

Discussion & Drafting guidelines toward high biodiesel blend diesel

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The 2nd APEC Workshop on Guidelines toward High Biodiesel Blend Diesel
(eg B20) Specification in the APEC Region

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Recommended B100 Spec. for B7 & (B7-B20)

Requirements for B100

Property items	Unit	Requirement	Property items	Unit	Requirement
FAME content	mass%	96.5 min.	Linolenic acid methyl ester	mass%	12.0 max.
Density, @15°C	g/cm ³	Report	Methanol content	mass%	0.20 max.
Viscosity, @40°C	mm ² /s	2.0 - 5.0	Mono-glyceride content	mass%	a. 0.70 / 0.60^{*1} max. b. Determined by field test^{*4}
Flash point	°C	100 min.	Di-glyceride content	mass%	0.20 max.
Sulfur content	ppm	10 max.	Tri-glyceride content	mass%	0.20 max.
Carbon residue, 10%	mass%	0.3 max.	Free glycerin	mass%	0.02 max.
Carbon residue, 100%	mass%	0.05 max.	Total glycerin	mass%	0.25 max.
Cetane number	-	51 min.	Metals (Na + K)	ppm	5.0 max.
Sulfated ash content	mass%	0.02 max.	Metals (Ca + Mg)	ppm	5.0 max.
Water content	ppm	500 max.	Phosphorus content	ppm	4.0 max.
Total contamination	ppm	24 max.	Cloud point	°C	16 / 13^{*2} max.
Copper corrosion	-	Class 1 max.	CFPP	°C	13 / 10^{*3} max.
Acid number	mgKOH/g	0.50 max.	*1, 2 & 3: applicable in the region where out-side temp. below 5°C in Winter (at cool condition).		
Oxidation stability			*4: MG limit must be specified by precipitate test at residential region with lowest temperature in the country.		
Rancimat method	hrs	10 min.			
Iodine number	-	120 max.			

AAF Recommendation for Diesel Spec.

- Requirements for Euro4 Diesel Fuel

Property items	Unit	Requirement
Density, @15°C	g/cm3	0.820 - 0.845
Cetane number	-	51 min.
Cetane index	-	51 min.
Viscosity, @40°C	mm2/s	2.0 - 4.5
Sulfur content	ppm	50 max.
Flash point	°C	55 min.
Distillation		
T50	°C	Report
T90	°C	Report
T95	°C	360 max.
End point	°C	Report
PAH	mass%	11 max.
Oxygenates		
FAME content	vol.%	a. 7 max. b. 7 – 20 (PME)*1
Alcohols content	vol.%	Not detected
Lubricity (HFRR)	µm	460 max.

Property items	Unit	Requirement
Carbon residue, 10%	mass%	0.30 max.
Cloud point	°C (max.)	Decided by out-side temp. in Winter (at cool condition)
Pour point	°C (max.)	
CFPP	°C (max.)	
Water content	ppm	200 max.
Oxidation stability-1		
conventional method	g/m3	25 max.
Oxidation stability-2		
modified Rancimat method*2	hrs	35 min.
△TAN method*3	mgKOH/g	0.12 max.
PetroOXY method*4	minutes	65 min.
Copper corrosion	-	1 max.
Total contamination	mg/kg	24 max.
Ash content	mass%	0.01 max.

*1: 7-20 % is applicable with PME (Palm Methyl Ester) only.

*2, 3, 4: At least one method out of three is required.

□ AAF Recommendation for Diesel Spec.

- Requirements for Euro5 Diesel Fuel

Property items	Unit	Requirement
Density, @15°C	g/cm3	0.820 - 0.845
Cetane number	-	51 min.
Cetane index	-	51 min.
Viscosity, @40°C	mm2/s	2.0 - 4.5
Sulfur content	ppm	10 max.
Flash point	°C	55 min.
Distillation		
T50	°C	Report
T90	°C	Report
T95	°C	360 max.
End point	°C	Report
PAH	mass%	8 max.
Oxygenates		
FAME content	vol.%	7 max.
Alcohols content	vol.%	Not detected
Lubricity (HFRR)	µm	460 max.

