 LUKOIL LUKOIL Neftohim Burgas AD	COMPANY TECHNICAL SPECIFICATION	CTS 1 - 05

The fuel JET A-1 is complied with the requirements of Joint Fuelling System (AFQRJOS)- Issue 32 - November 2020, covering the requirements of the following two specifications:

- British Ministry of Defence Standard DEF STAN 91-091/issue 12, 14th september 2020 for Turbine Fuel, Kerosene Type, Jet A-1, NATO Code F-35, Joint Service Designation: AVTUR;
- ASTM Standard Specification D 1655 for Aviation Turbine Fuels “Jet A-1” (Latest issue).


1. Technical requirements and test methods

№	Properties	Unit	Value		Test Method
			min	max	
1.	APPEARANCE				
1.1	Visual	Clear, bright and visually free from solid matter and undissolved water at ambient temperature			
1.2	Colour		report		ASTM D 156
1.3	Particulate contamination	mg/l	-	1,0	ASTM D 5452
1.4	Particulate, at point of manufacture, cumulative channel particle counts ➤ ≥ 4µm(c) ➤ ≥ 6µm(c) ➤ ≥ 14µm(c) ➤ ≥ 21µm(c) ➤ ≥ 25µm(c) ➤ ≥ 30µm(c)	ISO code	-	19	IP 565
			-	17	
			-	14	
			Report		
			Report		
			-	13	
2.	COMPOSITION				
2.1	Total Acidity	mg KOH/g	-	0,015	ASTM D 3242
2.2	Total aromatics	% (V/V)	-	26,5	ASTM D 6379
2.3	Sulphur Total	% (m/m)	-	0,30	ISO 8754 ASTM D 5453
2.4	Mercaptan Sulphur	% (m/m)	-	0,0030	ASTM D 3227
or 2.5	Doctor Test ¹⁾		negative		IP 30
2.6	Refinery components at point of manufacture				
2.6.1	Non hydroprocessed components	% (V/V)	report (incl. nil or 100 %)		
2.6.2	Mildly hydroprocessed components	% (V/V)	report (incl. nil or 100 %)		

№	Properties	Unit	Value		Test Method
			min	max	

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2.6.3	Severely hydroprocessed components	% (V/V)	report (incl. nil or 100 %)		
2.6.4	Synthetic components	% (V/V)	report (incl. nil or 50 %)		
3.	VOLATILITY				
3.1	Distillation				ASTM D 86
	➤ Initial Boiling Point	°C	report		
	➤ 10 % (V/V) at	°C	-	205,0	
	➤ 50 % (V/V) at	°C	report		
	➤ 90 % (V/V) at	°C	report		
	➤ End Point	°C	-	300,0	
	➤ Residue	% (V/V)	-	1,5	
	➤ Loss	% (V/V)	-	1,5	
3.2	Flash Point	°C	38,0	-	ASTM D 56
3.3	Density at 15 °C	kg/m ³	775,0	840,0	ASTM D 1298 ASTM D 4052
4.	FLUIDITY				
4.1	Freezing Point	°C	-	minus 47,0	ASTM D 2386 ASTM D 7153
4.2	Viscosity at minus 20 °C	mm ² /s	-	8,000	ASTM D 445
5.	COMBUSTION				
5.1	Smoke Point	mm	25,0	-	ASTM D 1322
5.2	Specific Energy , net	MJ/kg	42,80	-	ASTM D 4809 ASTM D 3338
6.	CORROSION Corrosion, Copper Strip (2 h ± 5 min at 100 °C ± 1 °C)	class	-	1	ASTM D 130
7.	THERMAL STABILITY (JFTOT)				
7.1	Control temperature	°C	260	-	ASTM D 3241
7.2	Tube Deposit Rating (Annex A1-VTR)	class	Less than 3, no "Peacock" or "Abnormal" colour deposits		
7.3	Filter Pressure Differential	mm Hg	-	25	
№	Properties	Unit	Value		Test Method
			min	max	
8.	CONTAMINANTS				


