TEST FUEL SPECIFICATIONS
for TMC Monitored Tests

ASTM Test Monitoring Center
Fuels Task Force-Approved Fuel Specifications
for Fuel Used in TMC Monitored Tests

A Program of ASTM International

Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206-4489
412-365-1000

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Introduction

The fuel specifications shown on the following pages were developed and approved by the Technical Guidance Committee's Fuels Task Force. This task force includes representatives from industry fuel suppliers, testing laboratories, producers and additive suppliers, and the Test Monitoring Center. These specifications are intended for use by the suppliers of fuel used in the various ASTM tests monitored by the Test Monitoring Center.

Sequence V Fuel Specification

Measurement	Units	ASTM Test Method	Spec	Quarterly Measure-ments
Distillation		D86		
Initial Boiling Point			22.2 - 35.0	✓
5 % Volume			Report	
10 % Volume			48.9 - 57.2	✓
20 % Volume				
30 % Volume				
40 % Volume	°C			
50 % Volume			98.9 – 115.2	✓
60 % Volume				
70 % Volume				
80 % Volume				
90 % Volume			162.8 – 176.7	✓
95 % Volume				
End Point			196.1 – 212.8	✓
Recovery	volume %		Report	
Residue	volume %		2.0 Max	
Loss	volume %		Report	
API Gravity	°API	D4052	56.5 – 61.2	✓
Specific Gravity	unitless	D4052	Report	
Reid Vapor Pressure	kPa	D5191	60.7 – 63.4	✓
Carbon	mass fraction	D5291	0.8580 – 0.8690	
Hydrogen	mass fraction	D5291	Report	
Carbon	mass fraction	D3343	Report	
Oxygen	mass %	D4815	0.05 maximum	

Measurement	Units	ASTM Test Method	Spec	Quarterly Measure-ments
Sulfur	mg/kg	D5453	100 maximum	
Lead	mg/L	D3237	2.6 maximum	✓
Phosphorous	mg/L	D3231	1.3 maximum	
Composition, aromatics	volume %	D1319	35.0 maximum	
Composition, aromatics	volume %	D5769	report	
Composition, olefins	volume %	D1319	10 maximum	
Composition, olefins	volume %	D6550	report	
Composition, saturates	volume %	D1319	Report	
Oxidation Stability	minutes	D525	1440 minimum	✓
Copper Corrosion	unitless	D130	1 maximum	
Solvent Washed Gum Content	mg/100 mL	D381	3 maximum	✓
Research Octane Number	unitless	D2699	96.0 – 98.0	
Motor Octane Number	unitless	2700	Report	
Anti-Knock Index (R+M)/2	unitless	2700	Report	
Sensitivity	unitless	D2700	7.5 minimum	
Appearance	unitless	N/A	clear and bright	✓
Net Heat of Combustion	Btu/lb	D240	Report	
Additive, Ethyl antioxidant	ptb	calculated	Report	

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PC-9-HS Fuel Specification

Measurement	Units	ASTM Test Method	Spec
Distillation		D86	
Initial Boiling Point	*ºC*		report
5% volume	*°C*		report
10% Volume	*°C*		report
20% volume	*°C*		report
30% volume	*°C*		report
40% volume	*°C*		report
50% Volume	*°C*		report
60% volume	*°C*		report
70% volume	*°C*		report
80% volume	*°C*		report
90% Volume	*°C*		282-338
95% volume	*°C*		report
End Point	*°C*		report
loss	*ml*		
residue	*ml*		
API Gravity	*ºAPI*	D4052	34.5-36.5
Specific Gravity		D4052	0.8423-0.8520
Cetane Index	*unitless*	D4737 or D976	report
Cetane Number	*unitless*	D613	42-48
Ramsbottom Carbon Residue on 10% Distillation	*%*	D524	max 0.35
Composition, aromatics	*mass %*	D5186	28.0-33.0
Net Heating Value	*MJ/kg*	D4809	report
Ash	*mass %*	D482	max 0.005
Flash Point	*ºC*	D93	min 54
Pour Point	*ºC*	D97	max -18
Cloud Point	*ºC*	D2500	report

