

**AVERAGE TESTED VALUE OF BUNKERS (DISTILLATE & RESIDUAL BASED FUELS) BY
THE MARITIME PORT AUTHORITY OF SINGAPORE FOR 3Q 2024**

A. Distillate

Characteristic	Unit	Average Tested Value 2Q 2024	Average Tested Value 3Q 2024	Test Method
Kinematic Viscosity @ 40°C	mm ² /s	3.845	3.755	ISO 3104
Density @15°C	kg/m ³	864.5	868.9	ISO 12185
Cetane Index	-	46.8	45.2	ISO 4264
Sulphur	% (m/m)	0.084	0.086	ISO 8754
Flash point	°C	76.0	77.0	ISO 2719
Hydrogen Sulfide	mg/kg	<0.60	<0.60	IP 570
Acid number	mg KOH/g	<0.10	<0.10	ASTM D664
Total Sediment Hot Filtration	% (m/m)	-	-	ISO 10307-1
Carbon Residue	% (m/m)	<0.10	<0.10	ISO 10370
Cloud Point	°C	-2	3	ISO 3015
CFPP	°C	-4	0	ASTM D6371
Pour Point	°C	-9	-6	ISO 3016
Ash	mass %	<0.001	<0.001	ISO 6245
Lubricity	µm	323	343	ISO 12156-1
Water	% (m/m)	-	-	ISO 12937
Oxidation Stability	g/m ³	6	6	ISO 12205
Strong Acid Number	mg KOH/g	-	Zero	ASTM D664
Total Organic Halogen Content as Chlorine	mg/kg	-	<2	EN 14077

B. Residual Fuels - VLSFO

Characteristic	Unit	Average Tested Value 2Q 2024	Average Tested Value 3Q 2024	Test Method
Kinematic Viscosity @50°C	mm ² /s	145.8	130.8	ISO 3104
Density @15°C	kg/m ³	950.7	957.4	ISO 12185
CCAI	-	823.7	832.6	ISO 8217 Annex F
Sulphur	% (m/m)	0.50	0.49	ISO 8754
Flash point	°C	81.0	83.5	ISO 2719
Hydrogen Sulfide	mg/kg	<0.60	<0.60	IP 570
Acid number	mg KOH/g	0.94	0.85	ASTM D664
Total Sediment Potential	% (m/m)	0.03	0.03	ISO 10307-2
Carbon Residue	% (m/m)	5.92	5.88	ISO 10370
Pour Point	°C	12	15	ISO 3016
Water	% (V/V)	0.22	0.26	ISO 3733
Ash	% (m/m)	0.026	0.026	ISO 6245
Vanadium	mg/kg	10	8	IP 501
Sodium	mg/kg	24	33	IP 501
Aluminium plus Silicon	mg/kg	36	39	IP 501
Calcium	mg/kg	24	26	IP 501
Zinc	mg/kg	2	1	IP 501
Phosphorus	mg/kg	1	1	IP 501
Strong Acid Number	mg KOH/g	-	Zero	ASTM D664
Total Organic Halogen Content as Chlorine	mg/kg	-	2	EN 14077

C. Residual-HSFO

Characteristic	Unit	Average Tested Value 2Q 2024	Average Tested Value 3Q 2024	Test Method
Kinematic Viscosity @50°C	mm ² /s	345.6	348.3	ISO 3104
Density @15°C	kg/m ³	981.4	979.4	ISO 12185
CCAI	-	844.3	842.2	ISO 8217 Annex F
Sulphur	% (m/m)	2.94	3.00	ISO 8754
Flash point	°C	87.5	90.0	ISO 2719
Hydrogen Sulfide	mg/kg	<0.60	<0.60	IP 570
Acid number	mg KOH/g	0.19	0.19	ASTM D664
Total Sediment Potential	% (m/m)	0.02	0.02	ISO 10307-2
Carbon Residue	% (m/m)	13.23	12.57	ISO 10370
Pour Point	°C	0	-1	ISO 3016
Water	% (V/V)	0.20	0.22	ISO 3733
Ash	% (m/m)	0.045	0.045	ISO 6245
Vanadium	mg/kg	127	152	IP 501
Sodium	mg/kg	25	25	IP 501
Aluminium plus Silicon	mg/kg	24	21	IP 501
Calcium	mg/kg	7	6	IP 501
Zinc	mg/kg	3	1	IP 501
Phosphorus	mg/kg	1	<1	IP 501
Strong Acid Number	mg KOH/g	-	Zero	ASTM D664
Total Organic Halogen Content as Chlorine	mg/kg	-	3	EN 14077

