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**2003 AUTOMOBILE MANUFACTURER FUEL RECOMMENDATIONS**

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***Vehicle Owners Manual Statements***

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**BMW**

**FUEL SPECIFICATIONS**

The engine uses lead-free gasoline only.

Required fuel:

Premium Unleaded Gasoline.

Min. 91 AKI.

AKI = Anti-Knock Index.

Do not use leaded fuels. The use of leaded fuels will cause permanent damage to the system's oxygen sensor and the catalytic converter.

**For your Own Safety**

Use unleaded gasoline only. Fuels containing up to and including 10% ethanol or other oxygenates with up to 2.8% oxygen by weight (i.e. 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 difference in fuel quality (volatility, composition, additives, others) among gasolines offered for sale in the United States and Canada. 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.

Obey pertinent safety rules when you are handling gasoline.

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**DAIMLERCHRYSLER**

**FUEL REQUIREMENTS**

Your vehicle is designed to meet all emission regulations and provide excellent fuel economy when using high quality regular unleaded gasoline with 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. Engine damage resulting from operating with a heavy spark knock may not be covered by the new vehicle warranty.

Poor quality gasolines can cause problems such as hard starting, stalling and hesitation. 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."

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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.**

### 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 MMT in Canada because MMT can be used at levels higher than those allowed in the United States.

### Sulfur in Gasoline

Your vehicle may have been designed to meet California low emission standards when using cleaner burning California reformulated gasoline with low sulfur. This vehicle may be sold nationwide. Your

vehicle will operate satisfactorily on fuels meeting Federal specifications, but emission control system performance may be adversely affected.

Gasoline sold outside California is permitted to have higher sulfur levels which may affect the performance of the vehicle's catalytic converter. This may cause the Malfunction Indicator Light to illuminate. The manufacturer recommends that you try a different brand of unleaded gasoline having lower sulfur to determine if the problem is fuel related prior to returning your vehicle to an authorized dealer for service.

#### CAUTION

If the Malfunction Indicator light is flashing, immediate service is required. Refer to the paragraph on the Onboard Diagnostics System in section 7 of this manual.

### Materials Added to Fuel

All gasoline sold in the United States and Canada 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, and could result in loss of warranty coverage.

- 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 are not recommended. Most of these products contain high concentrations of methanol.

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- Fuel system damage or vehicle performance problems resulting from the use of such fuels or fuel additives are not the responsibility of the manufacturer and may not be covered under the New Vehicle Warranty.

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### FERRARI

#### [Owners Manual]

Fuel Tank - Unleaded fuel, RON 95-98

#### [EPA 2003 MY Certification Application] Test Procedures

The test vehicles with respect to which data are submitted to demonstrate compliance with 2003 Emission Standards for Light-Duty vehicles are in all material respects as described in the application for certification, have been tested in accordance with the applicable test procedures utilizing the fuels and equipment described in the application for certification and, on the basis of such tests, conform to the requirements of the regulations in 40 CFR Part 86.

For each evaporative emission family - evaporative emission control system combination tests were designed and conducted in accordance with good engineering practice to assure that the vehicles covered by certificate of conformity will meet the 2003 evaporative emission standards for light-duty vehicles for the useful life of the vehicle.

#### California Additional Requirements

The Ferrari vehicles used in the certification process of the test group 3FEXV03.6LEV are carry-over from 2002 model year, test group 2FEXV03.6LEV, and are identical to the production vehicles to be sold in the State of California.

#### Driveability

FERRARI guarantees that the vehicles belonging to 2003 model year test group 3FEXV03.6LEV show satisfactory driveability in all the conditions that may be encountered during the standard use of the vehicles.

#### 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.

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### FORD

#### [Regular Grade Gasoline] Unleaded Gasoline Engines

Use only unleaded fuel.  
Use "Regular" unleaded gasoline with an (R+M)/2 octane rating of 87.  
Do not use fuel containing methanol.  
Do not use fuel or fuel additives with metal compounds.

