes after the first few tens of miles are basically to ensure a thorough cleaning of the motor. Initial start up and break-in generates ferrous wear metals that may or may not be kept in suspension by the oil so it is best to change it frequently. Not to mention all kinds of swarf and clag from teeny tiny bits of metal left over from the machining process to sealants and dirt that come out when the engine is first run.

To sum up:

- ⇒ Use mineral based oil (Preferably a straight HD 30 or 40 weight), 20-30 miles run it hard (after bringing it up to operating temps) and change oil
- ⇒ -1,500 miles run it hard, however you like, changing oil every 250-300 miles with mineral oil
- ⇒ 1,500+ run it as you like using the synthetic oil that works best for your particular motor. Avoid using “Energy Conserving” oils for your high performance Subaru Engine.

Your motor will be happy, it won't smoke, will make more power and last a good long time.

Oil recommendations for Turbo Subaru motors

This subject has been quite controversial among Subaru enthusiasts for some time. At Six Star Speed we always endeavor to give you the best information backed up by facts logic and experience. In fact the US Subaru owners manual is very confusing and ambiguous for the performance enthusiast. Here is the excerpt from the section on recommended oil use:

■ Engine oil

For the checking, adding and replacing procedure or other details, refer to "Engine oil" ☞11-10.

NOTE

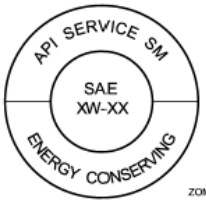
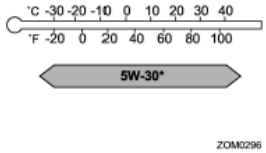
The procedure for changing the engine oil and oil filter should be performed by a properly-trained expert. It is recommended that you have this service performed by your SUBARU dealer.

▼ Approved engine oil

Always use the SUBARU approved engine oil. For further details, please contact your SUBARU dealer.
If the approved engine oil is unavailable, use the alternative engine oil described on the next page.

Now the above states that on the "approved" engine oil should be used however the approved oils are not actually specified. You must ask the dealer for details. So one would imagine what the dealer would say which is the oil that is approved is the Subaru branded 5W-30 grade oil. The manual goes on further:

▽ Turbo models

Oil grade	SAE viscosity No. and applicable temperature	Engine oil capacity
 ZOM0297 API classification SM or SN with the words "ENERGY CONSERVING" or "RESOURCE CONSERVING" **or**  ZOM0293 ILSAC GF-4 or GF-5, which can be identified with the ILSAC certification mark (Starburst mark)	**5W-30 synthetic** oil is required for optimum engine performance and protection. Conventional oil may be used if synthetic oil is unavailable. *: If 5W-30 synthetic oil is not available, 5W-30 or 5W-40 conventional oil may be used if replenishment is needed but should be changed to 5W-30 synthetic oil at the next oil change.  ZOM0296	– Adding the oil from L to F level: 1.1 US qt (1.0 liter, 0.9 Imp qt) – Changing the oil and oil filter: 4.4 US qt (4.2 liters, 3.7 Imp qt)

OK so now we find that 5W-30 is "required for optimum engine performance and protection". Now without making any judgments. we can learn the following from the owners manual:

⇒ 5W-30 Energy Conserving Synthetic oil is required by Subaru
⇒ Conventional oil may be used for topping up but it should be replaced by synthetic at the next oil change.

Oil recommendations for Turbo Subaru motors

Sounds good so far, but let's have a look at what the Japanese version owners manual indicates:

<table>
<tr><td colspan="2">燃料タンク容量</td><td colspan="4">約60ℓ</td></tr>
<tr><td rowspan="2">使用燃料</td><td>ターボ車</td><td colspan="4">無鉛プレミアムガソリン</td></tr>
<tr><td>ターボ車以外</td><td colspan="4">無鉛レギュラーガソリン</td></tr>
<tr><td rowspan="2">エアクリーナー
エレメント</td><td>使用部品</td><td colspan="4">純正エアクリーナエレメント</td></tr>
<tr><td>交換時期</td><td colspan="4">50,000 kmごと</td></tr>
<tr><td colspan="2" rowspan="2">バッテリー型式</td><td colspan="2">1.5i、2.0GT（MT車）、
WRX STI（MT車）</td><td colspan="2">55D23L（12V48AH）</td></tr>
<tr><td colspan="2">2.0i、2.0GT（AT車）、
WRX STI（AT車）</td><td colspan="2">65D23L（12V52AH）</td></tr>
<tr><td rowspan="10">エンジンオイル※</td><td rowspan="5">使用オイル</td><td colspan="3">SUBARU MOTOR OIL SM 5W-30</td><td>5W-30
（SM）</td></tr>
<tr><td colspan="3">SUBARU MOTOR OIL SM 0W-20
（ターボ車は使用不可）</td><td>0W-20
（SM）</td></tr>
<tr><td colspan="3">SUBARU Castrol SLX Professional SM
5W-40</td><td>5W-40
（SM）</td></tr>
<tr><td colspan="3">SUBARU elf レ・プレイアード
SM 10W-50</td><td>10W-50
（SM）</td></tr>
<tr><td colspan="3">SUBARU FREEDOM</td><td>10W-30</td></tr>
<tr><td rowspan="3">規定量</td><td></td><td>オイルの
み交換</td><td colspan="2">オイルとフィルター
同時交換</td></tr>
<tr><td>1.5i、2.0i、2.0GT</td><td>約4.0ℓ</td><td colspan="2">約4.2ℓ</td></tr>
<tr><td>WRX STI</td><td>約4.0ℓ</td><td colspan="2">約4.3ℓ</td></tr>
<tr><td>交換時期</td><td colspan="4">10,000 kmごと、または12か月ごと
（どちらか早い方で実施）</td></tr>
<tr><td rowspan="2">エンジンの
オイルフィルター</td><td>使用部品</td><td colspan="4">純正オイルフィルター</td></tr>
<tr><td>交換時期</td><td colspan="4">10,000 kmごと
エンジンオイルと一緒に交換することをお奨めします。</td></tr>
<tr><td rowspan="2">フューエル
フィルター</td><td>使用部品</td><td colspan="4">純正フューエルフィルター</td></tr>
<tr><td>交換時期</td><td colspan="4">100,000 kmごと</td></tr>
</table>

