AUTOMOBILE MANUFACTURER FUEL RECOMMENDATIONS

MODEL YEAR 2006

Prepared for the
Renewable Fuels Association

By
Herman & Associates
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Vehicle Owners Manual Statements

BENTLEY

FUEL SPECIFICATION
To achieve optimum performance, **Premium unleaded fuel**, 95 RON minimum should be used.

The required fuel octane rating, 91 AKI minimum, is the average of both the Research octane number and the Motor octane number. If premium unleaded fuel is not available, 87 AKI unleaded fuel can be used, but reduced engine performance may be experienced.

The correct grade of fuel for your vehicle can be found on the label inside the fuel filler door located to the rear, on the right-hand side of the vehicle.

▲CAUTION

Do not use fuel with an octane number lower than 87 AKI (91 RON minimum), doing so could damage the engine.

Do not use leaded fuel.

Do not use fuel additives.

Fuel Systems
Fuel containing oxygenates such as Ethanol, IPA, IBA and TBA can be used provided the ratio of either one of these oxygenates to gasoline does not exceed 10%. MTBE may, however, be added up to 15%. Gasohol which contains 10% Ethanol and 90% unleaded gasoline may be used.

The ratio of Methanol to gasoline must not exceed 3% plus additional co-solvents.

Using mixtures of Ethanol and Methanol is not allowed. These blends must also meet all other fuel requirements such as octane rating, boiling range, and vapor pressure etc.

BMW

FUEL SPECIFICATION
The engine uses lead-free gasoline only.

Required Fuel
Premium unleaded gasoline,
minimum octane rating: 91.

Minimum octane rating corresponds to the Anti-Knock Index AKI and is determined according to the so-called (R+M)/2 method. Do not use leaded gasoline, as otherwise the lambda probe and catalytic converter will be permanently damaged.

Use High-Quality Brands
Field experience has indicated significant differences in fuel quality: volatility composition, additives, etc., among gasolines offered for sale in the United States and Canada. Fuels containing up to and including 10% ethanol or other oxygenates with up to 2.8% oxygen by weight, that is, 15% MTBE or 3% methanol plus an equivalent amount of co-solvent, will not void the applicable warranties with respect to defects in materials or workmanship.

The use of poor-quality fuels may result in driveability, starting and stalling problems especially under certain environmental conditions, such as high ambient temperature and high altitude. Should you encounter driveability problems which you suspect could be related to the fuel you are using, we recommend that you respond by switching to a recognized high-quality brand. Failure to comply with these recommendations may result in unscheduled maintenance.

DAIMLERCHRYSLER

FUEL REQUIREMENTS
Your vehicle is designed to meet all emission regulations and provide excellent fuel economy and performance when using high quality regular unleaded gasoline having an octane rating of 87. The use of premium gasoline is not recommended. The use of premium gasoline will provide no benefit over high quality regular gasolines, and in some circumstances, may result in poorer performance.

Light spark knock at low engine speeds is not harmful to your engine. However continued heavy spark knock at high speeds can cause damage and immediate service is required.

Poor quality gasoline can cause problems such as hard starting, stalling and hesitations. If you experience these symptoms, try another brand of "regular" gasoline before considering service for the vehicle.

Over 40 automobile manufacturers around the world have issued and endorsed consistent gasoline specifications (the World Wide Fuel Charter, WWFC) to define fuel properties necessary to deliver enhanced emissions, engine performance and durability for your vehicle. The manufacturer recommends the use of gasolines that meet the WWFC specifications if they are available.

Reformulated Gasoline
Many areas of the country require the use of cleaner burning gasoline referred to as "Reformulated Gasoline."

Reformulated gasolines contain oxygenates and are specifically blended to reduce vehicle emissions and improve air quality.

The manufacturer supports the use of reformulated gasolines. Properly blended reformulated gasolines will provide excellent performance and durability of engine and fuel system components.

Gasoline/Oxygenate Blends
Some fuel suppliers blend unleaded gasoline with oxygenates such as 10% ethanol, MTBE, and ETBE. Oxygenates are required in some areas of the country during the winter months to reduce carbon monoxide emissions. Fuels blended with these oxygenates may be used in your vehicle.

▲CAUTION
DO NOT use gasolines containing Methanol. Use of these blends may result in starting and driveability and may damage critical fuel system components.

Problems that result from using methanol/gasoline blends are not the responsibility of the manufacturer. While MTBE is an oxygenate made from Methanol, it does not have the negative effects of Methanol.

MMT in Gasoline
MMT is a manganese containing metallic additive that is blended into some gasoline to increase the octane number. Gasolines blended with MMT offer no performance advantage beyond gasolines of the same octane number without MMT. Gasolines blended with MMT have shown to reduce spark plug life and reduce emission system performance in some vehicles. The manufacturer recommends using gasoline without MMT. Since the MMT content of gasoline may not be indicated on the pump, you should ask your gasoline retailer whether or not his/her gasoline contains MMT.

It is even more important to look for gasolines without MMT in Canada, because MMT can be used at levels higher than those allowed in the United States. MMT is prohibited in Federal and California reformulated gasolines.

Materials Added to Fuel
All gasoline sold in the United States is required to contain effective detergent additives. Use of additional detergents or other additives are not needed under normal conditions and would result in additional cost. Therefore, you should not have to add anything to the fuel.

Fuel System Cautions

▲CAUTION
Follow these guidelines to maintain your vehicle's performance.

- The use of leaded gas is prohibited by Federal law. Using leaded gasoline can impair engine performance, damage the emission control system.
- An out-of-tune engine, or certain fuel or ignition malfunctions, can cause the catalytic converter to overheat. If you notice a pungent burning odor or some light smoke, your engine may be out-of-tune or malfunctioning and may require immediate service. Contact your dealer for service assistance.
- The use of fuel additives which are now being sold as octane enhancers is not recommended. Most of these products contain high concentrations of methanol. Fuel system damage or vehicle performance problems resulting from the use of such fuels or additives is not the responsibility of the manufacturer.

NOTE: Intentional tampering with emission control systems can result in civil penalties being assessed against you.

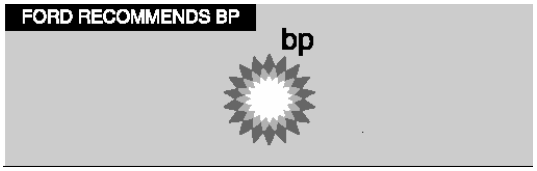
FERRARI

Fuel Tank
Unleaded fuel, RON 95-98

Alcohol Fuels
FERRARI uses in its fuel injection system the best components and materials available in the field but we have not carried out specific tests to assure the reliability of the system when using alcohol fuels. Consequently, we suggest that our customers not use alcohol fuel in our vehicles.

FORD

Choosing the Right Fuel



Use only UNLEADED FUEL. The use of leaded fuel is prohibited by law and could damage your vehicle.

Your vehicle was not designed to use fuel or fuel additives with metallic compounds, including manganese-based additives. Studies indicate these additives can cause your vehicle's emission control system to deteriorate more rapidly. In Canada, premium grade fuel generally contains more metallic additives than regular fuel. We recommend using regular grade fuel. In Canada, many fuels contain metallic additives, but fuels free of such additives may be available; check with you local fuel dealer.

Do not use fuel containing methanol. It can damage critical fuel system components.

Repairs to correct the effects of using a fuel for which your vehicle was not designed may not be covered by your warranty.

Octane Recommendations
Your vehicle is designed to use "Regular" unleaded gasoline with an (R+M)/2 octane rating of 87. We do not recommend the use of gasolines labeled as "Regular" that are sold with octane ratings of 86 or lower in high altitude areas.

Do not be concerned if your engine sometimes knocks lightly. However, if it knocks heavily under most driving conditions while you are using fuel with the recommended octane rating, see your dealer or a qualified service technician to prevent any engine damage.

FFV Engine (If Equipped)
Flexible fuel vehicle (FFV) fuel tanks may contain 0 to 85 percent or more of ethanol.

