



Sunoco Pipeline L.P.

Eastern Area Pipeline Systems

Product Specifications

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PRODUCT GRADE SPECIFICATIONS

CONVENTIONAL GASOLINE BLENDSTOCK FOR OXYGENATE BLENDING

Product Code	Product Name	Max RVP (psi)	Page
S83CB18	87 – Conventional Gasoline Blendstock	7.8	9
S83CB/CX/CZ19	87 - Conventional Gasoline Blendstock	8.0	9
S83CB20	87 - Conventional Gasoline Blendstock	9.0	9
S83CB/CX/CZ23	87 - Conventional Gasoline Blendstock	10.0	9
S83CB/CX/CZ25	87 - Conventional Gasoline Blendstock	12.5	9
S83CB/CX/CZ26	87 - Conventional Gasoline Blendstock	13.5 /14.5	9
S83CB/CX/CZ27	87 - Conventional Gasoline Blendstock	15.0 /15.5 / 16.0	9
91CB18	93 – Conventional Gasoline Blendstock	7.8	9
91CB/CX/CZ19	93 - Conventional Gasoline Blendstock	8.0	9
91CB20	93 - Conventional Gasoline Blendstock	9.0	9
91CB/CX/CZ23	93 - Conventional Gasoline Blendstock	10.0	9
91CB/CX/CZ25	93 - Conventional Gasoline Blendstock	12.5	9
91CB/CX/CZ26	93 - Conventional Gasoline Blendstock	13.5 /14.5	9
91CB/CX/CZ27	93 - Conventional Gasoline Blendstock	15.0 /15.5 / 16.0	9

REFORMULATED GASOLINE BLENDSTOCK FOR OXYGENATE BLENDING

Product Code	Product Name	Max RVP (psi)	Page
83RB/RBX23	87 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	VOC minimum 25.4%	11
83RB/RBX25	87 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	11.5 (Non-VOC Controlled)	11
83RB/RBX26	87 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	13.5 (Non-VOC Controlled)	11
83RB/RBX27	87 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	15.0 (Non-VOC Controlled)	11

PRODUCT GRADE SPECIFICATIONS Cont'd

REFORMULATED GASOLINE BLENDSTOCK FOR OXYGENATE BLENDING

Product Code	Product Name	Max RVP (psi)	Page
91RB/RBX23	93 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	VOC minimum 25.4%	11
91RB/RBX25	93 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	11.5 (Non-VOC Controlled)	11
91RB/RBX26	93 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	13.5 (Non-VOC Controlled)	11
91RB/RBX27	93 - Reformulated Gasoline Blendstock for 10.0 % ethanol blending	15.0 (Non-VOC Controlled)	11

DISTILLATES – FUNGIBLE GRADES

Product Code	Product Name	Cetane Minimum	Origin (ppm) Sulfur Maximum	Page
HS2FO	High Sulfur #2 Fuel Oil – Dyed	N/A	2000	13
HS2UND	High Sulfur #2 Fuel Oil – Undyed	N/A	2000	14
500HO2	500 ppm Heating Oil – Undyed	N/A	450	15
15HO2	15 ppm Heating Oil – Undyed (<5% Renewable Hydrotreated Diesel Fuel)	40	11	16
15MV2	15 ppm #2 – Motor Vehicle Undyed Diesel Fuel (<5% Renewable Hydrotreated Diesel Fuel)	40	11	18
15EXP2	15 ppm #2 – Motor Vehicle Undyed Diesel Fuel for Export	40	11	20
15NRLM	15 ppm #2 – Undyed Non-Road, Locomotive, Marine Diesel Fuel (<5% Renewable Hydrotreated Diesel Fuel)	40	11	21
15MV1	15 ppm #1 – Motor Vehicle Undyed Diesel Fuel (not for aviation use – DRA allowed)	40	11	23
400AV1K	400 ppm Aviation Kerosene	40	400	24
JETA	High Sulfur Aviation Kerosene	N/A	3000	26

DISTILLATES – SEGREGATED GRADES

JETA-FTZ	High Sulfur Aviation Kerosene	N/A	3000	28
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LIQUEFIED PETROLEUM GAS (LPGs) – FUNGIBLE GRADES

Product Code	Product Name	Page
NBUTANE	Normal Butane	29
MIXBUT	Mixed Butane	30

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 meeting ASTM D1655 prior to lifting. Connecting carriers will provide a pre-shipment FAX to include properties listed under section 1.4 below.
 - 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 a MINIMUM, pre-shipment FAX to include:

Conventional / CBOB Gasoline	RFG / RBOB Gasoline	Diesel / Heating Oil / Kerosene	Jet Fuel (Connecting Carriers)	Liquefied Petroleum Gases
API Gravity @ 60F	API Gravity @ 60F	API Gravity @ 60F	API Gravity @ 60F	Specific Gravity
RVP	RVP	Flash Point	Flash Point	Volatility
Sulfur, wt. %	Sulfur, wt. %	Sulfur Content	Sulfur Content	Propane Content
Distillation	Distillation	Distillation	Aqua-Glo	Butane Content
Octane (R + M) /2	Octane (R + M) /2	Cetane Index (Diesel)	Filter Membrane	Oil Stain Residue
Color and Appearance	Color and Appearance	Saybolt Color (Kerosene)	Saybolt Color	
DRA, ppm total polymer	DRA, ppm total polymer	DRA, ppm total polymer	Visual Appearance in White Bucket	
	Oxygen Content, wt. %		Water Separation (MSEP)	
	E200, vol%			
	E300, vol%			
	Benzene, vol%			
	Olefins, vol%			
	VOC Reduction, %			
	Driveability Index			

- 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 Product exception for an off-specification parameter may be requested in writing to Sunoco Pipeline Quality Assurance. However, such requests will be assessed on a case-by-case basis and their approval is not guaranteed.
- 7.0 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.

