**SCOPE 10 ЛИК**

**SAYBOLT-BULGARIA LTD**

**TEST CENTRE SAYBOLT-BULGARIA**

**Management and Laboratory address**:

8104, Burgas, Industrial Zone № 3, Lukoil Neftohim Burgas AD

**I.To perform testing of**:

| **Type of the scope**: *flexible for a part of the scope* | | | |
| --- | --- | --- | --- |
| **№** | **Tested products** | **Type of test / characteristic** | **Testing methods**  **(standard/ validated method)** |
| 1 | 2 | 3 | 4 |
| 1. | CRUDE OIL | 1.1 Density | БДС EN ISO 3675  ASTM D 1298  ASTM D 5002 |
| 1.2 Sulfur content | БДС EN ISO 8754  ASTM D 4294 |
| 1.3 Water content | БДС EN ISO 9029  ASTM D 4006 |
| 1.4Salts content | ASTM D 3230 |
| 1.5 Sediments (by extraction) | БДС EN ISO 3735  ASTM D 473 |
| 1.6 Maximum pour point | ASTM D 5853 (A) |
| 2. | AUTOMOTIVE FUELS, UNLEADED  GASOLINES, GASOLINES,  BIOGASOLINE, | 2.1 Appearance | БДС ISO 1998**-**2  БДС EN 228 cl.5.4  ASTM D 4176 |
| 2.2 Density | БДС EN ISO 3675  ASTM D 1298  БДС EN ISO 12185  ASTM D 4052 |
| 2.3 Distillation characteristics | БДС EN ISO 3405  ASTM D 86 |
| 2.4 Vapour pressure (Reid method) | ASTM D 323 |
| 2.5 Volatility index | БДС EN 228 cl.5.5.2 |
| 2.6 Sulfur content | БДС EN ISO 8754  ASTM D 4294  БДС EN ISO 20846  ASTM D 5453  БДС EN ISO 20884 |
| 2.7 Copper strip corrosion | БДС EN ISO 2160  ASTM D 130  ASTM D 4814 cl.7.1.4 |
| 2.8 Gum content (unwashed or solvent washed) | БДС EN ISO 6246  ASTM D 381 |
| 2.9 Vapour pressure | БДС EN 13016-1  ASTM D 5191 |
| 2.10 Lead content | БДС EN 237  ASTM D 3237 |
| 2.11 Water-soluble acids and bases | БДС 5252  ASTM D 1093 |
| * 1. ydrocarbon type:   - Arenes (aromatic)  - Alkenes (olefins)  - Saturated (paraffins) | БДС ISO 3837  ASTM D 1319  ASTM D 5134  БДС EN 15553  ASTM D 6839  ASTM D 5443  БДС EN ISO 22854 |
| 2.13 Motor Octane number, MON | БДС EN ISO 5163  ASTM D 2700  ГОСТ 511  ГОСТ Р 52946 |
| 2.14 Research Octane number, RON | БДС EN ISO 5164  ASTM D 2699  ГОСТ 8226  ГОСТ Р 52947 |
| 2.15 Mercaptan sulfur | БДС ISO 3012  ASTM D 3227  UOP 163 |
| 2.16 Hydrogen sulfide | ASTM D 4952  БДС 5579  UOP 163 |
| 2.17 Oxygen content | БДС EN 13132  БДС EN ISO 22854  ASTM D 6839 |
| 2.18 Oxygen-containing compounds | БДС EN 13132  БДС EN ISO 22854  ASTM D 6839 |
| 2.19 Methyl tert-butyl ether (MTBE) content | IP PM BG/91 (modified) |
| 2.20 Benzene content | БДС EN 12177  ASTM D 5134  БДС EN ISO 22854  ASTM D 6839 |
| 2.21 Oxidation stability (Induction period) | БДС EN ISO 7536  ASTM D 525 |
| 2.22 Manganese content | БДС EN 16135  БДС EN 16136 |
| 2.23 Saybolt colour | ASTM D 156 |
| 2.24 Metals content  - Lead  - Arsenic | ВЛМИ-СБ/001/2019 |
| 2.25 Iron content | БДС EN 16136 |
| 3. | FUELS FOR DIESEL ENGINES, GASOILS FOR INDUSTRIAL AND COMMUNAL PURPOSES, MARINE DISTILLATE FUELS | 3.1 Density | БДС EN ISO 3675  ASTM D 1298  БДС EN ISO 12185  ASTM D 4052 |
| 3.2 Appearance | ASTM D 4176 |
