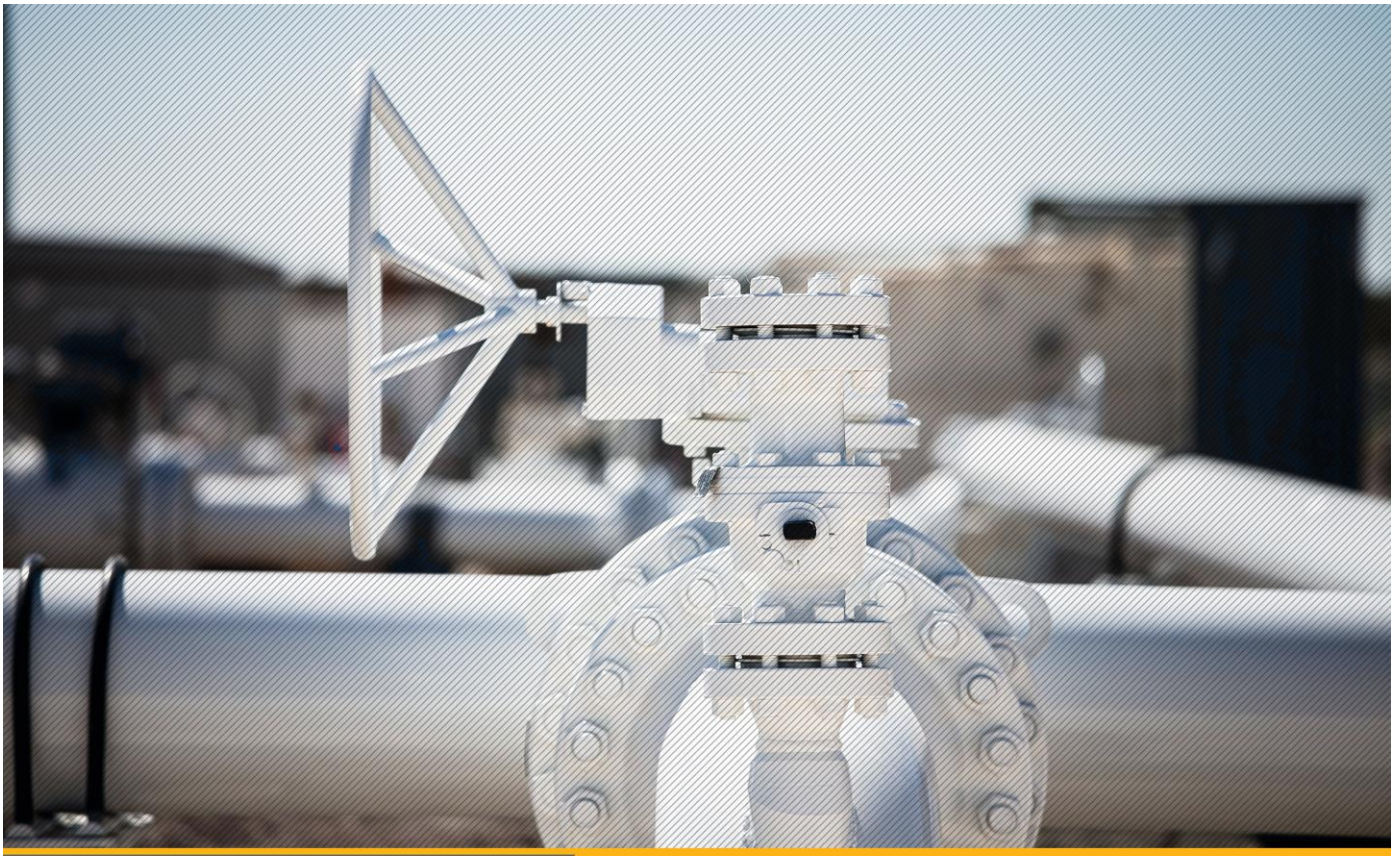