8.0 Workmanship - Appearance

- 8.1 The product shall be clear and bright, free of any suspended water, sediment or foreign material. A maximum Haze rating of 2 as determined by ASTM D4176, Procedure 2 of either tank temperature or 77°F (whichever is lowest) is the determining criteria.
- 8.2 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.
- 9.0 **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.
- 10.0 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.
- 11.0 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.
- 12.0 All Test Methods listed are based on the most current ASTM, unless specified otherwise or are regulatory required test methods.
- 13.0 **BIO-FUELS PROHIBITION POLICY:** In the interest of protecting our shippers' products, all products shipped are not permitted to contain Bio-Fuels, such as ethanol and bio-diesel (FAME, FAEE, or other Esters). Any distillate not produced by the origin refiner (e.g., import, previously certified diesel), whether blended with refinery production or delivered directly into the pipeline, shall be tested by ASTM D7371 or EN 14078. FAME result must be below the detection limit of the test method used.

SEGREGATED PRODUCTS FOR WHICH SPECIFICATIONS HAVE NOT BEEN ISSUED

LPG PRODUCT CODE	PRODUCT NAME	CRUDE OIL CODE	PRODUCT	OTHER PRODUCT CODE	PRODUCT NAME
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 schedule denotes the volatility properties as required by SPL and may not coincide with dates specified by appropriate government agencies. Some systems within SPL may require earlier dates for summer RVP limits in order to ensure compliance with EPA federal regulations. Shippers will be advised in advance of the date that fungible gasolines must be input into the SPL System via the scheduling calendar. SPL will monitor RVP compliance by ASTM D5191 using the EPA correction equation $(0.956 * X) - 0.347$ in 40 CFR §80.46(c).

APPROXIMATE ORIGIN MAXIMUM RVP AND DISTILLATION REQUIREMENTS ⁽¹⁾

Destination	Class	Jan	Feb	Mar 1-14	Mar 15-31	Apr 1-15	Apr 16-30	May	Jun	Jul	Aug	Sep 1-15	Sep 16-30	Oct	Nov	Dec
		psi	E-5	E-5	D-4	D-4	AA-4	AA-4	AA-3	AA-3	AA-3	AA-3	AA-3	AA-3	D-4	D-4
Eastern Products System	psi	15.0	15.0	13.5	13.5	9.0 ⁽³⁾	9.0 ⁽³⁾	9.0 ⁽³⁾	9.0 ⁽³⁾	9.0 ⁽³⁾	9.0 ⁽³⁾	9.0 ⁽³⁾	13.5	13.5	15.0	15.0
	psi	15.5	15.5	14.5	14.5	7.8 10.0	7.8 10.0	7.8 10.0	7.8 10.0	7.8 10.0	7.8 10.0	7.8 10.0	14.5	14.5	15.5	15.5
Pittsburgh Area	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12.5	14.5	16.0	16.0
	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.5	14.5	16.0	16.0
Ohio	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.5	14.5	16.0	16.0
	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.5	14.5	16.0	16.0
Michigan	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.5	14.5	16.0	16.0
	psi	16.0	16.0	14.5	14.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.5	14.5	16.0	16.0
Detroit Area	psi	16.0	16.0	14.5	14.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	14.5	14.5	16.0	16.0
	psi	16.0	16.0	14.5	14.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	14.5	14.5	16.0	16.0

Vapor Pressure / Distillation Class	Max Vapor Pressure	Distillation Temperatures, °F (°C), at % Volume Evaporated ASTM D86						Driveability Index max, °F (°C) Derived ⁽²⁾
		10 % max	50 % min	50 % max	90 % max	End Point max	Residue Vol. % max	
AA	7.8 / 8.0 / 9.0	158 (70)	150 (66)	250 (121)	374 (190)	430 (221)	2	1250 (597)
A	10.0	158 (70)	150 (66)	250 (121)	374 (190)	430 (221)	2	1250 (597)
B	11.0	149 (65)	150 (66)	245 (118)	374 (190)	430 (221)	2	1240 (591)
C	12.5	140 (60)	150 (66)	240 (116)	365 (185)	430 (221)	2	1230 (586)
D	13.5 / 14.5	131 (55)	150 (66)	235 (113)	365 (185)	430 (221)	2	1220 (580)
E	15.0 / 15.5 / 16.0	122 (50)	150 (66)	230 (110)	365 (185)	430 (221)	2	1200 (569)

Class: Vapor/Liquid Ratio of 20:1 ASTM D5188 °F (°C) Min.	1	2	3	4	5
For products which contain 10% Ethanol	129 (54)	122 (50)	116 (47)	107 (42)	102(39)

- (1) All limits are for gasoline-ethanol blends containing no more than 10 % by volume ethanol; refer to individual Product Grade specifications for specific RVP requirements. T50, TV/L and RVP limits for all RBOBs and CBOBs must comply with the applicable requirements of the area in which the fuel is destined for retail.
- (2) The Driveability Index (DI) specification limits are applicable at the refinery or import facility as defined by 40 CFR §80.2.
- (3) Eastern Product System summer 9.0 psi RVP limit is for NY destinations; PA destinations may ship 10.0 psi RVP maximum.

TABLE 2: ADDITIVE APPROVALS AND PROHIBITIONS

Sunoco 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-dimethylpentyl)-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 Sunoco Pipeline may contain only the following corrosion inhibitors:

Aqua Process	11CH77		Mobil	C-605
Afton Chem.	HiTEC 4875, 6455		Nalco	5403, 5405, 5406, EC5624A, EC5626A
Corexit	5267		SPEC-AID	8Q22, 8Q100, 8Q101, 8Q102, 8Q103, 8Q106, 8Q109 , 8Q110ULS, 8Q112ULS, 8Q123ULS
Innospec	DCI-4A, DCI-6A, DCI-11, DCI-30.N		Tolad	245, 249, 351, 3232, 3232D, 3240, 4410, 9711, 9715, 9719
Ethyl Hi Tec	580		Unichem	7500, 7501, 7510
Lubrizol	541, 8014, 8107		UOP	Unicor, Unicor J, Unicor PL
MidContinental	MCC5001		Champion	RPS-662, 807

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, Tolad 3032.

