



Sunoco Logistics



Sunoco Pipeline L.P.

Product Codes and Grade Specifications

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Product Code	Product Name	Max RVP (psi)	Page
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CONVENTIONAL GASOLINE

87CF19	87 Octane Conventional Gasoline	6.8	9
87CF20	87 Octane Conventional Gasoline	7.8	9
87CF23	87 Octane Conventional Gasoline	9.0	9
87CF27	87 Octane Conventional Gasoline	Non-VOC Controlled	9
93CF18	93 Octane Conventional Gasoline	6.6	9
93CF19	93 Octane Conventional Gasoline	6.8	9
93CF20	93 Octane Conventional Gasoline	7.8	9
93CF23	93 Octane Conventional Gasoline	9.0	9
93CF27	93 Octane Conventional Gasoline	Non-VOC Controlled	9

CONVENTIONAL GASOLINE BLENDSTOCK GRADES

S83CB18	Conventional Gasoline Blendstock	6.6	11
S83CB19	Conventional Gasoline Blendstock	6.8	11
S83CB20	Conventional Gasoline Blendstock	7.8	11
S83CB23	Conventional Gasoline Blendstock	9.0	11
S83CB27	Conventional Gasoline Blendstock	Non-VOC Controlled	11
91CB18	Conventional Gasoline Blendstock	6.6	11
91CB19	Conventional Gasoline Blendstock	6.8	11
91CB20	Conventional Gasoline Blendstock	7.8	11
91CB23	Conventional Gasoline Blendstock	9.0	11
91CB27	Conventional Gasoline Blendstock	Non-VOC Controlled	11

REFORMULATED GASOLINE – BLENDSTOCK GRADES

83RB23	Reformulated Gasoline Blendstock for 10.0 % ethanol blending	VOC min. 25.4%	13
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Product Code	Product Name	Max RVP (psi)	Page
83RB27	Reformulated Gasoline Blendstock for 10.0 % ethanol blending	Non-VOC Controlled	13
91RB23	Reformulated Gasoline Blendstock for 10.0 % ethanol blending	VOC min. 25.4%	13
91RB27	Reformulated Gasoline Blendstock for 10.0 % ethanol blending	Non-VOC Controlled	13
85RB23	Reformulated Gasoline Blendstock for 5.7 % ethanol blending	VOC min. 25.4%	13
85RB27	Reformulated Gasoline Blendstock for 5.7 % ethanol blending	Non-VOC Controlled	13
92RB23	Reformulated Gasoline Blendstock for 5.7 % ethanol blending	VOC min. 25.4%	13
92RB27	Reformulated Gasoline Blendstock for 5.7 % ethanol blending	Non-VOC Controlled	13

Product Code	Product Name	Minimum Cetane	Origin Sulfur Content PPM	
<u>DISTILLATES – FUNGIBLE GRADES</u>				
HS2FO	High Sulfur #2 Fuel Oil – Unmarked	N/A	2000	15
500MV2	500 ppm #2 – Motor Vehicle Undyed Diesel Fuel	40	420	16
15MV2	15 ppm #2 – Motor Vehicle Undyed Diesel Fuel	40	9	17
15EXP2	15 ppm #2 – Motor Vehicle Undyed Diesel Fuel for Export	40	9	18
500NRLM	500 ppm #2 – Undyed Non-Road, Locomotive, Marine Diesel Fuel	40	420	19
15NRLM	15 ppm #2 – Undyed Non-Road, Locomotive, Marine Diesel Fuel	40	9	20
500MV1	500 ppm #1 – Motor Vehicle Undyed Diesel Fuel Aviation Kerosene	40	400	21
15MV1	15 ppm #1 – Motor Vehicle Undyed Diesel Fuel Aviation Kerosene	40	9	23
500NR1	500 ppm #1 – Undyed Non-Road Diesel Fuel, Aviation Kerosene	40	400	25
JETA	High Sulfur Aviation Kerosene	N/A	3000	27
<u>DISTILLATES – SEGREGATED GRADES</u>				
S1D	15 ppm #1 – Motor Vehicle Undyed Diesel Fuel Kerosene (not for aviation use – DRA allowed)	40	9	29
S1K	500 ppm #1 – Motor Vehicle Undyed Diesel Fuel Kerosene (not for aviation use – DRA allowed)	40	400	30
<u>LIQUEFIED PETROLEUM GAS (LPGs) – FUNGIBLE GRADES</u>				
NBUTANE	Normal Butane			31
MIXBUT	Mixed Butane			31



SHIPMENT ACCEPTANCE TERMS

The following are general terms and conditions regarding product quality for all products shipped on the Sunoco Pipeline L.P. (SPL) system, both fungible and segregated:

- 1.0 A pre-shipment Certificate of Analysis(C of A), or a full C of A, must be received at SPL origin points, at least two hours prior to lifting. A full C of A, reflecting all tests listed in the SPL current specifications, must be received within 48 hours.
 - 1.1 Jet Fuel requires a full laboratory C of A prior to lifting.
 - 1.2 The C of A must be based on a representative sample of the product to be tendered into the SPL system. The C of A cannot be from a similar tank or previous shipment, and not from a generic set of data for a "typical" product.
 - 1.3 The product sampled and tested for the C of A must be homogenous, such that the C of A is representative of all batches originating from the tank C of A.
 - 1.4 At MINIMUM, pre-shipment FAX to include:

Conventional / CBOB Gasoline	RFG / RBOB Gasoline	Diesel / Heating Oil / NRLM / Kerosene	Jet Fuel	LPGs (Propane, Normal and Mixed Butane)
API Gravity @ 60F	API Gravity @ 60F	API Gravity @ 60F	Full D-1655 Required *	Specific Gravity
RVP	RVP	Flash Point	* Connecting carriers will provide a pre-shipment FAX to include:	Volatility
Octane (R + M) /2	Octane (R + M) /2	Sulfur Content		Oil Stain Residue
Color and Appearance	Oxygen Content, wt%	Cetane Index (Diesel)		Propane Content
Sulfur, wt%	Aromatics Content, vol%	Saybolt Color (Kerosene)	Visual Appearance in White Bucket	Butane Content
Distillation	E200, vol%	ASTM Color (Diesel, Heating Oil, NRLM)	API Gravity @ 60F	
DRA, ppm total polymer	E300, vol%	Red Dye Content (Heating Oil)	Water Separation (MSEP)	
	Olefins, vol%	Distillation	Filter Membrane	
	Sulfur, wt%	DRA, ppm total polymer	Aqua-Glo	
	VOC Reduction, %			
	Benzene, vol%			
	Color and Appearance			
	Driveability Index			
	Distillation			
	DRA, ppm total polymer			

- 2.0 Acceptance of the C of A by SPL does not relieve the shipper of liability or responsibility for specification compliance and composition of the product.
- 3.0 SPL reserves the right to reject or terminate shipments when samples are found to deviate from the applicable Certificate of Analysis.
- 4.0 SPL may sample and test products prior to acceptance, and during shipments, into the SPL system, and in the event of a variance against the C of A, SPL results will prevail.
- 5.0 For any parameter reported bordering on the specification maximum/minimum level, a recheck may be required prior to acceptance.
- 6.0 Any water suspended in or received with shipper product will be deducted from shipment volumes. The shipper will



be requested to remove the water or be invoiced for handling and disposal charges at the then prevailing rate as determined by SPL.