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8.1	Existent Gum	mg/100ml	-	7	IP 540
9	Microseparometer, (MSEP) ²⁾, rating				ASTM D 3948
9.1	MSEP without SDA		85	-	
9.2	MSEP with SDA		70	-	
10.	CONDUCTIVITY				
10.1	Electrical Conductivity ³⁾	pS/m	50	600	ASTM D 2624
11.	ADDITIVES ^{4) 5) 6)}				
11.1	Antioxidant ⁴⁾ in final batch (Optional)	mg/l	-	24,0	
11.2	Metal Deactivator, MDA ⁵⁾ (Optional)	mg/l	-	2,0	
	First Doping				
	Cumulative concentration after field re-doping				
11.3	Static Dissipator, SDA ⁶⁾ , Stadis® 450	mg/l	-	3,0	
	First Doping				
	Cumulative concentration after field re-doping				
12.	INCIDENTAL MATERIALS ⁷⁾				

TABLE NOTES:

- 1) The Doctor Test is an alternative requirement to the Sulphur Mercaptan Content. In the event of conflict between the Sulphur Mercaptan and Doctor Test results, the Sulphur Mercaptan results shall prevail.
- 2) These MSEP requirements apply only at point of manufacture. Any amendments in MSEP value indicate fuel contamination during transportation and provide basis for investigation, but are not to be used as the sole reason for rejection of the fuel.
- 3) Due to the requirements of DEF STAN 91-091/12, conductivity limits are mandatory for product to meet this specification. Some manufacturing and distribution systems inject SDA further downstream.
- 4) Antioxidants are mandatory in hydroprocessed fuels. Approved antioxidant additives are listed in Annex A.2.4 of DEF STAN 91-091/12, together with the appropriate RDE/A/XXX – Qualification Reference for quoting on refinery Certificates of Quality.
- 5) The approved Metal Deactivator Additive (MDA), RDE/A/650 are listed in Annex A.3.3. of DEF STAN 91-091/12.
The use of MDA at the point of manufacture is limited to 2.0 mg/l, except when copper contamination within the supply chain is known. See also Annex A.3.1 for the use of MDA in the supply chain, which includes the need to report thermal stability before and after MDA use.
- 6) Approved Static Dissipator additive Stadis® 450 is indicated in Annex A.4.2 of DEF STAN 91-091/12, together with the appropriate RDE/A/ 621 - Qualification Reference for quoting on refinery Certificates of Quality.
- 7)

INCIDENTAL MATERIALS

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1.	Fatty Acid Methyl Ester (FAME)	mg/kg	-	50	ASTM D 7797
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Testing is not mandatory and is not performed due to absence of risk of contamination with FAME during the production process. In the certificate it is noted: "Not measured – Risk assessed in accordance with JIG Bulletin 75".

2. Product description:

Colourless, highly flammable liquid.

The fuel is 100 % hydroprocessed kerosene fraction with antioxidant and static dissipater additives in accordance with Attachment A of DEF STAN 91-091/12.

3. Method for production and sampling:

3.1 Crude oil straight distillation with hydroprocessing of the kerosene fraction.

3.2 Sampling procedure corresponds to EN ISO 3170.

- Batch is the quantity of one kind or brand product, with same qualitative indices, produced by the same technologies, stored in one or more tanks and accompanied by a test document.

4. **Storage:** Closed tanks.

5. Transportation and documents:

5.1 By road and railway tankers, meeting the regulation of inflammable loads transportation.

5.2 The product has UN № 1863 according to UNO (United Nations Organization).

5.3 Each shipment shall be accompanied by Certificate of Quality. The minimum requirements of information to be included on the fuel's refinery batch certificate of quality are given below:

- Specification name, issue and any amendment number;
- Name and address of testing laboratory;
- Batch number or unique identifier;
- Quantity of fuel in the batch;
- Properties tested and including specification limit, test method and result of test;
- Additives, including qualification reference and quantity added;
- Name and position of authorised test certificate signatory or an electronic signature;
- Date of certification.

5.4 Product SDS (Safety Data Sheet) is submitted to the user prior or at the time of first delivery.

end

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