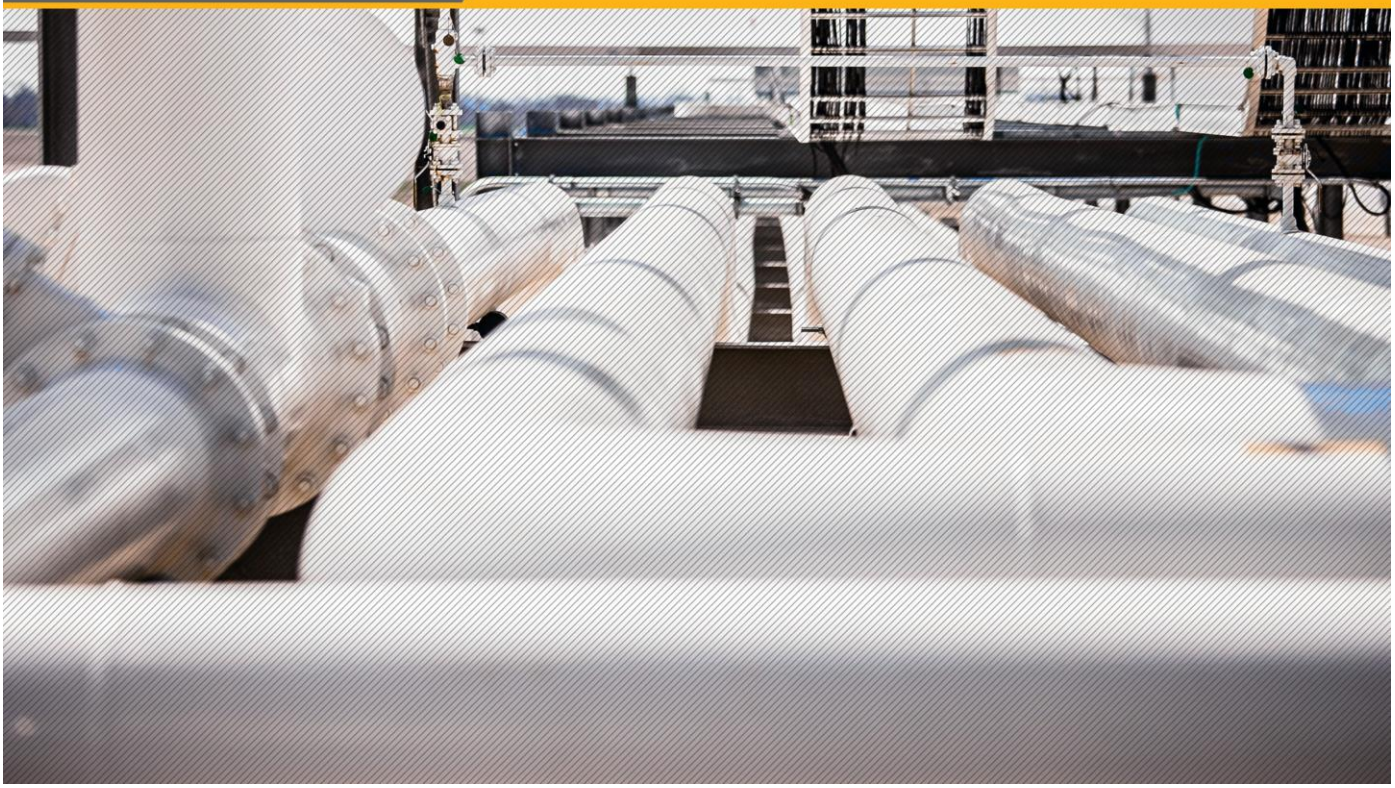