7.0 Workmanship - Appearance

7.1 The product shall be clear and bright, free of any suspended water, sediment or foreign material. A maximum rating of 2 as determined by ASTM-4176, Procedure 2 of either tank temperature or 77°F (whichever is lowest) is the determining criteria.

7.2 The product can contain no constituents that in SPL’s opinion would render it unacceptable for its commonly accepted end use. Such constituents may include but are not limited to unusual color or product odor.

8.0 PRODUCT TEMPERATURE - The maximum temperature of incoming product shall not exceed 100°F for Gasoline, JETA, Aviation and Kerosene. The maximum temperature of incoming product shall not exceed 110°F for Diesel Fuel Oil or #2 Heating Oil.

9.0 The only non-hydrocarbon components permitted to be blended in gasoline, moved by SPL, are those listed in the specifications. The use of alcohols for blending purposes is prohibited in all gasoline, segregated or fungible.

10.0 It is the Shipper’s responsibility to ensure the product meets all downstream carrier, federal, state or local requirements not stipulated in the SPL specifications.

11.0 All Test Methods listed are based on the most current ASTM, unless specified otherwise.

11.0 BIO-FUELS PROHIBITION POLICY: In the interest of protecting our shippers’ products, all products shipped are not permitted to contain any products containing Bio-Fuels, i.e., ethanol and bio-diesel.

SEGREGATED PRODUCTS FOR WHICH SPECIFICATIONS HAVE NOT BEEN ISSUED

<u>LPG PRODUCT CODE</u>	<u>PRODUCT NAME</u>	<u>CRUDE OIL CODE</u>	<u>PRODUCT NAME</u>	<u>OTHER PRODUCT CODE</u>	<u>PRODUCT NAME</u>
BBUTY	BB Stock	LEF	Lube Extracted Feedstocks	ALKYLT	Alkylate
ISO	IsoButane	SWEET	Sweet	BTF	Bonded Turbine Fuel
LPGMIX	LPG Mix	SYN	Synthetic	COND	Condensate
PENT	Pentane	SOUR	Sour	DISTCOM	Distillate Component
PROP	Propane	HEAVY	Heavy Sour	GASCOMP	Gasoline Component
ISOP	IsoPentane			LCO	Light Cycle Oil
PRPL	Propylene			NAPH	Naphtha
				RAFF	Raffinate
				REFLTM	Reformate
				TLENE	Toluene
				TXMIX	Toluene/Xylene Mix
				TRNSMX	Transmix
				STMIX	Segregated Transmix
				UNFGAS	Unfinished Gasoline
				VGO	Vacuum Gas Oil
				XYLE	Xylene



TABLE 1: SEASONAL VAPOR PRESSURE, DISTILLATION AND VAPOR LOCK PROTECTION CLASS REQUIREMENTS

The following dates represent SPL requirements in addition to those specified by government agencies. Shipper will be notified as needed of any changes to this schedule for the purposes of RVP compliance.

VOLATILITY CLASS

VOC AND RVP CONTROL SEASON

MONTHS	Conventional Grades				RFG / RBOB	Class
	RVP Max	Grade 18	Grade 19	Grade 20	Grade 23	
April, May	6.6	6.8	7.8	9.0	VOC min. 25.4%	A-4
June, July, August September 1- 15	6.6	6.8	7.8	9.0	VOC min. 25.4%	A-3

NON-VOC AND RVP CONTROL SEASON

MONTHS	ALL GRADES	Class
RVP Max		
September 16 – 30, October	13.5	D-4
November, December, January, February, March	15.0	E-5

Vapor Pressure / Distillation Class	Max Vapor Pressure	Distillation Temperatures, °F (°C), at % Volume Evaporated						Driveability Index max, °F (°C) Derived
		10 % max	50 % min*	50 % max	90 % max	End Point max	Residue Vol. Max %	
AA	7.8	158 (70)	170 (77)	250 (121)	374 (190)	437 (225)	2	1250 (597)
A	9.0	158 (70)	170 (77)	250 (121)	374 (190)	437 (225)	2	1250 (597)
B	10.0	149 (65)	170 (77)	245 (118)	374 (190)	437 (225)	2	1240 (591)
C	11.5	140 (60)	170 (77)	240 (116)	365 (185)	437 (225)	2	1230 (586)
D	13.5	131 (55)	150 (66)	235 (113)	365 (185)	437 (225)	2	1220 (580)
E	15.0	122 (50)	150 (66)	230 (110)	365 (185)	437 (225)	2	1200 (569)

Vapor Lock Protection Class	1	2	3	4	5
Vapor/Liquid Ratio of 20:1 ASTM D-5188 °F (°C) Min.	129 (54)	122 (50)	116 (47)	116 (47)	105 (41)

* Gasolines that contain 1 to 10 volume percent ethanol shall meet a minimum evaporated distillation temperature of 150 °F (66 °C) after blending.



TABLE 2: ADDITIVES

Sun Pipeline will permit only the types and concentrations of additives detailed below; all other types and concentrations or additives are prohibited.