Measurement	Units	ASTM Test Method	Spec
Strong Acid Number	*mg KOH/g*	D664	max 0.00
Total Acid Number	*mg KOH/g*	D664	max 0.050
Accelerated Stability	*mg/100 mL*	D2274	report
Copper Corrosion	*classification*	D130	max 1
Kinematic Viscosity	*mm2/s*	D445	2.4-3.0
Water and Sediment	*volume %*	D2709	max 0.050
Total Sulfur	*ppm*	D7039	400 - 500
Lubricity (HFRR)	µm	D6079	report
Bio fuel content	*%*	D7371	max 0.5%
Particulate matter	mg/L	D6217	report
hydrogen	wt %	D3343	report
carbon	wt %	D3343	report

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PC-10 Fuel Specification

Measurement	Units	ASTM Test Method	Spec
Distillation		D86	
Initial Boiling Point	*°C*		report
5% volume	*°C*		report
10% Volume	*°C*		report
20% volume	*°C*		report
30% volume	*°C*		report
40% volume	*°C*		report
50% Volume	*°C*		report
60% volume	*°C*		report
70% volume	*°C*		report
80% volume	*°C*		report
90% volume	*°C*		293-332
95% volume	*°C*		report
end boiling point	*°C*		report
loss	*ml*		report
residue	*ml*		report
API Gravity	*ºAPI*	D4052	34.0-37.0
Cetane Index	*unitless*	D4737	report
Cetane Number	*unitless*	D613	43-47
Specific Gravity		D4052	0.8400-0.8550
Ramsbottom Carbon Residue on 10% Distillation	*%*	D524	max 0.350
Net Heating Value	*MJ/kg*	D4809	report
Composition, aromatics	*mass %*	D5186	28.0 - 33.5
Ash	*mass %*	D482	max 0.005
Flash Point	*ºC*	D93	min 54
Pour Point	*ºC*	D97	max -18
Cloud Point	*ºC*	D2500	report
Strong Acid Number	*mg KOH/g*	D974	max 0.00
Total Acid Number	*mg KOH/g*	D974	max 0.05
Accelerated Stability	*mg/100 mL*	D2274	max 1.5

Measurement	Units	ASTM Test Method	Spec
Copper Corrosion	*classification*	D130	max 1
Kinematic Viscosity	*cSt*	D445	2.0-2.6
Water and Sediment	*volume %*	D2709	max 0.05
Total Sulfur	*mg/kg*	D7039	7-15
Particulate matter	mg/L	D6217	report
hydrogen	wt %	D3343	report
carbon	wt %	D3343	report
Lubricity (HFRR)	µm	D6079	max 460
Bio fuel content	*%*	D7371	max 0.5%

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Seq. VI Lube Certification Fuel

29-Oct-20

TEST	METHOD	UNITS	Seq. VI Specs		
			MIN	TARGET	MAX
Distillation - IBP	ASTM D86	°C	23.9		35.0
5%		°C			
10%		°C	48.9		57.2
20%		°C			
30%		°C			
40%		°C			
50%		°C	93.3		110.0
60%		°C			
70%		°C			
80%		°C			
90%		°C	151.7		162.8
95%		°C			
Distillation - EP		°C			212.8
Recovery		vol %		Report	
Residue		vol %		Report	
Loss		vol %		Report	
Gravity @ 60°F/60°F	ASTM D4052	°API	58.7		**61.2**
Density @ 15° C	ASTM D4052	kg/l	0.734		0.744
Dry Vapor Pressure Equivalent	ASTM D5191	kPa	60.1		63.4
Carbon	ASTM D3343	wt %		Report	
Carbon	ASTM D5291	mass %		Report	
Hydrogen	ASTM D5291	mass %		Report	
Hydrogen/Carbon ratio	ASTM D5291	mole/mole		Report	
Oxygen[1]	ASTM D4815	wt %			0.2
Oxygenates Ethanol	ASTM D4815	%		Report	
MTBE		%		Report	
ETBE		%		Report	
Methanol		%		Report	
Sulfur	ASTM D5453	mg/kg	3		15
Composition, aromatics	**ASTM D5769[4]**	**vol %**	**31.0**		**34.0**
C6 aromatics (benzene)	**ASTM D5769**	**vol %**			**1.00**
C7 aromatics (toluene)	**ASTM D5769**	**vol %**		**Report**	
C8 aromatics	**ASTM D5769**	**vol %**		**Report**	
C9 aromatics	**ASTM D5769**	**vol %**		**Report**	
C10+ aromatics	**ASTM D5769**	**vol %**		**Report**	
Composition, olefins	**ASTM D6550[4]**	**wt%**			**2.0**
Lead[1]	ASTM D3237	mg/l			2.6
Manganese[1]	ASTM D3831	g/gal			0.01
Phosphorus[1]	ASTM D3231	mg/l			1.3
Silicon[1]	ICP method	mg/kg			4
Particulate matter	ASTM D5452	mg/l			1
Oxidation Stability	ASTM D525	minutes	1000		
Copper Corrosion	ASTM D130				1
Gum content, washed	ASTM D381	mg/100mls			5.0
Gum content, unwashed	ASTM D381	mg/100mls	7.0		20.0
Research Octane Number	ASTM D2699		96.0		
Motor Octane Number	ASTM D2700			Report	
R+M/2	D2699/2700			Report	
Sensitivity			7.5		
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report	
Gross Heating Value, btu/lb	ASTM D240	btu/lb		Report	
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report	
Water and Sediment	ASTM D2709	vol%			0.01
Color[2]	VISUAL	1.75 ptb		Red	
Top Tier Additive[3]	ppm m/m	267		Report	

