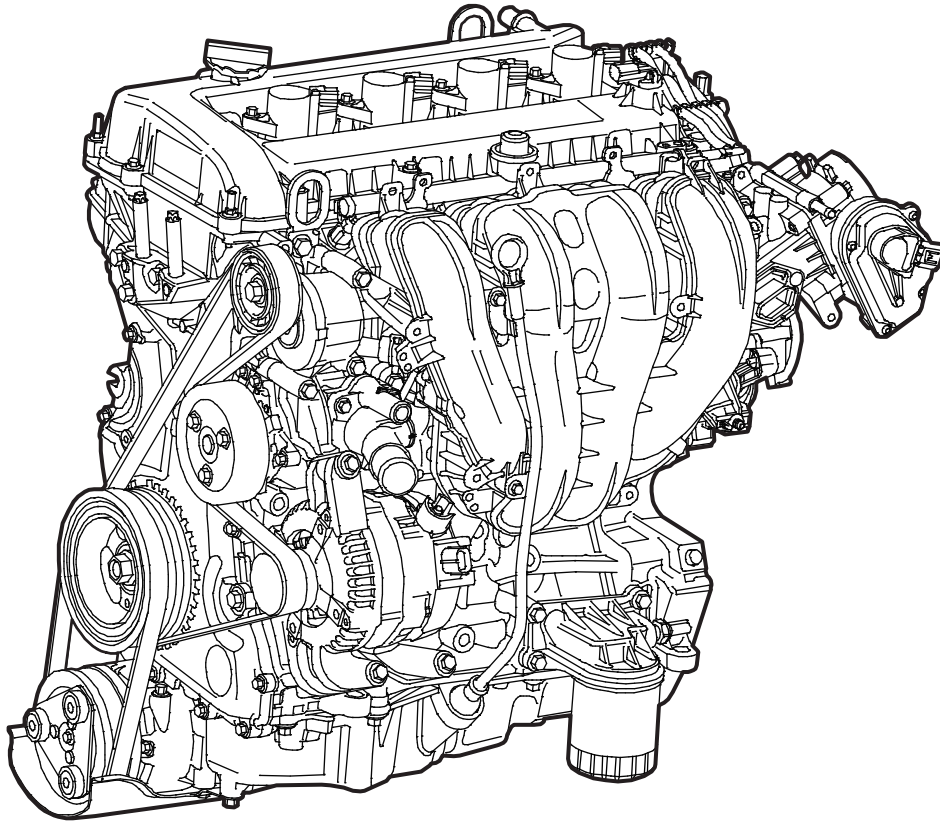


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21 03294j

## **B4184S8 (FlexiFuel)**

### **General**

The FlexiFuel engine is a 1.8 litre engine adapted for E85 fuel. E85 consists of a mixture of 85 % ethanol and 15 % 95-octane petrol.

However, the Engine Control Module (ECM) can also adapt all fuel mixtures from 100 % petrol to just E85.