| 3.3 Distillation characteristics | БДС EN ISO 3405  ASTM D 86 |
| 3.4 Sulfur content | БДС EN ISO 8754  ASTM D 4294  БДС EN ISO 20846  ASTM D 5453  БДС EN ISO 20884 |
| 3.5 Copper strip corrosion | БДС EN ISO 2160  ASTM D 130 |
| 3.6 Water-soluble acids and bases | БДС 5252 |
| 3.7 Hydrogen sulfide | БДС 5579 |
| 3.8 Cetane number, CN | БДС EN ISO 5165  ASTM D 613 |
| 3.9 Cetane index | БДС EN ISO 4264  ASTM D 4737  ASTM D 976 |
| 3.10 Kinematic viscosity | БДС EN ISO 3104  ASTM D 445 |
| 3.11 Flash point (closed-cup), Pensky- Martens | БДС EN ISO 2719  ASTM D 93 |
| 3.12 Ash content | БДС EN ISO 6245  ASTM D 482 |
| 3.13 Carbon Residue | БДС ISO 6615  ASTM D 189  БДС EN ISO 10370  ASTM D 4530 |
| 3.14 Water content | БДС EN ISO 12937  БДС ISO 3733  ASTM D 6304  ASTM D 95 |
| 3.15 Water and sediments | ASTM D 2709 |
| 3.16 Cloud point | БДС EN ISO 3015  ASTM D 2500 |
| 3.17 ASTM scale colour | БДС ISO 2049  ASTM D 1500 |
| 3.18 Lubrication ability at 60°C | БДС EN ISO 12156-1  ASTM D 6079 |
| 3.19 Fatty acids methyl esters (FAME) content | БДС EN 14078 |
| 3.20 Acid number | ASTM D 974  ASTM D 664 |
| 3.21 Freezing point | БДС 1751 |
| 3.22 Pour point | БДС EN ISO 3016  ASTM D 97 |
| 3.23 Cold filter plugging point (CFPP) | БДС EN 116  ASTM D 6371 |
| 3.24 Oxidation stability | БДС EN ISO 12205  ASTM D 2274 |
| 3.25 Total contamination | БДС EN 12662-1  IP 440 |
| 3.26 Total sediment by hot filtration | БДС ISO 10307-1  ASTM D 4870  IP 375 |
| 3.27 Aromatic hydrocarbons type  - Monoaromatic  - Diaromatic  - Triaromatic (arenes)  - Polycyclic aromatic (arenes) | БДС EN 12916  IP 391 |
| 3.28 Manganese content | БДС EN 16576 |
| 3.29 Specific heat of combustion | БДС ISO 8217 Annex J  ASTM D 4868 |
| 3.30 Oxidation stability by accelerated oxidation method, 110°C | БДС EN 15751 |
| 3.31 Iron content | БДС EN 16576 |
| 3.32 Electrical conductivity | ASTM D 2624 |
| 3.33 Solvent Blue 79 Similar content | ВЛМИ-СБ/002/2024 |
| 3.34 Content:  - n-Butyl phenyl ether (Butoxybenzene)  - ACCUTRACETM PLUS | ВЛМИ-СБ/003/2024 |
| 4. | BIODIESEL | 4.1 Density | БДС EN ISO 3675  ASTM D 1298  БДС EN ISO 12185  ASTM D 4052 |
| 4.2 Sulfur content | БДС EN ISO 20846  ASTM D 5453 |
| 4.3 Copper strip corrosion | БДС EN ISO 2160  ASTM D 130 |
| 4.4 Cetane number, CN | БДС EN ISO 5165  ASTM D 613 |
| 4.5 Kinematic viscosity | БДС EN ISO 3104  ASTM D 445 |
| 4.6 Flash point (closed-cup), Pensky - Martens | БДС EN ISO 2719  ASTM D 93 |
| 4.7 Carbon Residue | БДС EN ISO 10370  ASTM D 4530 |
| 4.8 Water content | БДС EN ISO 12937  ASTM D 6304 |
| 4.9 Pour point | БДС EN ISO 3016  ASTM D 97 |
| 4.10 Cold filter plugging point (CFPP) | БДС EN 116  ASTM D 6371 |
| 4.11 Total contamination | БДС EN 12662-2  IP 440 |
| 4.12 Oxidation stability by accelerated oxidation method, 110°C | БДС EN 15751  БДС EN 14112 |