[1] no intentional addition of these elements

[2] Innospec Oil Red B4 Liquid Dye

[3] Lubrizol UltraZol 8219. Can be obtained from Lubriol Sales.

[4] or use D6839 for everything measured by D5769 and D6550
for any conflict between supplier and customer measurement, refer to ASTM D3244 assigning risk 50/50 between supplier and customer
supplier should choose a lab to perform analysis and refrain from moving samples lab to lab in order to obtain "in spec" results

KA24E Green Fuel

Rev. Date: 11/18/2019

TEST	METHOD	UNITS	SPECIFICATIONS			RESULTS
			MIN	TARGET	MAX	
Distillation, % Evap - IBP	ASTM D86	°F	75		95	
5%		°F				
10%		°F	120		135	
20%		°F				
30%		°F				
40%		°F				
50%		°F	200		230	
60%		°F				
70%		°F				
80%		°F				
90%		°F	300		325	
95%		°F				
Distillation - EP		°F	385		415	
Recovery		vol %		Report		
Residue		vol %		Report		
Loss		vol %		Report		
Gravity @ 60°F	ASTM D4052	°API	58.7		61.2	
Density @ 15°C	ASTM D4052	kg/l	0.734		0.744	
Reid Vapor Pressure	ASTM D5191	psi	8.8		9.2	
Carbon	ASTM D5291	wt fraction	0.8580		0.8667	
Carbon	ASTM D3343	wt fraction		Report		
Sulfur	ASTM D2622	wt %	0.0120		0.0140	
Lead	ASTM D3237	g/gal			0.05	
Oxygen	ASTM D4815	wt %			0.2	
Composition, aromatics	ASTM D5769	vol %	28.5		34.5	
Composition, olefins	ASTM D6550	vol %	5.0		10.0	
Composition, saturates	Calc	vol %		Report		
Oxidation Stability	ASTM D525	minutes	1440			
Copper Corrosion, 3 hr @ 50°C	ASTM D130	Class			1	
Gum content, washed	ASTM D381	mg/100ml			5	
Gum content, unwashed	ASTM D381	mg/100ml			10	
Research Octane Number	ASTM D2699	Rating	96.0		97.5	
Motor Octane Number	ASTM D2700	Rating		Report		
R+M/2	D2699/2700	---		Report		
Sensitivity	D2699/2700	---	7.5			
Net Heating of Combustion	ASTM D240	btu/lb		Report		
Color	Visual			Green		