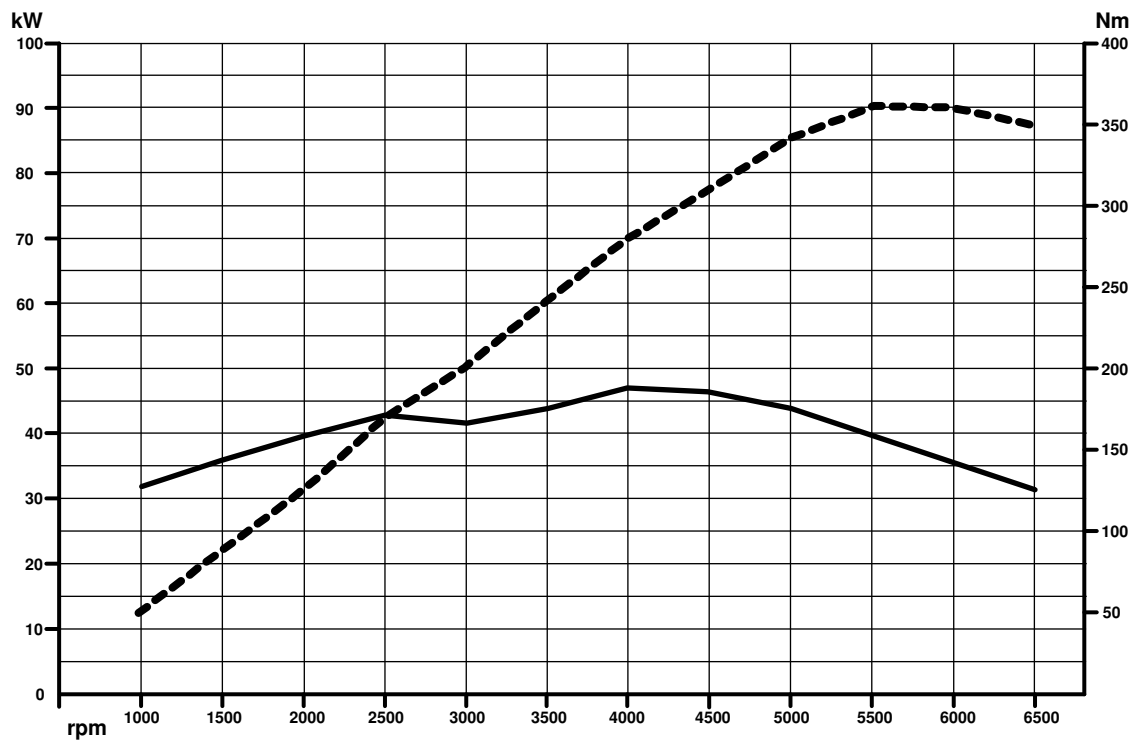
The FlexiFuel engine is basically a B4184S11 which has been modified to cope with the major stresses that operating with E85 entails.

### **FlexiFuel and the environment**

Operating with E85 is considered carbon dioxide neutral. This means that the same quantity of carbon dioxide released during combustion is reabsorbed and bound by vegetation and plants. In this way a type of cycle is formed.

Fossil fuels (such as petrol and diesel) only add carbon dioxide as there is no organic material that binds the carbon dioxide.

Fuel consumption with E85 increases by between 35-40 % because E85 has a lower energy content than normal petrol.



**B4184S8**  
 - - - Power (kW)  
 — Torque (Nm)

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Technical data	S40	V50
<b>Output</b>	125 hp@6000rpm	125 hp@6000rpm
<b>Torque</b>	165 Nm@4000rpm	165 Nm@4000rpm
<b>Fuel consumption (E85)</b>	10.4 l/100 km	10.5 l/100 km
<b>Acceleration, 0-100 km/h</b>	11 seconds	11 seconds
<b>Top speed</b>	200 km/h	200 km/h

### Changes

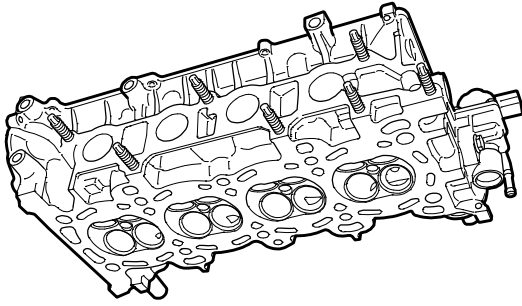
The following components or functions are adapted to E85 fuel compared with B4184S11:

- cylinder head
- injectors
- larger valve clearance
- fuel rail
- electric engine block heater
- fuel lines
- DC/AC converter
- fuel tank unit and fuel pump
- adaptation functions in the Engine Control Module (ECM)

### **Cylinder head**

The cylinder head has a surface coating on the intake valve seats adapted for E85 fuel.

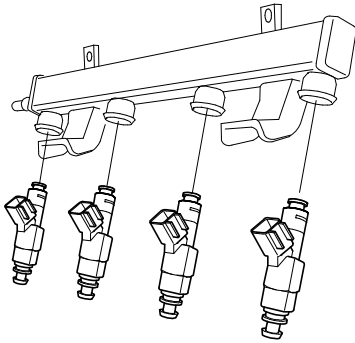
The valve play has been increased in order to achieve the service intervals.