D. Bio-Residual¹

Characteristic	Unit	Average Value 2Q 2024	Average Value 3Q 2024	Test Method
Kinematic Viscosity @50°C	mm ² /s	51.19	45.83	ISO 3104
Density @15°C	kg/m ³	934.3	936.0	ISO 12185
CCAI	-	820.9	824.2	ISO 8217 Annex F
Sulphur	% (m/m)	0.50	0.42	ISO 8754
Flash point	°C	90.0	102.0	ISO 2719
Hydrogen Sulfide	mg/kg	<0.60	<0.60	IP 570
Acid number	mg KOH/g	0.53	0.67	ASTM D664
Total Sediment Potential	% (m/m)	0.02	0.02	ISO 10307-2
Carbon Residue	% (m/m)	6.25	5.67	ISO 10370
Pour Point	°C	12	14	ISO 3016
Water	% (V/V)	0.15	0.19	ISO 3733
Ash	% (m/m)	0.020	0.023	ISO 6245
Vanadium	mg/kg	11	10	IP 501
Sodium	mg/kg	18	23	IP 501
Aluminium plus Silicon	mg/kg	26	24	IP 501
Calcium	mg/kg	12	18	IP 501
Zinc	mg/kg	2	2	IP 501
Phosphorus	mg/kg	1	1	IP 501
FAME content	% (m/m)	23.9	23.8	ASTM D7963

¹ Based on COQs received.

E. B100²

Characteristic	Unit	Average Value 2Q 2024	Average Value 3Q 2024	Test Method
Ester Content	% (m/m)	-	98.5	EN 14103
Density @15°C	kg/m ³	-	875.9	EN ISO 12185
Kinematic Viscosity @ 40 °C	mm ² /s	-	4.471	EN ISO 3104
Flash Point, PMCC	°C	-	165.5	EN ISO 2719
Cetane Number	-	-	60.5	EN ISO 5165
Copper Corrosion @ 50°C (122°F) for 3hrs	-	-	1a	EN ISO 2160
Oxidation Stability @ 110°C	hrs	-	>8	EN 14112
Acid Value	mg KOH/g	-	0.35	EN 14104
Iodine Value	g iodine /100g	-	51.8	EN 14111
Linolenic Acid Methyl Ester Content	% (m/m)	-	1	EN 14103
Polyunsaturated (>= 4 Double Bonds) Methyl Esters	% (m/m)	-	<0.60	EN 15779
Methanol Content	% (m/m)	-	0.026	EN 14110
Monoglycerides Content	% (m/m)	-	0.29	EN 14105
Diglycerides Content	% (m/m)	-	<0.10	EN 14105
Triglycerides Content	% (m/m)	-	<0.10	EN 14105
Free Glycerol	% (m/m)	-	0.009	EN 14105
Total Glycerol	% (m/m)	-	0.091	EN 14105
Water content	mg/kg	-	263	EN ISO 12937
Total Contamination	mg/kg	-	13.8	EN 12662
Sulfated Ash Content	% (m/m)	-	<0.02	ISO 3987
Sulfur Content	mg/kg	-	5	EN ISO 20846
Group II Metals (Ca + Mg)	mg/kg	-	<2	EN 14538
Group I Metals (Na + K)	mg/kg	-	<2	EN 14538
Phosphorus Content	mg/kg	-	<4	EN 14107
Cold Filter Plugging Point (CFPP)	°C	-	11	EN 116

² Based on COQs received.