Your needs are important for us. WARTER aviation product range includes:

- AVGAS aviation fuels – unleaded AVGAS WA UL91, leaded AVGAS 100LL,
- Turbo-combustion engine aviation fuel – JET-A1,
- Smoke Oil,
- Deicing & anti-icing products for planes and airport surfaces.

Quality is our reality and commitment. The key value of our products is superior quality which we ensure at each production, storage and delivery stage.

Safety. Compromise is never our way. Safety of our customers is our superior value!

From pilots for pilots. Our brand is appreciated both by individual customers as well as airport operators from around the world. Our offer is intended for general-purpose, commercial and military aviation.

We deliver globally! We deliver to any place in the world you choose. Wherever you are – we are there for you.

We always wish to be one step Ahead of your needs. And you are one step Ahead of your competitors just using our products. Check out our offer and find out the benefits of cooperation with WARTER Aviation.

WARTER aviation. History, passion, confidence.

WARTER aviation is a brand owned by the Warter Fuels S.A. Group. It is a leading manufacturer and distributor of aviation fuels in the world. Warter Fuels S.A. was founded as a result of merger of a long-term cooperation of OBR from Płock, its experience in manufacturing of petroleum products with modern lab and process facilities, ongoing monitoring of the aviation sector needs on a global scale and practical knowledge of leading experts.

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WHY AVGAS WA UL91?
UNLEADED, ETHANOL-FREE, ENVIRONMENT-FRIENDLY.

- Aviation fuel which will ensure your safety!
- Designed solely for aviation purposes (in contrast with MOGAS).
- Safe for the pilot, safe for the environment.
- Clean – all components are subject to careful verification and examination during the manufacturing process.
- Dedicated for aircraft piston engines.
- Ideal for ultra-light planes.
- Broad application among such engine manufacturers as Rotax, Lycoming and many others.
- LAA-999-413 certificate of conformity. Supplement 5 specifies the application of WA UL91 in the UK. Lycoming SI 1070Y, accepted by FAA, specifies types of engines approved for WA UL91.
- Manufactured as per ASTM D 7547 and DEF STAN 91-90.

WHY NOT MOGAS?

USE OF ALCOHOL – a general practice aimed at increasing the octane index is use of ethanol or ETBE compounds. Presence of alcohol in petrol may have multiple adverse effects on aircraft engines and their parts especially those made from rubber, plastic or composite. They may not only cause damage of such elements but also enable plastic and rubber components particles to penetrate the fuel system. Gasoline filtering system may be blocked or partly blocked. MOGAS users have to carry out detailed checks more often in order to avoid the fuel system failure or damage of the aircraft’s engine.

VAPOUR LOCK – carburettor icing. Due to higher volatility level of MOGAS, the occurrence of “vapour lock” is more likely. Especially after the engine has been used at the maximum operating temperature. The carburettor icing occurs much sooner in comparison with WA UL91. MOGAS absorbs more heat in the process of fuel and air mixing and therefore may cool down sooner during evaporation the consequence of which is ice accumulation around the carburettor.

FUEL QUALITY – aviation fuels are subject to rigorous checks aimed at ensuring 100% purity of AVGAS. Quality standards require monitoring at all stages of preparation of the components and manufacturing process, transport, storage on customer site in dedicated tanks until the refilling the aircraft tank. The principal downside of the MOGAS vehicle fuel is that it is not carefully checked with a view to contamination after it has left the refinery. Sometimes, during the transport and storage inadequate elements penetrate it which have an adverse effect on the engine and fuel supply system operation.

TRANSPORT – usually, MOGAS is stored in containers which are not designed for aviation sector, i.e. made form plastic. There have been many cases of electrostatic charge being suspended during the refilling.
Technical service tasks | Working time for maintenance checks
---|---
Engines with oil filter, after replacement and initial 50 h, complete oil replacement. | 50 h* | 100 h*
Filter replacement (after transitory period) | 50 h
Engines with oil pressure sensor filters, after replacements following the transitory period, complete oil replacement. | 25 h* | 50 h*
Oil pressure sensor filter replacement / monitoring / cleaning (after changes deriving from the transitory period) | 25 h

*or every 4 months, whichever occurs first; also: delete, check, clean and re-install the oil suction screen. Guidelines on the monitoring of oil filter and oil pressure sensors are given in Operational Bulletin no. 480.