| 5. | FUEL OILS, MARINE RESIDUAL FUELS | 5.1 Density | БДС EN ISO 3675  ASTM D 1298  БДС EN ISO 12185  ASTM D 4052 |
| 5.2 Sulfur content | БДС EN ISO 8754  ASTM D 4294 |
| 5.3 Water-soluble acids and bases | БДС 5252 |
| 5.4 Kinematic viscosity | БДС EN ISO 3104  ASTM D 445 |
| 5.5 Flash point (closed-cup), Pensky- Martens | БДС EN ISO 2719  ASTM D 93 |
| 5.6 Ash content | БДС EN ISO 6245  ASTM D 482 |
| 5.7 Carbon Residue | БДС ISO 6615  ASTM D 189  БДС EN ISO 10370  ASTM D 4530 |
| 5.8 Water content | БДС ISO 3733  ASTM D 95 |
| 5.9 Water and sediments | БДС ISO 3734  ASTM D 1796 |
| 5.10 Sediments (by extraction) | БДС EN ISO 3735  ASTM D 473 |
| 5.11 Specific heat of combustion | БДС ISO 8217 Annex J  ASTM D 4868 |
| 5.12 Freezing point | БДС 1751 |
| 5.13 Pour point | БДС EN ISO 3016  ASTM D 97 |
| 5.14 Flash point open - cup | БДС EN ISO 2592  ASTM D 92 |
| 5.15 ASTM scale colour | БДС ISO 2049  ASTM D 1500 |
| 5.16 Acid number | ASTM D 664 |
| 5.17 Total sediment by hot filtering | БДС ISO 10307-1/2  ASTM D 4870  IP 375  IP 390 |
| 5.18 Asphaltene content | ASTM D 6560  IP 143 |
| 5.19 Element content  - Sodium  - Nickel  - Calcium  - Vanadium  - Aluminum  - Silicon  - Zinc  - Iron | IP 470 |
| 5.20 Element content  - Phosphorus  - Sodium  - Nickel  - Calcium  - Vanadium  - Aluminum  - Silicon  - Zinc  - Iron | IP 501 |
| 5.21 Element content  - Aluminum  - Silicon | ASTM D 5184 |
| 5.22 Metal content  - Sodium  - Nickel  - Vanadium  - Iron | ASTM D 5863 |
| 6. | JET FUELS | 6.1 Density | БДС EN ISO 3675  ASTM D 1298  БДС EN ISO 12185  ASTM D 4052 |
| 6.2 Distillation characteristics | БДС EN ISO 3405  ASTM D 86 |
| 6.3 Sulfur content | БДС EN ISO 8754  ASTM D 4294  БДС EN ISO 20846  ASTM D 5453  БДС EN ISO 20884 |
| 6.4 Specific heat of combustion | ASTM D 3338 |
| 6.5 Copper strip corrosion | БДС EN ISO 2160  ASTM D 130 |
| * 1. Hydrocarbon type:   - Arenes (aromatic)  - Alkenes (olefins)  - Saturated (paraffins) | ASTM D 1319  БДС EN 15553 |
| 6.7 Content of resins  -ubwashed, washed with solvent | БДС EN ISO 6246  ASTM D 381 |
| 6.8 Mercaptan sulfur | БДС ISO 3012  ASTM D 3227  UOP 163 |
| 6.9 Hydrogen sulfide | ASTM D 4952  UOP 163 |
| 6.10 Saybolt colour | ASTM D 156 |
| 6.11 electrical conductivity | ASTM D 2624 |
| 7. | METHYL TERT- BUTYL ETHER (MTBE) | 7.1 Appearance | БДС ISO 1998-2  ASTM D 4176 |
| 7.2 Density | ASTM D 4052  БДС EN ISO 12185 |
| 7.3 Methyl tert-butyl ether (MTBE) | ASTM D 5441 |
| 7.4 Methanol | ASTM D 5441 |
| 7.5 Tert-butyl alcohol (TBA) | ASTM D 5441 |
| 7.6 Water content | ASTM E 1064 |
| 7.7 Sulfur content | БДС EN ISO 20846  ASTM D 5453 |
| 8. | TECHNICAL SULFUR | 8.1 Sulfur content | БДС 1678 cl. 4.1 |
| 8.2 Ash content | БДС 1678 cl. 4.5 |
| 8.3 Acids content recalculated as H2SO4 | БДС 1678 cl. 4.4 |
| 8.4 Organic substances content | БДС 1678 cl. 4.5 |
| 8.5 Moisture content | БДС 1678 cl. 4.9 |