GUM INHIBITORS AND METAL DEACTIVATORS

Gasoline shipments may, but are not required to, contain the following:

N, N'di-secondary butyl para-phenylenediamine	N,N'disalicylidene-1, 2 propanediamine
N, N'di (1-ethyl-2-methylpentyl) para-phenylenediamine	2, 6-di-tertiary butyl 4 methyl phenol
N,N'di-isopropyl-para-phenylenediamine	n-Butyl para-aminophenol
N,N-bis-(1, 4-diemethylpentyl)-p-phenylenediamine	2,4,6 - tri-tertiary butylphenol
Ortho-tertiary butylphenol	2,4-dimethyl-6-tertiary-butylphenol
2,4-di-tertiary butylphenol	2,6-di-tertiary butylphenol
N, secondary butyl, N'phenyl-para-phenylenediamine	Mixed propylated and butylated phenols
Butylated ethyl, methyl and dimethyl phenols	2,4,6 tri-isopropyl phenol

CORROSION INHIBITORS

All products shipped on SPL, with the exception of all grades of Aviation Kerosene, are required to meet a minimum level of corrosion protection. The concentration of inhibitor dosage will be controlled to meet a minimum rating of B+ (less than 5% of test surface rusted) as determined by NACE Standard TM0172-2001, Test Method – Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines.

Gasoline shipped on Sun Pipe Line may contain only the following corrosion inhibitors:

Aqua Process	11CH77		Mobil	C-605
Afton Chem.	HiTEC 6455		Nalco	5403, 5405, 5406, EC5624A, EC5626A
Corexit	5267		SPEC-AID	8Q22, 8Q100, 8Q101, 8Q102, 8Q103, 8Q106, 8Q109, 8Q110, 8Q112ULS
Innospec	DCI-4A, DCI-6A, DCI-11, DCI-30.N		Tolad	245, 249, 351, 3232, 3232D, 4410, 9715, 9719
Ethyl Hi Tec	580		Unichem	7500, 7501, 7510
Lubrizol	8014, 8107		UOP	Unicor, Unicor J, Unicor PL
MidContinental	MCC5001			

In addition to the above additives, the following may be used in diesel fuels and fuel oil transported by SPL: DuPont AFA-1, Innospec DMA-4, Nalco 5400-A, Nalco EC 5407-A, Infineum R511.

Static Dissipater Additives (Conductivity Improvers)

Product shipments may, but are not required to, contain static dissipater additives (SDA). The only approved SDA for use on Sun Pipeline is Innospec Statis 450. SDA is prohibited from all Jet Fuel and aviation kerosene grades. The origin maximum concentration of Statis 450 is 0.75 mg/l, and the origin maximum conductivity allowed is 250 pS/m at 21 deg C (70 deg F) by ASTM D2624.

Aviation Kerosene Additives

Product may only contain antioxidants and metal deactivators specified and within the concentration noted in the latest ASTM D-1655 with advance approval from Sun Pipeline prior to shipment. Use of these additives is expected to be short term at reasonable treat levels, and is to be clearly indicated on the Certificate of Analysis. All other additives are prohibited. Sun Pipeline reserves the right to deny shipment of product containing these additives.



Cloud and Pour Point Depressant Additives

Product may only contain ethylene vinyl acetate copolymer based cloud and pour point depressant additives only upon advance approval from Sun Pipeline prior to shipment. Use of these additives is expected to be short term at reasonable treat levels and is to be clearly indicated on the Certificate of Analysis. Sun Pipeline reserves the right to deny shipment of product containing cloud and pour point depressant additives.

Cetane Improver Additives

Product may only contain 2-ethyl hexyl nitrate or T-butyl peroxide based cetane improver additives only upon advance approval from Sun Pipeline prior to shipment. Use of these additives is expected to be short term at reasonable treat levels and is to be clearly indicated on the Certificate of Analysis. Sun Pipeline reserves the right to deny shipment of product containing cetane improver additives.

Prohibited Additives

Sun Pipeline only permits certain types and concentrations of additives as referenced, while all other types and concentrations of additives are prohibited. Prohibited additives include, but are not limited to the following:

Lubricity additives

Port Fuel Injector (PFI) additives

Biodiesel

Intake Valve Detergent Additives

Additives containing Phosphorous

Marker Solvent Yellow 124

Additive Documentation Requirements

If present, the type and concentration of approved additives must be clearly indicated on the Certificate of Analysis. Additive treat rates are acceptable for concentration reporting. Carrier may request review of volume reconciliation data to verify actual treat rates.



**CF GRADES - FUNGIBLE SPECIFICATION FOR
CONVENTIONAL GASOLINE (1)**

<u>CF - GRADE RVPs</u>	<u>ASTM TEST METHOD</u>	<u>RVP MAXIMUM (PSI)</u>
93CF18	D5191, D5482	6.6
87CF19 / 93CF19	D5191, D5482	6.8
87CF20 / 93CF20	D5191, D5482	7.8
87CF23 / 93CF23	D5191, D5482	9.0
87CF27 / 93CF27	D5191, D5482	Non-VOC Controlled

<u>87CF GRADE OCTANES</u>	<u>ASTM TEST METHOD</u>	<u>OCTANE, MINIMUM</u>
RON	D2699, D2885	Report
MON	D2700, D2885	82.0
Index, (R+M)/2		87.0

<u>93CF GRADE OCTANES</u>	<u>ASTM TEST METHOD</u>	<u>OCTANE, MINIMUM</u>
RON	D2699, D2885	Report
MON	D2700, D2885	Report
Index, (R+M)/2		93.0

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS (2)</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API at 60°F	D287, D1298, D4052	Report		
RVP (psi)	D5191	See above and Table 1 on page 6		3
Octane	RON MON Index, (R+M)/2	See table above		
Oxygen Content, wt, %	D4815, D5599, D5845	Report		5
Benzene, vol. %	D3606, D4053	4.9		
Color		Undyed		
Copper Strip Corrosion 3 hours @ 122°F	D130	1		2
Silver Strip Corrosion 3 hours @ 122°F	D 4814	1		2
Doctor test OR	D4952	Negative		
Mercaptan sulfur, wt %	D3227	0.0020		6
Solvent Washed Gum, mg/100ml	D381	4		
Lead Content – g/L at origin	D3237, D5059	0.01		
Oxidation stability – minutes	D525	240		
Phosphorous, gms/gal	D3231	0.004		
Sulfur, wt %	D2622, D5453, D7039	0.0080		
Haze Rating, @ 77°F	D4176	2		
Corrosive Properties	NACE TM0172-2001	B+		
Odor		Non-offensive		7
Distillation	D86	Refer to Table 1		
Vapor/Liquid Ratio of 20:1	D2533, D5188	Refer to Table 1		4
Driveability Index	D4814	Refer to Table 1		4