Property items	Unit	Requirement
Carbon residue, 10%	mass%	0.30 max.
Cloud point	°C (max.)	Decided by out-side temp. in Winter (at cool condition)
Pour point	°C (max.)	
CFPP	°C (max.)	
Water content	ppm	200 max.
Oxidation stability-1		
conventional method	g/m3	25 max.
Oxidation stability-2		
modified Rancimat method*2	hrs	35 min.
△TAN method*3	mgKOH/g	0.12 max.
PetroOXY method*4	minutes	65 min.
Copper corrosion	-	1 max.
Total contamination	mg/kg	24 max.
Ash content	mass%	0.01 max.

*2, 3, 4: At least one method out of three is required.

AAF Recommendation for Euro6 Diesel Spec.

Property Items	Unit	Requirement
Density @15 C	g/cm ³	0.82 – 0.845
Cetane Number	-	51 min.
Cetane Index	-	51 min.
Viscosity @40 C	mm ² /s	2.0 – 4.5
Sulfur Content	ppm	10 max
Flash Point	°C	55 min.
Distillation		
T50	°C	Report
T90	°C	Report
T95	°C	360 max.
End Point	°C	Report
PAH	mass%	7 max.
Oxygenates		
FAME Content	vol.%	7 max.
Alcohols Content	Vol.%	Not Detected
Lubricity (HFRR)	µm	460 max.

Property Items	Unit	Requirement
Carbon Residue 10%	mass%	0.30 max.
Cloud Point	°C(max)	Decided by out-side temperature in winter (at cool condition)
Pour Point	°C(max)	
CFPP	°C(max)	
Water Content	ppm	200 max.
Oxidation Stability-1		
Conventional Method	g/m ³	25 max.
Oxidation Stability-2		
Modified Rancimat*1	hr	35 min.
△ TAN *2	mgKOH/g	0.12 max.
PetroOXY*3	Minutes	65 min.
Copper Corrosion	-	1 max.
Total Contamination	mg/kg	24 max.
Ash Content	mass%	0.01 max.

*1,2,3: At least one method out of three is required.

Property	Unit	B100 for B7 & (B7-B20)	Euro4	Euro5	Euro6
Oxygenates					
FAME content	mass%	96.5 min			
	vol%		a. 7 max b. 7-20 (PME)	7 max	7 max
Alcohol content	vol%		Not detected	Not detected	Not detected
Density, @15°C	g/cm3	Report	0.82 - 0.845	0.82 - 0.845	0.82 - 0.845
Viscosity, @40°C	mm2/s	2.0 - 5.0	2.0 - 4.5	2.0 - 4.5	2.0 - 4.5
Flash point	°C	100 min	55 min	55 min	55 min
Sulfur content	ppm	10 max	50 max	10 max	10 max
Carbon residue, 10%	mass%	0.3 max	0.3 max	0.3 max	0.3 max
Carbon residue, 100%	mass%	0.05 max			
Cetane number	-	51 min	51 min	51 min	51 min
Cetane index	-		51 min	51 min	51 min
Sulfated ash content	mass%	0.02 max			
Ash content	mass%		0.01 max	0.01 max	0.01 max
Water content	ppm	500 max	200 max	200 max	200 max
Total contamination	ppm	24 max	24 max	24 max	24 max
Cooper corrosion	-	Class 1 max	1 max	1 max	1 max
Acid number	mgKOH/g	0.50 max			
Oxidation stability					
Conventional method	g/m3		25 max	25 max	25 max
Rancimat method	hrs	10 min	35 min	35 min	35 min
delta TAN method	mgKOH/g		0.12 max	0.12 max	0.12 max
PetroOXY method			65 min	65 min	65 min
Iodine number	-	120 max			
Linolenic acid methyl ester	mass%	12.0 max			
Methanol content	mass%	0.2 max			
Mono-glyceride content	mass%	a. 0.70 / 0.60* max b. Determined by field test			
Di-glyceride content	mass%	0.20 max			
Tri-glyceride content	mass%	0.20 max			
Free glycerin	mass%	0.02 max			
Total glycerin	mass%	0.25 max			
Metals (Na + K)	ppm	5.0 max			
Metals (Ca + Mg)	ppm	5.0 max			
Phosphorous content	ppm	4.0 max			
Cloud point	°C	16 / 13* max	Decided by outside temp in winter (at cool condition)		
Pour point					
CFPP	°C	13 / 10* max			
Distillation					
T50	°C		Report	Report	Report
T90	°C		Report	Report	Report
T95	°C		360 max	360 max	360 max
End point	°C		Report	Report	Report
PAH	maxx%		11 max	8 max	7 max
Lubricity (HFRR)	um		460 max	460 max	460 max

Thank you

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