#### 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 (8<sup>th</sup> 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

## 2003 Automobile Manufacturer Fuel Recommendations

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performance, and your warranty may be invalidated.

### Fuel Quality

The World-wide Fuel Charter recommends gasoline specifications to provide improved performance and emission control system protection. Ask your fuel supplier about gasolines that meet the World-wide Fuel Charter. In Canada, look for fuels that display the Auto Makers' Choice logo.

It should not be necessary to add any aftermarket products to your fuel tank if you use high quality fuel of the recommended octane rating. Aftermarket products could cause damage to the fuel system and invalidate your warranty.

### Cleaner Air

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

### [Premium Grade Gasoline]

Your vehicle was not designed to use fuel or fuel additives with metallic compounds, including manganese-based compounds containing MMT. 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 "Premium" unleaded gasoline with an (R+M)/2 octane rating of 91 or higher for optimum performance. The use of gasolines with lower octane ratings may degrade performance. The use of gasolines labeled as "Premium" in high altitude areas that are sold with octane ratings of less than 91 is not recommended.

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.

### Fuel Quality

If you are experiencing starting, rough idle or hesitation driveability problems during a cold

start, try a different brand of gasoline. If the problems persist, see your dealer or a qualified service technician.

If 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 issued the World-wide Fuel Charter that recommends gasoline specifications to provide improved performance and emission control system protection for your vehicle. Gasolines that meet the World-wide Fuel Charter should be used when available. Ask your fuel supplier about gasolines that meet the World-wide Fuel Charter. In Canada, look for fuels that display the Auto Makers' Choice logo.

### Cleaner Air

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

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## GENERAL MOTORS

### FUEL RECOMMENDATIONS REGULAR GRADE GASOLINE

#### Gasoline Octane

Use regular unleaded gasoline with a posted octane of 87 or higher. If the octane is less than 87, you may get 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. A little pinging noise when you accelerate or drive uphill is considered normal. This does not indicate a problem exists or that a higher-octane fuel is necessary. If you are using 87 octane or higher-octane fuel and you hear heavy knocking, your engine needs service.

#### Gasoline Specifications

It is recommended that gasoline meet specifications which were developed by the

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American Automobile Manufacturers Association and endorsed by the Canadian Vehicle Manufacturers' Association for better vehicle performance and engine protection. Gasolines meeting these specifications could provide improved driveability and emission control system performance compared to other gasolines. In Canada, look for the "Auto Makers' Choice" label on the pump.

### California Fuel

If your vehicle is certified to meet California Emission Standards (see the underhood emission control label), it is designed to operate on fuels that meet California specifications. 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 (see "Malfunction Indicator Lamp" in the Index) 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 vehicle 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. You should not have to add anything to your fuel. Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines, may be available in your area to contribute to clean air. General Motors recommends the use of such gasolines, particularly if they comply with the specifications described previously.

#### NOTICE

Your vehicle was not designed for fuel that contains methanol. Don't use fuel containing methanol. It can corrode metal parts in your fuel system and also damage plastic and rubber parts. That damage wouldn't be covered under your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT); ask the attendant where you buy gasoline whether the fuel contains MMT. General Motors does not recommend 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.

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## HONDA/ACURA

### Gasoline

Your Acura is designed to operate on premium unleaded gasoline with a pump octane number of 91 or higher.

**[Regular unleaded vehicles.** Your Honda is designed to operate on unleaded gasoline with a pump octane number of 86 or higher.]

Use of a lower octane gasoline can cause occasional metallic knocking noises in the engine and will result in decreased engine performance.

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

Using gasoline containing lead will damage your car's emissions controls. This contributes to air pollution.

In Canada, some gasolines contain an octane-enhancing additive called MMT. If you use such gasolines, your emissions control system performance may deteriorate and the Malfunction Indicator Lamp on your instrument panel may turn on. If this happens, contact your authorized Acura dealer for service.