Lycoming Operational Letter No. L 270
The letter presents benefits derived from the extended interval between and routine application for unleaded gasolines as presented in the recent edition of Operational Instruction no. SI-1070 for Lycoming engines.

Can your engine benefit from the use of WA UL 91 aviation gasoline?

Step 1
Check compatibility of your engine with WA UL 91. If you do not use the Lycoming engine, information about fuels admissible for your plane can be found in the plane instruction manual.

Step 2
What are the benefits of using WA UL 91? Spark ignition engines which use the unleaded gasoline, the interval between the checks is extended hence the durability of the engines is also extended.
# WA UL91 Aviation Gasoline

## Specification
Unleaded aviation gasoline WA UL91 is in conformity with ASTM D 7547, DEF STAN 91-90.

## Product
Aviation gasoline WA UL91 is a blend of hydrocarbons obtained in the process of crude oil processing. It contains antioxidant and anti-electrostatic additives.

## Use
Aviation gasoline WA UL91 is used in aviation piston engines.

## Durability
Aviation gasoline satisfies technical conditions in the period of 2 years of the manufacture data subject to proper storage.

## Storage
The fuel should be stored in closed tanks protecting the fuel from contact with air, dampness, mechanical contamination, exposure to sun and other light sources.

## Sulphur content
\[
\text{Sulphur content: } \% \text{ m/m Max 0.05}
\]

## Lead content
\[
\text{Lead content: } \text{gPb/l Max 0.013}
\]

## Calorific value
\[
\text{Calorific value: MJ/kg Min 43.5}
\]

## Crystallising point
\[
\text{Crystallising point: } ^\circ\text{C Max (-58)}
\]

## Copper corrosion
\[
\text{Copper corrosion 2h at t=100°C: Corrosion resistance Max 1}
\]

## Inherent resin content
\[
\text{Inherent resin content: mg/100ml Max 3}
\]

## Reaction with water, change of volume
\[
\text{Reaction with water, change of volume: ml Max 2}
\]

## Conductivity at 20°C
\[
\text{Conductivity at 20°C: } \mu\text{S/m 50-450}
\]

## Vapour pressure at 37.8°C
\[
\text{Vapour pressure at 37.8°C: kPa 38-49}
\]

## Oxidation stability
\[
\text{Oxidation stability at 100°C for 16 h: % (v/v) Min 97}
\]

## Potential resin content
\[
\text{Potential resin content: mg/100ml Max 6}
\]

## Motor octane number, MON
\[
\text{Motor octane number, MON: Min 91}
\]

## Research octane number, RON
\[
\text{Research octane number, RON: Min 96}
\]

## Fractional composition

<table>
<thead>
<tr>
<th>10% of the volume °C</th>
<th>Max 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>40% of the volume °C</td>
<td>Min 75</td>
</tr>
<tr>
<td>50% of the volume °C</td>
<td>Max 105</td>
</tr>
<tr>
<td>90% of the volume °C</td>
<td>Max 135</td>
</tr>
<tr>
<td>Final distillation °C</td>
<td>Max 170</td>
</tr>
<tr>
<td>Performance % (v/v)</td>
<td>Min 97</td>
</tr>
<tr>
<td>Residue % (v/v)</td>
<td>Max 1.5</td>
</tr>
<tr>
<td>Loss % (v/v)</td>
<td>Max 1.5</td>
</tr>
<tr>
<td>Total distillation temperature 10% of the volume °C</td>
<td>Max 135</td>
</tr>
<tr>
<td>Total distillation temperature 50% of the volume °C</td>
<td>Max 170</td>
</tr>
</tbody>
</table>

## Colour
Naturally colourless.

## Anti-knock properties

## Conductivity at 20°C
\[
\text{Conductivity at 20°C: } \mu\text{S/m 50-450}
\]
### AVGAS 100LL

**Specification**
Aviation gasoline AVGAS 100LL is manufactured as per DEF STAN 91-90, 4th ed., ASTM D910 and NO-91-A235 defence standard.

