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**IRVING OIL LIMITED**  
**REFINING DIVISION-SPECIFICATIONS**  
**JET A-1**  
**Meets CAN/CGSB-3.23**

Rev: March 2007

SPECIFICATIONS	UNITS	MIN	MAX	METHOD
Appearance		Bright & Clear		Visual
Aromatics	% VOL		25	ASTM D1319
Corrosion, Copper Strip	Class		No.1	ASTM D130
Density at 15°C (note 1)	Kg/m3	775	840	ASTM D1298 / ASTM D4052
Distillation – Initial Boiling Point (IBP)	°C	Report		ASTM D86
Distillation – 10% Recovered Point	°C		205	ASTM D86
Distillation – 20% Recovered Point	°C	Report		ASTM D86
Distillation – 50% Recovered Point	°C	Report		ASTM D86
Distillation – 90% Recovered Point	°C	Report		ASTM D86
Distillation – Final Boiling Point (FBP)	°C		300	ASTM D86
Distillation- Residue	% vol.		1.5	ASTM D86
Distillation – Loss	% vol.		1.5	ASTM D86
Conductivity Sept 1- April 15 April 16 – Aug 31 (notes 2a & b)	PS/m	50	600	ASTM D2624
Flash Point	°C	38(100)		ASTM D56/D3828
Freeze Point (note 3)	°C		-47	ASTM D2386/D5972
Existent gum (air or steam jet), mg/100 (note 15)	mg		7	ASTM D381
<b>Combustion Properties:</b>				
Smoke Point And (note 4)	mm	18		ASTM D1322
Naphthalenes (note 4)	% Vol.		3.0	ASTM D1840
Heat of Combustion (note 5)	MJ/kg	42.8		ASTM D3338/D4809/D4529
<b>Particulate Matter:</b>				
Into Storage (note 14)	mg/L		2.2	ASTM D2276/D5452
Into Aircraft	mg/L		.44	ASTM D2276/D5452
Filter Membrane Color rating (Note 17)			4	D5452
<b>Sulphur:</b>				
Mercaptan Sulphur (RSH) (note 6)	%Mass		.003	ASTM D3227
Sulphur (note 7)	%Mass		.30	ASTM D2622/D4294/D4543 CAN 3.0-No. 16.0
<b>THERMAL STABILITY @ 275°C</b>				
Pressure drop (note 8)	kPa(mm/Hg)		3.4 (25.0)	ASTM D3241
Preheater Deposit	Code		<3	ASTM D3241
<b>Total Acid Number (TAN)</b>				
Viscosity @-20°C (Viscosity @ -4 °F)	Mg/KOH/g cSt		.10 8	ASTM D3242 ASTM D445
<b>Water Reaction:</b>				
Interface Rating			1b	ASTM D1094
Water Separations (note 9)	MSEP	85		ASTM D3948
<b>Additives:</b>				
Stadis 450 (note 11)	mg/L		3	
Icing inhibitor; (note 13)	% vol.	.10	.15	ASTM D5006
Other Additives (note 10&12)				

IRVING OIL LIMITED-REFINING DIVISION

JET A-1 FUEL SPECIFICATION

**NOTES:**

**1. Density:**

In case of dispute, D1298 shall be the referee test method.

**2. Electrical Conductivity:**

(a) The Saint John Refinery produces jet fuel without Stadis 450. However, Stadis 450 is added within the specification limits at the East Saint John terminal and tank 301 located within the refinery.

The conductivity specification shall apply at time, temperature, and delivery to the purchaser.

(b) The Canadian Air Force Bases require a conductivity specification of 150 minimum.

**3. Freezing Point:**

In case of a dispute, D2386 shall be the referee test method.

**4. Combustion Properties:**

One of the following:

- |  |   |
|--|---|
| ➤ Smoke point, mm                              | CAN\CGSB-3.23-97--25 min                              |
| ➤ Smoke point, mm and<br>Naphthalene, % volume | CAN\CGSB-3.23-97--18 min<br>CAN\CGSB-3.23-97--3.0 max |

**5. Heat of Combustion:**

In case of dispute, D4809 shall be the referee test method.

**6. Mercaptan:**

The mercaptan sulphur determination may be waived if the fuel is considered "sweet" by ASTM D4952.

**7. Sulphur:**

In case of dispute, D4294 shall be the referee test method.

**8. Thermal Stability:**

CGSB specifies a maximum heater tube temperature shall be 260°C. The Irving Refinery has adopted CPL 54 stability temperature of 275°C.

**9. Water Separation Characteristics:**

The Saint John Refinery manufactures jet fuel **without** Stadis 450, as a result the specification of 85 minimum MSEP shall apply. If the Saint John refinery were to manufacture jet fuel with Stadis 450, the conductivity of 50 to 600 pS/cm shall apply along with a 70 minimum specification for MSEP.

**10. Antioxidant:**

Only the following antioxidants may be used, the concentration does not include the mass of solvent:

- 2,6-ditertiary butyl 4-methylphenol
- 2,4-dimethyl 6-tertiary butylphenol
- 2,6-diertiary-butylphenol
- 75% minimum, 2,6-ditertiary-butylphenol  
25% maximum mixture of tertiary and tritertiary butylphenol
- 55% minimum 2,4-dimethyl 6 tertiary butylphenol  
15% minimum 2,6-ditertiary-butyl-4-methylphenol  
Remainder as monomethyl and dimethyl tertiary-butyl phenols
- 72% minimum 2,4-dimethyl-6 tertiary butylphenol  
28% maximum monomethyl and dimethyl tertiary-butyl phenols

**11. Stadis 450:**

When additive depletion is evident by a conductivity loss further addition of Stadis 450 is allowed to bring the fuel into the acceptable conductivity range provided the following guidelines are used:

The original concentration of Stadis 450 allowed is 3 mg/L max.

The cumulative concentration of Stadis 450 allowed is 5 mg/L max.

If the initial concentration of Stadis 450 is not known then the further addition of Stadis 450 shall not exceed 2 mg/L.

**12. Metal Deactivator:**

N, N, disalicylidene-1, 2 propane may be added to the fuel.

**13. Icing Inhibitor:**

When requested, and agreed upon, an icing inhibitor conforming to the latest version of ASTM D4171 Type 111 or CAN\CGSB-3.526 M87 shall be added to the fuel.

**14. Particulate:** A minimum of 4L shall be filtered.

**15.** This fuel meets F-34 specification except it does not include the F-34 additive requirements. The gum specification is a F-34 specification.

**16.** All notes in the CGSB standard apply.

**17. Filter Colour Membrane Rating: This is a airport standard.**

**Note:** This specification meets F-34. Refer to the original CGSB 3.23 document for complete details of specifications to resolve any concerns.

### Conductivity Reference Table

	Summer (April 16-Aug 31)		Winter (Sep 1-Apr 15)	
	MIN	MAX	MIN	MAX
Refinery PRR	150	600	250	600
Truck Rack	75	600	150	600
Ship Loading	100	600	200	600
CGSB	50	600	50	600
*Kerosene: Does not have a maximum limit for Conductivity				