### Oxygenated Fuels

Some conventional gasolines are being blended with alcohol or an ether compound. These gasolines are collectively referred to as oxygenated fuels. To meet clean air

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standards, some areas of the United States and Canada use oxygenated fuels to help reduce emissions.

If you use an oxygenated fuel, be sure it is unleaded and meets the minimum octane rating requirement. Before using an oxygenated fuel, try to confirm the fuel's contents. Some states/provinces require this information to be posted on the pump.

The following are the U.S. EPA and Canadian CGSB approved percentages of oxygenates:

### **ETHANOL (ethyl or grain alcohol)**

You may use gasoline containing up to 10 percent ethanol by volume. Gasoline containing ethanol may be marketed under the name "Gasohol".

### **MTBE (Methyl Tertiary Butyl Ether)**

You may use gasoline containing up to 15 percent MTBE by volume.

### **METHANOL (methyl or wood alcohol)**

Your vehicle was not designed to use fuel that contains methanol. Methanol can corrode metal parts in the fuel system, and also damage plastic and rubber components. This damage would not be covered by your warranties.

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

Fuel system damage or performance problems resulting from the use of an oxygenated fuel containing more than the percentages of oxygenates given above are not covered under warranty.

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## 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.

If leaded gasoline is used, it will cause the catalytic converter to become ineffective and the emission control system to malfunction. This can also result in increased maintenance expense.

To avoid accidental use of leaded fuel, the larger nozzle used with leaded gasoline at service stations cannot be inserted into the fuel tank opening of your Hyundai.

### **WARNING**

Do not "TOP OFF" after the first nozzle shut off when refueling.

The fuel cap must be tightened at least 3 clicks, otherwise check engine light may illuminate.

### **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.

### **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).

### **Operation in Foreign Countries**

If you are going to drive your Hyundai in another country, be sure to:

Observe all regulations regarding registration and insurance.

Determine that acceptable fuel is available.

### **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

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gasolines will help the engine run cleaner and the Emission Control System performance.

### 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.

in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control systems performance may be affected. The malfunction indicator lamp on your instrument panel may turn on and/or your vehicle may fail a smog check test. If this occurs, return to your authorized Isuzu Dealer for diagnosis to determine the cause of failure. In the event it is determined that the cause of the condition is the type of fuels used, repairs may not be covered by your warranty.

In Canada, some gasolines contain an octane-enhancing additive called MMT. If you use such fuels, your emission control system performance may deteriorate and the malfunction indicator lamp on your instrument panel may turn on. If this happens, return to your authorized Isuzu Dealer for service. To provide cleaner air, all gasolines are now required to contain additives that will help prevent deposits from forming on your engine and fuel system, allowing your emission control system to function properly. Therefore, you should not have to add anything to the fuel. In addition, gasolines containing oxygenates, such as ethers and ethanol and reformulated gasolines may be available in your area to help clean the air. Isuzu recommends that you use these gasolines if they comply with the specifications described earlier.

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## ISUZU

### FUEL REQUIREMENTS

Use regular unleaded gasoline rated at 87 octane or higher. At a minimum, it should meet specifications ASTM D4814 in the United States and CGSB 3.5-M93 in Canada. Improved gasoline specifications have been developed by the American Automobile Manufacturers Association (AAMA) for better vehicle performance and engine protection.

Gasolines meeting the AAMA specification could provide improved driveability and emission control system protection compared to other gasolines. Be sure the posted octane is at least 87. If the octane is less than 87, you may notice a heavy knocking noise when you drive. If it's bad enough, it can damage your engine.

If you're using fuel rated at 87 octane or higher and you still 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.