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 Sunoco Pipeline is Innospec Statis 450. SDA is prohibited from all Jet Fuel / 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°C (70°F) by ASTM D2624.

Aviation Kerosene Additives

Product shall only contain antioxidants and metal deactivators specified and within the concentration noted in the latest ASTM D1655 with advance approval from Sunoco 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. Sunoco Pipeline reserves the right to deny shipment of product containing these additives.

Cloud and Pour Point Depressant Additives

Product shall only contain ethylene vinyl acetate copolymer based cloud and pour point depressant additives only upon advance approval from Sunoco 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. Sunoco Pipeline reserves the right to deny shipment of product containing cloud and pour point depressant additives.

Renewable Diesel

Renewable diesel is a liquid fuel derived from 100 % hydrotreated biomass-based feedstock's that meets the registration requirements for fuels and fuel additives established by the EPA under section 211 of the Clean Air Act and the requirements of ASTM D975. Renewable diesel shall not contain fatty acid esters; FAME, FAEE, or other esters.

Renewable Diesel as defined above is NOT considered biodiesel. All biodiesel remains prohibited on the pipeline.

Distillate grades 15HO2, 15MV2, and 15NRLM allow up to five (5) % by volume Renewable Diesel.

Sunoco Pipeline assumes no responsibility as a blender and all RINs (Renewable Identification Numbers) shall be separated before entering Sunoco Pipeline's system. At origin locations the volume of Renewable Diesel shall be disclosed on the COA (Certificate of Analysis).

Cetane Improver Additives

Product shall only contain 2-ethyl hexyl nitrate or T-butyl peroxide based cetane improver additives only upon advance approval from Sunoco 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. Sunoco Pipeline reserves the right to deny shipment of product containing cetane improver additives.

Prohibited Additives

Sunoco 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.

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

All parameters must be met after blending with denatured fuel ethanol unless noted.

CB - GRADE RVPs	ASTM TEST METHOD	BEFORE BLENDING	AFTER BLENDING
		WITH 10% ETHANOL	WITH 10% ETHANOL
		RVP MAXIMUM (PSI)	RVP MAXIMUM (PSI)
S83CB18 / 91CB18	D5191	6.6	7.8
S83CB19 / S83CX19 / S83CZ19 / 91CB19 / 91CX19 / 91CZ19	D5191	7.0	8.0
S83CB20 / 91CB20	D5191	7.8	9.0 ⁽⁷⁾
S83CB23 / S83CX23 / S83CZ23 / 91CB23 / 91CX23 / 91CZ23	D5191	9.0	10.0
S83CB25 / S83CX25 / S83CZ25 / 91CB25 / 91CX25 / 91CZ25	D5191	Report	12.5
S83CB26 / S83CX26 / S83CZ26 / 91CB26 / 91CX26 / 91CZ26	D5191	Report	13.5 / 14.5 ⁽⁷⁾
S83CB27 / S83CX27 / S83CZ27 / 91CB27 / 91CX27 / 91CZ27	D5191	Report	15.0 / 15.5 / 16.0 ⁽⁷⁾

S83CB GRADE OCTANES	ASTM TEST METHOD	OCTANE MINIMUM	OCTANE MINIMUM
RON	D2699, D2885	–	Report
MON	D2700, D2885	–	82.0
Index, (R+M)/2	Calculated	–	87.0

91CB GRADE OCTANES ⁽¹³⁾

RON	D2699, D2885	Report	Report
MON	D2700, D2885	Report	Report
Index, (R+M)/2	Calculated	90.0	93.0

PRODUCT PROPERTY	ASTM TEST METHOD	ORIGIN SPECIFICATIONS ⁽²⁾		NOTE
		MINIMUM	MAXIMUM	
Gravity, °API at 60°F	D287, D1298, D4052	Report		12
RVP (psi)	D5191	See above and Table 1 on page 6		7, 8, 10
Octane	RON			
	MON			
Index, (R+M)/2		See table above		
Oxygen Content, wt. %	D5599		0.1	4,11,12
Benzene, vol. %	D3606		3.8	11
Color			Undyed	
Copper Strip Corrosion 3 hours @ 122°F	D130		1	2
Silver Strip Corrosion 3 hours @ 122°F	D7667, D7671		1	2
Doctor test OR	D4952	Negative		
Mercaptan sulfur, wt. %	D3227		0.002	5
Solvent Washed Gum, mg/100ml	D381		4	
Lead Content – g/gal at origin	D3237, D5059		0.01	
Oxidation stability – minutes	D525	240		12
Phosphorous, g/gal	D3231		0.004	
Sulfur, wt. %	D2622		0.0080	11
Haze Rating, @ 77°F	D4176 Procedure 2		2	12
Corrosive Properties	NACE TM0172-2001	B+		12
Odor		Non-offensive		6
Distillation	D86		Refer to Table 1	11, 13
Vapor/Liquid Ratio of 20:1	D5188		Refer to Table 1	3, 13
Driveability Index	D4814		Refer to Table 1	

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

Gasoline designed for gasoline-ethanol blends in accordance with 40 CFR §80.27(d)(2).

Suitable for the special RVP provisions for ethanol blends that contain 9 and 10 % by volume ethanol.

The use of this gasoline to manufacture a gasoline-ethanol blend containing anything other than between 9 and 10 % by volume ethanol may cause a summertime RVP violation.