***\*Flexible Scope:*** *Implementing a new version of standards/documents or standards/ documents replacing them is allowed. An updated list of standards/documents and their dated versions is provided by CAB.*

**References:**

1. ВЛМИ-СБ/001/2019-Determination of the content of lead and arsenic in motor fuels and components for fuels, by ICP-OEC, from 2019.

2. IP PM BG/91 (modified)-Determination of the content of methyl tert-Butyl ether (MTBE) and tert- Amyl methyl ether (TAME) in light distillate raw materials - gas chromatography method.

3. ВЛМИ-СБ/002/2024-Determination of the content of the Solvent Blue 79 Similar marker using a spectrophotometer with ultraviolet measurement capabilities - Cary Win UV 50 BIO, from 2024.

4. ВЛМИ-СБ/003/2024- Determination of the content of n-Butyl phenyl ether (Butoxybenzene) in diesel fuels by two-dimensional gas chromatography with mass selective detector (GCMS) and calculation of the total content of the fuel marker ACCUTRACE ™ Plus, from 2024.

II. To perform sampling of:

|  |  |  |
| --- | --- | --- |
| **Type of the scope:** *flexible\** | | |
| **№** | **Tested products** | **Sampling methods**  **(standard/validated method)** |
| 1 | 2 | 3 |
| 1. | Crude oil | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 2. | Automotive fuels, unleaded gasolines, gasolines, biogasoline | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 3. | Fuels for diesel engines, gasoils for industrial and communal purposes, marine distillate fuels | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 4. | Biodiesel | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 5. | Fuel oils, marine residual fuels | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 6. | Jet fuels | БДС EN ISO 3170, ASTM D 4057,  ASTM D 5842 |
| 7. | Methyl tert-butyl ether (mtbe) | БДС EN ISO 3170, ASTM D 4057 |
| 8. | Solid chemical products (technical sulfur) | БДС ISO 8213 |

***\*Flexible Scope:*** *Implementing a new version of standards/documents or standards/ documents replacing them is allowed. An updated list of standards/documents and their dated versions is provided by CAB.*

**III. To perform calibration of:**

| **Type of the scope:** *fixed* | | | | | |
| --- | --- | --- | --- | --- | --- |
| **№** | Type of measuring instrument | Measured quantuty, measurement unit | Measurement  range | Measurement  uncertainty | Calibration method |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1. | Hydrometers for liquids with low surface tension | g/cm3 | from  0.6000 g/cm3  to 1.1000 g/cm3 | 0.00008 g/cm3 | МК-05/2019 |
| 2. | Automatic apparatus for density measurement | g/cm3 | From  0.7200 g/cm3  To 1.0000 g/cm3 | 0.00008 g/cm3 | МК-09/2019 |

**References:**

1. МК-05/2019 – Method of calibration of technical means for density measuring - Hydrometers for liquids with low surface tension from 2019.

2. МК-09/2019 - Method of calibration of automatic apparatus for density measurement from 2019.