**CF GRADES- FUNGIBLE SPECIFICATION FOR
CONVENTIONAL GASOLINE (1) Cont'd**

- (1) **This product does not meet the requirements for reformulated gasoline and may not be used in any reformulated gasoline covered area.**
- (2) ADDITIVES – *Refer to Table 2.*
 - Corrosion inhibitors, gum inhibitors and metal deactivators.
 - No additives or corrosion inhibitors containing phosphorous may be used in this gasoline.
 - The use of Port Fuel Injector (PFI) and intake valve detergent additives is prohibited.
 - The use of MMT octane enhancing additive is prohibited.
- (3) For products blended to meet EPA or state imposed summer VOC requirements, tests must be performed in accordance with the procedures described in 40 CFR, Part 80, Appendix E, Method 3.
- (4) The Driveability Index (DI) specification limits are applicable at the refinery or import facility as defined by 40 CFR Part 80.2. The V/L referee method will be D5188.
- (5) This grade may not contain oxygenates, such as ethers and alcohols. The use of non-hydrocarbon blending components in this grade is prohibited. Maximum MTBE, ETBE, and TAME allowed is 0.30 volume %.
- (6) Mercaptan sulfur waived if fuel is negative by Doctor Test.
- (7) Any gasoline exhibiting an offensive odor, exhibiting the odor of dienes, and/or any gasoline that poses a personal health hazard will not be accepted for shipment. Any gasoline containing more than 0.50 wt. % of dicyclopentadiene will not be accepted for shipment. The referee method will be based on a gas chromatograph test.



**CB GRADES - FUNGIBLE SPECIFICATION FOR
CONVENTIONAL GASOLINE BLENDSTOCK (1)**

<u>CB -GRADE RVPs</u>	<u>ASTM TEST METHOD</u>	<u>RVP MAXIMUM (PSI)</u>
S83CB18 / 91CB18	D5191, D5482	6.6
S83CB19 / 91CB19	D5191, D5482	6.8
S83CB20 / 91CB20	D5191, D5482	7.8
S83CB23 / 91CB23	D5191, D5482	9.0
S83CB27 / 91CB27	D5191, D5482	Non-VOC Controlled

<u>S83CB GRADE</u> <u>OCTANES</u>	<u>ASTM TEST METHOD</u>	<u>OCTANE AFTER</u> <u>BLENDING WITH</u> <u>ETHANOL, Min.</u>
RON	D2699, D2885	Report
MON	D2700, D2885	82.0
Index, (R+M)/2		87.0

<u>91CB GRADE</u> <u>OCTANES</u>	<u>ASTM TEST METHOD</u>	<u>OCTANE AFTER</u> <u>BLENDING WITH</u> <u>ETHANOL, Min.</u>
RON	D2699, D2885	Report
MON	D2700, D2885	Report
Index, (R+M)/2		93.0

<u>PRODUCT PROPERTY</u>	<u>ASTM</u> <u>TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS (2)</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API at 60°F Before EtOH blend	D287, D1298, D4052	Report		1
RVP (psi)	D5191	See above and Table 1 on page 6		3
Octane	RON MON Index, (R+M)/2	D2699, D2885 D2700, D2885		
Oxygen Content, wt, %	D4815, D5599, D5845		Report	5
Benzene, vol. %	D3606, D4053		4.9	
Color			Undyed	
Copper Strip Corrosion 3 hours @ 122°F	D130		1	2
Silver Strip Corrosion 3 hours @ 122°F	D 4814		1	2
Doctor test OR	D4952	Negative		
Mercaptan sulfur, wt %	D3227		0.0020	6
Solvent Washed Gum, mg/100ml	D381		4	
Lead Content – g/L at origin	D3237, D5059		0.01	
Oxidation stability – minutes	D525	240		
Phosphorous, gms/gal	D3231		0.004	
Sulfur, wt %	D2622, D5453, D7039		0.0080	
Haze Rating, @ 77°F	D4176		2	
Corrosive Properties Before EtOH Blend	NACE TM0172-2001	B+		1
Odor		Non-offensive		7
Distillation	D86		Refer to Table 1	
Vapor/Liquid Ratio of 20:1	D2533, D5188		Refer to Table 1	4
Driveability Index	D4814		Refer to Table 1	4



**CB GRADES - FUNGIBLE SPECIFICATION FOR
CONVENTIONAL GASOLINE BLENDSTOCK (1) Cont'd**

- (1) Base Gasoline - Not for sale to the ultimate consumer. **All parameters must be met after blending with denatured fuel ethanol unless noted. This product does not meet the requirements for reformulated gasoline and may not be used in any reformulated gasoline covered area.**
- (2) ADDITIVES – *Refer to Table 2.*
 - a. Corrosion inhibitors, gum inhibitors and metal deactivators.
 - b. No additives or corrosion inhibitors containing phosphorous may be used in this gasoline.
 - c. The use of Port Fuel Injector (PFI) and intake valve detergent additives is prohibited.
 - d. The use of MMT octane enhancing additive is prohibited.
- (3) For products blended to meet EPA or state imposed summer VOC requirements, tests must be performed in accordance with the procedures described in 40 CFR, Part 80, Appendix E, Method 3.
- (4) The Driveability Index (DI) specification limits are applicable at the refinery or import facility as defined by 40 CFR Part 80.2. In the case of sub-octane gasoline, DI limits will apply after blending with 10% denatured Fuel Ethanol. The V/L referee method will be D5188.
- (5) Before blending with denatured fuel ethanol, this grade may not contain oxygenates, such as ethers and alcohols. The use of non-hydrocarbon blending components in this grade is prohibited. Maximum MTBE, ETBE, and TAME allowed is 0.30 volume %.
- (6) Mercaptan sulfur waived if fuel is negative by Doctor Test.
- (7)** Any gasoline exhibiting an offensive odor, exhibiting the odor of dienes, and/or any gasoline that poses a personal health hazard will not be accepted for shipment. Any gasoline containing more than 0.50 wt. % of dicyclopentadiene will not be accepted for shipment. The referee method will be based on a gas chromatograph test.



