



تاریخ: ۱۴۰۴/۶/۳۰ Date: شماره: No.: ۲۱۰/۶/۲۳۷۱۹ پیوست: دارد Encl.:

به نام خدا

شرکت محترم حمل و نقل بین المللی عضو و غیر عضو

موضوع: استاندارد سوخت وارداتی به افغانستان

با احترام

طبق اطلاع واصله از مدیرکل محترم اداره کل راهداری و حمل و نقل جاده‌ای استان تهران،  
مبتنی بر اعلام سرپرست محترم سفارت ج.ا.ایران در کابل، بیپوست استاندارد جدید مرتبط با ۴ نوع  
سوخت شامل بنزین، گازوئیل و گاز مایع که توسط اداره ملی نورم و استاندارد ملی افغانستان تدوین  
و لازم الاجرا گردیده است، حضورتان ارسال می‌گردد.  
متمنی است کلیه شرکت‌های محترم فعال در مسیر مزبور مراتب را مد نظر قرار دهند.

با تشکر

افسانه فخری

دبیر



د افغانستان سفارت - تهران Embassy of Afghanistan-Tehran سفارت افغانستان - تهران

No:  
Date:  
Encl:

شماره: ۲۴۳۹

تاریخ: ۱۴۰۴/۰۶/۱۵

ضمایم: ۲۴ ورق

### یادداشت

سفارت افغانستان در تهران با اظهار تعارفات خود به وزارت امور خارجه جمهوری اسلامی ایران احتراماً اشعار می‌دارد:

بر اساس حکم شماره ۸۸۵/۶۶۷۵ مورخ ۱۴۰۴/۰۳/۰۵ هـ ش رهبری حکومت افغانستان، اداره ملی استاندارد افغانستان (Afghanistan National Standards Authority - ANSA) مجموعه‌ای از معیارهای ویژه برای کیفیت واردات نفت تدوین نموده است که دسته‌بندی‌های آن به شرح ذیل بوده و مشخصات استانداردهای مربوطه در جداول متعدد ضمیمه این یادداشت ارائه شده است:

الف: مشخصات استاندارد بنزین در سه نوع (ای ۹۲ "A92"، ای ۹۵ "A95"، ای ۹۸ "A98") ترتیب گردیده است:

ب: مشخصات استاندارد گازوئیل در دو نوع (ال ۶۲-۰۲ "L02-62"، گازوئیل کم سلفر "Low Sulfur Diesel Fuel") ترتیب گردیده است:

ج: مشخصات استاندارد گاز مایع (LPG) در یک نوع ترتیب گردیده است:

د: مشخصات استاندارد نفت خام در یک نوع ترتیب گردیده است:

ه: مشخصات استاندارد مبلایل (روغن موتورهای گازوئیل و بنزن) برای خودروهای بنزین و گازوئیل در دو نوع ترتیب گردیده است.

لازم به ذکر است که این معیارها به منظور تضمین تأمین انرژی با کیفیت و جلوگیری از واردات مواد نفتی بی کیفیت وضع گردیده است. مطابق با این معیارها، هرگونه محموله نفتی که مشخصات فنی و حداقل استانداردهای تعیین شده را نداشته باشد، از مرزهای کشور مسترد خواهد شد که این امر موجب وارد شدن خسارات مالی و مشکلات برای تاجران و تأمین کنندگان (Suppliers) مواد نفتی می‌گردد.

مراتب فوقاً به آن وزارت محترم ارقام یافت، خواهشمند است تا در راستای همکاری‌های مستمر خویش، موضوع فوق الذکر را به مراجع مربوطه جهت اطلاع رسانی به تأمین کنندگان و تاجران مواد نفتی ارجاع نموده، ممنون سازند.



موقع را مغتنم شمرده، احترامات فائقه را تجدید می‌نماید.  
به: وزارت محترم امور خارجه جمهوری اسلامی ایران