Pipeline Specifications

NuStar



NuStar Logistics, L.P. Product Specifications

Northern Mexico Supply (Valley)

SPECIFICATIONS FOR MEXICO GRADE GASOLINE BLENDSTOCK
87 Octane Gasoline – Metropolitan
Grade 76

NOM-016-CRE-2016 allows for [C] ~~MTBE, TAME and~~ Ethanol to be used as Oxygenates for blending purposes.

Specification Points	ASTM Test Method	Origin Shipments Minimum	Maximum
Specific Gravity	D4052	Report Only	
Vapor Pressure, kPa	D4953,D5191,D5482,D6378		69 (B-2), 79 (C-3)
Vapor Pressure, psi	D4953,D5191,D5482,D6378		10.0 (B-2), 11.5 (C-3)
Distillation temp			
Initial boiling temp, C	D86		
10% Recovered, C	D86		65 (B-2), 60 (C-3)
50% Recovered, C	D86	77	118 (B-2), 116 (C-3)
90% Recovered, C	D86		190 (B-2), 185 (C-3)
Final boiling temp, C	D86		225 (B-2 & C-3)
Distillation Residue, vol%	D86		2 (B-2 & C-3)
Benzene, vol %	D3606,D5580,D6277		1.0
Aromatics, vol %	D1319		32.0 (25.0 on 1/1/2020)
Olefins, vol %	D1319		11.9 (10.0 on 1/1/2020)
Mercaptan Sulfur, mg/kg	D3227		20
One of the following requirements must be met:			
Copper Corrosion	D 130		1
Silver Corrosion	D7667,D7671		1
Gum, Washed, mg/100ml	D 381		5
Gum, Unwashed, mg/100ml	D 381		70
Induction Period, min.	D 525	240	
Vapor lock protection temp, C			
@ V:L=20		50 (B-2), 47 (C-3)	
Research Octane {R}	D2699	Report	
Motor Octane {M}	D2700	82.0	
(R+M)/2	D4814	87.0	
Sulfur, ppm	D5453,D2622,D7039,D7220		30 avg, 80 max
Oxygen, % mass	D4815, D5845	1.0	2.7
BTX, vol %	D5580	Report	

ZMM Monterrey Metropolitan Zone

Volatility class specification by geographic region and season

	ZMM
January	C-3
February	C-3
March	B-2
April	B-2
May	B-2
June	B-2
July	B-2
August	B-2
September	B-2
October	B-2
November	C-3
December	C-3

Rev. 1
03/12/2019

SPECIFICATIONS FOR MEXICO GRADE GASOLINE BLENDSTOCK
91 Octane Gasoline – Metropolitan
Grade 77

NOM-016-CRE-2016 allows for [C] ~~MTBE, TAME and~~ Ethanol to be used as Oxygenates for blending purposes.

Specification Points	ASTM Test Method	Origin Shipments Minimum	Maximum
Specific Gravity	D4052	Report Only	
Vapor Pressure, kPa	D4953,D5191,D5482,D6378		69 (B-2), 79 (C-3)
Vapor Pressure, psi	D4953,D5191,D5482,D6378		10.0 (B-2), 11.5 (C-3)
Distillation temp65			
Initial boiling temp, C	D86		
10% Recovered, C	D86		65(B-2), 60 (C-3)
50% Recovered, C	D86	77	118(B-2), 116(C-3)
90% Recovered, C	D86		190 (B-2), 185 (C-3)
Final boiling temp, C	D86		225 (B-2 & C-3)
Distillation Residue, vol%	D86		2 (B-2 & C-3)
Benzene, vol %	D3606,D5580,D6277		1.0
Aromatics, vol %	D1319		32.0 (25.0 on 1/1/2020)
Olefins, vol %	D1319		11.9 (10.0 on 1/1/2020)
Mercaptan Sulfur, mg/kg	D3227		20
One of the following requirements must be met:			
Copper Corrosion	D 130		1
Silver Corrosion	D7667,D7671		1
Gum, Washed, mg/100ml	D 381		5
Gum, Unwashed, mg/100ml	D 381		70
Induction Period, min.	D 525	240	
Vapor lock protection temp, C			
@ V:L=20		50 (B-2), 47 (C-3)	
Research Octane {R}	D2699	94.0	
Motor Octane {M}	D2700	Report	
(R+M)/2	D4814	91.0	
Sulfur, ppm	D5453,D2622,D7039,D7220		30 avg, 80 max
Oxygen, % mas	D4815,D5845	1.0	2.7
BTX, vol %	D5580	Report	

ZMM Monterrey Metropolitan Zone

Volatility class specification by geographic region and season

	ZMM
January	C-3
February	C-3
March	B-2
April	B-2
May	B-2
June	B-2
July	B-2
August	B-2
September	B-2
October	B-2
November	C-3
December	C-3

Rev. 1
03/12/2019

SPECIFICATIONS FOR MEXICO GRADE GASOLINE BLENDSTOCK
87 Octane Gasoline – Rest of Country
Grade 86

NOM-016-CRE-2016 allows for [C] ~~MTBE, TAME and~~ Ethanol to be used as Oxygenates for blending purposes.

