

Perfect Renewable Diesel



BULK SPECIFICATIONS

Min. Max. Max.	PROPERTIES	UNITS		LIMIT
Center Index (¹¹) 55,0 (52.0) (¹¹) Density (② 15°C) kg/m3 820 (²) 840 Viscosity (② 40°C) mm2/s 2,0 (³) 4,0 Sulphur mg/kg (³) 10 Trace metal (³) mg/kg (³) 1 or non-detectable, whichever is lower is lower in the properties of the prope				Max.
Density @ 15°C kg/m3 820 (½) 840 Viscosity @ 40°C mm2/s 2.0 (³) 4.0 Sulphur mg/kg (⁴) 10 Trace metal (⁵) mg/kg (⁴) 1 or non-detectable, whichever is lower Total aromatics % m/m 5 PAH (di+, tri+) % m/m 2.0 T90 (⁴) °C 320 T95 (⁴) °C 340 Final Boiling Point °C 66 Flash point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (¹) °C 66 CEPP or LTFT or CP (¹) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability Equal to or lower than the lowest expected ambient temperature Wethod 2 (Rencimat, modified) (³0, or hours 35 Method 2 (Rencimat, modified) (³0, or mg K0H/g 0.12 Method 2 (belta TAb) (³0, or mg K0H/g 0.12 <	Cetane Number		55.0	
Viscosity @ 40°C mm2/s 2.0 (³) 4.0 Sulphur mg/kg (³) 10 Trace metal (⁵) mg/kg 1 or non-detectable, whichever is lower total aromatics % m/m 15 PAH (di+, tri+) % m/m 2.0 20 190 (⁵) °C 320 340 195 (⁵) °C 340 340 Final Boiling Point °C 66 Eash point °C 66 Eash point °C 66 Earbon residue % m/m 0.20 CFP or LTFT or CP (¹) °C Equal to or lower than the lowest expected ambient temperature were were expected ambien	Cetane Index (1)			
Sulphur mg/kg (4) 10 Trace metal (5) mg/kg I or non-detectable, whichever is lower lower and aromatics % m/m 15 PAH (di+, tri+) % m/m 2.0 195 PAH (di+, tri+) % m/m 320 195 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190 190	Density @ 15°C	kg/m3		840
Trace metal (5) mg/kg I or non-detectable, whichever is lower 15 DAI (di+, tri+) % m/m 15 PAH (di+, tri+) % m/m 2.0 195 (6) °C 320 195 (6) °C 340 Final Boiling Point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (7) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability mg/kg 20 Wethod 1 g/m3 25 Method 2 (Racnimat, modified) (8), or hours 35 Method 2 (Delta TAN) (8), or mg KOH/g 0.12 Method 2 (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam volume ml 100 Foam volume sec. 15 Foam volume ml 0.08 Foam volume ml 0.08 Foam volume ml 0.08 Foam volum	Viscosity @ 40°C	mm2/s	2.0 (3)	4.0
Total aromatics % m/m 15 PAH (di+, tri+) % m/m 2.0 T90 (6) °C 320 T95 (6) °C 340 Final Boiling Point °C 66 Flash point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (7) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability 8 20 Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (6), or mg KOH/g 0.12 Method 2b (Delta TAN) (6), or mg KOH/g 0.12 Foam vanishing time sec. 15 Foam vanishing time sec. 15 Biological growth (9) y/v 4 5 (10) Chter biofuels (11) % v/v 30 (11) Cital acid number mg KOH/g 0.08 Ferrous corrosion		mg/kg ⁽⁴⁾		10
PAH (di+, tri+) % m/m 2.0 190 (s) °C 320 195 (s) °C 340 195 (s) °C 340 Final Bolling Point °C 66 Clarbon residue % m/m 0.20 CFPP or LTFT or CP (P) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability 25 Method 1 g/m3 25 Method 2 (Rancimat, modified) (R) or mg KOH/g 0.12 Method 2 (Delta TAN) (R) or mg KOH/g 0.12 Method 2 (PetroOxy) (R) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (R) % v/v 4 5 (R) Chebre Involved (M) % v/v 4 5 (R) Ethanol/Methanol % v/v 4 5 (R) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Cl	Trace metal (5)	mg/kg		I or non-detectable, whichever is lower
190 (6) °C 320 195 (6) °C 340 Final Boiling Point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (7) °C 66 Water mg/kg 200 Oxidation Stability 200 Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam valume ml 100 Foam valishing time sec. 15 Biological growth (9) % v/v 4 5 (10) Other biofuels (11) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion	Total aromatics	% m/m		15
Final Boiling Point °C 340 Flash point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (7) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 0xidation Stability 25 Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Foam voulume ml 100 Foam voulume ml 100 Foam vanishing time sec. 15 Biological growth (9) v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Class I Ash % m/m 0.001 (13) Ash % m/m	PAH (di+, tri+)			2.0
Final Boiling Point °C 66 Carbon residue % m/m 0.20 CFP or LTFT or CP (**) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability 25 Method 1 g/m3 25 Method 2a (Rancimat, modified) (**), or hours 35 Method 2b (Delta TAN) (**), or mg KOH/g 0.12 Method 2c (PetroOxy) (**) minutes 65 Foam volume sec. 15 Foam vanishing time sec. 15 Biological growth (**) y v/v 4 5 (**) Other biofuels (**) % v/v 30 (**) Tetal acid number mg KOH/g 0.08 0.08 Ferrous corrosion mg KOH/g Non-detectable (**) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Class I Ash % m/m 0.001 (**) Ash % m/m 0.001 (**) <td< td=""><td></td><td>°C</td><td></td><td>320</td></td<>		°C		320
Flash point °C 66 Carbon residue % m/m 0.20 CFPP or LTFT or CP (7) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or mog KOH/g 0.12 Method 2b (Delta TAN) (8), or mog KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) no growth 15 EMBE (10) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test	T95 ⁽⁶⁾	°C		340
Carbon residue % m/m 0.20 CFPP or LTFT or CP (P) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability TO 25 Method 1 g/m3 25 Method 2a (Rancimat, modifield) (%) or mg KOH/g 0.12 Method 2b (Delta TAN) (%) or mg KOH/g 0.12 Method 2c (PetroOxy) (%) minutes 65 Foam volume ml 100 Foam volume ml 10 Foam volume wl 10 Foam volume vl vl Biological growth (*) vl vl Other biofuels (III) % v/v 4 5 (III) Other biofuels (III) % v/v Non-detectable (III) Total acid number mg KOH/g Class I Soh <td>Final Boiling Point</td> <td>°C</td> <td></td> <td>350</td>	Final Boiling Point	°C		350