Any fuel blends containing gasoline and ethanol should be treated the same as "Fuel Ethanol (E85)." To identify if your vehicle is an FFV, check your VIN or the label on the inside of your fuel filler door. When checking your VIN, the engine type identifier (8th character) is "K."

If you have a flex fuel vehicle, use only UNLEADED FUEL and ETHANOL (E85).

NOTE
Flexible fuel components and standard unleaded fuel components are NOT interchangeable. If your vehicle is not serviced in accordance with flexible fuel vehicle procedures, damage may occur and your warranty may be invalidated.

U.S. government regulations require fuel ethanol dispensing pumps to have a small, square, orange and black label with the common abbreviation E85 or the appropriate percentage for that region. Use of other fuels such as Fuel Methanol may cause power train damage, a loss of vehicle performance, and your warranty may be invalidated.

Fuel Quality
If you are experiencing starting, rough idle, or hesitation driveability problems, try a different brand of unleaded gasoline. "Premium" unleaded gasoline is not recommended for vehicles designed to use "Regular" unleaded gasoline because it may cause these problems to become more pronounced. If the problems persist, see your authorized dealer.

It should not be necessary to add any aftermarket products to your fuel tank if you continue to use high quality fuel of the recommended octane rating. Aftermarket products could cause damage to the fuel system. Repairs to correct the effects of using an aftermarket product in your fuel may not be covered by your warranty.

Many of the world's automakers approved the World-wide Fuel Charter that recommends gasoline specifications to provide improved performance and emission control system protection for your vehicle. Ask your fuel supplier about gasolines that meet the World-wide Fuel Charter.

Cleaner Air
Ford endorses the use of reformulated "cleaner-burning" gasolines to improve air quality.

GENERAL MOTORS

FUEL
The 8th digit of your vehicle identification number (VIN) shows the code letter or number that identifies your engine. You will find the VIN at the top left of the instrument panel.

If your vehicle has the 3.5L V6 engine (VIN Code K only), you may use either regular unleaded gasoline or ethanol fuel containing up to 85% ethanol (E85). In all other engines, use only regular unleaded gasoline.

Gasoline Octane
If your vehicle has a V6 engine, use regular unleaded gasoline with a posted octane rating of 87 or higher. If the octane rating is less than 87, you may notice an audible knocking noise when you drive, commonly referred to as spark knock. If this occurs, use a gasoline rated at 87 octane or higher as soon as possible. If you are using gasoline rated at 87 octane or higher and you hear heavy knocking, your engine needs service.

If your vehicle has the 5.3L V8 engine (VIN Code C), use premium unleaded gasoline with a posted octane rating of 91 or higher. You may also use regular unleaded gasoline rated at 87 octane or higher, but your vehicle's acceleration may be slightly reduced, and you may notice a slight audible knocking noise when you drive, commonly referred to as spark knock. If the octane is less than 87, you may notice a heavy knocking noise when you drive. If this occurs, use a gasoline rated at 87 octane or higher as soon as possible. Otherwise, you might damage your engine. If you are using gasoline rated at 87 octane or higher and you hear heavy knocking, your engine needs service.

Gasoline Specifications
At a minimum, gasoline should meet ASTM specification D 4814 in the United States or CAN/CGSB-3.5 in Canada. Some gasolines may contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT). General Motors recommends against the use of gasolines containing MMT.

California Fuel
If your vehicle is certified to meet California Emissions Standards, it is designed to operate on fuels that meet California specifications. See the underhood emission control label. If this fuel is not available in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be affected. The malfunction indicator lamp may turn on and your vehicle may fail a smog-check test. If this occurs, return to your authorized GM dealer for diagnosis. If it is determined that the condition is caused by the type of fuel used, repairs may not be covered by your warranty.

Additives
To provide cleaner air, all gasolines in the United States are now required to contain additives that will help prevent engine and fuel system deposits from forming, allowing your emission control system to work properly. In most cases, you should not have to add anything to your fuel. However, some gasolines contain only the minimum amount of additive required to meet U.S. Environmental Protection Agency regulations. To help keep fuel injectors and intake valves clean, or if your vehicle experiences problems due to dirty injectors or valves, look for gasoline that is advertised as TOP TIER Detergent Gasoline. Also, your GM dealer has additives that will help correct and prevent most deposit-related problems.

Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines may be available in your area. General Motors recommends the use of such gasolines if they comply with the specifications described earlier. However, E85 (85% ethanol) and other fuels containing more than 10% ethanol must not be used in vehicles not designed for those fuels.

Notice: Your vehicle was not designed for fuel that contains methanol. Do not use fuel containing methanol. It can corrode metal parts in your fuel system and also damage the plastic and rubber parts. That damage would not be covered under your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclo-pentadienyl manganese tricarbonyl (MMT); ask the attendant where you buy gasoline whether the fuel contains MMT. General Motors recommends against the use of such gasolines. Fuels containing MMT can reduce the life of spark plugs and the performance of the emission control system may be affected. The malfunction indicator lamp may turn on. If this occurs, return to your authorized GM dealer for service.

Fuel E85 (85% Ethanol)
The 8th digit of your vehicle identification number (VIN) shows the code letter or number that identifies your engine. You will find the VIN at the top left of the instrument panel.

If your vehicle has the 3.5L V6 engine (VIN Code K only), you may use either regular unleaded gasoline or ethanol fuel containing up to 85% ethanol (E85). In all other engines including the 3.5L V6 (VIN Code N), use only regular unleaded gasoline.

Only vehicles that have the 3.5L V6 engine (VIN Code K) may use 85% ethanol fuel (E85). General Motors encourages the use of E85 in vehicles that are designed to use it. The ethanol in E85 is a “renewable” fuel, meaning it is made from renewable sources such as corn and other crops.

Many service stations will not have an 85% ethanol fuel (E85) pump available. The U.S. Department of Energy has an alternative fuels website that can help you find E85 fuel. Those stations that do have E85 have a label indicating ethanol content. Do not use the fuel if the ethanol content is greater than 85%.

At a minimum, E85 should meet ASTM Specification D 5798.

To ensure quick starts in the wintertime, the E85 fuel must be formulated properly for your climate according to ASTM Specification D 5798. If you have trouble starting on E85, it may be because your E85 is not properly formulated for your climate. If this happens, switching to gasoline or adding gasoline to your fuel tank may improve starting. Your vehicle is designed to accommodate a mixture of gasoline and E85 fuel. For good starting and heater efficiency below 32ºF (0ºC), the fuel mix in the fuel tank should contain no more than 70% ethanol.

E85 has less energy per gallon than gasoline, so you will need to refill your tank more often when using E85 than when you are using gasoline. Regular unleaded gasoline is recommended when pulling a trailer.

Notice: **Some additives are not compatible with E85 fuel and may harm your fuel system. Damage caused by additives would not be covered by your new vehicle warranty. Do not use additives with E85 fuel.**

HONDA/ACURA

FUEL RECOMMENDATION
Regular Unleaded Vehicles
Your vehicle is designed to operate on unleaded gasoline with a pump octane number of 87 or higher**.** Use of a lower octane gasoline can cause a persistent, heavy metallic rapping noise that can lead to engine damage.

Premium Recommended Vehicles
Your vehicle is designed to operate on premium unleaded gasoline with a pump octane number of 91or higher. Use of a lower octane gasoline can cause occasional metallic knocking noises in the engine and will result in decreased engine performance. Use of a gasoline with a pump octane less than 87 can lead to engine damage.

Premium Mandatory Vehicles
Your vehicle is designed to operate on premium unleaded gasoline with a pump octane number of 91 or higher. If this octane grade is unavailable, regular unleaded gasoline with a pump octane of 87 or higher may be used temporarily. The use of regular unleaded gasoline can cause metallic knocking noises in the engine and will result in decreased engine performance. The long-term use regular-grade gasoline can lead to engine damage.

We recommend using quality gasolines containing detergent additives that help prevent fuel system and engine deposits.