Specification Points	ASTM Test Method	Origin Shipments Minimum	Maximum
Specific Gravity	D4052	Report Only	
Vapor Pressure, kPa	D4953,D5191,D5482,D6378		69 (B-2), 79 (C-3)
Vapor Pressure, psi	D4953,D5191,D5482,D6378		10.0 (B-2), 11.5 (C-3)
Distillation temp			
Initial boiling temp, C	D86		
10% Recovered, C	D86		65 (B-2), 60 (C-3)
50% Recovered, C	D86	77	118 (B-2), 116 (C-3)
90% Recovered, C	D86		190 (B-2), 185 (C-3)
Final boiling temp, C	D86		225 (B-2 & C-3)
Distillation Residue, vol%	D86		2 (B-2 & C-3)
Benzene, vol %	D3606,D5580,D6277		2.0
Aromatics, vol %	D1319		32.0(25.0 on 1/1/2020)
Olefins, vol %	D1319		11.9(10.0 on 1/1/2020)
Mercaptan Sulfur, mg/kg	D3227		20
One of the following requirements must be met:			
Copper Corrosion	D 130		1
Silver Corrosion	D7667,D7671		1
Gum, Washed, mg/100ml	D 381		5
Gum, Unwashed, mg/100ml	D 381		70
Induction Period, min.	D 525	240	
Vapor lock protection temp, C			
@ V:L=20		50 (B-2), 47 (C-3)	
Research Octane {R}	D2699	Report	
Motor Octane {M}	D2700	82.0	
(R+M)/2	D4814	87.0	
Sulfur, ppm	D5453,D2622,D7039,D7220		30 avg, 80 max
Oxygen, % mass	D4815,D5845		2.7
BTX, vol %	D5580	Report	

ROC Rest of Country

Volatility class specification by geographic region and season

	North
January	C-3
February	C-3
March	B-2
April	B-2
May	B-2
June	B-2
July	B-2
August	B-2
September	B-2
October	B-2
November	C-3
December	C-3

Rev. 1
03/12/2019

SPECIFICATIONS FOR MEXICO GRADE GASOLINE BLENDSTOCK
91 Octane Gasoline – Rest of Country
Grade 87

NOM-016-CRE-2016 allows for [C] ~~MTBE, TAME and~~ Ethanol to be used as Oxygenates for blending purposes.

Specification Points	ASTM Test Method	Origin Shipments Minimum	Maximum
Specific Gravity	D4052	Report Only	
Vapor Pressure, kPa	D4953,D5191,D5482,D6378		69 (B-2), 79 (C-3)
Vapor Pressure, psi	D4953,D5191,D5482,D6378		10.0 (B-2), 11.5 (C-3)
Distillation temp			
Initial boiling temp, C	D86		
10% Recovered, C	D86		65 (B-2), 60 (C-3)
50% Recovered, C	D86	77	118 (B-2), 116 (C-3)
90% Recovered, C	D86		190 (B-2), 185 (C-3)
Final boiling temp, C	D86		225 (B-2 & C-3)
Distillation Residue, vol%	D86		2 (B-2 & C-3)
Benzene, vol %	D3606,D5580,D6277		2.0
Aromatics, vol %	D1319		32.0(25.0 on 1/1/2020)
Olefins, vol %	D1319		11.9(10.0 on 1/1/2020)
Mercaptan Sulfur, mg/kg	D3227		20
One of the following requirements must be met:			
Copper Corrosion	D 130		1
Silver Corrosion	D7667,D7671		1
Gum, Washed, mg/100ml	D 381		5
Gum, Unwashed, mg/100ml	D 381		70
Induction Period, min.	D 525	240	
Vapor lock protection temp, C			
@ V:L=20		50 (B-2), 47 (C-3)	
Research Octane {R}	D2699	94.0	
Motor Octane {M}	D2700	Report	
(R+M)/2	D4814	91.0	
Sulfur, ppm	D5453,D2622,D7039,D7220		30 avg, 80 max
Oxygen, % mass	D4815,D5845		2.7
BTX, vol %	D5580	Report	