- (1) Base Gasoline - Not for sale to the ultimate consumer. **This product does not meet the requirements for reformulated gasoline, and may not be used in any reformulated gasoline covered area.**
- (2) *Refer to Table 2 for Additive Approvals and Prohibitions.*
 - 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) Computer and Linear methods may be used to determine V/L value. The V/L referee method will be D5188.
- (4) 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 % by volume.
- (5) Mercaptan sulfur waived if fuel is negative by Doctor Test.
- (6) 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 % by wt. of dicyclopentadiene will not be accepted for shipment. The referee method will be based on a gas chromatograph test.
- (7) RVP limits after blending with ethanol for product grades shipped on the Eastern Products System associated with origin locations: Twin Oaks, Point Breeze, Montello, Malvern (PA); and Caledonia (NY), will be as follows: for A3/A4 – 9.0 psi max.; D-4 – 13.5 psi max.; for E-5 – 15.0 psi max. For all other areas, refer to Table 1 on Page 6.
- (8) Requires dual certification on the certificate of analysis, before and after blending with ethanol.
- (9) CZ and CX segregated grades are for products destined to a Free Trade Zone delivery location and Export.
- (10) 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 §80.
- (11) Refer to test methods requirements published in 40 CFR §80.46; test methods must be approved under 40 CFR §80.47.
- (12) Specification must be met before blending of denatured fuel ethanol.
- (13) **Premium CB grades** specification limits **before blending with denatured fuel ethanol** will be as follows: R+M/2 minimum = 90.0; T50 minimum = 170F; TV/L minimum: Class 3 = 124F, Class 4 = 116F, Class 5 = 105F.

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

All parameters must be met after blending with denatured fuel ethanol unless noted.

<u>RB - GRADES</u>		<u>VOC REDUCTION REQUIREMENT</u>
<u>VOC & RVPs</u>	<u>DESCRIPTION</u>	<u>(RVP MAXIMUM)</u>
83RB23 / 83RBX23	RFG Blendstock for 10 % Ethanol Blending	VOC min 25.4 %
83RB25 / 83RBX25	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (11.5)
83RB26 / 83RBX26	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (13.5)
83RB27 / 83RBX27	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (15.0)
91RB23 / 91RBX23	RFG Blendstock for 10 % Ethanol Blending	VOC min 25.4 %
91RB25 / 91RBX25	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (11.5)
91RB26 / 91RBX26	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (13.5)
91RB27 / 91RBX27	RFG Blendstock for 10 % Ethanol Blending	Non-VOC Controlled (15.0)

<u>83RB/RBX 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	Calculated	87.0

<u>91RB/RBX GRADE OCTANES</u>	<u>ASTM TEST METHOD</u>	<u>OCTANE MINIMUM</u>
RON	D2699, D2885	Report
MON	D2700, D2885	Report
Index, (R+M)/2	Calculated	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		50.0	7
RVP (psi) Before EtOH blend	D5191	See above and Table 1 on page 6		1, 7, 10
Octane RON	D2699, D2885			
MON	D2700, D2885			
(R+M)/2		See table above		
Oxygen Content, wt. %	D5599	Report		4, 7
Benzene, volume %	D3606		1.30	7
Color			Undyed	
Copper Corrosion 3 hours @ 122°F	D130		1	2
Silver Corrosion 3 hours @ 122°F	D7667, D7671		1	2
Doctor test OR	D4952	Negative		
Mercaptan sulfur, wt. %	D3227		0.002	5
E200, volume %	D86	30.0	70.0	7
E300, volume %	D86	70.0	100.0	7
Emission Performance Reduction, (%)				9
VOC Control Region 2	EPA Complex Model	25.4		
Solvent Washed Gum, mg/100ml	D381		4	
Lead Content – g/gal at origin	D3237, D5059		0.01	
Olefins, volume %	D1319		25.0	7
Oxidation stability – minutes	D525	240		
Phosphorous, g/gal	D3231		0.004	
Sulfur, wt. %	D2622		0.0080	7

**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>	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Corrosive Properties Before EtOH Blend	NACE TM0172-2001	B+		1
Odor		Non-offensive		6
Distillation	D86		See Table #1	7
Vapor/Liquid Ratio of 20:1	D5188		See Table #1	3
Driveability Index	D4814		See Table #1	

- (1) Base Gasoline - Not for sale to the ultimate consumer. **This RBOB may not be combined with any other RBOB except other RBOB having the same requirement for oxygenate type and amount.**
- (2) Refer to Table 2 for Additive Approvals and Prohibitions.
 - 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) Computer and Linear methods may be used to determine V/L value. The V/L referee method will be D5188.
- (4) **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 % by volume. **After blending with denatured fuel ethanol**, oxygen content must meet a minimum of 1.7 % by wt. and a maximum of 4.0 % by wt.
- (5) Mercaptan Sulfur is waived if fuel is negative by Doctor Test.
- (6) 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 % by wt. of dicyclopentadiene will not be accepted for shipment. The referee method will be based on a gas chromatograph test.
- (7) Refer to test methods requirements published in 40 CFR §80.46; test methods must be approved under 40 CFR §80.47.
- (8) RBX segregated grades are for Export use only.
- (9) Emissions reductions must be calculated using EPA guidelines.
- (10) 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 §80.

~~HS2FO - SPECIFICATION FOR FUNGIBLE HIGH SULFUR DYED # 2 FUEL OIL~~

~~EPA Designation - HOMMRK~~

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API @ 60°F	D287, D1298, D4052	30		
Flash Point, °F	D93, D56	130		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	4.1	
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		7	
Oxidation Stability, mg/100 ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Corrosive Properties	NACE TM0172 2001	B+		
Additives		Report		6
Color, visual		Dyed		2
Dye Content, ppm (PTB)	D6258, D6756, or Petrospec DT100	13.0 (4.6)	16.0 (5.6)	3

- (1) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.
- (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 D86
- (5) Cloud Point and Pour Point:

<u>Sept</u>	<u>Mar</u>	<u>Apr</u>	<u>Aug</u>
Cloud	+15°F / 9°C	+20°F / 7°C	
Pour	0°F / 18°C	+10°F / 12°C	
- (6) Report types and concentrations. Refer to Table 2 for Additive Approvals and Prohibitions.