In addition, in order to maintain good performance, fuel economy and emissions control, we strongly recommend, in areas where it is available, the use of gasoline that does NOT contain manganese–based fuel additives such as MMT.

Use of gasoline with these additives may adversely affect performance and cause the Malfunction Indicator Lamp on your instrument panel to come on. If this happens, contact your authorized dealer for service.

Some gasoline today is blended with oxygenates such as ethanol or MTBE. These gasolines are collectively referred to as oxygenated fuels. Your vehicle is designed to operate on oxygenated gasoline containing up to 10 percent ethanol by volume and up to 15 percent MTBE by volume. Do not use gasoline containing methanol.

If you notice any undesirable operating symptoms, try another service station or switch to another brand of gasoline.

HYUNDAI

FUEL RECOMMENDATIONS

Use Unleaded Gasoline

Unleaded gasoline with a Pump Octane Rating of 87 (Research Octane Number 91) or higher must be used in your Hyundai.

What About Gasohol?

Gasohol (a mixture of 90% unleaded gasoline and 10% ethanol or grain alcohol) may be used in your Hyundai. However, if your engine develops driveability problems, the use of 100% unleaded gasoline is recommended. Fuels with unspecified quantities of alcohol, or alcohols other than ethanol, should not be used.

Do Not Use Methanol

Fuels containing methanol (wood alcohol) should not be used in your Hyundai. This type of fuel can reduce vehicle performance and damage components of the fuel system.

Use of MTBE

Hyundai recommends that fuels containing MTBE (Methyl Tertiary Butyl Ether) over 15.0% vol. (Oxygen Content 2.7% weight) should not be used in your Hyundai.

Fuel containing MTBE over 15.0% vol. (Oxygen Content 2.7% weight) may reduce vehicle performance and produce vapor lock or hard starting.

▲CAUTION
Your Hyundai's New Vehicle Limited Warranty may not cover damage to the fuel system and any performance problems that are caused by the use of fuels containing methanol or fuels containing MTBE (Methyl Tertiary Butyl Ether) over 15.0% vol. (Oxygen Content 2.7% weight).

Gasolines for Cleaner Air

To help contribute to cleaner air, Hyundai recommends that you use a gasoline treated with detergent additives, which help prevent deposit formation in the engine. These gasolines will help the engine run cleaner and the Emission Control System performance.

ISUZU

FUEL

Use regular unleaded gasoline with a posted octane rating of 87 or higher. If the octane rating is less than 87, you may notice an audible knocking noise when you drive, commonly referred to as spark knock. If this occurs, use a gasoline rated at 87 octane or higher as soon as possible. If you are using gasoline rated at 87 octane or higher and you hear heavy knocking, your engine needs service.

If you hear a little pinging noise when you're accelerating or driving up a hill, it is normal, and you don't have to buy a higher octane fuel to get rid of the pinging. But a constant heavy knocking is an indication that there may be a problem.

Gasoline Specifications

At a minimum, gasoline should meet ASTM specification D 4814 in the United States or CAN/CGSB-3.5 in Canada. Some gasolines may contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT). We recommend against the use of gasolines containing MMT.

California Fuel

If your vehicle is certified to meet California Emissions Standards, it is designed to operate on fuels that meet California specifications. See the underhood emission control label. If this fuel is not available in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be affected. The malfunction indicator lamp may turn on and your vehicle may fail a smog-check test. If this occurs, return to your authorized dealer for diagnosis. If it is determined that the condition is caused by the type of fuel used, repairs may not be covered by your warranty.

Additives
To provide cleaner air, all gasolines in the United States are now required to contain additives that will help prevent engine and

fuel system deposits from forming, allowing your emission control system to work properly. In most cases, you should not have to add anything to your fuel. However, some gasolines contain only the minimum amount of additive required to meet U.S. Environmental Protection Agency regulations. To help keep fuel injectors and intake valves clean, or if your vehicle experiences problems due to dirty injectors or valves, look for gasoline that is advertised as TOP TIER Detergent Gasoline. Also, your dealer has additives that will help correct and prevent most deposit-related problems.

Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines may be available in your area. We recommend that you use these gasolines if they comply with the specifications described earlier. However, E85 (85% ethanol) and other fuels containing more than 10% ethanol must not be used in vehicles not designed for those fuels.

Notice: Your vehicle was not designed for fuel that contains methanol. Do not use fuel containing methanol. It can corrode metal parts in your fuel system and also damage the plastic and rubber parts. That damage would not be covered under your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclo-pentadienyl manganese tricarbonyl (MMT); ask the attendant where you buy gasoline whether the fuel contains MMT. We recommend against the use of such gasolines. Fuels containing MMT can reduce the life of spark plugs and the performance of the emission control system may be affected. The malfunction indicator lamp may turn on. If this occurs, return to your authorized dealer for service.

JAGUAR

FUEL
Unleaded Fuel
All vehicles are fitted with a catalytic system and can only use unleaded fuel.

Unleaded fuel must be used for the emission control system to operate properly. Its use will also reduce spark plug fouling, exhaust system corrosion and engine oil deterioration.

The preferred fuel should have an octane rating of at least 95 RON (Research Octane Number) and a minimum anti-knock index (AKI) of 91.

Super Green Plus 98 RON unleaded fuel (where available) may be used as an alternative to the standard 95 RON unleaded fuel.

Some countries have only 91 RON fuel available. The vehicles in these countries are specially calibrated to use this fuel.

Using unleaded fuel with a lower AKI than recommended can cause persistent, heavy spark knock (a metallic rapping noise). If severe, this can lead to engine damage.

If a heavy spark knock is detected even when using fuel of the recommended octane rating, or if you hear steady spark knock while holding a steady speed on level roads consult a Jaguar Dealer to have the problem corrected.

Failure to do so is misuse of the vehicle, for which Jaguar Cars Limited, is not responsible. However, occasional light 'spark knock' for a short time while accelerating or driving up hill, may occur.

Fuels Containing Alcohol
Caution: Take care not to spill fuel during refueling. Fuel containing alcohol can cause paint damage, which may not be covered under the warranty.

Some fuel suppliers sell fuel containing alcohol without advertising its presence. Where uncertainty exists, check with the service station operator.

Note: Some difficulty in starting may be encountered when using alcohol blended fuel.

Ethanol
Fuels containing up to 10 percent ethanol (grain alcohol) may be used. Ensure the fuel has octane ratings no lower than those recommended for unleaded fuel. Most drivers will not notice any operating difference with fuel containing ethanol. If a difference is detected, the use of conventional unleaded fuel should be resumed.

Methanol
Some fuels contain methanol (methyl or wood alcohol). If you use fuels containing methanol, the fuels must also contain co-solvents and corrosion inhibitors for methanol. Also, do not use fuels that contain more than three percent methanol even if they contain co-solvents and corrosion inhibitors. Fuel system damage or vehicle performance problems resulting from the use of such fuels is not the responsibility of Jaguar Cars Limited, and may not be covered under the warranty.

Methyl Tertiary Butyl Ether (MTBE)
Unleaded fuel containing an oxygenate known as MTBE can be used provided the ratio of MTBE to conventional fuel does not exceed 15 percent.

MTBE is an ether based compound, derived from petroleum, which has been specified by several refiners as the substance to enhance the octane rating of fuel.

KIA

Fuel Requirements
Your new Kia vehicle must use only unleaded fuel having an octane rating of at least 87.

NOTICE
NEVER USE LEADED FUEL. The use of leaded fuel is detrimental to the catalytic converter and will damage the engine control system's oxygen sensor and affect emission control. Never add any fuel system cleaning agents to the fuel tank other than what Kia has specified or the equivalent. (Consult an authorized Kia dealer for details.)

Your new Kia is designed to obtain maximum performance with UNLEADED FUEL, as well as minimize exhaust emissions and spark plug fouling.

Gasoline Containing Alcohol and Methanol
Gasohol, a mixture of gasoline and ethanol (also known as grain alcohol), and gasoline or gasohol containing methanol (also known as wood alcohol) are being marketed along with or instead of leaded or unleaded gasoline.