**Product**
Aviation gasoline AVGAS 100LL is a blend of hydrocarbons obtained in the process of crude oil processing. It contains anti-knock, colouring, antioxidant and anti-electrostatic additives.

**Use**
Aviation gasoline AVGAS 100LL is used in aviation piston engines.

**Durability**
Aviation gasoline satisfies technical conditions in the period of 2 years of the manufacture data subject to proper storage.

**Storage**
The fuel should be stored in closed tanks protecting the fuel from contact with air, dampness, mechanical contamination, exposure to sun and other light sources.

### Performance

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur content % m/m</td>
<td>Max 0.05</td>
</tr>
<tr>
<td>Lead content gPb/l</td>
<td>Max 0.56</td>
</tr>
<tr>
<td>Calorific value MJ/kg</td>
<td>Min 43.5</td>
</tr>
<tr>
<td>Crystallising point °C</td>
<td>Max (-58)</td>
</tr>
<tr>
<td>Copper corrosion 2h w t=100°C</td>
<td>Corrosion resistance</td>
</tr>
<tr>
<td>Inherent resin content mg/100ml</td>
<td>Max 3</td>
</tr>
<tr>
<td>Reaction with water, change of volume</td>
<td>ml</td>
</tr>
<tr>
<td>Conductivity at 20°C pS/m</td>
<td>Max 5</td>
</tr>
<tr>
<td>Vapour pressure at 37.8°C kPa</td>
<td>38–49</td>
</tr>
<tr>
<td>Oxidation stability = 100°C for 16 h</td>
<td></td>
</tr>
<tr>
<td>Potential resin content mg/100ml</td>
<td>Max 6</td>
</tr>
<tr>
<td>Solid content mg/100ml</td>
<td>Max 2</td>
</tr>
<tr>
<td>Colour</td>
<td>Blue</td>
</tr>
<tr>
<td>Anti-knock properties</td>
<td></td>
</tr>
<tr>
<td>Motor octane number, MON Min 99.6</td>
<td></td>
</tr>
<tr>
<td>Performance number, PN Min 130</td>
<td></td>
</tr>
<tr>
<td>Fractional composition 18% of the volume °C</td>
<td>Max 75</td>
</tr>
<tr>
<td>40% of the volume °C</td>
<td>Min 75</td>
</tr>
<tr>
<td>50% of the volume °C</td>
<td>Max 105</td>
</tr>
<tr>
<td>90% of the volume °C</td>
<td>Max 135</td>
</tr>
<tr>
<td>Final distillation °C</td>
<td>Max 170</td>
</tr>
<tr>
<td>Performance % (v/v)</td>
<td>Min 97</td>
</tr>
<tr>
<td>Residue % (v/v)</td>
<td>Max 1.5</td>
</tr>
<tr>
<td>Losses % (v/v)</td>
<td>Max 1.5</td>
</tr>
<tr>
<td>Total distillation temperature 18% obj +50% obj. °C</td>
<td>Min 135</td>
</tr>
</tbody>
</table>
JET A-1

- **Specification**
  Aviation fuel JET-A1 is manufactured as per AFQRJOS, DEF STAN 91-091, ASTM D 1655-16a.

- **Product**
  Aviation fuel for turbine engines is a refined bridge fraction which is blend of hydrocarbons, obtained from conservative and secondary crude oil processing. It contains antioxidant and anti-electrostatic additives.

- **Use**
  Aviation gasoline JET-A1 is used in aviation turbine engines.

- **Storage**
  The fuel should be stored in closed tanks protecting the fuel from contact with air, dampness, etc.
SMOKE OIL

Product
Smoke Oil is a professional, crystal clear mineral oil. It produces intensive white fumes trails with a long trail exposition.

- Safe for the pilot and the audience.
- The purest fraction of the mix of Vaseline and paraffin oil.

Use
Aviation smoke oil is intended for smoke generators in planes with piston engines.

