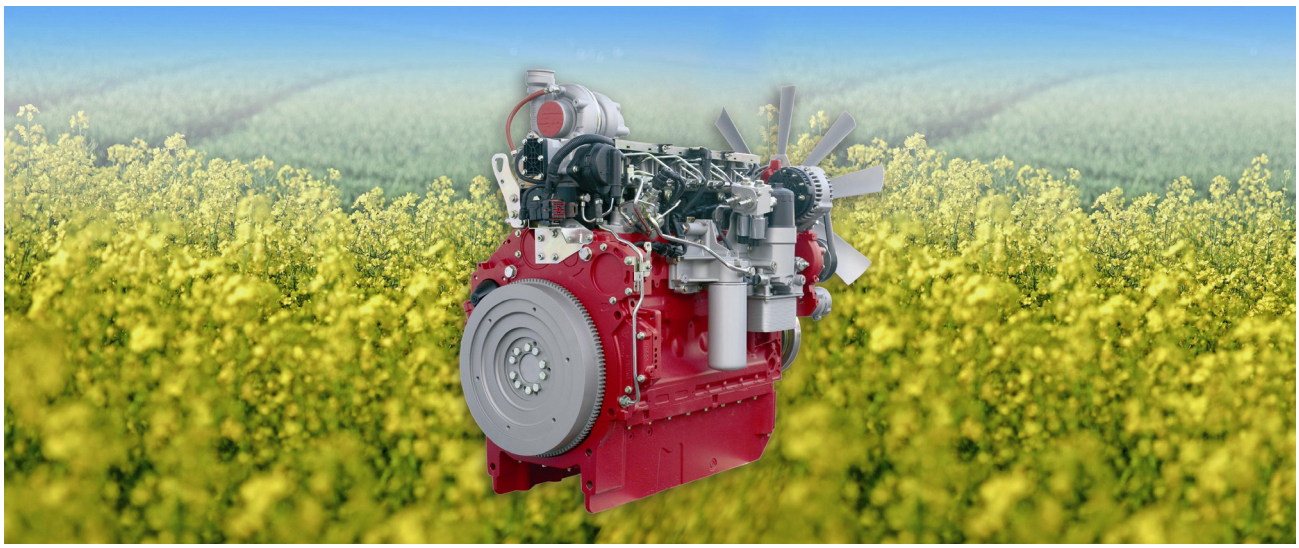
The engine company.



Use of biodiesel and vegetable oil in agricultural technology – latest recommendations for DEUTZ engines (State Nov. 2009)

DEUTZ AG, Cologne, is one of the leading independent manufacturers of compact diesel engines in the power range from 10 to 500 kW for on-road and off-road applications. The development of series mature diesel engines which can be operated with 100 % biodiesel has been one of the key activities for many years.
The Technical Circular TR 0199-99-3005 deals with all the engine releases for biodiesel applications in detail.

Engine releases for biodiesel

At present the series

- 912, 913, 914
- 413, 513
- 1011, 2011
- 1012, 2012, 1013, 2013

manufactured from 1993 and the series TCD 2012 2V/4V and TCD 2013 2V/4V for mobile machinery and agricultural applications are released for the use of biodiesel in accordance with the specification DIN EN 14214 “Fuels for motor vehicles – Fatty Acid Methyl Ester (FAME) for diesel engines”. The TCD 2015 series is released from 2010.

Basic conditions for the use of biodiesel

Users of biodiesel in DEUTZ engines should choose their suppliers very carefully and have them guarantee compliance with the limit values specified by DIN EN 14214. DEUTZ recommends its customers in Germany to have the biodiesel quality verified additionally by a certificate of the AGQM (Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.V.).

Turbocharged engines are excluded from the release for applications which are usually operated with a high load of more than 80 % of the nominal power; these are engines used in district heating power stations for example.

A power loss of 5-9 % is to be expected with biodiesel. This may not be compensated by blocking up the fuel injector. The loss in power and the increased fuel consumption of 7-8 % result from the 12 % lower calorific value and the 5 % higher density. The particulate emission is reduced considerably by approx. 20 to 50 % and the soot emission by approx. 40 to 60 % in operation with biodiesel. The carbon monoxide emissions and hydrocarbons are reduced by up to 25 % or 50 %. The emission of nitrogen oxides (NOx), on the other hand, rises by approx. 10 %.