Do not use gasohol containing more than 10% ethanol, and do not use gasoline or gasohol containing any methanol. Either of these fuels may cause driveability problems and damage to the fuel system.

Discontinue using gasohol of any kind if driveability problems occur.

Vehicle damage or driveability problems may not be covered by the manufacturer's warranty if they result from the use of:

1. Gasohol containing more than 10% ethanol.
2. Gasoline or gasohol containing methanol.
3. Leaded fuel or leaded gasohol.

NOTICE
Never use gasohol which contains methanol. Discontinue use of any gasohol products which impairs driveability.

LAMBORGHINI

FUEL
Gasoline grades
Using the correct grade of gasoline is important for the environment and helps avoid damage to the engine.

Generally speaking, a distinction is made between unleaded and leaded petrol. Since Lamborghini vehicles are equipped with a catalytic converter, unleaded petrol only is to be used.

The different kinds of petrol have different octane ratings (RON). The vehicle's optimum working order is obtained by using petrol with a RON number octane varying from 95 to 98 or with an octane higher rating (Premium).

Important!
• Refueling with leaded fuel even once would permanently impair the efficiency of the catalytic converter.
• High engine speed and full throttle can damage the catalytic converter when using petrol with an octane rating lower than the correct grade for the engine.

LAND ROVER

TYPE OF FUEL

ONLY USE PREMIUM UNLEADED FUEL

- Unleaded fuel is essential for proper operation of the emission control system.

Caution: DO NOT use leaded fuel! Your engine is designed to use unleaded fuel ONLY.

Even a very small quantity of leaded fuel will damage your vehicle's emission control system and could invalidate the emissions warranty. In addition leaded fuel will damage the oxygen sensors in the fuel injection system and also seriously damage the catalyst in the catalytic converter.

Caution: DO NOT use fuel system cleaning agents, as many of these products can be harmful to gaskets and other materials used in fuel system components.

Octane Requirements
Premium unleaded gasoline with a CLC or AKI octane rating of 91 or higher should be used.

NOTE: *Federal law requires that gasoline octane ratings be posted on the pumps. The Cost of Living Council (CLC) octane rating or Anti Knock Index (AKI) octane rating shown is an average of Research Octane Number (RON) and Motor Octane Number (MON).*

Using unleaded fuel with an octane rating lower than that recommended can cause persistent, heavy 'engine knock' (a metallic rapping noise). If severe, this can lead to engine damage.

NOTE: *Mid or regular grade gasoline with a CLC or AKI octane rating of not lower than 87 may also be used, but performance and fuel economy will be reduced.*

If heavy engine knock is detected when using the recommended octane rated fuel, or if steady engine knocking is present while maintaining a steady speed on level roads, contact your Retailer for advice.

NOTE: An occasional, light, engine knock while accelerating or climbing hills is acceptable**.**

Octane Enhancers
The use of octane enhancers is not recommended, and may invalidate the vehicle warranty.

NOTE: *Reformulated gasoline and gasoline that contain detergents, anti-corrosion and stability additives is recommended - they will help your vehicle maintain the correct level of emissions and engine performance*.

Driveability
If you encounter driveability, starting and stalling problems, especially in high ambient temperatures or at high altitude when the engine is cold, it may be caused by poor quality fuel. Try an alternative brand and if the problem persists, seek advice from your Retailer.

Gasoline/Oxygenated Fuel Blends
To avoid invalidating the vehicle warranty, use ONLY fuels blended within the following limits:

- Up to 15% of Methyl Tertiary Butyl Ether (MTBE) and unleaded fuel mix.
- Up to 15% of Ethyl Tertiary Butyl Ether (ETBE) and unleaded fuel mix.
- Up to 10% of Ethanol (Ethyl or grain alcohol) and unleaded fuel mix.

Methanol/Unleaded Fuel Blends
In some areas, it is possible to buy unleaded fuel that is blended with up to 5% Methanol (Methyl or wood alcohol) and cosolvents and corrosion preventatives. Using these blends can cause driveability problems and damage the fuel system components. Their use may also invalidate the vehicle warranty.
WHEREVER POSSIBLE, AVOID USING FUEL CONTAINING METHANOL!

▲WARNING
Automotive fuels can cause serious injury and even death if misused.

Methanol/unleaded fuel blends, even in small amounts can cause blindness and possible death if swallowed. Additionally, take precautions to prevent methanol from coming into contact with the skin.

MAZDA

FUEL REQUIREMENTS
Vehicles with catalytic converters or oxygen sensors must use ONLY UNLEADED FUEL, which will reduce exhaust emissions and keep spark plug fouling to a minimum.

Your Mazda will perform best with fuel listed in the table.

Fuel	Octane Rating* (Anti-knock index)
Regular unleaded fuel	87 [(R+M)/2 method] or above (91 RON or above)

*U.S. federal law requires that octane ratings be posted on gasoline station pumps.

Fuel with a rating lower than 87 octane (91 RON) could cause the emission control system to lose effectiveness. It could also cause engine knocking and serious engine damage.

▲CAUTION

- USE ONLY UNLEADED FUEL
- Leaded fuel is harmful to the catalytic converter or the oxygen sensor. The lead will accumulate on the oxygen sensor and the catalyst inside the converter. This will result in a malfunction of the emission control system, causing poor performance.
- Your vehicle can only use oxygenated fuels containing no more than 10% ethanol by volume. Damage to your vehicle may occur when ethanol exceeds this recommendation, or if the gasoline contains any methanol. Stop using gasohol of any kind if your vehicle engine is performing poorly.
- Never add fuel system additives. Never add cleansing agents other than those specified by Mazda. Other cleansing agents and additives may damage the system. Consult an Authorized Mazda Dealer.

Gasoline blended with oxygenates such as alcohol or ether compounds are generally referred to as oxygenated fuels. The common gasoline blend that can be used with your vehicle is ethanol blended at no more than 10%. Gasoline containing alcohol, such as ethanol or methanol, may be marketed under the name “Gasohol”.

Vehicle damage and drivability problems resulting from the use of the following may not be covered by the Mazda warranty.

- Gasohol containing more than 10% ethanol.
- Gasoline or gasohol containing methanol
- Leaded fuel or leaded gasohol.

MERCEDES-BENZ

Premium Unleaded Gasoline
To maintain the engine's durability and performance, premium unleaded gasoline must be used. If premium unleaded gasoline is not available and low octane fuel is used, follow these precautions.

- Have the fuel tank only partially filled with unleaded regular and fill up with premium unleaded as soon as possible.
- Avoid full throttle driving and abrupt acceleration.
- Do not exceed an engine speed of 3000 rpm if the vehicle is loaded with a light load such as two persons and no luggage.
- Do not exceed 2/3 of maximum accelerator pedal position if the vehicle is fully loaded or operating in mountainous terrain.

Gasoline Additives (Gasoline Engine)
A major concern among engine manufacturers is carbon build-up caused by gasoline. Mercedes-Benz recommends only the use of quality gasoline containing additives that prevent the build up of carbon deposits.

After an extended period of using fuels without such additives, carbon deposits can build up, especially on the intake valves and in the combustion area, leading to engine performance problems such as:

- Warm-up hesitation
- Unstable idle
- Knocking/pinging
- Misfire
- Power loss

In areas where carbon deposits may be encountered due to lack of availability of gasolines which contain these additives, Mercedes-Benz recommends the use of additives approved by us for use on Mercedes-Benz vehicles. Refer to Factory Approved Service Products Pamphlet for a listing of approved product(s). Follow directions on product label.

Do not blend other fuel additives with fuel. This only results in unnecessary cost and may be harmful to the engine operation.

Damage or malfunction resulting from poor fuel quality or from blending additional fuel additives other than those tested and approved by us on Mercedes-Benz vehicles listed in the Factory Approved Service Products pamphlet are not covered by the Mercedes-Benz Limited Warranty.