## Specifications of low sulfur Diesel Fuel (1500 ppm)

| No. | TEST PARAMETERS                                 | METHODS                | UNITS              | LIMITS                   | RESULT |
|-----|-------------------------------------------------|------------------------|--------------------|--------------------------|--------|
| 1   | Cetane Number                                   | ASTM D613/D639D        |                    | Min 51                   |        |
| 2   | Cetane Index                                    | ASTM D976              |                    | According to Calculation |        |
| 3   | Distillation                                    | ASTM D86               | °C                 | -                        | -      |
|     | 10%                                             | ASTM D86               | °C                 | 180-230                  |        |
|     | 50%                                             | ASTM D86               | °C                 | 230-280                  |        |
|     | 90%                                             | ASTM D86               | °C                 | 280-340                  |        |
|     | 96%                                             | ASTM D86               | °C                 | 360                      |        |
| 4   | Kinematic viscosity at 40 °C                    | ASTM D445              | mm <sup>2</sup> /s | 1.8-6.0                  |        |
| 5   | Water content                                   | ASTM D6304             | mg/kg              | Max 200                  |        |
| 6   | Flash point                                     | ASTM D3828/D93/D2709   | °C                 | Min 55                   |        |
| 7   | Sulfur content                                  | ASTM D4294/D5453       | mg/kg              | Max 1500                 |        |
| 8   | Mercaptans Sulfur Content                       | ASTM D3227/GOST 17323  | %                  | Max 0.01                 |        |
| 9   | Hydrogen sulfide                                | ASTM D5623/GOST 17323  | mg/kg              | Max 0.5                  |        |
| 10  | Copper strip corrosion rating at 50 °C          | ASTM D130/GOST 32329   | -                  | 1a                       |        |
| 11  | Content of Dissolved Water, Acids, and Alkalis  | ASTM D664/D6304/D 2709 | -                  | Non                      |        |
| 12  | Gum Content, mg per 100 cm <sup>3</sup> of Fuel | GOST 8489              | mg/cm <sup>3</sup> | Max 40                   |        |
| 13  | Acidity, mg KOH per 100 cm <sup>3</sup> of Fuel | ASTM D974/GOST 5985    | mg/cm <sup>3</sup> | Max 5                    |        |
| 14  | Iodine Number, gr of iodine per 100 gr of fuel  | ASTM D5514/GOST 2070   | gr/ml              | Max 6                    |        |
| 15  | Ash Content                                     | ASTM D482/GOST 1461    | %                  | Max 0.01                 |        |
| 16  | Carbon Residue (10% residue)                    | ASTM D524/GOST 32392   | %                  | Max 0.20                 |        |
| 17  | Mechanical Particulate Content                  | GOST 6370              | %                  | Not Present              |        |
| 18  | Cloud Point                                     | ASTM D2500/D5772/D7689 | °C                 | Max (-7)                 |        |
| 19  | Cold Filter Plugging Point (CFPP), °C           | ASTM D6371/GOST EN 116 | °C                 | Max (-10)                |        |
| 20  | Density at 15 °C                                | ASTM D1298/D4052       | Kg/m <sup>3</sup>  | 820-860                  |        |

The Cloud Point (CP) and Cold Filter Plugging Point (CFPP) are considered only for the winter season. Taking into account the climatic conditions in Afghanistan, the winter season in this standard is defined from the 15th of Qaws (approximately December 6) to the 15th of Hoot (approximately March 5), and the rest of the year is considered as summer."





## Specifications of Diesel Fuel (L.O.2-62)

| No. | TEST PARAMETERS                                 | METHODS                | UNITS              | LIMITS                   | RESULT |
|-----|-------------------------------------------------|------------------------|--------------------|--------------------------|--------|
| 1   | Cetane Number                                   | ASTM D613/D6890        |                    | Min 51                   |        |
| 2   | Cetane Index                                    | ASTM D976              |                    | According to Calculation |        |
| 3   | Distillation                                    | ASTM D86               | °C                 | -                        |        |
|     | 10%                                             | ASTM D86               | °C                 | 180-230                  |        |
|     | 50%                                             | ASTM D86               | °C                 | 230-280                  |        |
|     | 90%                                             | ASTM D86               | °C                 | 280-340                  |        |
|     | 96%                                             | ASTM D86               | °C                 | Max 360                  |        |
| 4   | Kinematics viscosity at 40 °C                   | ASTM D445              | mm <sup>2</sup> /s | 1.8-6.0                  |        |
| 5   | Water content                                   | ASTM D6304             | mg/kg              | Max 200                  |        |
| 6   | Flash point                                     | ASTM D3828/D93/D2709   | °C                 | Min 62                   |        |
| 7   | Sulfur content                                  | ASTM D4294/D5453       | %                  | Max 0.2                  |        |
| 8   | Mercaptans Sulfur Content                       | ASTM D3227/ GOST 17323 | %                  | Max 0.01                 |        |
| 9   | Hydrogen sulfide                                | ASTM D5623/GOST 17323  | mg/kg              | Max 0.5                  |        |
| 10  | Copper strip corrosion rating at 50°C           | ASTM D130/GOST 32329   | -                  | Class 3                  |        |
| 11  | Content of Dissolved Water, Acids, and Alkalis  | ASTM D664/D6304/D 2709 | -                  | -                        |        |
| 12  | Gum Content, mg per 100 cm <sup>3</sup> of Fuel | GOST 8489              | mg/cm <sup>3</sup> | Max 40                   |        |
| 13  | Acidity, mg KOH per 100 cm <sup>3</sup> of Fuel | ASTM D974/GOST 5985    | mg/cm <sup>3</sup> | Max 5                    |        |
| 14  | Iodine Number, gr of iodine per 100 gr of fuel  | ASTM D5554/GOST 2070   | gr/ml              | Max 6                    |        |
| 15  | Ash Content                                     | ASTM D482/GOST 1461    | %                  | 0.01                     |        |
| 16  | Carbon Residue (10% residue)                    | ASTM D524/GOST 32392   | %                  | Max 0.20                 |        |
| 17  | Mechanical Particulate Content                  | GOST 6370              | %                  | Not Present              |        |
| 18  | Cloud Point                                     | ASTM D2500/D5772/D7689 | °C                 | Max (-7)                 |        |
| 19  | Cold Filter Plugging Point (CFPP), °C           | ASTM D6371/GOST EN 116 | °C                 | Max (-10)                |        |
| 20  | Density at 15°C                                 | ASTM D1298/D4052       | Kg/m <sup>3</sup>  | 820-860                  |        |