CFP or LTFT or CP (7) °C Equal to or lower than the lowest expected ambient temperature Water mg/kg 200 Oxidation Stability Pmod 25 Method 1 g/m3 25 Method 2a (Rancimat, modified) (8) or hours 35 Method 2b (Delta TAN) (8) or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam volume ml 100 Foam volume (9) sec. 15 Biological growth (9) x no growth FAME (10) % v/v 30 (11) Other biofuels (11) % v/v 30 (11) Other biofuels (11) % v/v Non-detectable (12) 0.08 Ferrous corrosion Eight rusting Cloas I Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total sec test method 10 Particulate contamination, size distribution code rating Clear and bri	Flash point	°C	66	
Water mg/kg żexpected ambient temperature Oxidation Stability 200 Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or mg KOH/g 0.12 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) ron growth 15 FAME (10) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion rating 0.08 Ferrous corrosion rating Class 1 Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per 150 4406 Appearance Clear and bright; no free water or particulates <tr< td=""><td>Carbon residue</td><td>% m/m</td><td></td><td>0.20</td></tr<>	Carbon residue	% m/m		0.20
Oxidation Stability Method I g/m3 25 Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) 100 Cher biofuels (11) % v/v 4 9 100 Cher biofuels (11) % v/v 30 101 Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per 150 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 2) % power loss 25	CFPP or LTFT or CP ⁽⁷⁾	°C		
Method 1 g/m3 25 Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Class I Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method I I Particulate contamination, size distribution code rating Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss Light rusting Clear and bright; no free water or particulates 85	Water	mg/kg		200
Method 2a (Rancimat, modified) (8), or hours 35 Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) % v/v no growth FAME (10) % v/v 4 5 (10) Other biofuels (11) % v/v Non-detectable (12) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Oxidation Stability			
Method 2b (Delta TAN) (8), or mg KOH/g 0.12 Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Method I	g/m3		25
Method 2c (PetroOxy) (8) minutes 65 Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) no growth FAME (10) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class 1 Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Method 2a (Rancimat, modified) (8), or	hours	35	
Foam volume ml 100 Foam vanishing time sec. 15 Biological growth (9) ron growth FAME (10) % v/v 4 7 5 (10) Other biofuels (11) % v/v 30 Non-detectable (12) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Method 2b (Delta TAN) ⁽⁸⁾ , or	mg KOH/g		0.12
Foam vanishing time Biological growth (9) FAME (10) Other biofuels (11) Other biofuels (11) Ethanol/Methanol My v/v Total acid number Mg KOH/g Copper corrosion Tating Copper corrosion rating Class I Ash Mm/m O.001 (13) Particulate contamination, total see test method Particulate contamination, size distribution Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % power loss Is 15 Injector cleanliness (Method 2) My v/v 4 Non-detectable (12)	Method 2c (PetroOxy) (8)	minutes	65	
Biological growth (9) FAME (10) Other biofuels (11) Other biofuels (11) Ethanol/Methanol W v/v 30 Non-detectable (12) Total acid number mg KOH/g Copper corrosion rating Class I Ash % m/m O.001 (13) Particulate contamination, total Particulate contamination, size distribution Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 10 See test method National or size of	Foam volume	ml		100
FAME (10) % v/v 4 5 (10) Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class 1 Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Foam vanishing time	sec.		15
Other biofuels (11) % v/v 30 (11) Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class 1 Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2				
Ethanol/Methanol % v/v Non-detectable (12) Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	FAME (10)	% v/v	4	5 (10)
Total acid number mg KOH/g 0.08 Ferrous corrosion Light rusting Copper corrosion rating Class 1 Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Other biofuels (11)	% v/v	30	(II)
Ferrous corrosion Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total Particulate contamination, size distribution rating Referrous corrosion See test method 10 Particulate contamination, size distribution Referrous corrosion See test method ID Referrous corrosion Iday of 18 / 16 / 13 per 150 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Ethanol/Methanol	% v/v		Non-detectable (12)
Copper corrosion rating Class I Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Total acid number	mg KOH/g		0.08
Ash % m/m 0.001 (13) Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Ferrous corrosion			Light rusting
Particulate contamination, total see test method 10 Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Copper corrosion	rating		
Particulate contamination, size distribution code rating 18/16/13 per ISO 4406 Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Ash	% m/m		0.001 (13)
Appearance Clear and bright; no free water or particulates Injector cleanliness (Method 1) % air flow loss 85 Injector cleanliness (Method 2) % power loss 2	Particulate contamination, total	see test method		10
Injector cleanliness (Method 1)% air flow loss85Injector cleanliness (Method 2)% power loss2	Particulate contamination, size distribution	code rating		18/16/13 per ISO 4406
Injector cleanliness (Method 2) % power loss 2	Appearance		Clear and b	right; no free water or particulates
Injector cleanliness (Method 2) % power loss 2	Injector cleanliness (Method 1)	% air flow loss		85
Lubricity (HFRR wear scar dia. @ 60°C) micron 400		% power loss		2
	Lubricity (HFRR wear scar dia. @ 60°C)	micron		400

