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043
05/08/2011

Technical Bulletin

Fuel systems.

GATES REFERENCE : MAKE : MODEL : ENGINE : ENGINE CODE :	Various	 

There has been a big evolution in car fuel technology: pressures have gone a lot higher, fuel permeation is legally controlled and there are numerous different fuel blends. These blends have chemical compositions which can damage the rubber of standard fuel hoses, plastic seals and non-treated aluminium parts. These damages could result in vehicle fires.
Incorrect usage of a specific hose type can lead to different problems, such as leaks, hoses becoming brittle and breaking up, fuel permeation through the hose material (bio fuel permeates quickly through standard nitrile hose material) (Fig. 1).

Fig. 1

Biodiesel permeating through standard fuel hose

No fuel contact at metal insert

Gates offer a broad product range for fuel systems. As these products are quite different, questions about usage/resistance often occur. The current 4219 low permeation hose will be replaced from September 2011 on, by our new type 4219 Barricade Fuel Injection hose (Fig. 2), made of a 5 layer-barrier technology eliminating practically all permeation (225 PSI /1,55 MPa).

The new 4219 Barricade Fuel Injection hose covers all types of fuel, including E10, E15, E85 and biodiesel up to B100 (100 % biodiesel), except LPG. The exact part numbers and further information will be communicated mid August 2011.

Fig. 2

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Fuel line hoses (FLH):

We have 5 types of FLH in our range, but it is clear it can be very dangerous, even catastrophic, if the hose is used for something it has not been developed for.
Apart from possible fires, breakdowns, etc; fuel permeating through the hose into the atmosphere will increase the emissions.


Correct usage


Incorrect usage

Product	Correct usage	Incorrect usage
Standard FLH **3225** Ø 3.2, 4, 5, 6, 7, 8, 10, 12 WP: 1 MPa Max. Temp: 125° C SAEJ30R7	Leaded and unleaded fossil petrol, alcohol extended fuel e.g. E10 Fossil diesel	In-tank applications LPG Biodiesel (B..)
Textile covered FLH **4324** Ø 3.2, 4, 5, 6, 7, 8, 10 WP: 0.6 MPa Max. Temp: 100° C	Leaded and unleaded fossil petrol,fossil diesel.	Same as 3225 Alcohol extended petrol (E..)
Small diameter FLH **4324** Ø 2.7 WP: 1 Mpa Max. Temp: 110° C	Small Ø fuel applications Connection hose Vacuum hose	Same as 3225 Alcohol extended petrol (E..)
Submersible FLH **4219** Ø 8, 10 WP: 0.7 MPa Max Temp:135°, peaks to 150° SAEJ30R10	All types of petrol and diesel, including alcohol extended petrol and biodiesel (E.., B..)	LPG
Low permeation FH **4219** Ø 6, 8, 10 WP: 1.2 MPa Max Temp:135°, peaks to 150° SAEJ30R9	All types of petrol and diesel, including alcohol extended petrol and biodiesel (E.., B..),	LPG
New **4219 Barricade Greenshield** Ø 6, 8, 10 WP: 1.55 MPa Max Temp:135°, peaks to 150° SAEJ30R14T2*	All types of petrol and diesel, including alcohol extended petrol and biodiesel (E.., B..),	LPG

Ø = diameter in mm
WP = maximum working pressure
* except for kink resistance
1 MPa = 10 bar

Gates' advice:

Application	Gates' Fuel Hose
Fossil petrol and diesel	All
Alcohol extended petrol (E..)	3225 + 4219
Biodiesel (B..)	4219
In tank application	Submersible 4219
LPG	None

Ethanol fuel mixtures have "E" numbers which describe the percentage of ethanol fuel in the mixture by volume, e.g. E10 means this is a mixture of 10% ethanol and 90% fossil petrol. E10 and other blends of ethanol can reduce carbon monoxide (CO) emissions by 20 to 30% under the right conditions.
Biodiesel is produced from vegetable oils (e.g. rapeseed, soybean) or animal fat. Biodiesel mixtures use a system known as the "B" factor to state the amount of biodiesel in any fuel mix e.g. B5: this is a mixture of 5% biodiesel and 95% fossil diesel. Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems
Apart from these fuel hoses, Gates also offers other fuel system related products:

Fuel caps (7410)

As you are aware, fuel tanks must "breathe". This ventilation is obtained in different ways according to the vehicle manufacturers' preference, which is nowadays strictly related to ecology and possibilities of saving space. One method of ventilation is through the tank cap, another one through the filler neck. In both cases special devices allow ventilation. Therefore, when choosing the right cap reference please remember that:

1) A tank carrying ventilation through the filler neck requires a sealed cap (NON-VENTED type).
2) A tank without ventilation device requires a breathing cap (VENTED cap or cap with breathing valve).

The two types of caps look the same in size and operation, but differ in ventilation. Make sure you choose the right type of cap and carefully read the manufacturer's instructions.

When the venting system fails, it can lead to imploded tanks (Fig. 3 and 4).

Fig. 3

Fig. 4

Connectors (7315)

Quality, single barb connectors (Fig. 5) can be used to make any leak proof (fuel) hose assembly. Made from high impact glass-reinforced nylon, they resist extreme temperatures from -65°C to +250°C and are able to transport coolant additives, petrol, diesel, oil and LPG.
WP: maximum 2 MPa.

Fig. 5

Flexible fuel fill hose (4663)

This flexible hose (Fig. 6) connects the fuel tank with the filler neck. In older vehicles, without pistol guidance built in, the installed hose could be damaged by the pump pistol.

Fig. 6

Attention:

Make sure your engine is bio-fuel ready, before using it.
If your engine is OE equipped with Low Permeation Hose (like 4219), it is not allowed to replace it with higher permeation hose (e.g. 3225).

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