Available tanks
- Plastic canisters – 20l
- Steel barrels – 200l

SMOKE OIL

<table>
<thead>
<tr>
<th>Size</th>
<th>Unit</th>
<th>Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematic viscosity 40 °C</td>
<td>mm²/s</td>
<td>ISO 3104</td>
<td>99.9</td>
</tr>
<tr>
<td>Appearance</td>
<td>-</td>
<td>visual</td>
<td>Clear and light</td>
</tr>
<tr>
<td>Colour (Saybolt)</td>
<td>-</td>
<td>ASTM D 156</td>
<td>30</td>
</tr>
<tr>
<td>Density at 15 °C</td>
<td>kg/m³</td>
<td>ISO 11185</td>
<td>808.5</td>
</tr>
<tr>
<td>Refractive index 20 °C</td>
<td>-</td>
<td>DIN 51423-2</td>
<td>1.45</td>
</tr>
<tr>
<td>Purity requirements for white medical oils</td>
<td>-</td>
<td>EU PHARM</td>
<td>Satisfied</td>
</tr>
<tr>
<td>Pour point</td>
<td>°C</td>
<td>ASTM D 5950</td>
<td>-39</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>°C</td>
<td>ISO 278</td>
<td>192</td>
</tr>
</tbody>
</table>
DEICING & ANTI-ICING PRODUCTS

Modern, chemical, de-icing agents also preventing aircraft icing and airport surfaces. They remove snow, frost, ice and protect against re-icing.

WATER BORYGO RUNWAY KF
Airport Surface de-icing agent
Based on potassium formate. The fluid contains a package of corrosion inhibitors protecting elements from metal and metal alloys used in aviation industry. The content of the active substance is at least 50%. The product is conformant with AMS 1435C.

Characteristics
Appearance: Colourless, clear, homogeneous fluid of one colour, without separating layers, particles or foreign objects
Density: 1.34-1.35 g/cm³
pH (at 20 °C): 10.7 (±0.5)
Crystallising point: Solution 50% (weight) -15 °C
Ready for use -60 °C

Container size: 1000l – palletised containers/bulk

WATER BORYGO RUNWAY SF
Airport Surface de-icing agent
Granulate used for airport surfaces de-icing based on sodium formate. The granulate contains a package of corrosion inhibitors protecting elements from metal and metal alloys used in aviation industry. The content of the active substance is at least 98%. The product is conformant with 1431D.

Characteristics
Appearance: White, homogeneous, irregular, without lumps, free from foreign objects
Density: 1.34-1.35 g/cm³
pH (at 20 °C): 9.5 (±0.5)
Particle size: > 2mm < 8mm
Crystallising point: Solution 15% (weight) -9 °C (effective up to -18 °C)

Package size: 25kg, 500kg or 1000kg - big bag

WATER PLANE GA
De-icing agent preventing aircraft surface icing
Warter Plane GA is used to prevent or remove ice from planes with the protection system type TKS which may also be used for de-icing on the ground. The product is conformant with DTD 406 B.

Characteristics
Appearance: Transparent, colourless fluid
pH: 6.0 - 7.5
Ignition temperature: > 60 °C
Freezing temperature: does not freeze at -40 °C for 1 h

Packaging size: 10L, 20L, 200L - containers
OUR LOGISTICS

TANK TRUCKS
CAPACITY UP TO 36 000 L
Depending on customer requirements, tanks are provided with a pump and counter or prepared for gravitational unloading. Separation of the tanks space carrying different products and / or serving different customers at the same time. Capacity from 34 000 l to 36 000 l, provided with a pump, counter (at 15 °C) and unloading report printer.

ISO-TANKS
ROAD, RAILWAY AND MARITIME TRANSPORT
ISO-tanks capacity ranges from 22 000 l to 35 000 l.
Tank / container ISO 20’
Capacity: 17 000 kg, equivalent of 25 700 l at 15°C.
Ideal for maritime transport.
Tank / container SWAP BODY 23’ – 26’
Ideal for mixed transport in Europe.
Capacity: 24 000 kg, equivalent of 33 400 l at 15°C.

STEEL BARRELS
STORAGE
CONTENT:
195 l, loading: 145kg AvGasu
55 l, loading: 40kg AvGasu

NOTES
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WE SHIP TO THE WHOLE WORLD!