〈注〉※印 エンジンオイル消費量は新車時から数千km走行すると安定しはじめます。
また、厳しい運転条件（悪路、山道、登降坂路、交差点などでの急加減速の繰り返し、またはエンジンの高回転使用頻度が高いなど）での走行時は、通常に比べてエンジンオイルの消費が早くなることがあります。このような使用の頻度が高い場合、1000 km 走行あたり0.5ℓ～1ℓ消費する場合があります。早めの点検・補充をお奨めします。

Oil recommendations for Turbo Subaru motors

Now yes we know it's in Japanese but lucky for you we can read Japanese…

Basically what the Japanese manual states is *specific* recommendations for turbo Subaru engines. They specify Subaru 5W-30 Subaru Castrol SLX Professional SM, Subaru elf SM 10W-50 or Subaru Freedom 10W-30.

In the notes beneath the chart it simply states that oil consumption may be higher initially with a new engine. If you operate the car under harsh conditions such as heavy acceleration, high revs, mountain road driving then oil consumption may be higher and .5 – l liter per 1,000 km is allowable and to check the oil regularly within the service interval.

The key takeaway here is the specific oil recommendations and the recognition of performance or "harsh" driving conditions which the US owners manual does not acknowledge. However as enthusiasts we tune our cars for higher performance which in an of itself would be considered "harsh" conditions. To that end we will give you the following recommendations:

Normal driving – no heavy throttle, high temperature conditions, stock motor, stock power levels use an energy conserving 5W-30 synthetic oil for best fuel economy. Six Star Speed recommends highly rated (ACEA A3) 5W-30 and 0W-30 oils for these conditions

Performance driving – tuned motor, high temperature, stock or built motor, on road use a synthetic 5W-40 gasoline engine oil.

High performance – highly tuned stock motor, built motor high power >400WHP, track/off road, use a synthetic 10W-50.

Most enthusiasts would need to jump right to the "Performance" level use as the bar for normal driving is pretty low. At Six Star Speed we suggest this is where enthusiasts should start. Now the JDM owners manual gives a specific oil recommendation of Castrol GLX 5W-40. In the USA this oil is sold as Castrol EDGE with Syntec Power Technology 5W-40. That's good news as it is available in just about every chain auto parts store in America. The bad news is the price is about $9 per quart. However that is a small price to pay to keep your engine running strong and for a good long time.

For high performance driving we advise 10W-50. The JDM manual specifies Elf 10W-50. This oil is actually available in the USA as Total Quartz Racing 10W-50. It is only available from Elf/Total dealers but you will likely find great pricing on 5 liter jugs. If you need advice on where to find this oil just contact us at sales@6starspeed.com Our suggestion is that you avoid 5W-30 Energy conserving oils if you drive in one or more of the following conditions:

- ⇒ Are tuned to produce more than the stock power output
- ⇒ Engage full throttle use for any period of time
- ⇒ Drive in conditions hotter than 90 degrees F
- ⇒ Drive at constant high speed conditions over 65 mph

If you have purchased a turbo upgrade or service from us you will find our oil recommendations as part of your warranty book. We go into great details as to which oils we advise for performance driven Subaru's. This information is constantly being revised so check the website often.

Oil recommendations for Turbo Subaru motors

As a quick reference please see the following oil use chart for turbocharged Subaru engines

CONDITION	BRAND/LINE	TYPE	GRADE
Normal Driving	Motul 8100 X-Max	Synthetic	5W-30
	Motul 8100 X-LITE	Synthetic	0W-30
	Redline	Synthetic	5W-30
	Mobil 1 ESP-Formula	Synthetic	5W-30
	Castrol EDGE w/SPT	Synthetic	0W-30
Performance Driving	Mobil 1	Synthetic	0W-40
	Castrol Edge w/SPT	Synthetic	0W-40
	Castrol Edge w/SPT	Synthetic	5W-40
	Motul 8100 X-MAX	Synthetic	0W-40
	Motul 8100 X-CESS	Synthetic	5W-40
	Total Quartz Energy 9000	Synthetic	5W-40
High Performance	Castrol Edge w/SPT	Synthetic	5W-50
	Redline	Synthetic	5W-50
	Total Quartz Racing	Synthetic	10W-50

Conclusions

Bringing it all together, the right collection of components, assembly, fluid materials and tuning will result in a powerful and fun to drive Subaru. There are many other aspects that were beyond the scope of this guide but it's a good starting point for those considering a stroker engine build. In all things of this nature Six Star Speed recommends professional installation and consultation. We want you to have it done right the first time and for it to last a long time. Professionals have the tools and expertise to give you every last bit of value out of your performance dollar.

Of course Six Star Speed is available for consultation on stroker motors or any other aspect of Subaru performance and tuning as well as a great source for all of the performance parts you will need to get your project started. We have an intense passion for Subaru cars and we love to increase the knowledge base in the community.

SIX STAR SPEED

6920 Braddock Road
SteB 633
Aannandale VA 22003
Tel: 202-469-6768
http://6starpseed.com
email: sales@6starspeed.com