**RB GRADES - FUNGIBLE SPECIFICATION FOR REFORMULATED
GASOLINE BLENDSTOCK FOR BLENDING WITH 10% DENATURED FUEL
ETHANOL VOC CONTROLLED REGION 2 (1)**

<u>RB - GRADES</u>	<u>DESCRIPTION</u>	<u>RVP MAXIMUM OR VOC REDUCTION REQUIREMENT – REFER TO TABLE 1</u>
83RB23	RFG Blendstock for 10% Ethanol Blending	VOC min 25.4 %
83RB27	RFG Blendstock for 10% Ethanol Blending	Non-VOC Controlled
91RB23	RFG Blendstock for 10% Ethanol Blending	VOC min 25.4 %
91RB27	RFG Blendstock for 10% Ethanol Blending	Non-VOC Controlled
85RB23	RFG Blendstock for 5.7% Ethanol Blending	VOC min 25.4 %
85RB27	RFG Blendstock for 5.7% Ethanol Blending	Non-VOC Controlled
92RB23	RFG Blendstock for 5.7% Ethanol Blending	VOC min 25.4 %
92RB27	RFG Blendstock for 5.7% Ethanol Blending	Non-VOC Controlled

**83RB and 85RB
OCTANES**

RON
MON
Index, (R+M)/2

ASTM TEST METHOD

D2699, D2885
D2700, D2885

**OCTANE AFTER
BLENDING WITH
ETHANOL, Min.**

Report
82.0
87.0

**91RB and 92RB
OCTANES**

RON
MON
Index, (R+M)/2

ASTM TEST METHOD

D2699, D2885
D2700, D2885

**OCTANE AFTER
BLENDING WITH
ETHANOL, Min.**

Report
Report
93.0

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS (2)</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API at 60°F Before EtOH blend	D287, D1298, D4052	Report		1
Aromatics (vol. %)	D5769, GC-OFID <i>See Note</i>		50	8
RVP (psi)	D5191	<i>See above and Table 1 on page 6</i>		3
Octane RON	D2699, D2885			
MON	D2700, D2885			
(R+M)/2		<i>See table above</i>		
Oxygen Content, wt. %	D5599, GC-OFID	Report		5,8
Benzene, vol. %	D3606		1.30	
Color			Undyed	
Copper Corrosion 3 hours @ 122°F	D130		1	2
Silver Corrosion 3 hours @ 122°F	D 4814		1	2
Doctor test OR	D4952	Negative		
Mercaptan sulfur, wt. %	D3227		0.0020	6



**RB GRADES - FUNGIBLE SPECIFICATION FOR REFORMULATED GASOLINE
BLENDSTOCK FOR BLENDING WITH 10% DENATURED FUEL ETHANOL VOC
CONTROLLED REGION 2 (1) Cont'd**

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS (2)</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
E200, vol. %	D86	30.0	70.0	
E300, vol. %	D86	70.0	100.0	
Emission Performance Reductions (%)				
VOC Control Region 2	EPA	25.4		
Solvent Washed Gum, mg/100ml	D381		4	
Lead Content – g/L at origin	D3237, D5059		0.01	
Olefins, vol. %	D1319		25.0	
Oxidation stability – minutes	D525	240		
Phosphorous, gms/gal	D3231		0.004	
Sulfur, wt %	D2622, D5453, D7039		0.0080	
Haze Rating, @ 77°F	D4176		2	
Corrosive Properties Before EtOH Blend	NACE TM0172-2001	B+		1
Odor		Non-offensive		7
Distillation	D86		<i>See Table #1</i>	
Vapor/Liquid Ratio of 20:1	D2533, D5188		<i>See Table #1</i>	4
Driveability Index	D4814		<i>See Table #1</i>	4

- (1) Base Gasoline - Not for sale to the ultimate consumer. **This RBOB may not be combined with any other RBOB except RBOB having the same requirement for oxygenate type and amount. All parameters must be met after blending with denatured fuel ethanol unless noted.**
- (2) ADDITIVES – *Refer to Table 2.*
 - a. Corrosion inhibitors, gum inhibitors and metal deactivators.
 - b. No additives or corrosion inhibitors containing phosphorous may be used in this gasoline.
 - c. The use of Port Fuel Injector (PFI) and intake valve detergent additives is prohibited.
 - d. The use of MMT octane enhancing additive is prohibited.
- (3) For products blended to meet EPA or state imposed summer VOC requirements, tests must be performed in accordance with the procedure described in 40 CFR, Part 80, Appendix E, Method 3.
- (4) The Driveability Index (DI) specification limits are applicable at the refinery or import facility as defined by 40 CFR Part 80.2. In the case of sub-octane gasoline, DI limits will apply after blending with 10% denatured Fuel Ethanol. The V/L referee method will be D5188.
- (5) **Before blending with denatured fuel ethanol**, this grade may not contain oxygenates, such as ethers and alcohols. The use of non-hydrocarbon blending components in this grade is prohibited. Maximum MTBE, ETBE, and TAME allowed is 0.30 volume %. **After blending with denatured fuel ethanol**, oxygen content must meet a minimum of 1.5 wt.% and a maximum of 4.0 wt%.
- (6) Mercaptan Sulfur is waived if fuel is negative by Doctor Test.
- (7) Any gasoline exhibiting an offensive odor, exhibiting the odor of dienes, and/or any gasoline that poses a personal health hazard will not be accepted for shipment. Any gasoline containing more than 0.50 wt. % of dicyclopentadiene will not be accepted for shipment. The referee method will be based on a gas chromatograph test.
- (8) Refer to test methods published in 40 CFR Chapter 1, Part 80.46. Alternative aromatics and oxygenates test methods, ASTM D 1319 and ASTM D 4815, may be used according to federal and state regulations.



HS2FO - SPECIFICATION FOR FUNGIBLE HIGH SULFUR

2 FUEL OIL - UNMARKED

<u>PRODUCT PROPERTY</u>	<u>TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API @ 60°F	D287, D4052	30		
Flash Point, °F	D93, D56	133		1
At Delivery		125		
Physical Distillation, °F	D86			
50% recovered		Report		
90% recovered		540	640	
End Point			690	
OR: Simulated Distillation, °F	D2887			4
50% recovered		Report		
90% recovered		572	673	
End Point			790	
Color, ASTM	D1500, D6045		2.5	2
Viscosity, cSt @40°C(104°F)	D445	1.9	3.4	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	5
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	5
Corrosion, 3 hrs @122°F	D130		1	
Sulfur, ppm wt.	D2622, D4294, D5453, D7039		2000	
Ash, wt %	D482		0.01	
Carbon Residue: Ramsbottom wt. %	D524 or D4530		0.35	
On 10% Bottom				
BS&W. vol. %	D2709		< 0.05	
Thermal stability, 90 minutes				
150°C Pad rating OR	DuPont, D6468		7	
Oxidation Stability, mg/L	D2274		2.5	
Haze Rating, @ 77°F	D4176		2	
Corrosive Properties	NACE TM0172-2001	B+		
Additives		Report		6
Color, visual		Dyed		2
Dye Content, ppm (Pound per 1,000 barrels PTB)	D6258 or Petrospec DT100	13.0 (4.6)	16.0 (5.6)	3

(1) Referee method is ASTM D-93

(2) Prior to addition of dye.