ROC Rest of Country

Volatility class specification by geographic region and season

	North
January	C-3
February	C-3
March	B-2
April	B-2
May	B-2
June	B-2
July	B-2
August	B-2
September	B-2
October	B-2
November	C-3
December	C-3

Rev. 1
03/12/2

SPECIFICATION FOR MEXICO GRADE ULTRA LOW SULFUR FUEL DIESEL

GRADE 88

Specification Points	ASTM Test Methods	Shipments (At Origin) Minimum	Maximum
Specific Gravity	D4052, D1298		Report
Color	D1500		2.5
Color visual		Undyed	
Distillation,	D86, D7344, D7345		
Initial boiling temp, C		Report	
10% Recovered, C			275
50% Recovered, C		Report	
90% Recovered, C			345
Final Boiling temp, C		Report	
Corrosion, Copper Strip @ 50 C	D130	1	
Cetane			
(1) Cetane Number	D613	45	
Or (2) Cetane Index, Procedure A	D4737	45	
Cetane Index 1/	D976	45	
Flash, C	D93,D7094,D3828	45	
Carbon Residue on 10% Bottoms			
(Ramsbottom) - Percent	D524	0.25	
Cloud Point, C	D2500	Report	
Pour Point, C	D97		0 (Mar to Oct)
Pour Point, C	D97		-5 (Nov to Feb)
Kinematic Viscosity, mm^2/s @40 C	D445	1.9	4.1
Ash, % mass	D482		0.01
Sulfur (Zones ZMVM,ZMG,ZMM,ZFN)	D5453,D2622,D7039,D7220		15

Sulfur (Rest of country) ppm	D5453,D2622,7039,D7220		500
Aromatics (Volume %)	D1319, D5186		35
Water & Sediment, vol.%	D2709		0.05
Conductivity, pS/m @ 70 F	D2624, D4308	25	
Lubricity, microns	D6079, D7688		520

1/ In the case the Cetane Number is measured, it shall be performed on the un-additized fuel.

Zones:	ZMVM	Mexico Valley Metropolitan Zone
	ZMG	Guadalajara Metropolitan Zone
	ZMM	Monterrey Metropolitan Zone
	ZFN	Northern Frontier Zone

Rev. 1

03/12/2019

SPECIFICATION FOR FUNGIBLE ULTRA LOW SULFUR FUEL DIESEL

GRADE 37

Specification Points	ASTM Test Methods	Shipments (At Origin) Minimum	Shipments (At Origin) Maximum	Deliveries 1/ (At Terminals) May Be
Gravity, Degrees A.P.I.	D287	Report		
Color	D1500		2.5	3.0
Color visual		Undyed		
Distillation,	D86			
50% Recovered, F			Report	
90% Recovered, F		540	640	
OR				
Simulated distillation	D2887			
50% Recovered, F			Report	
90% Recovered, F		572	672	
Corrosion, Copper Strip @122 F	D130		1	
Cetane				
(1) Cetane Number	D613	40.0		
Or (2) Cetane Index, Procedure A	D4737	40.0		
Cetane Index 2/	D976	40		
Flash, F	D93	130		125
Thermal Stability,				
(1) Thermal, % reflectance	D6468 (W)	75		
	D6468(Y)	82		
Aging Period (minutes)	D6468	90		
OR (2) Oxidation, mg/100ml	D2274		2.5	
Carbon Residue on 10% Bottoms				