**~~HS2UND – SPECIFICATION FOR FUNGIBLE HIGH SULFUR
UNDYED # 2 FUEL OIL~~**

~~EPA Designation – HOUMRK~~

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API @ 60°F	D287, D1298, D4052	30		
Flash Point, °F	D93, D56	130		1
At Delivery		125		
Physical Distillation, °F	D86			
50 % recovered		Report		
90 % recovered		540	640	
End Point			690	
OR: Simulated Distillation, °F	D2887			2
50 % recovered		Report		
90 % recovered		572	673	
End Point			790	
Color, ASTM	D1500, D6045		2.5	
Viscosity, cSt @ 40°C (104°F)	D445	1.9	4.1	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	3
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	3
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		7	
Oxidation Stability, mg/100ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Corrosive Properties	NACE TM0172 2001	B+		
Additives		Report		4
Color, visual		Undyed		

(1) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.

(2) Referee method is ASTM D86

(3) Cloud Point and Pour Point: ~~Sept – Mar~~ ~~Apr – Aug~~
~~Cloud~~ ~~+15°F / 9°C~~ ~~+20°F / 7°C~~
~~Pour~~ ~~0°F / 18°C~~ ~~+10°F / 12°C~~

(4) Report types and concentrations. Refer to Table 2 for Additive Approvals and Prohibitions.

500HO2 - SPECIFICATION FOR FUNGIBLE 500 PPM UNDYED # 2 FUEL OIL

EPA Designation - HOUMRK

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Gravity, °API @ 60°F	D287, D1298, D4052	30		
Flash Point, °F At Delivery	D93, D56	130		1
Physical Distillation, °F	D86			
50 % recovered		Report		
90 % recovered		540	640	
End Point			690	
OR: Simulated Distillation, °F	D2887			2
50 % recovered		Report		
90 % recovered		572	673	
End Point			790	
Color, ASTM	D1500, D6045		2.5	
Viscosity, cSt @ 40°C (104°F)	D445	1.9	4.1	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	3
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	3
Corrosion, 3 hrs. @ 122°F	D130		1	
Sulfur, ppm wt.	D2622, D4294, D5453, D7039		450	
Ash, wt. %	D482		0.01	
Carbon Residue: Ramsbottom, wt. % On 10 % Bottom	D524 or D4530		0.35	
BS&W, volume %	D2709		< 0.05	
Thermal stability, 90 minutes				
150°C Pad rating OR	DuPont		7	
Oxidation Stability, mg/100ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Corrosive Properties	NACE TM0172-2001	B+		
Additives		Report		4
Color, visual		Undyed		

- (1) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.
- (2) Referee method is ASTM D86
- (3) Cloud Point and Pour Point:

	<u>Sept – Mar</u>	<u>Apr – Aug</u>
Cloud	+15°F / -9°C	+20°F / -7°C
Pour	0°F / -18°C	+10°F / - 12°C
- (4) Report types and concentrations. *Refer to Table 2 for Additive Approvals and Prohibitions.*

15HO2 - SPECIFICATION FOR FUNGIBLE 15 PPM UNDYED #2 FUEL OIL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL ⁽¹⁾

EPA Designation - HOUMRK

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Renewable Fuel, vol %		0	5.0	9, 10
Gravity, °API @ 60 °F	D287, D1298, D4052	30		
Flash Point, °F	D93, D56	130		6
	At Delivery	125		
Distillation, °F	50 % recovered D86	Report		
	90 % recovered	540	640	
	End Point		690	
OR: Simulated Distillation, °F	D2887			3
	50 % recovered	Report		
	90 % recovered	572	673	
	End Point		790	
Color, ASTM	D1500, D6045		2.5	
Additives		Report		5
Viscosity, cSt @ 40°C (104°F)	D445, D7042	1.9	4.1	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	4
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	4
Corrosion, 3 hrs @ 122°F	D130		1	
Sulfur, ppm wt.	D2622, D5453, D7039			7
	Origin		11	12
	Connecting carrier		11	12
Cetane Number or Index	D613, D6890, D4737A, D7170	40.		8
Aromatics, Volume %	D1319		35	11
	OR			
Aromatics by Cetane Index	D976	40		
Ash, wt. %	D482		0.01	
Carbon Residue: Ramsbottom, wt. %	D524		0.35	
	On 10% Bottom			
BS&W, volume %	D2709		< 0.05	
Thermal stability, 90 minutes				
	150°C Pad Rating DuPont		7	
	OR			
Thermal stability, % Reflectance	D6468			
	Y/Green or	73		
	W Unit	65		
	OR			
Oxidation Stability, mg/100 ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Dye Content, ppm (lb per 1000 Bbls PTB)	D6258, D6756, or Petrospec DT100		Report	
Color, visual		Undyed		2
Corrosive Properties	NACE TM0172-2001	B+		

15HO2 - SPECIFICATION FOR FUNGIBLE 15 PPM UNDYED #2 FUEL OIL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL ⁽¹⁾ Cont'd

EPA Designation - HOUMRK

- (1) **Not 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 D86
- (4) Cloud Point and Pour Point:

	<u>Sept – Mar</u>	<u>Apr – Aug</u>
Cloud	+15°F / -9°C	+20°F / -7°C
Pour	0°F / -18°C	+10°F / - 12°C
- (5) Report types and concentrations. *Refer to Table 2 for Additive Approvals and Prohibitions.*
- (6) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.
- (7) Origin laboratory certifying sulfur content can qualify the test method used per EPA performance based testing criteria (see 40 CFR §80.584). The referee test method will be ASTM D5453.
- (8) Where Cetane number by test method D613 is not available, D4737A can be used as an approximation.
- (9) May contain up to 5.0 % Renewable Diesel as defined in Table 2.
- (10) Shipments of 15HO2 that “do not” contain Renewable Diesel may only be nominated as a segregated batch for deliveries into the Sunoco Logistics Eagle Point, NJ facility.
- (11) Test method must be approved under 40 CFR §80.47.
- (12) Test method must be approved under 40 CFR §80.584.