If your vehicle is certified to meet California Emissions Standards (indicated on the underhood tune-up label), it is designed to operate on fuels that meet California specifications. If such fuels are not available

### CAUTION

**Your vehicle was not designed for fuel that contains methanol. Don't use it. It can corrode metal parts in your fuel system and also damage plastic and rubber parts. That damage wouldn't be covered under your warranty.**

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## JAGUAR

### On the Road

The continuous use of high quality fuel makes the need for additional additives unnecessary. This will help to protect the engine components against corrosion, carbon deposit formation and prevent the

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fuel injection system from clogging. If in doubt your local Jaguar Dealer will advise on which fuel must be used in your vehicle.

### Emission Control Components

Owing to the legislative requirements or options available in some markets, a Jaguar Dealer should be consulted where any doubt exists as to the precise emission control system specification of this vehicle.

### Fuel Requirements

Any vehicle NOT fitted with a catalytic system can use either leaded or unleaded fuel.

The use of either leaded or unleaded fuel depends on the type of emission control system fitted to the engine and the legislative requirements in the country for which the vehicle is manufactured.

The preferred fuel is 95 RON unleaded, where selection is available.

### Unleaded Fuel

The filter neck of the fuel tank is a small diameter to suit the unleaded fuel pump nozzle and will prevent the larger diameter leaded fuel nozzle from entering the filler neck.

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.

Use unleaded fuel with an octane rating of at least 95 RON (Research Octane Number).

### Note:

1. Some countries have only 91 RON fuel available. The vehicles in these countries are specifically calibrated to use this fuel.
2. 'Super Green' Plus 98 RON unleaded fuel (where available) may be used as an alternative to the standard 95 RON unleaded fuel.

Using unleaded fuel with an octane rating lower 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.

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### **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.

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.

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## **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.

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## **LAND ROVER**

### **FUEL SYSTEM TYPE OF FUEL**

#### **Octane Requirements**

Premium unleaded gasoline with a CLC or AKI minimum octane rating of 87 is recommended.

**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).*

**NOTE:** *Engine performance and fuel economy may improve if higher octane fuel is used.*

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

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.

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

### IMPORTANT INFORMATION

#### ONLY USE UNLEADED FUEL

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

**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.

**Fuel system cleaning agents should be avoided, as many of these products can be harmful to gaskets and other materials used in fuel system components.**

### Octane Enhancers

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

**NOTE:** Reformulated gasolines and gasolines that contain detergents, anti-corrosion and stability additives are 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 to 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.**

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## 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.

Fuel with a lower rating could cause the emission control system to lose effectiveness. It could also cause engine knocking and serious engine damage.

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.

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### Haiti, Ecuador, Venezuela

Use only premium unleaded fuel 91[(R+M)/2 method] or above (96 RON or above).

#### △ 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.

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## MERCEDES - BENZ

### Premium Unleaded Gasoline

To maintain the engine's durability and performance, premium unleaded gasoline must be used. If premium unleaded 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.

### Fuel Requirements

Use only Premium unleaded 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 not to 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.

### Gasoline Additives

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

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in the combustion area, leading to engine performance problems such as:

- warm-up hesitation
- unstable idle
- knocking/pinging
- misfire
- power loss

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

Damage or malfunctions resulting from poor fuel quality or from blending specific fuel additives are not covered by the Mercedes-Benz Limited Warranty.

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## 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.

<b>△ CAUTION</b>
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<b>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.</b>
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### 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.

### 3.0 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 used. However, the performance level may be reduced.

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 gasoline contain oxygenates, and are specially blended to reduce vehicle emissions and improve air quality.

## 2003 Automobile Manufacturer Fuel Recommendations

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Mitsubishi Motors Corporation 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 beyond gasolines of the same octane number without 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**

If you live in the northeast United States, your vehicle may have been designed to meet California low emission standards based on clean burning California 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 light (SERVICE ENGINE SOON) 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 dealer may recommend that you try using a different brand of unleaded gasoline having a lower sulfur 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 light (SERVICE ENGINE SOON) is flashing, have the system checked as soon as possible at an authorized dealer.