Fuel Requirements
Use only premium unleaded gasoline meeting ASTM standard D 439:

- The octane number (posted at the pump) must be 91 min. It is an average of both the Research (R) Octane Number and the Motor (M) Octane Number: (R+M)/2. This is also known as the ANTI-KNOCK INDEX.

Unleaded gasoline containing oxygenates such as ethanol, IPA, IBA, and TB4 can be used provided the ratio of any one of these oxygenates to gasoline does not exceed 10%, MTBE must not exceed 15%.

The ratio of methanol to gasoline must not exceed 3% plus additional cosolvents.

Using mixtures of ethanol and methanol is not allowed. Gasohol, which contains 10% ethanol and 90% unleaded gasoline, can be used.

These blends must also meet all other fuel requirements, such as resistance to spark knock, boiling range, vapor pressure etc.

MITSUBISHI

Fuel Selection
Your vehicle is designed to use unleaded gasoline only. It is equipped with a fuel filler tube especially designed to accept only a small diameter unleaded gasoline dispensing nozzle.

▲CAUTION
Using leaded gasoline in your vehicle will damage the engine, catalytic converter, and the oxygen sensors. Also, using leaded gasoline is illegal, and will void your warranty coverage of the engine, catalytic converter, and oxygen sensors.

Gasoline Additives
Many fuel suppliers add detergents to their gasoline to minimize fuel injector fouling and to control intake valve deposits. These detergent gasolines are highly recommended for use in your vehicle. They help keep your engine in tune and your emission control system working properly.

Octane Requirement
2.4 Liter Engine Model
Your vehicle is designed to operate on unleaded gasoline having a minimum octane rating of 87 [(MON+RON)/2], or 91 RON.

3.8 Liter Engine Model
Your vehicle is designed to operate on premium grade unleaded gasoline having a minimum octane rating of 91 [(MON+RON)/2], or 95 RON. If premium grade unleaded gasoline is not available, unleaded gasoline having an octane rating of 87 [(MON+RON)/2], or 91 RON may be temporarily use[d] as an emergency measure, but only under the following precautions.

- Have the fuel tank filled only partially with unleaded regular gasoline, and fill up with unleaded premium gasoline as soon as possible.
- Avoid full throttle driving and abrupt acceleration.

MON: Motor Octane Number
RON: Research Octane Number

Oxygenated Gasoline
Gasoline sold at some service stations may contain oxygenates such as ethanol, methanol, and MTBE (Methyl Tertiary Butyl Ether), although they may not be identified by those names. Oxygenates are required in some areas of the country. Fuels blended with these oxygenates may be used in your vehicles.

Ethanol (Gasohol)
A mixture of 10% ethanol (grain alcohol) and 90% unleaded gasoline may be used in your vehicle, provided the octane rating is at least as high as that recommended for unleaded gasoline.

Methanol
Do not operate your vehicle on gasoline containing methanol (wood alcohol). The use of this type of alcohol can result in vehicle performance problems and could damage critical fuel system parts.

MTBE (Methyl Tertiary Butyl Ether)
A mixture of unleaded gasoline and 15% or less MTBE may be used in your vehicle, provided the octane rating is at least as high as that recommended for unleaded gasoline.

Fuel containing more than 15% MTBE may cause reduced vehicle performance, vapor lock, or difficulty in starting.

Reformulated Gasoline
Many areas of the country require the use of cleaner burning fuel referred to as “Reformulated Gasoline”. Reformulated gasolines contain oxygenates, and are specially blended to reduce vehicle emissions and improve air quality.

Mitsubishi Motors strongly supports the use of reformulated gasolines. Properly blended reformulated gasolines should have no adverse effects on vehicle performance or the durability of engine and fuel system components.

MMT
MMT is a manganese containing metallic additive that is blended into some gasolines to increase the octane number. Gasolines blended with MMT offer no performance advantage over gasolines of the same octane number that do not contain MMT. Gasolines blended with MMT may adversely affect the spark plug and emission systems.

Mitsubishi Motors Corporation recommends using gasolines without MMT.

Sulfur in Gasoline
Your vehicle may have been designed to meet California low emission standards based on clean burning low sulfur gasoline. Gasoline sold outside of California is allowed to have higher sulfur levels that may affect the performance of your vehicle’s catalytic converter. This may cause the engine malfunction indicator (“SERVICE ENGINE SOON” or “Check engine light”) to come on.

Seeing this light while operating on high sulfur gasoline does not necessarily mean your emission control system is malfunctioning. If this happens, your authorized Mitsubishi Motors dealer or a repair facility of your choice may recommend that you try using a different brand of unleaded gasoline having a lower sulfur content to determine if the problem is fuel related.

NOTE:
- Poor quality gasoline can cause problems such as difficulty in starting, stalling, engine noise and hesitation. If you experience these problems, try another brand and/or grade of gasoline.

If the engine malfunction indicator ("SERVICE ENGINE SOON" or "Check engine light") comes on, have the system checked as soon as possible by an authorized Mitsubishi Motors dealer or a repair facility of your choice.

NISSAN/INFINITI

FUEL RECOMMENDATION
Use unleaded regular gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (Research octane number 91).

For improved vehicle performance, NISSAN recommends the use of unleaded premium gasoline with an octane rating of at least 91 AKI number (Research octane number 96).

▲CAUTION
- Using a fuel other than that specified could adversely affect the emission control system, and may also affect the warranty coverage.
- Under no circumstances should a leaded gasoline be used, because this will damage the three-way catalyst.
- Do not use E-85 fuel in your vehicle. Your vehicle is not designed to run on E-85 fuel. E-85 fuel can damage the fuel system components and is not covered by the NISSAN vehicle limited warranty.

Gasoline Specifications
NISSAN recommends using gasoline that meets the World Wide Fuel Charter (WWFC) specifications where it is available. Many of the automobile manufacturers developed this specification to improve the emission control system and vehicle performance. Ask your service station manager if the gasoline meets the WWFC specifications.

Reformulated Gasoline
Some fuel suppliers are now producing reformulated gasolines. These gasolines are specially designed to reduce vehicle emissions. NISSAN supports efforts towards cleaner air and suggests that you use reformulated gasolines when available.

Gasoline Containing Oxygenates
Some fuel suppliers sell gasoline containing oxygenates such as ethanol, MTBE and methanol with or without advertising their presence. NISSAN does not recommend the use of fuels of which the oxygenate content and the fuel compatibility for a NISSAN cannot be readily determined. If in doubt, ask your service station manager.

If you use oxygenate-blend gasoline, please take the following precautions as the usage of such fuels may cause vehicle performance problems and/or fuel system damage.

- The fuel should be unleaded and have an octane rating no lower than that recommended for unleaded gasoline.
- If an oxygenate-blend, excepting a methanol blend, is used, it should contain no more than 10% oxygenate (MTBE may, however, be added up to 15%)
- If a methanol blend is used, it should contain no more than 5% methanol (methyl alcohol, wood alcohol). It should also contain a suitable amount of appropriate cosolvents and corrosion inhibitors. If not properly formulated with the appropriate cosolvents and corrosion inhibitors, such methanol blends may cause fuel system damage and/or vehicle performance problems. At this time, sufficient data is not available to ensure that all methanol blends are suitable for use in NISSAN vehicles.

If any undesirable driveability problems such as engine stalling and hard hot starting are experienced after using oxygenate-blend fuels, immediately change to a non-oxygenate fuel or a fuel with a low blend of MTBE.

Take care not to spill gasoline during refueling. Gasoline containing oxygenates can cause paint damage.

E-85 Fuel
E-85 fuel is a mixture of approximately 85% fuel ethanol and 15% unleaded gasoline. E-85 can only be used in a Flexible Fuel Vehicle (FFV). Do not use E-85 fuel in your vehicle. U.S. government regulations require fuel ethanol dispensing pumps to be identified by a small, square, orange and black label with the common abbreviation or the appropriate percentage for that region.