15MV2 - SPECIFICATION FOR FUNGIBLE 15 PPM #2 MOTOR VEHICLE DIESEL FUEL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL⁽¹⁾

EPA Designation – DMV2D015

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Renewable Fuel, vol. %		0	5.0	9, 10
Gravity, °API @ 60 °F	D287, D1298, D4052	30		
Flash Point, °F	D93	130		6
	At Delivery	125		
Distillation, °F	50 % recovered	Report		
	90 % recovered	540	640	
	End Point		690	
OR: Simulated Distillation, °F	D2887			3
	50 % recovered	Report		
	90 % recovered	572	673	
	End Point		790	
Color, ASTM	D1500, D6045		2.5	
Additives		Report		5
Viscosity, cSt @40°C (104°F)	D445, D7042	1.9	4.1	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	4
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	4
Corrosion, 3 hrs. @ 122°F	D130		1	
Sulfur, ppm wt.	D2622, D5453, D7039			7
	Origin		11	12
	Connecting carrier		11	12
Cetane Number or Index	D613, D6890, D4737A, D7170	40.		8
Aromatics, Vol. %	D1319		35	11
	OR			
Aromatics by Cetane Index	D976	40		
Ash, wt. %	D482		0.01	
Carbon Residue: Ramsbottom wt. %	D524		0.35	
	On 10% Bottom			
BS&W, vol. %	D2709		< 0.05	
Thermal stability, 90 minutes				
	150°C Pad Rating	DuPont	7	
	OR			
Thermal stability, % Reflectance	D6468			
	Y/Green or	73		
	W Unit	65		
	OR			
Oxidation Stability, mg/100 ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Dye Content, ppm (lb per 1000 Bbls PTB)	D6258, D6756, or Petrospec DT100		Report	
Color, visual		Undyed		2
Corrosive Properties	NACE TM0172-2001	B+		

15MV2 - SPECIFICATION FOR FUNGIBLE 15 PPM #2 MOTOR VEHICLE DIESEL FUEL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL⁽¹⁾
Cont'd

EPA Designation – DMV2D015

- (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 D86
- (4) Cloud Point and Pour Point:

	<u>Sept – Mar</u>	<u>Apr – Aug</u>
Cloud	+15°F / -9°C	+20°F / -7°C
Pour	0°F / -18°C	+10°F / - 12°C
- (5) Report types and concentrations. *Refer to Table 2 for Additive Approvals and Prohibitions.*
- (6) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.
- (7) Origin laboratory certifying sulfur content can qualify the test method used per EPA performance based testing criteria (see 40 CFR §80.584). The referee test method will be ASTM D5453.
- (8) Where Cetane number by test method D613 is not available, D4737A can be used as an approximation.
- (9) May contain up to 5.0 % Renewable Diesel as defined in Table 2.
- (10) Shipments of 15MV2 that “do not” contain Renewable Diesel may only be nominated as a segregated batch for deliveries into the Sunoco Partners Marketing & Terminals Eagle Point, NJ facility.
- (11) Test method must be approved under 40 CFR §80.47.
- (12) Test method must be approved under 40 CFR §80.584.

**15EXP2 - SPECIFICATION FOR SEGREGATED 15 PPM #2 MOTOR VEHICLE
UNDYED DIESEL FUEL FOR EXPORT⁽¹⁾**

***15EXP2 SPECIFICATIONS ARE IDENTICAL TO 15MV2 - SPECIFICATION FOR FUNGIBLE
15 PPM #2 MOTOR VEHICLE UNDYED DIESEL FUEL WITH THE EXCEPTION OF NOTE # 1,
AS FOLLOWS:***

***Note (1) Per 40 CFR §80.584 “This diesel fuel is for export use only,” and is excluded from the EPA’s
Designate and Track reporting requirements.***

15NRLM - SPECIFICATION FOR FUNGIBLE 15 PPM #2 NON-ROAD DIESEL FUEL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL⁽¹⁾

EPA Designation – DNRLM015

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Renewable Fuel, vol. %		0	5.0	9, 10
Gravity, °API @ 60 °F	D287, D1298, D4052	30		
Flash Point, °F	D93, D56	130		6
	At Delivery	125		
Distillation, °F	50 % recovered	D86	Report	
			540	640
	90 % recovered		690	
	End Point			
OR: Simulated Distillation, °F	D2887			3
	50 % recovered	Report		
	90 % recovered	572	673	
	End Point		790	
Color, ASTM	D1500, D6045		2.5	
Additives		Report		5
Viscosity, cSt @ 40°C (104°F)	D445, D7042	1.9	4.1	
Pour Point, °F	D97, D5985, D5949, D5950		See Note	4
Cloud Point, °F	D2500, D5771, D5772, D5773		See Note	4
Corrosion, 3 hrs. @ 122°F	D130		1	
Sulfur, ppm wt.	D2622, D5453, D7039			7
		Origin	11	12
	Connecting carrier		11	12
Cetane Number or Index	D613, D6890, D4737A, D7170	40.		8
Aromatics, Vol. %	D1319		35	11
	OR			
Aromatics by Cetane Index	D976	40		
Ash, wt. %	D482		0.01	
Carbon Residue: Ramsbottom wt. %	D524		0.35	
		On 10% Bottom		
BS&W, vol. %	D2709		< 0.05	
Thermal stability, 90 minutes				
	150°C Pad Rating OR	DuPont, D6468	7	
Thermal stability, % Reflectance	D6468			
	Y/Green or	73		
	W Unit	65		
	OR			
Oxidation Stability, mg/100 ml	D2274		2.5	
Haze Rating, @ 77°F	D4176 Procedure 2		2	
Dye Content, ppm (lb per 1000 Bbls PTB)	D6258, D6756, or Petrospec DT100		Report	
Color, visual		Undyed		2
Corrosive Properties	NACE TM0172-2001	B+		

15NRLM - SPECIFICATION FOR FUNGIBLE 15 PPM #2 NON-ROAD DIESEL FUEL CONTAINING UP TO 5 % RENEWABLE HYDROTREATED DIESEL FUEL⁽¹⁾ Cont'd

EPA Designation – DNRLM015

- (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 D86
- (4) Cloud Point and Pour Point:

	<u>Sept – Mar</u>	<u>Apr – Aug</u>
Cloud	+15°F / -9°C	+20°F / -7°C
Pour	0°F / -18°C	+10°F / - 12°C
- (5) Report types and concentrations. *Refer to Table 2 for Additive Approvals and Prohibitions.*
- (6) Referee method is ASTM D93, test method ASTM D56 may be used as an alternative.
- (7) Origin laboratory certifying sulfur content can qualify the test method used per EPA performance based testing criteria (see 40 CFR §80.584). The referee test method will be ASTM D5453.
- (8) Where Cetane number by test method D613 is not available, D4737A can be used as an approximation.
- (9) May contain up to 5.0 % Renewable Diesel as defined in Table 2.
- (10) Shipments of 15NRLM that “do not” contain Renewable Diesel may only be nominated as a segregated batch for deliveries into the Sunoco Logistics Eagle Point, NJ facility.
- (11) Test method must be approved under 40 CFR §80.47.
- (12) Test method must be approved under 40 CFR §80.584.