### **Catalytic Converter**

The catalytic converter requires you to use unleaded fuel only. Leaded gasoline will

destroy the emission control effectiveness of the converter.

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## **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, INFINITI recommends the use of unleaded premium gasoline with an octane rating of at least 91 AKI number (Research octane number 96)

### **Reformulated Gasoline**

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

### **Gasoline Containing Oxygenates**

Some fuel suppliers sell gasoline containing oxygenates such as ethanol, MTABE and methanol with or without advertising their presence. INFINITI does not recommend the use of fuels of which the oxygenate content and the fuel compatibility for your INFINITI 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

## 2003 Automobile Manufacturer Fuel Recommendations

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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 INFINITI 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.

### Aftermarket Fuel Additives

INFINITI does not recommend the use of any 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

In most parts of North America, you should use unleaded gasoline with an octane rating of at least 87 or 91 AKI (Anti-Knock Index) number. However, you may use unleaded gasoline with an octane rating as low as 85 AKI number in these high altitude areas [over 4,000 ft (1,219 m)] such as Colorado, Montana, New Mexico, Utah, Wyoming, northeastern Nevada, southern Idaho, western South Dakota, western Nebraska and that part of Texas which is directly south of New Mexico.

Using unleaded gasoline with an octane rating lower than stated above 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 INFINITI 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 an INFINITI retailer 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.

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## 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,

## 2003 Automobile Manufacturer Fuel Recommendations

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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 methylcyclopentadienyl 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.

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## SAAB

### Refueling

Only fuel from well-known oil companies should be used.

All Saab gasoline engines can be driven on fuel of grade AON 87-93.

For optimum performance we recommend:

- AON 90 for 4-cylinder engines
- AON 93 for 3.0t V6 and 2.3T Aero.

If fuel containing a mixture of alcohol is used, the following restrictions apply:

Methanol: max. 5% by volume  
Ethanol: max. 10% by volume  
MTBE: max. 15% by volume.

The most effective way to prevent condensation forming in the tank (and thus avoid possible running problems) is to keep the tank well filled.

Before the onset of freezing temperatures in winter, it may be advisable to add gasoline anti-freeze to the fuel a few times to dispel any condensation in the system.

### Recommended Fuel

The engine in your Saab 95 is designed to operate on unleaded gasoline that has an octane rating of 87 or higher. Octane rating is determined according to the formula:

$(MON + RON)/2$  where MON is the Motor Octane number, and RON is the Research Octane Number.

The average of these two values is the octane rating of the gasoline as it appears on the pump at a retail gas station. This value is sometimes referred to as the "Anti-Knock Index" (AKI) or the "Average Octane Number" (AON).

To avoid deposit formation on the fuel injectors which can cause poor driveability, use only quality gasolines that contain detergents and corrosion inhibitors. Because gasolines sold at retail gas stations vary in their composition and quality, you should switch to a different brand if you begin experiencing driveability and/or hard starting problems shortly after refueling your car. In recent years, a variety of fuel additives and alcohols or oxygenates have been blended with gasoline. These types of gasolines may be found in all parts of the United States and Canada, but particularly in geographic areas and cities that have high carbon monoxide levels. Saab approves the use of such "reformulated" gasolines in its products, which help in reducing pollution from all motor vehicles, provided that the following blending percentages are met by such fuels:

- Up to 10% ethanol by volume, with corrosion inhibitors.
- Up to 15% MTBE by volume (methyl tertiary butyl ether).
- Up to 5% methanol by volume, with an equal amount of a suitable co-solvent and added corrosion inhibitors.

Other, less common, fuel additives used by some gasoline dealers are also acceptable, provided that the resultant gasoline is not more than 2.7% oxygen by weight.

## 2003 Automobile Manufacturer Fuel Recommendations

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Some Canadian and U.S. gasolines contain an octane enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT). If such fuel is used; your emission control system performance may deteriorate and the malfunction indicator lamp on your instrument panel may turn on. If this occurs, return to your authorized Saab dealer for service.