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### **Injectors**

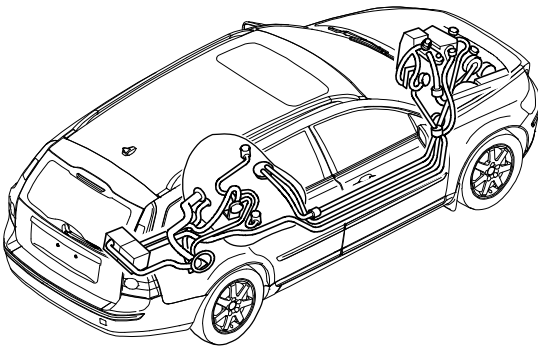
The holes in the injectors have been increased by 30-35 % to increase the flow capacity because the energy content in E85 is lower than that of petrol. More fuel must be injected to achieve the same torque/output when operating with E85 compared with 95-octane petrol.



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### **Fuel lines**

The fuel lines are manufactured in stainless steel and the fuel rail is coated with nickel on the inside. This is because E85 has a corrosive effect on certain metals.

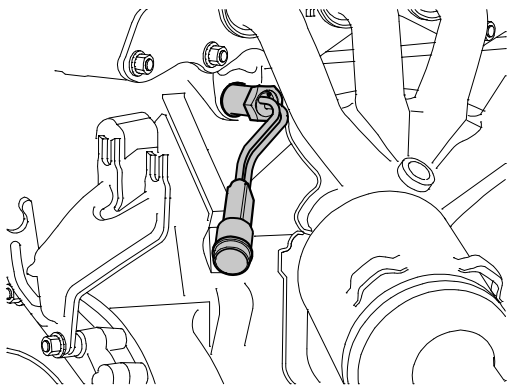


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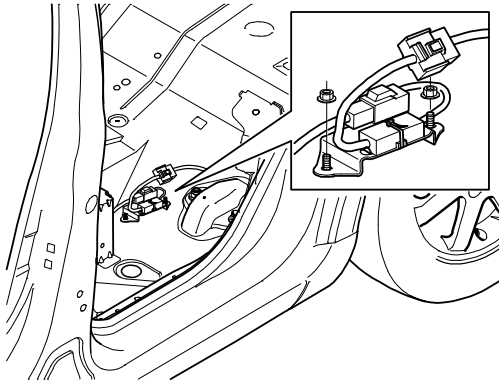
### **Electric engine block heater**

The engine block heater is fitted at the factory. It is located in one of the frost plug holes. Cable routing is carried out by the dealer before delivery to the customer.

The engine block heater should be used when the temperature is expected to be less than  $-15^{\circ}\text{C}$  but it can also be effectively used in temperatures above  $-15^{\circ}\text{C}$ . Using the engine block heater reduces fuel consumption and emissions when starting from cold and the engine starts more easily.



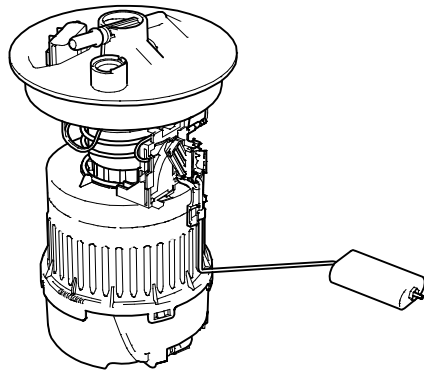
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### ***DC/AC converter***

A DC/AC converter is fitted on the left-hand side under the rear seat and is designed to supply a square wave pulse (alternating current) at 170 Hz to the fuel sensor's resistor in order to prevent corrosion arising.



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### ***Fuel tank unit and fuel pump***

Several of the fuel pump's internal components have been adapted to cope with the special stresses that operating with E85 entails:

- changed winding of the pump's electric armature
- carbon commutator instead of copper commutator
- improved quality in plastic and rubber
- certain cable terminals and connections have been encapsulated
- special resistor card for the level sensor to work with the inverter (DC/AC converter)

### ***Regulating the fuel***

The Engine Control Module (ECM) has new software adapted for the B4184S8. This is used to calculate the ethanol content in the fuel and to optimise the adaptation of the calculated fuel injection quantity.