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

<u>EPA Designation – DMV1D015</u> <u>PRODUCT PROPERTY</u>	<u>ASTM</u> <u>TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Appearance – Clear & Bright @ 77°F	D4176, Procedure 1	Pass		3
Gravity, °API	D287, D1298 or D4052	37	51	
Color, Saybolt At Delivery	D156, D6045	18 +16		
Corrosion, 2 hrs. @ 212°F	D130		1	
Distillation, °F	D86			
	10 % recovered		400	
	50 % recovered	Report		
	90 % recovered		550	
	95 % recovered	Report		
	End Point		572	
	Residue, volume %		1.5	
	Loss, volume %		1.5	
Viscosity, cSt 104°F (40°C)	D445, D7042	1.3	1.9	
Flash Point, °F	D56, D93, D3828	123		8
Freeze point, °F	D2386, D5972, D7153, D7154		-22	
Corrosive Properties	NACE TM0172-2001	B+		
Water & Sediment, percent volume	D2709		<0.05	
Carbon residue, wt % on 10% bottom	D524		0.15	
Ash, wt. %	D482		0.01	
Sulfur, ppm wt., at Origin	D2622, D5453, D7039		11	6
Connecting Carrier			11	6
Doctor Test, OR	D4952		Negative	
Mercaptan Sulfur, wt. %	D3227		0.003	2
Cetane Number or Index	D613, D6890, D4737A	40.		4
Aromaticity, percent volume	D1319		35	7
OR				
Aromatics by Cetane Index	D976-80	40		
Conductivity, pS/m	D2624	Report		9
Thermal Stability,				
90 minutes at 150°C Pad Rating	DuPont		7	5
Burning Quality	D187	Report		

- (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 77°F.
- (4) Where Cetane number by test method D613 is not available, D4737A can be used as an approximation.
- (5) To rate the filter pad use Octel F-21 procedure.
- (6) Origin laboratory certifying sulfur content can qualify the test method used per EPA performance based testing criteria (see 40 CFR §80.584).
- (7) Test method must be approved under 40 CFR §80.47.
- (8) Kerosene fuel results obtained by Test Method D93 may be up to 1°C higher than those obtained by Test Method D56. Results obtained by Test Method D3828 may be up to 2°C lower than those obtained by Test Method D56, which is the preferred method. In case of dispute, Test Method D56 shall apply.
- (9) *Refer to Table 2 for Additive Approvals and Prohibitions.*

400AV1K - SPECIFICATION FOR FUNGIBLE AVIATION KEROSENE ⁽¹⁾

<u>PRODUCT PROPERTY</u>	<u>ASTM 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	D130		1	
Distillation, °F	D86			
	10 % recovered		400	
	50 % recovered	Report		
	90 % recovered		550	
	End Point		572	
	Residue, vol. %		1.5	
	Loss, vol. %		1.5	
Or: Simulated Distillation, °F	D 2887			6
	10 % recovered		365	
	50 % recovered	Report		
	90 % recovered		579	
	End Point		644	
Gravity, °API	D287, D1298 or D4052	37	51	
Flash Point, °F	D56, D3828	108		
MSEP (at Origin)	D3948	85		5
Net Heat of Combustion – BTU/lb.	D3338, D4529, D4809	18,400		
Particulate Contaminant, mg/100 ml	D5452	Report		
	Filtration time	Report		
Doctor Test, OR	D4952		Negative	
	Mercaptan sulfur, wt. %	D3227	0.003	2
Sulfur, ppm wt., at Origin	D1266, D2622, D4294, D5453		400	
	Connecting Carrier		400	
Existent Gum, mg/100ml	D381		7	
Freeze point, °F	D2386, D5972, D7153, D7154		-40	
Thermal Stability	D3241			
(2.5 hrs. at control temperature 275°C)				
Filter Pressure Drop in mm/Hg			25	
Tube rating: One of the following requirements shall be met:				
(1) Annex A1 VTR, VTR Color Code			Less than 3	
			(No Peacock or Abnormal Color Deposits)	
(2) Annex A2 ITR or Annex A3 ETR,			85	
nm average over area of 2.5 mm ² (refer to D1655 for referee method)				
Combustion Properties, one of the following properties must be met:				
1) Smoke Point, mm OR	D1322	25.0		
2) Smoke point, mm	D1322	18.0		
and Naphthalenes, vol. %	D1840		3.0	
Viscosity, cSt -4°F (-20°C)	D445, D7945		8.0	
Viscosity, cSt 104°F (40°C)		1.3 1.0	1.9	
Cetane Index	D976, D4737A	40		

400AV1K - SPECIFICATION FOR FUNGIBLE AVIATION KEROSENE ⁽¹⁾ Cont'd

<u>PRODUCT PROPERTY</u>	<u>ASTM</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
	<u>TEST METHOD</u>	<u>MINIMUM</u>	<u>MAXIMUM</u>	
Ash, wt. %	D482		0.01	
Carbon residue, wt. % on 10 % bottom	D524		0.15	
Burning Quality	D187	Report		

- (1) **This product is for use as aviation fuel or home heat. Not for use as a Motor Vehicle Fuel. As such, it should not be included 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 77°F.
- (4) Only those additives specified and within the concentration noted in the latest ASTM D1655 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, Sunoco Pipeline must be notified 72 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 D1655 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 D86.