The Cloud Point (CP) and the maximum Cold Filter Plugging Point (CFPP) are considered only for the winter season. Taking into account the climatic conditions in Afghanistan, the winter season in this standard is defined from the 15th of Qaws (approximately December 6) to the 15th of Hoot (approximately March 5), and the rest of the year is considered as summer.

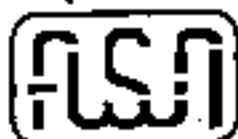




### Specification for Gasoline A92, A95 and A98

| Test Parameters             | Unit                  | Test method           | Grade      |            |            | Test Results |
|-----------------------------|-----------------------|-----------------------|------------|------------|------------|--------------|
|                             |                       |                       | A92        | A95        | A98        |              |
| Color                       | -                     | Visual                | Visual     | Visual     | Visual     |              |
| Copper Corrosion            | -                     | ASTMD-130             | Class 1    | Class 1    | Class 1    |              |
| Density@ 15°C               | Kg/m <sup>3</sup>     | ASTMD-1298            | 725-780    | 725-780    | 725-780    |              |
| Distillation                | °C                    | ASTMD-86              | -          | -          | -          |              |
| Initial Boiling Point (IBP) | °C                    | ASTMD-86              | Report     | Report     | Report     |              |
| 10%                         | °C                    | ASTMD-86              | Max-65     | Max 60     | Max 55     |              |
| 50%                         | °C                    | ASTMD-86              | Max-110    | Max 105    | Max 100    |              |
| 90%                         | °C                    | ASTMD-86              | Max-180    | Max 170    | Max 160    |              |
| Final Boiling Point (FBP)   | °C                    | ASTMD-86              | Max-215    | Max 215    | Max 215    |              |
| Residue                     | %                     | ASTMD-86              | Max-2      | Max 2      | Max 2      |              |
| Loss (evaporated volume)    | %                     | ASTMD-86              | Max-4      | Max-4      | Max-4      |              |
| 70 °C                       | %                     | ASTMD-86              | 15-47      | 15-50      | 15-50      |              |
| 100 °C                      | %                     | ASTMD-86              | 40-70      | 40-70      | Max-70     |              |
| 180 °C                      | %                     | ASTMD-86              | Min-85     | Min-85     | Min-85     |              |
| Final Boiling Point (FBP)   | °C                    | ASTMD-86              | 215        | 215        | 215        |              |
| Residue                     | %                     | ASTMD-86              | Max-2      | Max-2      | Max-2      |              |
| RON                         | -                     | ASTMD-2699/2700       | Min - 92   | Min - 95   | Min - 98   |              |
| MON                         | -                     | ASTMD-2699/2700       | Min - 83   | Min - 85   | Min - 88   |              |
| RVP                         | KPa                   | ASTMD-323/GOST 28781  | 55-90      | 60-95      | 80-100     |              |
| Sulfur Content              | %mass                 | ASTMD-4294/1266/2622  | Max - 0.05 | Max - 0.05 | Max - 0.05 |              |
| Lead content                | mg/dcm                | ASTMD-3831/GOST 51942 | Max- 0.010 | -          | -          |              |
| Gum content                 | mg/100cm <sup>3</sup> | ASTMD-381             | 5.0        | 5.0        | 5.0        |              |
| Benzene content             | %                     | ASTMD-4053/7576/4420  | 1.0        | 1.0        | 1.0        |              |
| Oxidation stability         | -                     | ASTMD-525/GOST 4039   | Min-360    | Min-360    | Min-360    |              |