However, these blended gasolines are regulated and should never exceed these recommended blend percentages and service station operators should know if their gasolines contain detergents and service station operators should know if their gasolines contain detergents and oxygenates, and have been reformulated to reduce vehicle emissions. Nevertheless, if you begin to notice a problem with the way your car starts or runs shortly after it has been refueled, try a different brand of gasoline.

### Note

Higher concentrations of methanol than listed above, or the use of methanol-blended gasoline without suitable co-solvents and corrosion inhibitors, can damage your car's fuel system, leading to the need for repairs which are not covered by Saab's product warranty.

### Fuel (Gasoline Engine)

Use regular unleaded gasoline rated at 87 octane or higher. It is recommended that the gasoline meet specifications which were developed by the American Automobile Manufacturers Association (AAMA) and endorsed by the Canadian Motor Vehicle Manufacturers Association for better vehicle performance and engine protection. Gasolines meeting the AAMA specification could provide improved driveability and emission control system performance compared to other gasolines.

### Canada Only

Be sure the posted octane is at least 87. If the octane is less than 87, you may get a heavy knocking noise when you drive. If it's bad enough, it can damage your engine. If you're using fuel rated at 87 octane or higher and you hear heavy knocking, your engine needs service. But don't worry if you

hear a little pinging noise when you're accelerating or driving up a hill. That's normal, and you don't have to buy a higher octane fuel to get rid of pinging. It's the heavy, constant knock that means you have a problem.

If your vehicle is certified to meet California Emission Standards (indicated on the underhood emission control label), it is designed to operate on fuels that meet California specifications. If such fuels are 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 "Engine malfunction (CHECK ENGINE)" indicator on your main instrument panel may turn on and/or your vehicle may fail a smog-check test. See "Engine malfunction (CHECK ENGINE)" indicator on page 53. If this occurs, return to your authorized Saab dealer for diagnosis to determine the cause of failure. In the event it is determined that the cause of the condition is the type of fuels used, repairs may not be covered by your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT), ask your service station operator whether or not the fuel contains MMT. Saab Automobile AB does not recommend the use of such gasolines. If fuels containing MMT are used, spark plug life may be reduced and your emission control system performance may be affected. The malfunction indicator lamp on your instrument panel may turn on. If this occurs, return to your authorized Saab dealer for service.

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## SUBARU

### ⚠ CAUTION

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

## 2003 Automobile Manufacturer Fuel Recommendations

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### ▼ Fuel requirements

The 2.5 Liter engine is designed to operate using unleaded gasoline with an octane rating of 87 AKI or higher.

### ▼ 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.

### ▼ Gasoline for California-Certified LEV

Your vehicle was certified to California's low emission vehicle (LEV) standards as indicated on the underhood tune-up label. It is designed to optimize engine and emission 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.

### ▼ 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

## 2003 Automobile Manufacturer Fuel Recommendations

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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.**

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## 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 not 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.

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## 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 the specifications of ASTM D4814 in the U.S.A. and CGSB 3.5-M93 in Canada.

## 2003 Automobile Manufacturer Fuel Recommendations

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### 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. For improved vehicle performance, the use of premium unleaded gasoline with an Octane Rating of 91 (Research Octane Number 96) or higher is recommended.

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 pads, consult your Toyota dealer.

However, now and then, you may notice light knocking for a short time while accelerating or driving up hills. This is no need for concern.

### Gasoline 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 three categories that depend on required emission levels. In the U.S., category 3 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.

### Sulfur in Gasoline

If your vehicle is certified to California Emission Regulations, the vehicle is designed to operate on California cleaner burning gasoline (CBG) that contains lower sulfur. If you cannot use California CBG, your emission control system may suffer damage and turn on the Malfunction Indicator Lamp.

If the malfunction is caused by the type of fuel used, repairs may not be covered by your warranty.

### Gasoline Containing MMT

Some gasoline contain an octane enhancing additive called MMT (Methylcyclopentadienyl 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.