Aftermarket Fuel Additives
NISSAN does not recommend the use of any aftermarket fuel additives (i.e. fuel injector cleaner, octane booster, intake valve deposit removers, etc.) which are sold commercially. Many of these additives intended for gum, varnish or deposit removal may contain active solvent or similar ingredients that can be harmful to the fuel system and engine.

Octane Rating Tips
Using unleaded gasoline with an octane rating lower than recommended can cause persistent, heavy spark knock. (Spark knock is a metallic rapping noise.) If severe, this can lead to engine damage. If you detect a persistent heavy spark knock even when using gasoline of the stated octane rating, or if you hear steady spark knock while holding a steady speed on level roads, have your dealer correct the condition. Failure to correct the condition is misuse of the vehicle, for which NISSAN is not responsible.

Incorrect ignition timing will result in knocking after-run or overheating. This in turn may cause excessive fuel consumption or damage to the engine. If any of the above symptoms are encountered, have your vehicle checked at a NISSAN dealer or other competent service facility.

However, now and then you may notice light spark knock for a short time while accelerating or driving up hills. This is no cause for concern, because you get the greatest fuel benefit when there is a light spark knock for a short time under heavy engine load.

PORSCHE

FUEL QUALITY
Your engine is designed to provide optimum performance and fuel economy using **unleaded premium fuel with an octane rating of 98 RON (93 CLC or AKI).** Porsche therefore recommends the use of these fuels on your vehicle.

Porsche also recognizes that these fuels may not always be available. Be assured that your vehicle will operate properly on unleaded premium fuels with octane numbers of at least 95 RON (90 CLC or AKI), since the engine's "Electronic Oktane™ knock control" will adapt the ignition timing, if necessary.

Fuels Containing Alcohol and Ether
Some areas of the U.S. require oxygenated fuels during certain portions of the year. Oxygenated fuels are fuels which contain alcohols (such as methanol or ethanol) or ether (such as MTBE).

Under normal conditions, the amount of these compounds in the fuel will not affect driveability.

You may use oxygenated fuels in your Porsche, provided the octane requirements for your vehicle are met. We recommend, however, to change to a different fuel or station if any of the following problems occur with your vehicle.

- Deterioration of driveability and performance.
- Substantially reduced fuel economy.

- Vapor lock and non-start problems especially at high altitude or at high temperature.
- Engine malfunction or stalling.

Fuels Containing MMT
Some North American fuels contain an octane enhancing additive called methyl-cyclopentadienyl manganese tricarbonyl (MMT). If such fuels are used, your emission control system performance may be negatively affected.

The check engine warning lights on your instrument panel may turn on. If this occurs, Porsche recommends you stop using fuels containing MMT.

ROLLS ROYCE

FUEL SPECIFICATIONS
Use Only Unleaded Fuel
The engine requires only unleaded gasoline, which can also be sulfur-free. However, you can use different fuel qualities, as the engine is provided with knock control.

Your Rolls-Royce engine is rated to run on:
- Super Plus/premium plus fuel -- 98 AKI (Anti-Knock Index)
- Fill up with fuel of this grade whenever possible, so that the car achieves its nominal performance and fuel consumption values.

You can also run the engine on:
- Premium-grade unleaded fuel – 95 AKI (Anti-Knock Index).

The minimum permissible grade is:
- Regular-grade unleaded fuel – 91 AKI (Anti-Knock Index).

If this grade of fuel is being used, the engine may tend to make a knocking sound while being started at high ambient temperatures. This has no influence on the engine's operating life.

▲ Never use fuel containing lead, as the oxygen sensor and the catalytic converter will be permanently damaged.

Fuels
Use unleaded gasoline only. Fuels containing up to and including 10% ethanol or other oxygenates with up to 2.8% oxygen by weight that is, 15% MTBE or 3% methanol plus an equivalent amount of co-solvent – will not void the applicable warranties with respect to defects in materials or workmanship. Field experience has indicated significant differences in fuel quality – volatility, composition, additives, etc. – among gasolines offered for sale in the United States and Canada. The use of poor-quality fuels may result in drivability, starting and stalling problems especially under certain environmental conditions such as high ambient temperature and high altitude.

Should you encounter drivability problems which you suspect could be related to the fuel you are using, we recommend that you respond by switching to a recognized high-quality brand.

Failure to comply with these recommendations may result in unscheduled maintenance.

Follow the relevant safety rules when handling gasoline.

SAAB

FUEL
Use of the recommended fuel is an important part of the recommended maintenance of your vehicle.

Gasoline Octane
Use regular unleaded gasoline with a posted octane rating of 87 or higher. If the octane rating is less than 87, you may notice an audible knocking noise when you drive, commonly referred to as spark knock. If this occurs, use a gasoline rated at 87 octane or higher as soon as possible. If you are using gasoline rated at 87 octane or higher and you hear heavy knocking, your engine needs service.

Gasoline Specifications
At a minimum, gasoline should meet ASTM specification D 4814 in the United States or CAN/CGSB-3.5 in Canada. Some gasolines may contain an octane-enhancing additive called methylcyclo-pentadienyl manganese tricarbonyl (MMT). We recommend against the use of gasolines containing MMT.

California Fuel
If your vehicle is certified to meet California Emissions Standards, it is designed to operate on fuels that meet California specifications. See the underhood emission control label. If this fuel is not available in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be affected. The malfunction indicator lamp may turn on and your vehicle may fail a smog-check test. See *Malfunction Indicator Lamp* on page 3-36. If this occurs, return to your authorized dealer for diagnosis. If it is determined that the condition is caused by the type of fuel used, repairs may not be covered by your warranty.

Additives
To provide cleaner air, all gasolines in the United States are now required to contain additives that will help prevent engine and

fuel system deposits from forming, allowing your emission control system to work properly. In most cases, you should not have to add anything to your fuel. However, some gasolines contain only the minimum amount of additive required to meet U.S. Environmental Protection Agency regulations. To help keep fuel injectors and intake valves clean, or if your vehicle experiences problems due to dirty injectors or valves, look for gasoline that is advertised as TOP TIER Detergent Gasoline. Also, your GM dealer has additives that will help correct and prevent most deposit-related problems.

Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines may be available in your area. We recommend that you use these gasolines, if they comply with the specifications described earlier. However, E85 (85% ethanol) and other fuels containing more than 10% ethanol must not be used in vehicles not designed for those fuels.

Notice: **Your vehicle was not designed for fuel that contains methanol. Do not use fuel containing methanol. It can corrode metal parts in your fuel system and also damage plastic and rubber parts. That damage would not be covered under your warranty.**

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclo-pentadienyl manganese tricarbonyl (MMT); ask the attendant where you buy gasoline whether the fuel contains MMT. We recommend against the use of such gasolines. Fuels containing MMT can reduce the life of spark plugs and the performance of the emission control system may be affected. The malfunction indicator lamp may turn on. If this occurs, return to your authorized dealer for service.

SUBARU

FUEL

▲CAUTION
Use of a fuel which is low in quality or use of an inappropriate fuel additive may cause engine damage.

Fuel Requirements
2.5-Liter Non-Turbo Engines
The 2.5-liter non-turbo engine is designed to operate using unleaded gasoline with an octane rating of 87 AKI or higher.

2.5-Liter Turbo Models and 3.0-Liter Models
The 2.5-liter turbo engine and 3.0-liter engine are designed to operate using premium unleaded gasoline with an octane rating of 91 AKI or higher. If premium unleaded gasoline is not available, regular unleaded gasoline with an octane rating of 87 AKI or higher may be temporarily used.

For optimum engine performance and driveability, it is required (for 2.5-liter turbo models), and recommended (for 3.0-liter models) that you use premium unleaded gasoline.

NOTE
Be sure to use premium unleaded gasoline of 91 AKI or higher for a 2.5-liter turbo engine model. If other gasoline (lower than 91 AKI) is used, knocking, reduced output and poor accelerator response will result.

Fuel Octane Rating
This octane rating is the average of the Research Octane and Motor Octane numbers and is commonly referred to as the Anti Knock Index (AKI).