(3) This product must contain the dye Solvent Red 164 at a minimum concentration spectrally equivalent to 4.6 pounds per thousand barrels of the solid dye standard Solvent Red 26.

(4) Referee method is ASTM D-86

(5) Eastern PL system:

 Cloud Sept - Mar +15°F / -9°C

 Pour 0°F / -18°C

 Mid-West PL system:

 Cloud Sept - Mar +10°F / -12°C

 Pour -10°F / -23°C

 Apr - Aug

 +20°F / -7°C

 +10°F / -12°C

 Apr - Aug

 +20°F / -7°C

 +10°F / -12°C

(6) Report types and concentrations. Use of static dissipater additive, conductivity or lubricity improver is prohibited.

Refer to Table 2.



500MV2 - SPECIFICATION FOR FUNGIBLE 500 PPM #2 MOTOR VEHICLE UNDYED DIESEL FUEL (1)

Table with columns: PRODUCT PROPERTY, TEST METHOD, MINIMUM, MAXIMUM, NOTE. Includes specifications for Gravity, Flash Point, Physical Distillation, etc.

(1) For use in Model Year 2006 and older diesel highway vehicles and engines. Also for use in nonroad, locomotive and marine diesel engines. Not for use in model year 2007 and newer highway vehicles or engines.

(2) Product must exhibit no visible evidence of dye.

(3) Referee method is ASTM D-86

Table for Eastern and Mid-West PL systems showing Cloud and Pour points for Sept-Mar and Apr-Aug.

(5) Report types and concentrations. Use of static dissipater additive, conductivity or lubricity improver is prohibited. Refer to Table 2.

(6) Referee method is ASTM D-93

(7) Where cetane number by test method D613 is not available, D4737B can be used as an approximation.



15MV2 - SPECIFICATION FOR FUNGIBLE 15 PPM #2 MOTOR VEHICLE UNDYED DIESEL FUEL (1)

Table with columns: PRODUCT PROPERTY, TEST METHOD, MINIMUM, MAXIMUM, NOTE. Includes specifications for Gravity, Flash Point, Distillation, OR: Simulated Distillation, Color, Additives, Viscosity, Pour Point, Cloud Point, Corrosion, Sulfur, Cetane Number, Aromatics, Ash, Carbon Residue, BS&W, Thermal stability, Oxidation Stability, Haze Rating, Dye Content, Color, and Corrosive Properties.

(1) For On-Road use and should be designated as such in the EPA's Designate and Track reporting system.

(2) Product must exhibit no visible evidence of dye.

(3) Referee method is ASTM D-86

Table for Eastern and Mid-West PL systems showing Cloud and Pour points for Sept-Mar and Apr-Aug periods.

(5) Report types and concentrations. Use of static dissipater additive, conductivity or lubricity improver is prohibited. Refer to Table 2.

(6) Referee method is ASTM D-93

(7) Origin refineries must provide sulfur from top, middle and bottom of each tank before lifting.

(8) Where cetane number by test method D613 is not available, D4737B can be used as an approximation.



**15EXP2 - SPECIFICATION FOR 15 PPM #2 MOTOR VEHICLE
UNDYED DIESEL FUEL FOR EXPORT**

***15EXP2 SPECIFICATIONS ARE IDENTICAL TO 15MV2 FUNGIBLE SPECIFICATION WITH THE
EXCEPTION OF NOTE # 1, AS FOLLOWS:***

***Note (1) Per CFR 80.501 “This diesel fuel is for export use only,” and is excluded from the EPA’s
Designate and Track reporting requirements.***



500NRLM - SPECIFICATION FOR FUNGIBLE 500 PPM
#2 UNDYED NON-ROAD, LOCOMOTIVE, MARINE DIESEL FUEL (1)

Table with columns: PRODUCT PROPERTY, TEST METHOD, ORIGIN SPECIFICATIONS (MINIMUM, MAXIMUM), and NOTE. Rows include properties like Gravity, Flash Point, Physical Distillation, etc.

(1) For use in Model Year 2006 and older diesel highway vehicles and engines. Also for use in nonroad, locomotive and marine diesel engines. Not for use in model year 2007 and newer highway vehicles or engines. This product is for off-road use and should be designated as such in the EPA's Designate and Track reporting system.

(2) Product must exhibit no visible evidence of dye.

(3) Referee method is ASTM D-86

(4) Eastern PL system:

Cloud +15°F / -9°C
Pour 0°F / -18°C

Apr - Aug

+20°F / -7°C
+10°F / -12°C

Mid-West PL system:

Cloud +10°F / -12°C
Pour -10°F / -23°C

Apr - Aug

+20°F / -7°C
+10°F / -12°C

(5) Report types and concentrations. Use of static dissipater additive, conductivity or lubricity improver is prohibited.

Refer to Table 2.

(6) Referee method is ASTM D-93

(7) Where cetane number by test method D613 is not available, D4737B can be used as an approximation.



**15NRLM - SPECIFICATION FOR FUNGIBLE 15 PPM
#2 UNDYED NON-ROAD, LOCOMOTIVE, MARINE DIESEL FUEL**

15NRLM SPECIFICATIONS ARE IDENTICAL TO 500NRLM FUNGIBLE SPECIFICATIONS WITH THE EXCEPTION OF THE SULFUR CONTENT AS FOLLOWS:

<u>PRODUCT PROPERTY</u>	<u>TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Sulfur, ppm wt.	D2622, D5453, D7039			1
Origin			9	
Connecting carrier			11	

(1) Origin refineries must provide sulfur from top, middle and bottom of each tank before lifting.



500MV1 - SPECIFICATION FOR FUNGIBLE 500 PPM #1 MOTOR
VEHICLE UNDYED DIESEL FUEL - AVIATION KEROSENE (1)

Table with columns: PRODUCT PROPERTY, TEST METHOD, ORIGIN SPECIFICATIONS (MINIMUM, MAXIMUM), and NOTE. Rows include properties like Acidity, Additives, Appearance, Aromatics, Color, Conductivity, Corrosion, Physical Distillation, Gravity, Flash Point, MSEP, Net Heat of Combustion, Particulate Contaminant, Water reaction, Mercaptan sulfur, Sulfur, Existent Gum, Freeze point, Thermal Stability, and Combustion Properties.