## Crude oil Specifications

| Table 1: Classifications of Crude Oil |                 |                           |             |
|---------------------------------------|-----------------|---------------------------|-------------|
| Class                                 | Name            | % mass fraction of Sulfur | Test Method |
| 1                                     | Low sulfur      | Up to 0.60                | GOST 1437   |
| 2                                     | Sulfur (Normal) | 0.61-1.80                 |             |
| 3                                     | High Sulfur     | 1.81-3.50                 |             |
| 4                                     | Highest Sulfur  | >3.50                     |             |

| Table 2: Types of crude oil  |       |                      |        |              |        |              |        |              |        |              |        |
|------------------------------|-------|----------------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|
| Specifications               |       | Crude Oil Parameters |        |              |        |              |        |              |        | Test Method  |        |
|                              |       | 0                    |        | 1            |        | 2            |        | 3            |        | 4            |        |
|                              |       | Internal use         | Export | Internal use | Export | Internal use | Export | Internal use | Export | Internal use | Export |
| Density (Kg/m <sup>3</sup> ) | 20 °C | Max - 830.0          |        | 830.1-850.0  |        | 850.1-870.0  |        | 870.1-895.0  |        | Min-895.0    |        |
|                              | 15 °C | Max - 834.5          |        | 834.6-854.4  |        | 854.5-874.4  |        | 874.5-899.3  |        | Min-899.3    |        |
| Fractional Composition       |       |                      |        |              |        |              |        |              |        |              |        |
| 200 °C                       |       | -                    | 30     | -            | 27     | -            | 21     | -            | -      | -            | -      |
| 300 °C                       |       | -                    | 52     | -            | 47     | -            | 42     | -            | -      | -            | -      |
| 350 °C                       |       | -                    | 62     | -            | 57     | -            | 53     | -            | -      | -            | -      |
| Mass % of Paraffin           |       | -                    | 6.0    | -            | 6.0    | -            | 6.0    | -            | -      | -            | -      |

| Table 3: Groups of Crude oil                        |                             |            |            |                          |
|-----------------------------------------------------|-----------------------------|------------|------------|--------------------------|
| Specifications                                      | Norms of Crude oil (groups) |            |            | Test Method              |
|                                                     | 1                           | 2          | 3          |                          |
| % mass fraction of water (Max)                      | 0.5                         | 0.5        | 0.1        | GOST 2477 / ASTM D-4006  |
| Condensed chlorides salts (mg/dm <sup>3</sup> ) Max | 100                         | 300        | 900        | GOST 21534 / ASTM D-3230 |
| Mechanical Particulate Content (Max)                | 0.05                        |            |            | GOST 6370                |
| Saturated vapor pressure (KPa) Max                  | 66.7 (500)                  | 66.7 (500) | 66.7 (500) | GOST 1756 / ASTM D-6377  |
| Chlorinated organic contents (ppm)                  | Report                      |            |            | ASTM D-4929              |

| Table 4: Types of Crude oil                          |                            |    |     |             |
|------------------------------------------------------|----------------------------|----|-----|-------------|
| Specifications                                       | Norms of Crude oil (Types) |    |     | Test Method |
|                                                      | 1                          | 2  | 3   |             |
| % mass fraction of water (Max)                       | 20                         | 50 | 100 | GOST 50802  |
| Total % mass fraction of methyl and ethyl mercaptans | 40                         | 60 | 100 |             |