Seq III, IX, and X Lube Cert Gasoline

29-Oct-20

TEST	METHOD	UNITS	Seq. III Specs		
			MIN	TARGET	MAX
Distillation - IBP	ASTM D86	°C	23.9		35.0
5%		°C			
10%		°C	48.9		57.2
20%		°C			
30%		°C			
40%		°C			
50%		°C	93.3		110.0
60%		°C			
70%		°C			
80%		°C			
90%		°C	151.7		162.8
95%		°C			
Distillation - EP		°C			212.8
Recovery		vol %		Report	
Residue		vol %		Report	
Loss		vol %		Report	
Gravity @ 60°F/60°F	ASTM D4052	°API	58.7		61.2
Density @ 15° C	ASTM D4052	kg/l	0.734		0.744
Dry Vapor Pressure Equivalent	ASTM D5191	kPa	60.1		63.4
Carbon	ASTM D3343	wt %		Report	
Carbon	ASTM D5291	mass %		Report	
Hydrogen	ASTM D5291	mass %		Report	
Hydrogen/Carbon ratio	ASTM D5291	mole/mole		Report	
Oxygen[1]	ASTM D4815	wt %			0.2
Oxygenates Ethanol	ASTM D4815	%		Report	
MTBE		%		Report	
ETBE		%		Report	
Methanol		%		Report	
Sulfur	ASTM D5453	mg/kg	3		15
Composition, aromatics	**ASTM D5769[3]**	**vol %**	31.0		34.0
C6 aromatics (benzene)	**ASTM D5769**	**vol %**			1.0
C7 aromatics (toluene)	**ASTM D5769**	**vol %**		Report	
C8 aromatics	**ASTM D5769**	**vol %**		Report	
C9 aromatics	**ASTM D5769**	**vol %**		Report	
C10+ aromatics	**ASTM D5769**	**vol %**		Report	
Composition, olefins	**ASTM D6550[3]**	**wt%**			2.0
Lead[1]	ASTM D3237	mg/l			2.6
Manganese[1]	ASTM D3831	g/gal			0.01
Phosphorus[1]	ASTM D3231	mg/l			1.3
Silicon[1]	ICP method	mg/kg			4
Particulate matter	ASTM D5452	mg/l			1
Oxidation Stability	ASTM D525	minutes	1000		
Copper Corrosion	ASTM D130				1
Gum content, washed	ASTM D381	mg/100mls			5.0
Gum content, unwashed	ASTM D381	mg/100mls			10.0
Research Octane Number	ASTM D2699		96.0		
Motor Octane Number	ASTM D2700			Report	
R+M/2	D2699/2700			Report	
Sensitivity			7.5		
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report	
Gross Heating Value, btu/lb	ASTM D240	btu/lb		Report	
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report	
Water and Sediment	ASTM D2709	vol%			0.01
Color[2]	VISUAL	1.75 ptb		Red	

[1]no intentional addition of these elements permitted.

[2]Innospec Oil Red B4 Liquid Dye

[3]or use D6839 for everything measured by D5769 and D6550

for any conflict between supplier and customer measurement, refer to ASTM D3244 assigning risk 50/50 between supplier and customer

supplier should choose a lab to perform analysis and refrain from moving samples lab to lab in order to obtain "in spec" results

ASTM D975 Fuel Limits for Ford 6.7L

Measurement	Units	ASTM Test Method	Spec
Distillation		D86	
Initial Boiling Point	*°C*		report
5% volume	*°C*		report
10% Volume	*°C*		report
20% volume	*°C*		report
30% volume	*°C*		report
40% volume	*°C*		report
50% Volume	*°C*		report
60% volume	*°C*		report
70% volume	*°C*		report
80% volume	*°C*		report
90% volume	*°C*		282-338
95% volume	*°C*		report
end boiling point	*°C*		report
loss	*ml*		report
residue	*ml*		report
API Gravity	*ºAPI*	D4052	30.0-45.0
Cetane Index	*unitless*	D4737	report
Cetane Number	*unitless*	D613	40-63
Specific Gravity		D4052	report
Ramsbottom Carbon Residue on 10% Distillation	*%*	D524	max 0.350
Net Heating Value	*MJ/kg*	D4809	report
Composition, aromatics	*mass %*	D5186	13 - 43
Ash	*mass %*	D482	max 0.01
Flash Point	*ºC*	D93	min 52
Pour Point	*ºC*	D97	report
Cloud Point	*ºC*	D2500	report
Strong Acid Number	*mg KOH/g*	D974	report
Total Acid Number	*mg KOH/g*	D974	report
Accelerated Stability	*mg/100 mL*	D2274	report
Copper Corrosion	*classification*	D130	max 1

Measurement	Units	ASTM Test Method	Spec
Kinematic Viscosity	*cSt*	D445	1.9-2.9
Water and Sediment	*volume %*	D2709	max 0.05
Total Sulfur	*mg/kg*	D7039	max 15
Particulate matter	mg/L	D6217	report
hydrogen	wt %	D3343	report
carbon	wt %	D3343	report
Lubricity (HFRR)	µm	D6079	max 520
Bio fuel content	*%*	D7371	max 0.5%

- Fuel is to be purchased as a Summer Blend. No waivers from ASTM D975 Table 1 for Winter Blends are allowed for fuel for this test
- For a test that does not use a batched fuel, such as PC-10, measure D240, D445, D86, D4052, D613, D5186, D7371 and D7039 on the start of test sample and report values in the appropriate test forms

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