The ethanol/petrol mixture can vary considerably in the tank, from only E85 to only petrol. The mixture ratio of ethanol and petrol is detected by the "normal" adaptation strategies of the Engine Control Module (ECM). This takes place by evaluating the lambda-sond signals. For example, "a lot" of ethanol results in a lean fuel/air mixture. The Engine Control Module (ECM) compensates by increasing the quantity of injected fuel so that the correct lambda value is achieved.

***Points to remember, and service***

The engine block heater should be engaged when the temperature is expected to fall below -15°C and the car is only filled with E85. This is because the engine may be difficult to start due to the properties of E85.

It is recommended that the petrol quantity in the tank should be increased by topping up with petrol if possible.

Ten litres of petrol will reduce the proportion of E85 in a three-quarter's full tank from 85 % to 70 %.

This improves the cold start properties.

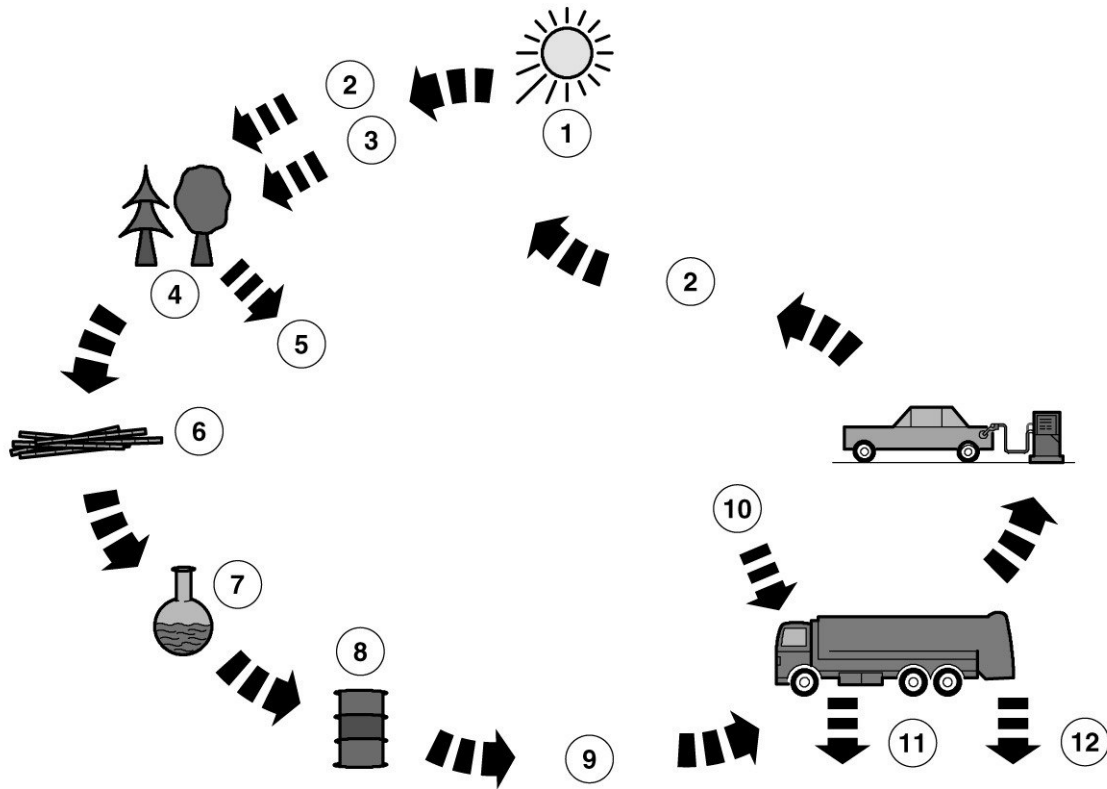
Engine oil with the following properties must be used:

Oil grade: WSS-M2C913-B

Viscosity: SAE 5W-30

Service intervals are 10 000 km or 1 year.

The reserve can in the car should be filled with petrol and not E85 because petrol has better cold start properties.



23 03545v

1	Solar energy	4	Plants	7	Distillation	10	Air with oxygen
2	Carbon dioxide	5	Oxygen	8	Ethanol	11	Transport energy
3	Water	6	Biomass	9	Alcohol/Fuel	12	Carbon dioxide/Water vapour

### Ethanol and methanol as vehicle fuel

Ethanol and methanol both belong to the alcohol family and can be used as fuel in vehicles. Both alcohols are poisonous and so it is important to follow the local safety regulations. Ethanol and methanol are highly corrosive to light metal and can also change the properties of certain plastics.