(Ramsbottom) - Percent D524		0.35		
Cloud Point, F	D2500, D5771 D5772, D5773			3/
Pour Point, F	D97, D5949 D5950, D5985			3/
Viscosity, cSt @104 F	D445	1.9	4.1	
Haze Rating 4/	D4176		2	3
Ash, wt %	D482		0.01	
Sulfur, ppm 5/	D2622		11	
NACE Corrosion	TM0172, D7548	B+		
Aromatics (Volume %)	D1319		31.7	
Or Aromatics by Cetane Index	D976	40		
BS&W, vol.%	D2709		<0.05	
Conductivity, pS/m @ 70 F	D2624		250	

1/ Delivered products meet all applicable requirements at time and place of delivery.

2/ ASTM D976 data is required for low sulfur oils to demonstrate aromatics compliance per the EPA.

3/ Due to fungible specifications, the cloud/pour point for diesel products must comply with the ASTM specifications for the region in which the diesel is produced. It should be noted that diesel products distributed into colder climates may require lower cloud and/or pour points or suppressors, i.e., winterization.

4/ The finished product shall be visually free of undissolved water, sediment, and suspended matter in proffered tankage and at the point of delivery. Compliance with this workmanship clause will be determined by ASTM D4176, Procedure 2 at 77 F or at actual conditions present at the point and time of sampling, whichever is lower.

5/ Origin laboratory certifying sulfur content must qualify the test method used per EPA Performance Based Testing Criteria (see CFR 80.584). The referee method will be ASTM D5453. *Sulfur limit, 12 ppm for interconnecting pipelines.

Additional Requirements:

Biodiesel: The sue of any biodiesel fuel as a blending component is prohibited.

Dyes: ULSD grade shipments may not be dyed.

Rev. 4

01/31/2018

SPECIFICATION FOR FUNGIBLE B5 ULSD

#2 Fuel Oil`

Specification Points		ASTM Test Methods	Shipments (At Origin) Minimum	Shipments (At Origin) Maximum	Deliveries 1/ (At Terminals) May Be
Gravity, Degrees A.P.I.		D287	30.0		
Color		D1500		4.0	
Color visual			Undyed		
Distillation,		D86			
	50% Recovered, F			Report	
	90% Recovered, F		540	640	
OR					
Simulated distillation		D2887			
	50% Recovered, F			Report	
	90% Recovered, F		572	672	
Corrosion, Copper Strip @122 F		D130		1	
Cetane					
	(2) Cetane Number	D613	40.0		
Or	(2) Cetane Index, Procedure A	D4737	40.0		
Cetane Index 2/		D976	40		
Flash, F		D93	130		125
Thermal Stability,					
	(2) Thermal, % reflectance	D6468 (W)	75		
		D6468(Y)	82		
	Aging Period (minutes)	D6468	90		
OR	(2) Oxidation, mg/100ml	D2274		2.5	
Carbon Residue on 10% Bottoms					

(Ramsbottom) - Percent	D524		0.35		
Cloud Point, F	D2500, D5771 D5772, D5773				3/
Pour Point, F	D97, D5949 D5950, D5985				3/
Viscosity, cSt @104 F	D445	1.9	4.1		
FAME, vol %	D7371		5		4/
Haze Rating 5/	D4176		2	3	
Ash, wt %	D482		0.01		
Sulfur, ppm 6/	D2622		11		
NACE Corrosion	TM0172, D7548	B+			
Aromatics (Volume %)	D1319		35		
Or Aromatics by Cetane Index	D976	40			
BS&W, vol.%	D2709		<0.05		

1/ Delivered products meet all applicable requirements at time and place of delivery.

2/ ASTM D976 data is required for low sulfur oils to demonstrate aromatics compliance per the EPA.

3/ Due to fungible specifications, the cloud/pour point for diesel products must comply with the ASTM specifications for the region in which the diesel is produced. It should be noted that diesel products distributed into colder climates may require lower cloud and/or pour points or suppressors, i.e., winterization.

4/ Biodiesel Direct Supplier or certifying laboratory must be BQ9000/ISO9000 certified.

