Page **1** of **2**

 **PRODUCT SPECIFICATION: AUTOMOTIVE DIESEL OIL FOR SINGAPORE, 10 PPM SULFUR**

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| **(GASOIL 0.001% SGP) INSPECTION**   | **TEST METHOD**   | **LIMITS**   |
| **PHYSICAL**   |  |
| 1  | Density @ 15°C, kg/L  | ASTM D1298 (\*1) / D4052  | 0.82 to 0.845  |
| 2  | Colour, ASTM  | ASTM D1500  | 2.0 max  |
| 3  | Appearance @ 30°C  | ASTM D4176 Procedure 1  | Pass  |
| 4  | Lubricity HFRR, (WSD 1,4) @ 60°C, um (\*2)  | IP450 / ASTM D6079  | 460 max  |
| **COMPOSITION**   |  |
| 5  | Total Sulfur, ppm  | ASTM D5453  | 10 max  |
| 6  | Polycyclic Aromatic Hydrocarbon, %m/m  | ASTM D6591  | 8.0 max  |
| **CORROSION**   |  |
| 7  | Corrosion, Copper (3h @ 100°C)  | ASTM D130  | No. 1 max  |
| 8  | Strong Acid Number, mg KOH/g  | ASTM D664  | Nil  |
| 9  | Total Acid Number, mg KOH/g  | ASTM D664  | 0.25 max  |
| **VOLATILITY**   |  |
| 10  | Distillation: Initial Boiling Point 10% Recovered, °C 50% Recovered, °C 95% Recovered, °C Recovered @ 250 °C, %v/v Recovered @ 350 °C, %v/v  | ASTM D86  | To report To report To report 360.0 max 65 max 85 min  |
| 11  | Flash Point, °C  | ASTM D93  | 66 min  |
| **COMBUSTION**   |  |
| 12  | Ash, % m/m  | ASTM D482  | 0.01 max  |
| 13  | Microcarbon Residue on 10% Distillation Residue, % m/m  | ASTM D4530  | 0.10 max  |
| 14  | Cetane Index  | ASTM D4737  | 49.0 min  |
| 15  | Cetane Number (\*3)  | ASTM D613  | 51.0 min  |
| **FLUIDITY**   |  |
| 16  | Pour Point, °C (\*4)  | ASTM D97 /D5950  | 9 max  |
| 17  | Kinematic Viscosity @ 40°C, cSt  | ASTM D445  | 1.7 to 5.5  |
| **CONTAMINANTS**   |  |
| 18  | Sediment by Extraction, % m/m  | ASTM D473  | 0.01 max  |
| 19  | Water Content, % v/v  | ASTM D95 (\*1) / D6304  | 0.05 max  |

 Notes:

\*1 Referee method.

 Page **2** of **2**

 **PRODUCT : UNLEADED PREMIUM MOTOR GASOLINE 95R - ULG95**

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| **For Singapore Market INSPECTION**   | **TEST METHOD**   | **LIMITS**   |
| 1  | Colour  | Visual  | Undyed  |
| 2  | Corrosion, Copper (3h @ 50°C)  | ASTM D130  | No.1 max  |
| 3  | Density @ 15°C, kg/L  | ASTM D1298 (\*1)/ D4052  | To report  |
| 4  | Distillation: IBP, °C 10% Evaporated, °C 50% Evaporated, °C 90% Evaporated, °C Final Boiling Point, °C Residue, % v/v Loss, % v/v  | ASTM D86  | To report 74.0 max 77.0 to 110.0 130.0 to 180.0 215.0 max 2.0 max To report  |
| 5  | Doctor Test  | IP 30  | Negative (\*2)  |
| 6  | Existent Gum, mg/100 Ml  | ASTM D381  | 4 max  |
| 7  | Induction Period, minutes  | ASTM D525  | 240 min  |
| 8  | Lead, mg/L  | IP 224  | 5 max (\*3)  |
| 9  | Octane Number: RON MON  | ASTM D2699 ASTM D2700  | 95.0 min 83.0 min  |
| 10  | Odour  | -  | Marketable  |
| 11  | Phosphorous, mg/L  | ASTM D3231  | 1.3 max (\*3)  |
| 12  | Dry Vapor Pressure Equivalent, kPa or Reid Vapour Pressure, kPa  | ASTM D5191 (\*1) ASTM D323  | 70.0 max 70.0 max  |
| 13  | Sulfur, ppm(wt)  | ASTM D7039/ D5453  | 50 max  |
| 14  | Vapour-Liquid Ratio of 20:1 (Estimated), oC  | ASTM D4814  | 54.0 min  |

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| **INSPECTION**   | **TEST METHOD**   | **LIMITS**   |
| 15  | Benzene Content, % v/v  | ASTM D5580  | 3.5 max  |
| 16  | MTBE, % v/v  | (\*4)  | 10 max  |
| Additives: The type and amount (based on active ingredient) to be shown on quality documents:  |
| 1  | Anti-oxidant: Type Active concentration, mg/L  | - -  | To report 71 max  |

**Notes** :

\*1 Referee method.

\*2 Alternatively: Mercaptan Sulfur, % mass = 0.0015 max by ASTM D3227 \*3 On undyed product.

\*4 Volume calculation or tested by ASTM D4815.