

**AVERAGE TESTED VALUE OF BUNKERS (DISTILLATE & RESIDUAL FUELS)
BY MARITIME PORT AUTHORITY SINGAPORE FOR 1st QUARTER 2024**

A. Distillate Fuels

Characteristic	Unit	Average Tested Value 4Q 2023	Average Tested Value 1Q 2024	Test Method
Kinematic Viscosity @ 40°C	mm ² /s	3.869	4.017	ISO 3104
Density @15°C	kg/m ³	869.3	867.3	ISO 12185
Cetane Index	-	44.6	46.1	ISO 4264
Sulphur	% (m/m)	0.093	0.078	ISO 8754
Flash point	°C	70.0	70.0	ISO 2719
Hydrogen Sulfide	mg/kg	0.01	0.01	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	5	6	ISO 3015
CFPP	°C	1	2	ASTM D6371
Pour Point	°C	-6	-6	ISO 3016
Ash	mass %	0.001	0.001	ISO 6245
Lubricity	µm	316	319	ISO 12156-1
Water	% (m/m)	-	-	ISO 12937
Oxidation Stability	g/m ³	10	8	ISO 12205
FAME	% (V/V)	0.06	0.07	IP 579 Range A

B. Residual Fuels - VLSFO

Characteristic	Unit	Average Tested Value 4Q 2023	Average Tested Value 1Q 2024	Test Method
Kinematic Viscosity @50°C	mm ² /s	116.0	136.5	ISO 3104
Density @15°C	kg/m ³	949.7	950.2	ISO 12185
CCAI	-	827.2	824.1	ISO 8217 Annex F
Sulphur	% (m/m)	0.48	0.48	ISO 8754
Flash point	°C	70.0	69.0	ISO 2719
Hydrogen Sulfide	mg/kg	0.01	0.02	IP 570
Acid number	mg KOH/g	0.72	0.85	ASTM D664
Total Sediment Potential	% (m/m)	0.02	0.02	ISO 10307-2
Carbon Residue	% (m/m)	5.90	6.06	ISO 10370
Pour Point	°C	15	15	ISO 3016
Water	% (V/V)	0.22	0.25	ISO 3733
Ash	% (m/m)	0.021	0.028	ISO 6245
Vanadium	mg/kg	6	8	IP 501
Sodium	mg/kg	15	18	IP 501
Aluminium plus Silicon	mg/kg	28	33	IP 501
Calcium	mg/kg	14	21	IP 501
Zinc	mg/kg	1	1	IP 501
Phosphorus	mg/kg	1	1	IP 501

C. Residual-HSFO

Characteristic	Unit	Average Tested Value 4Q 2023	Average Tested Value 1Q 2024	Test Method
Kinematic Viscosity @50°C	mm ² /s	354.6	346.5	ISO 3104
Density @15°C	kg/m ³	981.7	980.2	ISO 12185
CCAI	-	843.8	842.4	ISO 8217 Annex F
Sulphur	% (m/m)	2.82	2.88	ISO 8754
Flash point	°C	70.0	70.0	ISO 2719
Hydrogen Sulfide	mg/kg	0.01	0.01	IP 570
Acid number	mg KOH/g	0.22	0.21	ASTM D664
Total Sediment Potential	% (m/m)	0.02	0.02	ISO 10307-2
Carbon Residue	% (m/m)	12.86	13.51	ISO 10370
Pour Point	°C	9	9	ISO 3016
Water	% (V/V)	0.29	0.30	ISO 3733
Ash	% (m/m)	0.046	0.044	ISO 6245
Vanadium	mg/kg	145	140	IP 501
Sodium	mg/kg	24	25	IP 501
Aluminium plus Silicon	mg/kg	21	22	IP 501
Calcium	mg/kg	5	6	IP 501
Zinc	mg/kg	1	1	IP 501
Phosphorus	mg/kg	1	1	IP 501