5/ The finished product shall be visually free of undissolved water, sediment, and suspended matter in proffered tankage and at the point of delivery. Compliance with this workmanship clause will be determined by ASTM D4176, Procedure 2 at 77 F or at actual conditions present at the point and time of sampling, whichever is lower.

6/ Origin laboratory certifying sulfur content must qualify the test method used per EPA Performance Based Testing Criteria (see CFR 80.584). The referee method will be ASTM D5453.

Additional Requirements:

Dyes: ULSD grade shipments may not be dyed.

Rev. 1

02/01/2018

SPECIFICATIONS FOR PREMIUM CONVENTIONAL GASOLINE BLENDSTOCK (PBOB) – 91 OCTANE

For blending with 10% denatured fuel ethanol (92% purity) as defined by ASTM D4806.

This PBOB may not be combined with any other PBOB except PBOB having the same requirement for oxygenate type and amount.

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

Requirements for both Segregated and Fungible:

Specification Points	ASTM Test Method	Minimum	Origin Shipments Maximum	Deliveries (At Terminals)
Research Octane {R}	D2699		Report	
Motor Octane {M}	D2700		Report	
(R+M)/2	D4814	91.0		
Oxygen Content, wt. %	D4815, D5599 , GC-OFID		0.05	1/, 2/, 8/
DVPE 3/	D4953, D5191 Grabner		EPA	
P2			7.8	
P9			9.0	
P6			10.0	
P3			10.5	
P7			11.5	
P5			12.5	
P8			13.5	
P4			14.0	

PA	15.0

This is a base gasoline, not for sale to the ultimate consumer.

Heavy metals are not allowed.

Any gasoline exhibiting an offensive odor and/or poses a personal health hazard will not be accepted for shipment.

Any gasoline exhibiting an offensive odor and/or containing more than 0.50 wt % dicyclopentadiene will not be accepted for shipment.

The referee method will be based on a gas chromatograph test.

Emissions reductions must be calculated using EPA guidelines.

Fungible only requirements:

Specification Points	ASTM Test Method	Origin Shipments Minimum	Origin Shipments Maximum	Deliveries (At Terminals) Minimum	Deliveries (At Terminals) Maximum
Gravity, Degrees API	D287		Report Only		7/
Color			Undyed		
Mercaptan Sulfur, wt. % 4/	D3227		0.003		
Hydrogen Sulfide	D3227		None		
Copper Corrosion	D130		1		
Silver Corrosion	D4814			1	
Gum, Existent, mg/100ml	D381		4		5
Oxidation Stability, min.	D525	240			180
Phosphorous, g/gal	D3231		0.003		0.005
Sulfur, ppm 5/	D2622		80		
Haze rating 9/	D4176		2		3
NACE Corrosion	TM0172	B+			
Benzene, vol %	D3606, D4053		1.3		
Aromatics, vol %	D1319		50		

Olefins, vol %	D1319	25
Volatility:		
Driveability Index	D4814	See chart
Distillation, F @ % Evap.	D86	See chart
Vapor/Liquid Ratio (V/L), F @20	D5188	See chart 6/

	Driveability	10 vol%	50 vol%		90vol%	EndPt	V/L(where applicable)	
Class	Index	Max	Min	Max	Max	Max	Class	Min
AA	1250	158	150	250	374	430	1	129
A	1250	158	150	250	374	430	2	122
B	1240	149	150	245	374	430	3	116
C	1230	140	150	240	365	430	4	107
D	1220	131	150	235	365	430	5	102
E	1200	122	150	230	365	430		

NOTES (Apply to Fungible and Segregated):

1/ All P grades may not contain oxygenates, such as ethers and alcohols. The use of non-hydrocarbon blending components in these grades is prohibited.

2/ Refer to test methods published in 40 CFR Chapter 1, Part 80.46. Alternative aromatics and oxygenates test methods, ASTM D1319 and D4815, may be used according to federal and state regulations.

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.

4/ Mercaptan sulfur determination is waived if the result of the Doctor Test ASTM D4952 is negative.

5/ Refer to 40 CFR Part 80.195 (d)(2). Alternate sulfur test methods, ASTM D5453, D4294 and D7039, may be used according to federal and state regulations.