**500MV1 - SPECIFICATION FOR FUNGIBLE 500 PPM #1 MOTOR
VEHICLE UNDYED DIESEL FUEL - AVIATION KEROSENE (1) Cont'd**

- (1) **For use in Model Year 2006 and older diesel highway vehicles and engines. Also for use in nonroad, locomotive and marine diesel engines. Not for use in model year 2007 and newer highway vehicles or engines.**
- (2) The mercaptan sulfur determination may be waived if the fuel is considered sweet by the doctor test described in ASTM D4952.
- (3) The finished product shall be visibly free of undissolved water, sediment, and suspended matter, and not exhibit any various shades of green, blue or red. Compliance will be determined with the product temperature adjusted to 77F.
- (4) Only those additives specified and within the concentration noted in ASTM D-1655 will be considered for acceptance. The use of any other additives is prohibited. Use of all additives must be approved prior to shipment and reported on the C of A. If any Metal Deactivator Additive (MDA) has been added, Sun Pipeline must be notified 48 hours in advance and reserves the right to refuse the shipment. If the batch has been treated with MDA, the following information is to be provided: (1) the purpose of adding MDA, (2) a breakdown of total metals present in the jet fuel before treating with MDA, (3) JFTOT test results both prior to and after adding MDA, (4) MDA treat rate, and (5) MDA product used. *Refer to Table 2.*
- (5) Per ASTM D-1655 Water Separation Characteristics at Points Downstream - Results of downstream Test Method D3948 testing are not to be used as the sole reason for rejection of fuel, but they can indicate a mandatory need for further diligent investigation or remedial action, or both, such as passing the fuel through a clay adsorption unit to remove surfactants. However, the fuel may be rejected in the absence of satisfactory Test Method D3948 testing results if no documented evidence is presented that a detailed investigation was carried out demonstrating that the fuel was free of excess water and dirt and could be delivered into aircraft in a clean condition. *Refer to Table 2*
- (6) Referee method is ASTM D-86



15MV1 - SPECIFICATION FOR FUNGIBLE 15 PPM #1 MOTOR VEHICLE UNDYED DIESEL FUEL – AVIATION KEROSENE(1)

Table with columns: PRODUCT PROPERTY, TEST METHOD, ORIGIN SPECIFICATIONS (MINIMUM, MAXIMUM), and NOTE. Rows include properties like Acidity, Additives, Appearance, Aromatics, Color, Conductivity, Corrosion, Distillation, Gravity, Flash Point, MSEP, Net Heat of Combustion, Particulate Contaminant, Water reaction, Mercaptan sulfur, Sulfur, Existing Gum, Freeze point, Thermal Stability, and Combustion Properties.



**15MV1 - SPECIFICATION FOR FUNGIBLE 15 PPM #1 MOTOR
VEHICLE UNDYED DIESEL FUEL – AVIATION KEROSENE(1) Cont'd**

- (1) **For On-Road use and should be designated as such in the EPA's Designate and Track reporting system.**
- (2) The mercaptan sulfur determination may be waived if the fuel is considered sweet by the doctor test described in ASTM D4952.
- (3) The finished product shall be visibly free of undissolved water, sediment, and suspended matter, and not exhibit any various shades of green, blue or red. Compliance will be determined with the product temperature adjusted to 77F.
- (4) Only those additives specified and within the concentration noted in ASTM D-1655 will be considered for acceptance. The use of any other additives is prohibited. Use of all additives must be approved prior to shipment and reported on the C of A. If any Metal Deactivator Additive (MDA) has been added, Sun Pipeline must be notified 48 hours in advance and reserves the right to refuse the shipment. If the batch has been treated with MDA, the following information is to be provided: (1) the purpose of adding MDA, (2) a breakdown of total metals present in the jet fuel before treating with MDA, (3) JFTOT test results both prior to and after adding MDA, (4) MDA treat rate, and (5) MDA product used. *Refer to Table 2.*
- (5) Per ASTM D-1655 Water Separation Characteristics at Points Downstream - Results of downstream Test Method D3948 testing are not to be used as the sole reason for rejection of fuel, but they can indicate a mandatory need for further diligent investigation or remedial action, or both, such as passing the fuel through a clay adsorption unit to remove surfactants. However, the fuel may be rejected in the absence of satisfactory Test Method D3948 testing results if no documented evidence is presented that a detailed investigation was carried out demonstrating that the fuel was free of excess water and dirt and could be delivered into aircraft in a clean condition.
- (6) Origin refineries must provide sulfur from top, middle and bottom of each tank before lifting.
- (7) Referee method is ASTM D-86



500NR1 - SPECIFICATION FOR FUNGIBLE 500 PPM #1 UNDYED
NON-ROAD DIESEL FUEL - AVIATION KEROSENE (1)

<u>PRODUCT PROPERTY</u>	<u>TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Acidity, total mg KOH/g	D3242		0.10	
Additives		Report		4
Appearance	White Bucket	Clear & Bright		3
Aromatics, vol %	D1319		25	
Color, Saybolt	D156, D6045	18		
At Delivery		+16		
Conductivity, pS/m	D2624	Report		4
Corrosion, 2 hrs @212 °F (100°C)	D130		1	
Physical Distillation, °F	D86			
10 % recovered			400	
50% recovered		Report		
90% recovered		Report		
End Point			572	
Residue, vol. %			1.5	
Loss, vol. %			1.5	
OR: Simulated Distillation, °F	D2887			6
10% recovered			365	
50% recovered		Report		
90% recovered		Report		
End Point			644	
Gravity, °API	D187, D1298 or D4052	37	51	
Flash Point, °F	D56, D3828	123		
MSEP (at Origin)	D3948	85		5
Net Heat of Combustion – BTU/lb.	D3338, D4529, D4809	18,400		
Particulate Contaminant, mg/l	D5452	Report		
Filtration time		Report		
Water reaction, Interface rating	D1094		1b	
Mercaptan sulfur, wt/%	D3227		0.003	2
Sulfur, ppm wt.	D1266, D2622, D4294, D5453		400	
Existent Gum, mg/100ml	D381		7	
Freeze point, °F	D2386, D5972, D7153		-40	
Thermal Stability	D3241			
JFTOT (2.5 hrs at 275°C)				
Filter Pressure Drop in mm/Hg			25	
Tube deposit less than code			Code 3	
			No Peacock or Abnormal Color Deposits	
Combustion Properties, one of the following properties must be met:				
1) Smoke Point, mm OR	D1322	25		
2) Smoke point, mm	D1322	18		
and Naphthalenes, vol. %	D1840		3.0	
Viscosity, cSt -20°C (-4°F)	D445		8.0	
Viscosity, cSt @40°C (104°F)		1.4	2.2	
Cetane Index	D976, D4737	40		
Ash, wt %	D482		0.01	
Carbon residue, wt % on 10% bottom	D524		0.15	
Burning Quality	D187	Report		