The poor evaporation capacity of biodiesel in comparison with diesel fuel can lead to an increased infiltration of fuel into the engine oil. If the amount of biodiesel infiltration is too high, polymerisation, subsequent clogging of the engine and failure of the engine lubrication with serious engine damage can occur. Biodiesel infiltration is especially critical in the low load range.
Therefore the lubricating oil change interval must be halved in relation to operation with diesel fuel in accordance with EN 590 or DIN 51628.

The engine company.

Another problem is possible fuel filter blockages after changing over from diesel fuel to biodiesel due to dissolving of deposits. This is recognisable by a marked reduction in performance after the changeover. The problem can be remedied permanently, however, by changing the filter once; this must be done approx. 30 to 50 hours after the first changeover.
Longer standstills of more than 4 to 6 weeks with biodiesel are to be avoided (e.g. winter break in agriculturally used machinery) because deposits can form on the injection system and the plungers and the engine can no longer be started in the worst case.
Instead, the engine should be operated and shut down with diesel fuel before the break. If equipment or vehicle manufacturers use fuel pipes which are not resistant to biodiesel, these pipes must be changed once a year. We recommend the use of biodiesel-resistant pipes; in this case they do not have to be changed every year.
Manual fuel supply pumps and LDA diaphragms in the series 1012, 1013, 2012, 2013, TCD 2012 2V-mechanical and TCD 2013 2V-mechanical are not resistant to biodiesel and must be changed every year.
The ability of biodiesel to absorb more water can easily lead to exceeding of the limit value for water (500 mg/kg according to DIN EN 14214).
The user is therefore recommended to ask the fuel supplier for advice regarding the supply system.
The user is basically obliged to monitor the quality of the biodiesel and the cleanliness of the tank systems.
Biodiesels can be mixed with normal diesel fuel; however, the restrictions already mentioned apply for mixtures.
Mixtures with a 5 to 7 % (V/V) content of biodiesel (B5 or B7) as they are permitted in Germany by the Biofuel Quota Act according to the current standards EN 590 and DIN 51628 are excluded from the restrictions. The biodiesel mixtures must comply with EN 14214 in any case.

DEUTZ Natural Fuel Engine®

In mid 2008 DEUTZ Natural Fuel Engine® were introduced as the first series-produced industrial engines which can be operated exclusively with 100 % rape seed oil.
This engine is a further development based on the proven liquid cooled DEUTZ engine series TCD 2012 and TCD 2013 and basically consists of a DEUTZ Common Rail system DCR® for an optimum atomisation and combustion of the rape seed fuel, a 2-tank system with automatic switching from biodiesel or diesel to rape seed oil and the patented DEUTZ Fuel Management DFM®.

The release is limited to rape seed oil in accordance with DIN V 51605 (cold pressed and refined). Other vegetable oils may not be used (not even as additives). Biodiesel according to DIN EN 14214 can be used instead of normal diesel fuel according to DIN EN 590.
These engines are available in the tractors produced by AGCO Fendt (FENDT 820 Vario Greentec) and DEUTZ-Fahr (Agrotron Natural Power).

FENDT 820 Vario Greentec
TCD 2012 L06-4V 152 kW/2100 rpm (source: FENDT)

Summary

Due to the rising mineral oil prices and the reduction in subsidisation of agricultural diesel, biodiesel and rape seed oil are becoming very attractive for many users in the agricultural sector because the increasing taxation of biofuels is excluded for agricultural applications and the customer often has the exploitation of the added value in his own hands.
With the extensive release of engines for biodiesel applications and the development of the DEUTZ Natural Fuel Engine®, DEUTZ again underlines its leading position in the field of biogenic fuels and therefore directly supports the marketing and sale of biofuels to make a contribution to the increasing replacement of fossil fuels by regenerative fuels in future and to the resulting reductions in the greenhouse effect.

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