

WARTER  fuels	TECHNICAL SPECIFICATION	WT-15/OBR PR/PD/104
Warter Fuels JSC	Aviation Gasoline AVGAS 115/145	Edition II

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Approved for use from: **10.02.2017**

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1. Scope of TS

The scope of TS is aviation gasoline AVGAS 115/145, which is the mixture of hydrocarbons, obtained from conservative and secondary processes of the crude petroleum and suitable amounts of antiknock, dyeing, antioxidant and antistatic additives

2. Usage scope of TS subject

Aviation gasoline is used to power piston engines

3. Division and designation

Division – N/A

Designation – Aviation Gasoline AVGAS 115/145.

4. Requirements and research

4.1 General properties

The Producer is obliged to add dyeing and antiknock additives to the aviation gasoline. Other additives specified in this TS may also be used. The Producer is obliged to publish the name and quantity of the added additives in quality certificate. The aviation gasoline shall be produced in accordance with the clearly established technology.

4.1.1. Antiknock additives

As antiknock additives, mixtures of compounds containing not less than 61% (m / m) of tetraethyl lead and such amount of ethylene dibromide to provide two atoms of bromine per atom of lead are used. TEL - B ethyl liquid from Innospec / Alcor is used as a antiknock additive. The amount of additive should be such, so the concentration of lead in the finished gasoline does not exceed 1.28 g Pb / l.

4.1.2. Dyeing additives

Aviation gasoline should contain the identifying purple color additive (blue in an amount of 0.713 mg / l and red in an amount of 0.502 mg / l).

4.1.3. Antioxidant additives

Antioxidant additives prevent from the formation of resins and other products of oxidation as well as from knocking out the lead compounds. The content of the additive based on the weight of the active ingredient, should not exceed 12.0 mg / l. As the antioxidant additive BHT (2,6-ditertbutyl-4-methylphenol) is used.

4.1.4. Antistatic additives

Antistatic additives are added to the gasoline in an amount providing the conductivity in accordance to detailed requirements table, ie. within the range of 50 ÷ 450 pS / m. The antistatic additive Stadis 450 is used. The concentration of the additive in the gasoline should not exceed 3.0 mg / l.

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4.1.5. Durability

The aviation gasoline meets the requirements of TS within two years from the date of production under the condition of proper storage.

4.1.6. Packaging, storage, and transportation

Aviation gasoline AVGAS 115/145 is delivered in a special tank trucks, iso-tank containers and steel drums approved for transport of aviation gasoline . Make sure that the packaging in which gasoline will be transported is clean, dry and undamaged. Each package unit as well as truck's transport documents should clearly and permanently indicate:

- Name of the gasoline
- Amount of gasoline in packaging unit
- Production date and batch numer
- Warning of fire risk and safety instruction
- Commercial contract number (if required)

Always store gasoline in containers that protects it from air, moisture and mechanical impurities. Storage places should be protected from direct sunlight, heating (underground tanks with limited air exchange). This reservation is for the reduction of both the losses associated with the evaporation and loss of the lightest components, which will change two key parameters of gasoline: vapor pressure and fractional composition. Tanks should be marked with information boards with the identification numbers of ADR threats and material identifying number UN:

33
1203

4.2 Specific Properties

4.2.1 Research

For each batch of aviation gasoline (after the composing), the following analysis must be performed- in accordance with the requirements table:

- Appearance
- Colour
- Fractional composition
- Density at temp. 15°C,
- Reid vapour pressure at temp. 37,8°C,
- Freezing point,
- Electrical conductivity at temp. 20°C,
- Motor Octane Number MON,
- LOM Lean rating – aviation metod,
- Existent gum,
- Oxidation stability at temp. 100°C, time 16h,
- Sulfur content,
- Lead content,
- Specific energy,
- Copper corrosion,
- Water reaction,
- Iodine number,
- Aromatic hydrocarbons content,

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- Acidity,
- Oxidation resistance determination – induction period method.

Performance number determination, should be performed once a quarter

The standards and requirements for these designations refer to the table of specific properties .

4.2.2. Appearance evaluation

The test product should be poured into a glass cylinder with a diameter of 40 mm to 50 mm, made of clear glass ,then it should be visually inspected in transmitting light. The test should be performed at a temperature of $20 \pm 5^\circ\text{C}$. Gasoline meets the requirements, if the study is a clear liquid, without sediment, turbidity, and water.

4.2.3. Sampling.

The sample must be taken from the tank, after the completion of mixing, in the amount of 5 l for full range of test with accordance to WT No. QI / 7.5 / 01 / IN / 51 "Manual sampling".

4.2.4. Specific properties of AVGAS 115/145

No.	Properties	Unit	Limits	Test method
1	Density at 15°C	kg/m^3	To be reported	ASTM D 4052 ASTM D 1298
2	Colour	-	Purple	ASTM D 2392
3	Appearance	-	Clear, bright liquid without any solid particles and undissolved water at ambient temp.	acc p.4.2.2. WT-15/OBR PR/PD/104 ASTM D 4176
3	Antiknock rating - Motor octane Number (MON) - LOM Lean rating – aviation method - Performance number *	-	- Min. 115 Min. 145	ASTM D2700 ASTM D 909
4	Fractional composition : - Initial boiling point - 10% (V/V) - 40% (V/V) - 50 % (V/V) - 90% (V/V) - Final boiling point - Performance	$^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ % (v/v)	To be reported Max 75 Min 75 Max 105 Max 135 Max 170 Min 97	ASTM D 86

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	- Residue - Loss Sum of 10% and +50% evaporated temperatures	% (v/v) % (v/v) °C	Max 1,5 Max 1,5 Min 135	
5	Sulfur content	% (m/m)	Max 0,05	ASTM D 2622 ASTM D 1266 ASTM D 5453
6	Lead content	g Pb/l	Max 1,28	ASTM D 5059 ASTM D 3341
7	Specific energy	MJ/kg	Min 44,0	ASTM D 4529 ASTM D 3338
8	Freezing point	°C	Max -60	ASTM D 2386 ASTM D 7153
9	Corrosion to copper strip-2h at 100°C	Corrosion rate	Max 1	ASTM D 130
10	Existent gum	mg/100 ml	Max 3	ASTM D 381
11	Water re action- volume change	ml	Max 2	ASTM D 1094
12	Electrical conductivity at 20°C	pS/m	50 ÷ 450	ASTM D2624
13	Reid vapor pressure at 37,8 °C	kPa	38,5 ÷ 49	ASTM D 5190 ASTM D 5191
14	Iodine number	g J ₂ /100g	Max 2,0	PN-82/C-04068
15	Acidity	mg KOH/ 100cm ³	Max 0,3	PN-85/C-04066
16	Aromatic hydrocarbons content	% m/m	Min 5	ASTM D 1319 PN EN 15553
17	Oxidation resistance determination induction period method.	Godz.	Min 12	PN ISO 7536/Ap1
18	Oxidation stability at temp. 100°C, time 16h - Potential gum - Precipitate	mg/100 ml mg/100 ml	Max 6 Max 2	ASTM D 873

* Performance number determination, should be performed once a quarter

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THE END
ADDITIONAL INFO

TECHNICAL SPECIFICATION ISSUED BY:
WARTER FUELS S.A.