FREQUENTLY ASKED QUESTIONS ON BI-FUEL CONVERSION?

What methods/technologies are employed in the bi-fuel (dual fuel) conversion?

There are two conversion technologies:

One for slow/middle-speed engines (up to 1000 rpm)

Two for high-speed engine (1200 to 1800 rpm)

Therefore the choice for the appropriate solution is determined by the engine speed and consequent suction/exhaust valve overlap (opening of suction and exhaust valves at the same time).

Slow/middle-speed engines normally feature a large valve overlap when the pure air is flushing (cleaning) and cooling the cylinder. After bi-fuel conversion, it is necessary to continue cylinder flushing/cooling by pure air, i.e. gas flow into the cylinder during the valve overlap must be interrupted to avoid the presence of gas in the hot exhaust manifold (this would cause a potentially dangerous situation and result in substantial fuel losses). Therefore, typically for slow and middle-speed engines, each cylinder is equipped with the patented electromagnetic gas valve with variable gas injection timing controlled by an electronic control system.

In contrast, high-speed engines have only a small valve overlap, so it is possible to install just a central mixer(s) before the turbocharger(s) for the continuous flow of the gas/air mixture. Gas injection is controlled by a throttle operated by the electronic control system, according to the required engine output and speed.

Is it necessary to stop the engine in case of required transition between bi-fuel and pure diesel operation modes?

No, transitions between the two modes (from bi-fuel to diesel and vice versa) can be achieved while the engine is running (i.e. without interruption of the load supply) and is a very smooth process. Note the engine will always start on diesel and the operation mode is switched to bi-fuel upon a predefined output level. In case of gas shortage, the transition is immediate and seamless at the actual engine load, gas valves are shut off automatically and the engine continues on pure diesel operation. One the gas supply has returned the engine is switched back to bi-fuel.

Is it possible to operate a converted generator set on diesel oil only?

Yes, standard operation mode of the converted engine is certainly bi fuel. However, operation on diesel fuel only (e.g. in case of gas emergency) remains possible at any time and the converted engine operates using diesel fuel with the same parameters as those before conversion was undertaken.

What is a de-rating factor (output reduction) for a converted generator set?

After the conversion, the engine nominal output is not de-rated and all engine parameters (e.g. exhaust temperature, engine temperature etc.) and behaviour (e.g. response to a load steps) remains within the limits stated by the engine manufacture for the original diesel engine (provided these parameters were within limits before the conversion). The de-rating factor according to the ambient conditions remains the same.

How does the conversion effect maintenance costs?

Maintenance costs after conversion will not be increased al all. Substantial parts of the engine remain unchanged, new mechanical parts of heavy duty design (e.g. service interval for the electromagnetic gas valves is 6000 running hours), and electronic control systems are fully automatic. Moreover, the gas operation means less carbonization of combustion chambers and turbocharger, so that the interval for de-carbonization and overhauling of the engine is prolonged.

What warranty is provided for the conversion?

Standard warranty is 12 months from the date of start up, 4000 running hours, which ever expires earlier. The warranty covers equipment related to the conversion.

What types of gas can be used for the bi-fuel engine operation?

Generally, the most suitable are the methane based gases with none or very low contains of propane such as typically found in natural gas. For consulting possible usage of other gas types, please contact us with respective gas specifications.

Can LPG be used for bi-fuel engine operation?

In case of LPG, the bi-fuel conversion is also generally possible, but the situation is different. The LPG has acceptable calorific values regularly; also composition is OK considering there are no aggressive elements (sulphur, hydrogen etc.). The LPG is more explosive then natural gas and therefore it has tendency for so called “knocking”, i.e. the LPG starts to auto fire when the gas volume, combustion temperature and combustion pressure are higher, i.e. at higher engine loads. Thus we expect substantial power output reduction after the engine conversion just to avoid knocking. As an example: We have generally calculated that if the LPG consists of 50% propane and 50% butane, at LPG/diesel ratio 65/35% the engine power output has to be derated down to 60% of the nominal output. Of course, exact calculation would have to be done for the specific engine type.

Can CNG or LNG be used for bi-fuel engine operation?

Since CNG and LNG are just highly compressed or liquefied versions of Natural Gas, after sufficient pressure reduction it can be used for bi-fuel engine operation.

Can Biogas be used for bi-fuel engine operation?

Concerning biogas, the bi-fuel conversion of the engine is generally possible. We need to know biogas composition and calorific value to evaluate if the particular biogas type is really suitable. Calorific value may be an issue as biogas is derived from different sources and there is low calorific value in many cases. You can imagine we have to inject sufficient volume of gas into the cylinder to substitute diesel oil (or, better to say, substitute energy delivered by diesel oil). If the calorific value (energy) of the biogas is very low, we would need to inject a larger volume of biogas into the cylinder, which could be technically impossible. Contact us with respective gas analysis.