Using a gasoline with a lower octane rating can cause persistent and heavy knocking, which can damage the engine. Do not be concerned if your vehicle sometimes knocks lightly when you drive up a hill or when you accelerate. See your dealer or a qualified service technician if you use a fuel with the specified octane rating and your vehicle knocks heavily or persistently.

Unleaded Gasoline
The neck of the fuel filler pipe is designed to accept only an unleaded gasoline filler nozzle. Under no circumstances should leaded gasoline be used because it will damage the emission control system and may impair driveability and fuel economy.

California Fuel
If your vehicle was certified to California low Emission Standards as indicated on the underhood tune-up label, it is designed to optimize engine and emission control system performance with gasoline that meets the clean burning low-sulfur California gasoline specifications. If you live in any other state than California, your vehicle will operate on gasoline meeting Federal specifications. Gasoline sold outside California is permitted to have higher sulfur levels, which may affect the performance of your vehicle's catalytic converter and may produce a sulfur exhaust odor or smell. SUBARU recommends that you try a different brand of unleaded gasoline having lower sulfur to determine if the problem is fuel related before returning your vehicle to an authorized dealer for service. The CHECK ENGINE warning light/Malfunction indicator lamp may also turn on. If this occurs, return to your authorized SUBARU dealer for diagnosis. If it is determined that the condition is caused by the type of fuel used, repairs may not be covered by your warranty.

MMT
Some gasoline contains an octane enhancing additive called MMT (Methyl-cyclopentadienyl Manganese Tricarbonyl). If you use such fuels, your emission control system performance may deteriorate and the CHECK ENGINE warning light/Malfunction indicator lamp may turn on. If this happens, return to your authorized SUBARU Dealer for service. If it is determined that the condition is caused by the type of fuel used, repairs may not be covered by your warranty.

Gasoline for Cleaner Air
Your use of gasoline with detergent additives will help prevent deposits from forming in your engine and fuel system. This helps keep your engine in tune and your emission control system working properly, and is a way of doing your part for cleaner air. If you continuously use a high quality fuel with the proper detergent and other additives, you should never need to add any fuel system cleaning agents to your fuel tank.

Many gasolines are now blended with materials called oxygenates. Use of these fuels can also help keep the air cleaner. Oxygenated blend fuels, such as MTBE (Methyl Tertiary Butyl ether) or ethanol (ethyl or grain alcohol) may be used in your vehicle, but should contain no more than 15% MTBE or 10% ethanol for the proper operation of your SUBARU.

In addition, some gasoline suppliers are now producing reformulated gasolines, which are designed to reduce vehicle emissions. SUBARU approves the use of reformulated gasoline.

If you are not sure what the fuel contains, you should ask your service station operators if their gasolines contain detergents and oxygenates and if they have been reformulated to reduce vehicle emissions.

As additional guidance, only use fuels suited for your vehicle as explained below.

- Fuel should be unleaded and have an octane rating no lower than that specified in this manual.
- Methanol (methyl or wood alcohol) is sometimes mixed with unleaded gasoline. Methanol can be used in your vehicle **ONLY** if it does not exceed 5% of the fuel mixture **AND** if it is accompanied by sufficient quantities of the proper cosolvents and corrosion inhibitors required to prevent damage to the fuel system. Do not use fuel containing methanol **EXCEPT** under these conditions.
- If undesirable driveability problems are experienced and you suspect they may be fuel related, try a different brand of gasoline before seeking service at your SUBARU dealer.
- Fuel system damage or driveability problems which result from the use of improper fuel are not covered under the SUBARU Limited Warranty.

▲CAUTION
Do not let fuel spill on the exterior surfaces of the vehicle. Fuels containing alcohol may cause paint damage, which is not covered under the SUBARU Limited Warranty.

SUZUKI

FUEL RECOMMENDATION
Your vehicle requires regular unleaded gasoline with a minimum rating of 87 pump octane ((R+M)/2 method). In some areas, the only fuels that are available are oxygenated fuels. Oxygenated fuels which meet the minimum octane requirements and the requirements described below may be used in your vehicle without jeopardizing the New Vehicle Limited Warranty.

NOTE
Oxygenated fuels are fuels which contain oxygen-carrying additives such as MTBE or alcohol.

Gasoline Containing MTBE
Unleaded gasoline containing MTBE (methyl tertiary butyl ether) may be used in your vehicle if the MTBE content is not greater than 15%. This oxygenated fuel does not contain alcohol.

Gasoline/Ethanol Blends
Blends of unleaded gasoline and ethanol (grain alcohol), also known as gasohol, may be used in your vehicle if the ethanol content is not greater than 10%.

Gasoline/Methanol Blends
Fuels containing 5% or less methanol (wood alcohol) may be suitable for use in your vehicle if they contain cosolvents and corrosion inhibitors. Do NOT USE fuels containing more than 5% methanol under any circumstances. Fuel system damage or vehicle performance problems resulting from the use of such fuels are not the responsibility of SUZUKI and may not be covered under the New Vehicle Limited Warranty.

Fuel Pump Labeling
In some states, pumps that dispense oxygenated fuels are required to be labeled for the type and percentage of oxygenate and whether important additives are present. Such labels may provide enough information for you to determine if a particular blend of fuel meets the requirements listed above. In other areas, pumps may not be clearly labeled as to the content or type of oxygenate and additives. If you are not sure that the fuel you intend to use meets these requirements, check with the service station operator or the fuel supplier.

NOTE
To help clean the air, SUZUKI recommends you use the oxygenated fuels. However, if you are not satisfied with the driveability or fuel economy of your vehicle when you are

using the oxygenated fuel, switch back to the regular unleaded gasoline.

▲CAUTION
Be careful not to spill fuel containing alcohol while refueling. Fuels containing alcohol can cause paint damage, which is not covered under the New Vehicle Limited Warranty.

TOYOTA

FUEL TYPE
Your new vehicle must use only unleaded gasoline.

To help prevent gas station mix-ups, your Toyota has a smaller fuel tank opening. The special nozzle on pumps with unleaded fuel will fit it, but the larger standard nozzle on pumps with leaded gas will not.

At a minimum, the gasoline you use should meet specifications of ASTM D4814 in the U.S.A. and CGSB 3.5-M93 in Canada.

NOTICE
Do not use leaded gasoline. Use of leaded gasoline will cause the three-way catalytic converter to lose its effectiveness and the emission control system to function improperly. Also, this can increase maintenance costs.

Octane Rating
Select Octane Rating 87 (Research Octane Number 91) or higher.

Use of unleaded gasoline with an octane rating or research octane number lower than stated above will cause persistent heavy knocking. If it is severe, this will lead to engine damage.

If Your Engine Knocks….
If you detect heavy knocking even when using the recommended fuel, or if you hear steady knocking while holding a steady speed on level roads, consult your Toyota dealer. However, occasionally, you may notice light knocking for a short time while accelerating or driving up hills. This is normal and there is no need for concern.

Gasolines Containing Detergent Additives
Toyota recommends the use of gasoline that contains detergent additives to avoid build-up of engine deposits.

However, all gasoline sold in the U.S. contains detergent additives to keep clean and/or clean intake systems.

Quality Gasoline
Automotive manufacturers in the U.S., Europe and Japan have developed a specification for quality fuel named World-Wide Fuel Charter (WWFC) that is expected to be applied world wide. The WWFC consists of four categories that depend on required emission levels. In the U.S., category 4 has been adopted. The WWFC improves air quality by providing for better emissions in vehicle fleets, and customer satisfaction through better vehicle performance.

Cleaner Burning Gasoline
Cleaner burning gasoline, including reformulated gasoline that contains oxygenates such as ethanol or MTBE is available in many areas.

Toyota recommends the use of cleaner burning gasoline and appropriately blended reformulated gasoline. These types of gasoline provide excellent vehicle performance, reduce vehicle emissions, and improve air quality.

Oxygenates In Gasoline
Toyota allows the use of oxygenate blended gasoline where the oxygenate content is up to 10% ethanol or 15% MTBE. If you use gasohol in your Toyota, be sure that it has an octane rating no lower than 87.