#### *Ethanol*

Ethanol is produced from organic material (e.g. sugar cane) and is carbon dioxide neutral. The plants from which ethanol is produced absorb the same amount of carbon dioxide that is released when the ethanol (i.e. the plants) is combusted.

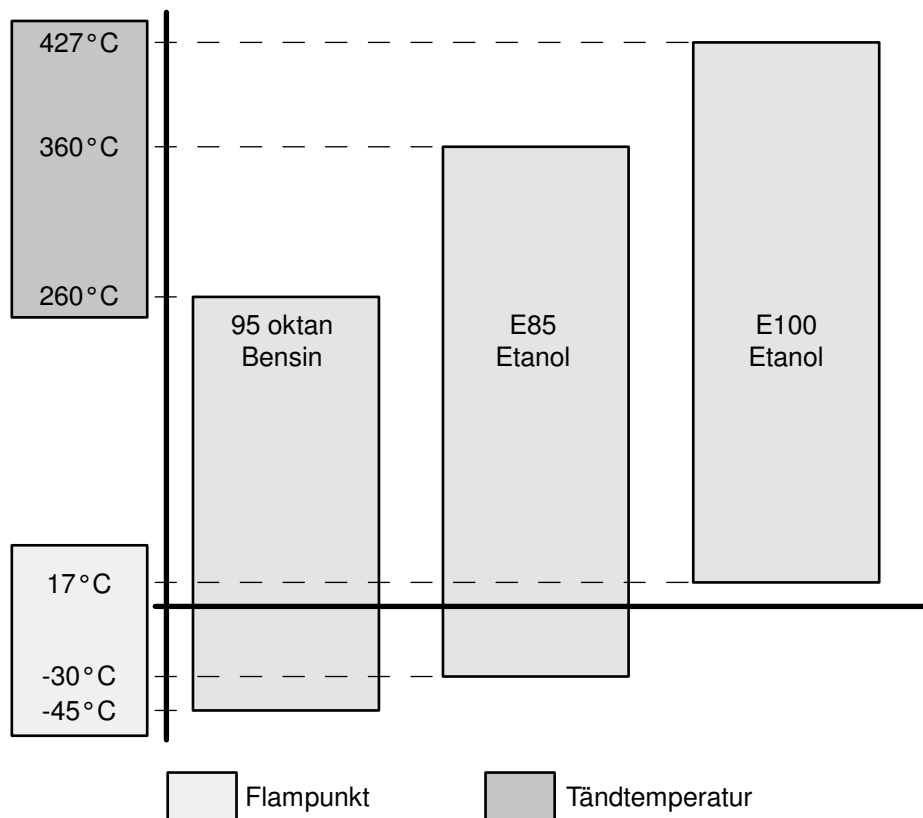
Ethanol, like methanol, is a volatile colourless fluid and its energy content is approx. 30 % less than petrol. In practice this means that a car driven on E85 consumes 30 % more fuel.

E85 is a mixture of 85 % ethanol and 15 % petrol which is available at petrol stations.

Brazil is the country that produces most ethanol (manufactured from sugar cane) where all petrol is mixed with at least 20 % ethanol and ethanol cars are widespread. One hectare of sugar cane is equivalent to 5,000 litres of ethanol.

#### *Methanol*

Methanol is produced by means of chemical engineering and can be produced from synthesis gas, fossil fuels and other chemical products. If methanol is produced from fossil fuels then the environmental benefits disappear when the carbon dioxide is released into the atmosphere.



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### ***Flash point and ignition temperature***

The difference between flash point and ignition temperature between E85 and 95-octane petrol is relatively small which means that there is no difference when handling the fuel alternatives.

Flash point is the lowest temperature at which a substance discharges so much in terms of combustible gases that it can ignite from an external ignition source such as a spark from a matchstick.

The ignition temperature is the lowest temperature (at atmospheric pressure) at which a substance self-combusts without any external ignition source.

Through the addition of petrol, E85 has a lower flash point and better cold start properties than pure ethanol (E100).