ELF ATMO MAX

"Unleaded competition fuel for naturally aspirated 4-stroke engines"

Our formula use pure bases to guarantee naturally stable, long-lasting properties, consistent from one production batch to another. This search for constant and optimum quality ensures you obtain first class performance, in conformity with competition requirements.

"ELF ATMO MAX has been developed to provide maximum performances for small, naturally aspirated 4-stroke engines such as Super 1600 and S2000".

Uses

- Unleaded **ELF ATMO MAX** fuel, derived from **ELF ATMO RALLYE**, has been especially designed for naturally aspirated 4-stroke engines.
- **ELF ATMO MAX** conforms not to FIA Annex J regulations.
- The oxygenated compounds and octane ratings are in the upper range to ensure optimal performances. Optimised at the very limit of FIA regulations, **ELF ATMO MAX** allows you to obtain maximum power from naturally aspirated engines with relatively low cylinder capacities but which run at high speeds.
- Adapted everywhere naturally aspirated 4-stroke engines are used:
    - Circuit
    - Rally & Rallycross
    - Acceleration
    - Hill climbing

Characteristics

		Standard data	**FIA /Annex J regulations OLD**
OCTANE NUMBERS	RON	101.6	95 to 102
	MON	86.9	85 to 90
DENSITY	kg/l at 15°C	0.735	0.720 to 0.785
OXYGEN	% m/m	3.65	3.7 max
AIR/FUEL RATIO		14.05	
VAPOUR PRESSURE	Bar at 37.8°C	0.530	0.900 max
DISTILLATION	FBP (°C)	130	225 max

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	% vol. at 70°C	39	10 to 47
	% vol. at 100°C	68	30 to 70
SULPHUR	mg/kg	<10	10 max
BENZENE	% vol.	<0.1	0.5 max
LEAD CONTENT	g/litre	<0.005	0.013 g/l max

Properties

Fuel characteristics	→	Technical advantages	→	Engine benefits
Oxygenated compound content set at the upper limit of regulations.	→	Effect of **natural supercharging** High latent vaporisation heat favouring **mixture cooling** before combustion Increased **volume filling** by charge cooling	→	**Spontaneous power gains (without specific tuning) over the whole range.** **Increased power by optimisation before ignition.** **Excellent engine response in transient phase.**
The research octane and motor octane oad numbers (RON and MON) are set **at the upper limit of the regulations**	→	Excellent resistance to **knocking**, ensuring controlled combustion	→	**Remarkable reliability under severe conditions (compression and heat / humidity rates)** **Permits using optimised ignition timing for higher power.**
Strict selection and incorporation of the **best olefin compounds**	→	**High combustion speed** for optimised output for the same tuning parameters	→	**Control of knocking at very high engine speeds.** **Good engine response in transient phase.**

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Very low **benzene** and **sulphur** contents	→	Harmless	→	**No special precautions for use** **ELF ATMO MAX respects both health and the environment.**

Recommendations

- **ELF ATMO MAX** fuel is custom-developed and adapted for naturally aspirated engines running at high compression rates.
- **ELF ATMO MAX** provides exceptional gains in power and reliability, without fine-tuning.
- Engine mapping must be optimised (Air/Fuel ratio, ignition sequence) to obtain full benefit from this product.
- For use with turbocharged engines, ELF also offers leaded **ELF ATMO BOOST** fuel and unleaded **ELF PERFO MAX** fuel for competitions not subject to official regulations.

Storage

To preserve its original properties and comply with the Health and Safety rules pertaining to fuels, **ELF ATMO MAX** must be handled and stored away from sunlight and bad weather and properly resealed in its drum after each use, to avoid loss of the lightest particles.

Glossary

RON & MON: RON & MON characterise the resistance to knocking (see definition) of a fuel used in a spark-ignition engine. RON is representative of the functioning of an engine running under cold and low speed conditions, while MON is representative of an engine running under warm and high speed conditions.
Used for competition, MON is commonly used to describe a fuel's anti-knocking capacity.
Higher octane levels allow engines to run more efficiently under severe, high speed conditions (high rotation speed, high compression ratio).

KNOCKING: Knocking is the result of non controlled fuel combustion in the engine. Sometimes revealed by a characteristic 'pinking' noise, these detonation phenomena often damage the engine.
There are two ways to prevent knocking: tuning the ignition timing and/or using a fuel with better anti-knocking characteristics (RON/MON and combustion speed).

CHARGE COOLING: The amount of energy needed to vaporise fuel depends on the latent vaporisation heat. This phenomenon leads to cooling the intake air which in turn generates internal supercharging.

COMBUSTION SPEED: It characterizes the fuel's reactivity in the combustion process. The higher the combustion speed, the more effective it is, and the greater the power produced by the engine, via a better cycle yield.

OXYGEN CONTENT: Oxygenated compounds naturally contain high levels of octane and generally improve engine filling capacities thanks to the cooling effect on the admitted air flow (see definition). Others also have remarkable combustion speeds.

DENSITY (or dimensional weight): Usually measured at 15°C and under 1 bar, given in kg/litre (or in kg/m3), this is the density of one litre (or 1000 litres) of fuel.
A fuel's density increases as its temperature drops.

VAPOUR PRESSURE: Usually measured at 37.8°C (Reid vapour pressure), by bar (or Pascals), with its distillation curve, this dimension characterises a fuel's capacity to evaporate. This property comes into play when the petrol is mixed with the air intake and for cold engine starts. If the vapour pressure is too high, it can cause 'vapour lock'.

AIR/FUEL RATIO (stoichiometric ratio): This ratio characterises the respective fuel and combustive (air intake) quantities necessary for theoretically ideal combustion. In practice, the engine tuner will usually ensure that the air/fuel ratio corresponds to a value between 1.10 and 1.20, or the theoretical value in relation to the real value.