## 2003 Automobile Manufacturer Fuel Recommendations

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### Gasoline Quality

In 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 are encountered (poor hot starting, vaporizing, engine knock, etc.), discontinue its use.
- Take care not to spill gasohol during refueling. Gasohol may cause paint damage.

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## VOLKSWAGEN/AUDI

### Fuel Supply

Use only unleaded fuel in your vehicle.

### Fuel Recommendation

The fuel recommended for your vehicle is unleaded premium grade gasoline with a minimum octane rating of 91 AKI [ $=(R+M)/2$ ]/95 RON or higher.

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

Your vehicle may also be operated using unleaded regular gasoline with a minimum octane rating of 87 AKI / 91 RON. However, using 87 AKI/91 RON octane fuel will lead to a certain loss of engine power.

### Notes

- 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!

The use of leaded gasoline will severely damage your vehicle's catalytic

converter and its ability to control exhaust emissions.

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.

### Octane Rating

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

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

### Explanation of the abbreviations:

AKI = Anti Knock Index =

$(R+M)/2 = (RON + MON)/2$

RON = Research Octane Number

MON = Motor Octane Number

### Use of gasoline containing alcohol or MTBE (methyl tertiary butyl ether)

You may use unleaded gasoline blended with alcohol or MTBE (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% cosolvents.

### Note

Methanol fuels which do not meet these requirements may cause corrosion and damage to plastic and rubber components in the fuel system.

### Blend of gasoline and ethanol (grain alcohol or ethyl alcohol)

## 2003 Automobile Manufacturer Fuel Recommendations

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-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.

### Notes

- Do not use fuels that fail to meet the specified criteria in this chapter.
- If you are unable to determine whether or not a particular fuel blend meets the specifications, ask your service station or its fuel supplier.
- Do not use fuel for which the contents cannot be identified.
- Fuel system damage and performance problems resulting from the use of fuels different from those specified are not the responsibility of Audi and are not covered under the New Vehicle or the Emission Control System Warranties.
- If you experience a loss of fuel economy or driveability and performance problems due to the use of one of those fuel blends, we recommend that you switch to unblended fuel.

### 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.

### Gasoline Additives

A major concern among many auto manufacturers is carbon deposit build-up caused by the type of gasoline you use.

Although gasolines differ from one manufacturer to another, they have certain things in common. All gasolines contain properties that can cause deposits to collect on vital engine components, such as fuel injectors and intake valves. Although most gasoline brands include additives to keep engine and fuel systems clean, they are not equally effective.

After an extended period of using inadequate fuels, built-up carbon deposits can rob your engine of peak performance.

### Note

**Damage or malfunction due to poor fuel quality is not covered by the Audi New Vehicle Limited Warranty.**

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## VOLVO

### FUEL REQUIREMENTS, REFUELING

#### Deposit Control (Detergent) Gasoline

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 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 Lamp located on your instrument panel may light. If this occurs, return your vehicle to an authorized Volvo retailer for service.

## 2003 Automobile Manufacturer Fuel Recommendations

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### 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 while 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.

### Octane Rating

Volvo engines are designed for optimum performance on unleaded premium gasoline with an octane rating AKI 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).

### 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.

### CAUTION

- Do not refuel with the engine running. Turn the ignition off or to position I. If the ignition is on, an incorrect reading could occur in the fuel gauge.
- After refueling, close the fuel filler cap by turning it clockwise until it *clicks* into place.
- Avoid spilling gasoline during refueling. Gasoline containing alcohol can cause paint damage that may not be covered under the New Vehicle Limited Warranty.
- Do not use gasolines containing methanol (methyl alcohol, wood alcohol). This practice can result in vehicle performance deterioration and can damage critical parts in the fuel system. Such damage may not be covered under the New Vehicle Limited Warranty.
- Do not overfill the fuel tank. Overfilling could damage the emission control system.