

**AVERAGE TESTED VALUE OF BUNKERS (DISTILLATE & RESIDUAL FUELS)  
BY MARITIME PORT AUTHORITY SINGAPORE FOR 1<sup>st</sup> QUARTER 2022**

A. Distillate Fuels

Characteristic	Unit	Average Tested Value 1Q 2022	Average Tested Value 4Q 2021	Test Method
Kinematic viscosity @ 40°C	mm <sup>2</sup> /s	3.650	3.527	ISO 3104
Density @15°C	kg/m <sup>3</sup>	869.833	866.267	ISO 12185
Cetane Index	-	44.067	44.800	ISO 4264
Sulphur	mass%	0.073	0.097	ISO 8754
Flash point	°C	69.933	70.000	ISO2719
Hydrogen Sulfide	mg/kg	0.010	0.017	IP 570
Acid number	mg KOH/g	0.100	0.100	ASTM D664
Total Sediment Hot Filtraton	mass %	-	-	ISO 10307-1
Carbon Residue	mass %	0.023	0.300	10370
Cloud Point	°C	5.167	2.667	ISO 3015
CFPP	°C	-0.900	-2.667	ASTM D6371
Pour Point	°C	-6.433	-7.833	ISO 3016
Ash	mass %	0.001	0.010	ISO 6245
Lubricity	microns	373.267	367.167	ISO 12156-1
Water	volume %	0.000	0.010	ISO 12937
Oxidation Stability	g/m <sup>3</sup>	4.100	7.600	ISO 12205
Fame	volume %	0.087	0.060	IP 579 Range A

B. Residual Fuels - VLSFO

Characteristic	Unit	Average Tested Value 1Q 2022	Average Tested Value 4Q 2021	Test Method
Kinematic Viscosity@50°C	mm <sup>2</sup> /s	121.347	111.473	ISO 3104
Density @15°C	kg/m <sup>3</sup>	952.900	952.033	ISO 12185
CCAI	-	829.000	828.800	ISO 8217 Annex F
Sulphur	mass%	0.480	0.480	ISO 8754
Flash point	°C	68.800	68.900	ISO 2719
Hydrogen Sulfide	mg/kg	0.010	0.013	IP 570
Acid number	mg KOH/g	0.993	1.033	ASTM D664
Total Sediment	mass %	0.023	0.020	ISO 10307-2
Carbon Residue	mass %	6.233	6.063	ISO 10370
Pour Point	°C	13.333	12.767	ISO 3016
Water	volume %	0.223	0.237	ISO 3733
Ash	mass %	0.030	0.026	ISO 6245
Vanadium	mg/kg	10.667	9.767	IP 501
Sodium	mg/kg	18.000	20.367	IP 501
Aluminium plus Silicon	mg/kg	26.000	22.867	IP 501
Calcium	<30	25.667	23.900	IP 501
Zinc	<15	1.000	1.267	IP 501
Phosphorus	<15	1.000	1.300	IP 501

C. Residual-HFO

<b>Characteristic</b>	<b>Unit</b>	<b>Average Tested Value 1Q 2022</b>	<b>Average Tested Value 4Q 2021</b>	<b>Test Method</b>
Kinematic Viscosity @50°C	mm <sup>2</sup> /s	322.230	326.297	ISO 3104
Density @15°C	kg/m <sup>3</sup>	981.933	979.467	ISO 12185
CCAI	-	845.333	842.000	ISO 8217 Annex F
Sulphur	mass%	3.260	3.277	ISO 8754
Flash point	°C	69.033	69.733	ISO 2719
Hydrogen Sulfide	mg/kg	0.010	0.010	IP 570
Acid number	mg KOH/g	0.197	0.273	ASTM D664
Total Sediment	mass %	0.037	0.030	ISO 10307-2
Carbon Residue	mass %	14.680	13.407	ISO 10370
Pour Point	°C	9.000	9.000	ISO 3016
Water	volume %	0.283	0.257	ISO 3733
Ash	mass %	0.048	0.047	ISO 6245
Vanadium	mg/kg	142.333	148.000	IP 501
Sodium	mg/kg	27.333	23.667	IP 501
Aluminium plus Silicon	mg/kg	15.667	14.667	IP 501
Calcium	<30	8.333	12.333	IP 501
Zinc	<15	1.667	1.667	IP 501
Phosphorus	<15	1.000	1.333	IP 501