JET A - SPECIFICATION FOR FUNGIBLE HIGH SULFUR AVIATION KEROSENE

<u>PRODUCT PROPERTY</u>	<u>ASTM 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		3
Appearance	White Bucket	Clear & Bright		2
1. Aromatics, vol %, OR	D1319		25	
2. Aromatics, vol %	D6379		26.5	
Color, Saybolt	D156, D6045	18		
Conductivity, pS/m	D2624	Report		3
Corrosion, 2 hrs. @ 212°F	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	D 2887			5
10 % recovered			365	
50 % recovered		Report		
90 % recovered		Report		
End Point			644	
Gravity, °API	D187, D1298 or D4052	37	51	
Flash Point, °F	D56, D93, D3828	108		7
MSEP (at Origin)	D3948	85		4
Net Heat of Combustion – BTU/lb.	D3338, D4529, D4809	18,400		
Particulate Contaminant, mg/l	D5452	Report		
Filtration time		Report		
Doctor Test, OR	D4952		Negative	
Mercaptan sulfur, wt. %	D3227		0.003	1
Sulfur, ppm wt.	D1266, D2622, D4294, D5453		3000	
Existent Gum, mg/100ml	D381, IP540		7	
Freeze point, °F (°C)	D2386, D5972, D7153, D7154		-40 (-40) / Jet A -52.6 (-47) / Jet A-1	6
Thermal Stability	D3241			
(2.5 hrs. at control temperature 275°C)				
Filter Pressure Drop in mm/Hg			25	
Tube rating: One of the following requirements shall be met:				
(1) Annex A1 VTR, VTR Color Code			Less than 3	
			(No Peacock or Abnormal Color Deposits)	
(2) Annex A2 ITR or Annex A3 ETR, nm average over area of 2.5 mm ² (refer to D1655 for referee method)			85	
Combustion Properties, one of the following properties must be met:				
1) Smoke Point, mm OR	D1322	25.0		
2) Smoke point, mm	D1322	18.0		
and Naphthalenes, vol. %	D1840		3.0	
Viscosity, cSt -4°F (-20°C)	D445, D7945		8.0	

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 77°F.
- (3) Only those additives specified and within the concentration noted in the latest ASTM D1655 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, Sunoco 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 D1655 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 D86
- (6) For product to comply with JET A-1 parameters, the -52.6°F (-47°C) maximum specification must be met.
- (7) Aviation turbine fuel results obtained by Test Method D93 may be up to 1°C higher than those obtained by Test Method D56. Results obtained by Test Method D3828 may be up to 2°C lower than those obtained by Test Method D56, which is the preferred method. In case of dispute, Test Method D56 shall apply.

**JET A-FTZ - SPECIFICATION FOR SEGREGATED HIGH SULFUR
AVIATION KEROSENE**

JET A-FTZ SPECIFICATIONS ARE IDENTICAL TO JET A FUNGIBLE SPECIFICATION.

N-BUTANE - SPECIFICATION FOR FUNGIBLE BUTANE

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Vapor Pressure, psia @ 100°F	D1267, D2598, D6897		70	1
Relative Density @ 60/60°F	D1657, D2598	Report		
Volatile Residue:				
Temperature @ 95 % evaporated °F	D1837		36	
Residual Matter:				
Residue on evaporation of 100 mL	D2158		0.05	
Oil Stain Observation, mL	D2158		Pass	2
Corrosion, Copper Strip	D1838		1	
Sulfur, ppmw	D2784, D6667		140	
Composition, Liq. volume %:	D2163			
Iso-butane and lighter			7.0	
N-butane		93.0		
Pentane and heavier			2.0	
Hydrogen Sulfide	D2420		Pass	
Fluorides, ppmw	D7359		1	
Free water content			None	
Additives	See note 3			

Note: The specification defines only a basic purity for this product. This product is to be free of any contaminants that might render the product unacceptable. Specific contaminants which may render product unacceptable, include but are not limited to dirt, rust, scale and all other types of solids contaminants, caustics, chlorides, oxygenates, heavy metals, glycol, inorganic gases and any compound added to the product to enhance the ability to meet these specifications.

- (1) In case of dispute about the vapor pressure of the product, the value actually determined by Test Method D1267 shall prevail over the value calculated by Practice D2598 or measured by Test Method D6897.
- (2) An acceptable product shall not yield a persistent oil ring when 0.3 mL of solvent residue mixture is added to a filter paper, in 0.1-mL increments and examined in daylight after 2 min as described in Test Method D2158.
- (3) Additive Restrictions – *Refer to Table 2.*

MIXED BUTANE - SPECIFICATION FOR FUNGIBLE MIXED BUTANE

<u>PRODUCT PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ORIGIN SPECIFICATIONS</u>		<u>NOTE</u>
		<u>MINIMUM</u>	<u>MAXIMUM</u>	
Vapor Pressure, psia @ 100°F	D2598, D6897		Report	
Relative Density @ 60/60°F	D1657, D2598	Report		
Corrosion, Copper Strip	D1838		1	
Sulfur, ppmw	D6667		30	
Composition, Liq. Volume %:	D2163			
Propane			4.00	
Iso-butane			40.00	
N-butane		55.00		
Pentanes			20.0	
Hexane and heavier			1	2
Olefins			5	
Hydrogen Sulfide	D2420		Pass	
Fluorides, ppmw	D7359		1	
Free water content			None	
Additives	See note 1			

Note: The specification defines only a basic purity for this product. This product is to be free of any contaminants that might render the product unacceptable. Specific contaminants which may render product unacceptable, include but are not limited to dirt, rust, scale and all other types of solids contaminants, caustics, chlorides, oxygenates, heavy metals, glycol, inorganic gases and any compound added to the product to enhance the ability to meet these specifications.

- (1) Additive Restrictions – *Refer to Table 2.*
- (2) Inkster deliveries: 2 % maximum for hexane and heavier.