**500NR1 - SPECIFICATION FOR FUNGIBLE 500 PPM #1 UNDYED
NON-ROAD DIESEL FUEL - AVIATION KEROSENE (1) Cont'd**

- (1) For use as off-road kerosene or as aviation turbine fuel. Not for use as a Motor Vehicle Fuel.**
- (2) The mercaptan sulfur determination may be waived if the fuel is considered sweet by the doctor test described in ASTM D4952.
- (3) The finished product shall be visibly free of undissolved water, sediment, and suspended matter, and not exhibit any various shades of green, blue or red. Compliance will be determined with the product temperature adjusted to 77F.
- (4) Only those additives specified and within the concentration noted in ASTM D-1655 will be considered for acceptance. The use of any other additives is prohibited. Use of all additives must be approved prior to shipment and reported on the C of A. If any Metal Deactivator Additive (MDA) has been added, Sun Pipeline must be notified 48 hours in advance and reserves the right to refuse the shipment. If the batch has been treated with MDA, the following information is to be provided: (1) the purpose of adding MDA, (2) a breakdown of total metals present in the jet fuel before treating with MDA, (3) JFTOT test results both prior to and after adding MDA, (4) MDA treat rate, and (5) MDA product used. *Refer to Table 2.*
- (5) Per ASTM D-1655 Water Separation Characteristics at Points Downstream - Results of downstream Test Method D3948 testing are not to be used as the sole reason for rejection of fuel, but they can indicate a mandatory need for further diligent investigation or remedial action, or both, such as passing the fuel through a clay adsorption unit to remove surfactants. However, the fuel may be rejected in the absence of satisfactory Test Method D3948 testing results if no documented evidence is presented that a detailed investigation was carried out demonstrating that the fuel was free of excess water and dirt and could be delivered into aircraft in a clean condition.
- (6) Referee method is ASTM D-86.



JET A - SPECIFICATION FOR FUNGIBLE HIGH SULFUR AVIATION KEROSENE

Table with columns: PRODUCT PROPERTY, TEST METHOD, ORIGIN SPECIFICATIONS (MINIMUM, MAXIMUM), and NOTE. Rows include properties like Acidity, Additives, Appearance, Aromatics, Color, Conductivity, Corrosion, Physical Distillation, Gravity, Flash Point, MSEP, Net Heat of Combustion, Particulate Contaminant, Water reaction, Mercaptan sulfur, Sulfur, Existent Gum, Freeze point, Thermal Stability, and Viscosity.



**JET A - SPECIFICATION FOR FUNGIBLE HIGH SULFUR
AVIATION KEROSENE Cont'd**

- (1) The mercaptan sulfur determination may be waived if the fuel is considered sweet by the doctor test described in ASTM D4952.
- (2) The finished product shall be visibly free of undissolved water, sediment, and suspended matter, and not exhibit any various shades of green, blue or red. Compliance will be determined with the product temperature adjusted to 77F.
- (3) Only those additives specified and within the concentration noted in ASTM D-1655 will be considered for acceptance. The use of any other additives is prohibited. Use of all additives must be approved prior to shipment and reported on the C of A. If any Metal Deactivator Additive (MDA) has been added, Sun Pipeline must be notified 48 hours in advance and reserves the right to refuse the shipment. If the batch has been treated with MDA, the following information is to be provided: (1) the purpose of adding MDA, (2) a breakdown of total metals present in the jet fuel before treating with MDA, (3) JFTOT test results both prior to and after adding MDA, (4) MDA treat rate, and (5) MDA product used. *Refer to Table 2.*
- (4) Per ASTM D-1655 Water Separation Characteristics at Points Downstream - Results of downstream Test Method D3948 testing are not to be used as the sole reason for rejection of fuel, but they can indicate a mandatory need for further diligent investigation or remedial action, or both, such as passing the fuel through a clay adsorption unit to remove surfactants. However, the fuel may be rejected in the absence of satisfactory Test Method D3948 testing results if no documented evidence is presented that a detailed investigation was carried out demonstrating that the fuel was free of excess water and dirt and could be delivered into aircraft in a clean condition.
- (5) Referee method is ASTM D-86



**S1D - SPECIFICATION FOR SEGREGATED 15 PPM #1 MOTOR VEHICLE UNDYED
DIESEL FUEL KEROSENE – NOT FOR AVATION USE – DRA ALLOWED**

*S1D SPECIFICATIONS ARE IDENTICAL TO 15MVI FUNGIBLE SPECIFICATION WITH THE
EXCEPTION OF DRAG REDUCING AGENT(DRA) USAGE.*



**S1K - SPECIFICATION FOR SEGREGATED 500 PPM #1 MOTOR VEHICLE UNDYED
DIESEL FUEL KEROSENE – NOT FOR AVATION USE – DRA ALLOWED**

*S1K SPECIFICATIONS ARE IDENTICAL TO 500MVI FUNGIBLE SPECIFICATION WITH THE
EXCEPTION OF DRAG REDUCING AGENT (DRA) USAGE.*



NBUTANE - SPECIFICATION FOR FUNGIBLE NORMAL BUTANE
MIXBUT - SPECIFICATION FOR FUNGIBLE MIXED BUTANE

Table with columns: PRODUCT PROPERTY, TEST METHOD, and ORIGIN SPECIFICATIONS (NORMAL BUTANE, MIXED BUTANE). Rows include Relative Density, Composition (Propane, Propylene, Iso-butane, N-butane, etc.), Vapor Pressure, Volatile Residue, Temperature, Residual Matter, Oil stain observation, Corrosion, Total Sulfur, Hydrogen Sulfide, Free water content, and Additives.

- (1) An acceptable product shall not yield a persistent ring when 0.3ml of solvent residue mixture is added to a filter paper in 0.1 increments and examined after two minutes as described in D-2158
(2) The presence or absence of water shall be determined by visual inspection of the samples on which the relative density is determined.
(3) Additive Restrictions - Refer to Table 2.