Footnotes

- (1) Cetane Index is acceptable instead of Cetane Number if a standardized engine to determine the Cetane Number is unavailable and Cetane improvers are not used. When Cetane improvers are used, the estimated Cetane Number must be greater than or equal to the specified value and the Cetane Index must be greater than or equal to the number in parenthesis.
- (2) May relax the minimum limit to 800 kg/m3 when ambient temperatures are below -30°C. For environmental purposes, a minimum of 815 kg/m3 can be adopted.
- (3) May relax the minimum limit to 1.5 mm2/s when ambient temperatures are below -30°C or to 1.3 mm2/s when ambient temperatures are below -40°C.
- (4) The unit mg/kg is often expressed as ppm.
- (5) Examples of trace metals include, but are not limited to, Cu, Fe, Mn, Na, P, Pb, Si and Zn. Another undesirable element is Cl. No trace metal should exceed I mg/kg. No intentional addition of metal-based additives is allowed.
- (6) Compliance with either T90 or T95 is required.
- (7) If compliance is demonstrated by meeting CFPP, then it must be no more than 10°C less than cloud point.
- (8) Methods 2a and 2b must be used with fuels containing FAME. Method 2c correlation data are based on fuels containing FAME.
- (9) Alternative test methods, with appropriate limits for no biological growth, can be used.
- (10) For FAME, both EN14214 and ASTM D6751, or equivalent standards, should be considered. Where FAME is used, the blendstock should meet the B100 Guidelines.
- (11) Other biofuels include HVO and BTL. Blending level must allow the finished fuel to meet all the required specifications.
- (12) At or below detection limit of the test method used.
- (13) Limit and test method are under review to assure DPF endurance.