6/ Refer to test methods in 40 CFR Chapter 1, Part 80.46.

7/ Specifications must be met before blending of denatured fuel ethanol.

8/ Oxygen content must meet a minimum of 1.7 wt.% and a maximum of 4.0 wt.% after blending of denatured fuel ethanol.

9/ Compliance with ASTM D4176 will be determined using Procedure 2 at the following temperatures, adjusted seasonally:

February 16 – September 30	55 F max
October 1 – February 15	45 F max

Rev. 3

02/01/2018

SPECIFICATIONS FOR SUB OCTANE GRADE GASOLINE

(Conventional Gasoline - This product does not meet the requirements for reformulated gasoline and may not be used in any reformulated gasoline covered area.)

Specification Points	ASTM Test Method	Origin Shipments Minimum	Origin Shipments Maximum	Deliveries 1/ (At Terminals)	
Gravity, Degrees API	D287,D1298,D4052			Report Only	
Color				Undyed	
Distillation 2/	D86				
Volatility 2/	D5191				
E200, vol%	D86		Report		
E300, vol%	D86		Report		
Drivability Index 2/					
Mercaptan Sulfur, wt % 3/	D3227		0.003		
Hydrogen Sulfide	D3227		None		
Copper Corrosion	D130		1		
Silver Corrosion	D7667,D7671		1		
Gum, Existent, mg/100ml	D381		4	5	
Oxidation Stability, min.	D525	240			
Phosphorous, g/gal	D3231		0.003	0.005	
Lead, g/gal	D3237		0.010	0.05	
Research Octane {R}	D2699	4/			
Motor Octane {M}	D2700	4/			
(R+M)/2	D4814	4/			

Sulfur, ppm	D2622		80	
Benzene, vol%	D3606		4.9	
Aromatics, vol%	D1319	Report		
Olefins, vol%	D1319	Report		
Oxygenates, wt %	D4815,D5599		0.05	
Haze rating 5/	D4176		2	3
NACE Corrosion	TM0172	B+		
Odor 6/		Nonoffensive		

SPECIFICATIONS FOR SUB OCTANE GRADE GASOLINE

The following parameters apply after blending with denatured fuel ethanol at 10%

Product property	Test method	Origin limits
Distillation,		
10% Evap(T10),F	D86	Report
20% Evap(T20),F	D86	Report
50% Evap(T50),F	D86	150
RVP 6/	D5191	Report

Vapor to Liquid Ratio	Class 1	Class 2	Class 3	Class 4	Class 5
D5188, min 2/,7/	129	122	116	107	102

1/ Delivered products meets all applicable requirements at time and place of delivery.

1/ Refer to Seasonal Gasoline Volatility Schedule.

2/ Mercaptan Sulfur determination is waived if the result of the Doctor Test ASTM D4952 is negative.

3/ Shipments must meet one of the following requirements before or before and after with denatured fuel ethanol:

(1) Test the base gasoline before and after the addition of 10% ethanol

	Base Gasoline	Blend with 10% Ethanol
RON, min.	Report	Report

MON, min.	Report	82.0
(R+M)/2	83.0	87.0

OR (2) Test the base gasoline

	Base Gasoline
RON, min.	Report
MON, min.	79.0
(R+M)/2	84.0

4/ Compliance with ASTM D4176 will be determined using Procedure 2 at the following temperatures, adjusted seasonally:

February 16 – September 30	55 F max
October 1 – February 15	45 F max

5/ Any gasoline exhibiting an offensive odor and/or containing more than 0.30 wt % dicyclopentadiene will not be accepted for shipment.

6/ RVP limits on ethanol blended gasoline are controlled by various federal and state regulations and waivers, which are generally greater than the limits for base gasoline.

7/ D5188 is the referee test method. The alternate equation in D4814 may also be used.

Rev. 3

01/31/2018

Revision Table

Version No.	Date	Action(s)
1	September 1, 2019	Initial Issue
2	March 23, 2024	Remove reference to MTBE and TAME.