Toyota does not recommend the use of gasoline containing methanol.

Gasoline Containing MMT
Some gasoline contain[s] an octane enhancing additive called MMT (Methyl-cyclopenta-dienyl Manganese Tricarbonyl).

Toyota does not recommend the use of gasoline that contains MMT. If fuel containing MMT is used, your emission control

system may be adversely affected. The Malfunction Indicator Lamp on the instrument cluster may come on. If this happens, contact your Toyota dealer for service.

Gasoline Quality
In a very few cases, you may experience driveability problems caused by the particular gasoline that you are using. If you continue to have unacceptable driveability, try changing gasoline brands. If this does not rectify your problem, then consult your Toyota dealer.

NOTICE
• Do not use gasohol other than stated above. It will cause fuel system damage or vehicle performance problems • If driveability problems occur (poor hot starting, vaporizing, engine knock, etc.), discontinue the use. • Take care not to spill gasohol during refueling. Gasohol may cause paint damage.

VOLKSWAGEN/AUDI

FUEL SUPPLY - GASOLINE
Octane Rating
Octane rating indicates a gasoline's ability to resist engine damaging "knock" caused by pre-ignition. Therefore, buying the correct grade of gasoline is very important to help prevent possible engine damage and a loss of engine performance.

The recommended gasoline octane rating for your engine can be found on a label located on the inside of the fuel filler flap. This rating may be specified as AKI (CLC) or RON (ROZ).

Gasolines most commonly used in the United States and Canada have the following octane ratings that can usually be found on the filler pump:

Premium Grade: 91 – 96 AKI
Regular Grade: 87 – 90 AKI

Unleaded Gasoline
Unleaded gasoline is available throughout the USA, Canada, and in most European countries. We recommend that you do not take your vehicle to areas or countries where unleaded gasoline may not be available.

Gasoline Containing Alcohol or MTBE
You may use unleaded gasoline blended with alcohol or MTBE (methyl tertiary butyl ether; commonly referred to as oxygenates) if the blended mixture meets the following criteria:

Blend of Gasoline Methanol (wood alcohol or methyl alcohol)
• Anti-knock index must be 87 AKI or higher,
• Blend must contain no more than 3% methanol,
• Blend must contain more than 2% co-solvents.

Blend of Gasoline and Ethanol (Grain Alcohol or Ethyl Alcohol)
• Anti-knock index must be 87 AKI or higher.
• Blend must not contain more than 10% ethanol.

Blend of Gasoline and MTBE
• Anti-knock index must be 87 AKI or higher.
• Blend must contain not more than 15% MTBE.

Seasonally Adjusted Gasoline
Many gasolines are blended to perform especially well for winter or summer driving. During seasonal change-over, we suggest that you fill up at busy gas stations where the seasonal adjustment is more likely to be made in time.

NOTE
• Do not use any fuel with octane ratings lower than 87 AKI or 91 RON otherwise expensive engine damage will occur.
• Do not use leaded gasoline. Using leaded gasoline will severely damage your vehicle's catalytic converter and its ability to reduce exhaust emissions.
• Methanol fuels that do not meet these requirements may cause corrosion and damage to plastic and rubber components in the fuel system.
• Do not use fuels that fail to meet the criteria specified above.

• If you are unable to determine whether or not a particular fuel blend meets the specifications above, ask your service station or its fuel supplier.
• Do not use fuels for which the contents cannot be identified.
• Fuel system damage and performance problems resulting from the use of fuels different from those specified above are not the responsibility of Volkswagen and are not covered under the New Vehicle or the Emission Control System Warranties.

For the Sake of the Environment
Just one tank full of leaded gas will seriously reduce the efficiency of the catalytic converter.

Tips
If you notice a loss of fuel economy or driveability and performance problems using one of these fuel blends, we recommend that you switch to unblended fuel.

Gasoline Additives
Gasoline additives improve the quality of the gasoline.

Gasoline quality influences engine behavior, efficiency, performance and service life. For this reason you should always use good quality gasoline containing additives. These additives will help to prevent corrosion, keep the fuel system clean and prevent deposits from building up in the engine.

If good quality gasoline containing additives is not available, or if engine problems arise, additives may be added to the gasoline.

You can also buy gasoline additives separately and add them to the gasoline yourself if you have problems starting or if the engine does not run smoothly

Not all gasoline additives are effective. We recommend you use only genuine Volkswagen gas additives for gasoline engines. These additives are available from your authorized Volkswagen dealer. You will also receive information on how to use them.

Do not mix other gas additives with the gas.

VOLVO

FUEL REQUIREMENTS
Octane Rating
Volvo engines are designed for optimum performance on unleaded premium gasoline with an AKI octane rating of 91 or above. AKI (ANTI KNOCK INDEX) is an average of the Research Octane Number, RON, and the Motor Octane Number, MON. ((RON + MON)/2). The minimum octane requirement is AKI 87 (RON 91).

Deposit Control Gasoline (Detergent Additives)
Volvo recommends the use of detergent gasoline to control engine deposits. Detergent gasoline is effective in keeping injectors and intake valves clean. Consistent use of deposit control gasolines will help ensure good driveability and fuel economy. If you are not sure whether the gasoline contains deposit control additives, check with the service station operator.

Unleaded Fuel
Each Volvo has a three-way catalytic converter and must use only unleaded gasoline. U.S. and Canadian regulations require that pumps delivering unleaded gasoline be labeled “UNLEADED”. Only these pumps have nozzles which fit your car’s filler inlet. It is unlawful to dispense leaded fuel into a vehicle labeled “unleaded gasoline only”. Leaded gasoline damages the three-way catalytic converter and the heated oxygen sensor system. Repeated use of unleaded gasoline will lessen the effectiveness of the emission control system and could result in loss of emission warranty coverage. State and local vehicle inspection programs will make detection of misfueling easier, possibly resulting in emission test failure for misfueled vehicles.

NOTE: Some U.S. and Canadian gasolines contain an octane enhancing additive called methyl-cyclopentadienyl manganese tricarbonyl (MMT). If such fuels are used, your Emission Control System performance may be affected and the Check Engine Light

(malfunction indicator lamp) located on your instrument panel may light. If this occurs, please return your vehicle to an authorized Volvo retailer for maintenance.

Gasoline Containing Alcohol and Ethers

"Oxygenated Fuels"
Some fuel suppliers sell gasoline containing "oxygenates" which are usually alcohols or ethers. In some areas, state or local laws require that the service pump be marked indicating use of alcohols or ethers. However, there are areas in which the pumps are unmarked. If you are not sure whether there is alcohol or ethers in the gasoline you buy, check with the service station operator. To meet seasonal air quality standards, some areas require the use of "oxygenated" fuel.

Volvo allows the use of the following "oxygenated fuels;" however, the octane ratings listed on this page must still be met.

Alcohol – Ethanol: Fuels containing up to 10% ethanol by volume may be used. Ethanol may also be referred to as Ethyl alcohol, or "Gasohol".

Ethers – MTBE: Fuels containing up to 15% MTBE may be used.

Fuel Formulations
Do not use gasoline that contains lead as a knock inhibitor, and do not use lead additives. Besides damaging the exhaust emission control system on your car, lead has been strongly linked to certain forms of cancer.

Many fuels contain benzene as a solvent. Unburned benzene has been strongly linked to certain forms of cancer. If you live in an area where you must fill your own gas tank, take precautions. These may include:

- standing upwind away from the filler nozzle while refueling.
- refueling only at gas stations with vapor recovery systems that fully seal the mouth of the filler neck during refueling.
- wearing neoprene gloves while handling a fuel filler nozzle.

Use of Additives
With the exception of gas line antifreeze during winter months, do not add solvents, thickeners, or other store-bought additives to your car's fuel, cooling or lubricating systems. Overuse may damage your engine, and some of these additives contain organically volatile chemicals. Do not needlessly expose yourself to these chemicals.