Table 1 – General Properties of Diesel Engine Oils

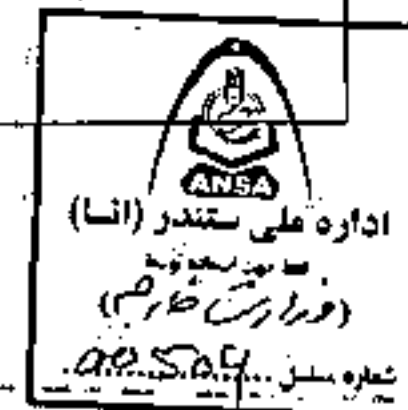
| No. | Property                                                                                                          | Unit               | Acceptable Limits <sup>a</sup>                                                                                                                    | Test Method                          |
|-----|-------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1   | Kinematic viscosity at 100°C, low shear rate                                                                      | mm <sup>2</sup> /s | As per SAE J300 (Annex A)                                                                                                                         | ISIRI 340 / ASTM D445                |
| 2   | Viscosity at 150°C, high shear rate (HTHS) <sup>b</sup>                                                           | mPa.s              | As per SAE J300 (Annex A)                                                                                                                         | ASTM D4683 / D5481                   |
| 3   | Apparent low-temp viscosity (CCS) <sup>c</sup>                                                                    | mPa.s              | As per SAE J300 (Annex A)                                                                                                                         | ISIRI 5512 / ASTM D5293              |
| 4   | Apparent low-temp viscosity (MRV) <sup>c</sup>                                                                    | mPa.s              | As per SAE J300 (Annex A)                                                                                                                         | ASTM D4684                           |
| 5   | Viscosity index                                                                                                   | -                  | To be reported                                                                                                                                    | ISIRI 195 / ASTM D2270               |
| 6   | Shear stability<br>(viscosity at 100°C after testing)                                                             | -                  | Oil must retain its viscosity grade after testing                                                                                                 | ISIRI 17764                          |
| 7   | Volatility, max.                                                                                                  | Mass percent (%)   | Grades 40, 50, 60: 5%<br>Grades 20, 30, 25W-X: 6%<br>Grade 20W-X: 10%<br>Other grades: 15%                                                        | ISIRI 3780 / ASTM D5800              |
| 8   | Flash point, min.                                                                                                 | °C                 | Grades 40, 50, 60: 220°C<br>Other grades: 200°C                                                                                                   | ISIRI 198 / ASTM D92                 |
| 9   | Foaming test (foam tendency/stability), max.:<br>- Stage 1: at 24°C<br>- Stage 2: at 93.5°C<br>- Stage 3: at 24°C | mL                 | 0-10<br>0-50<br>0-10                                                                                                                              | ISIRI 196 / ASTM D892                |
| 10  | Pour point, max.                                                                                                  | °C                 | Grade 40, 50, 60: -9°C<br>Grade 20, 30, 25W-X: -18°C<br>Grade 15W-X, 20W-X: -24°C<br>Grade 10W-X: -30°C<br>Grade 5W-X: -33°C<br>Grade 0W-X: -39°C | ISIRI 201 / ASTM D97                 |
| 11  | Elements                                                                                                          | Mass (%)           | As per the specification of the additive used                                                                                                     | ISIRI 3281 / ISIRI 9377 / ASTM D4951 |
| 12  | Total Base Number (TBN) <sup>d</sup>                                                                              | mg KOH/g           | API CC to API CE: min. 5<br>API CF-4 to CH-4: min. 8<br>API CH-4 and higher: min. 10                                                              | ISIRI 2772 / ASTM D4739              |
| 13  | Total Acid Number (TAN)                                                                                           | mg KOH/g           | To be reported                                                                                                                                    | ISIRI 18030 / ASTM D974              |

a) For API CK-4 and FA-4, viscosity grades are limited to those in Table 6.

b) HTHS values for API CI-4, CJ-4, CK-4, and FA-4 are given in their respective specification tables (Tables 4, 5, 6).

c) This test is mandatory for multi grade oils.

d) If the TBN value differs in the additive datasheet, that value shall be considered acceptable.



**Table 2 – Specific Properties for API CG-4 and API CF-4 Quality Levels**

| No.                                                                                                                              | Property                                                                                                                                                                                                                          | Unit                         | Acceptable Limits                     | Test Method      |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------|------------------|
| 1                                                                                                                                | Corrosion test at 121°C:<br>– Increase in copper concentration in the oil, Max<br>– Increase in lead concentration in the oil, Max<br>– Increase in tin concentration in the oil, Max<br>– Copper strip corrosion (per ISIRI 336) | mg/kg<br>mg/kg<br>mg/kg<br>- | 20<br>60<br>To be reported<br>Grade 3 | ASTM D5968 (CBT) |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |                                                                                                                                                                                                                                   |                              |                                       |                  |

**Table 3 – Specific Properties for API CH-4 Quality Level**

| No.                                                                                                                              | Property                                                                                                                                                                                                                          | Unit                         | Acceptable Limits                      | Test Method         |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------|---------------------|
| 1                                                                                                                                | Corrosion test at 135°C:<br>– Increase in copper concentration in the oil, Max<br>– Increase in lead concentration in the oil, Max<br>– Increase in tin concentration in the oil, Max<br>– Copper strip corrosion (per ISIRI 336) | mg/kg<br>mg/kg<br>mg/kg<br>- | 20<br>120<br>To be reported<br>Grade 3 | ASTM D6594 (HT CBT) |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |                                                                                                                                                                                                                                   |                              |                                        |                     |

**Table 4 – Specific Properties for API CI-4 Quality Level**

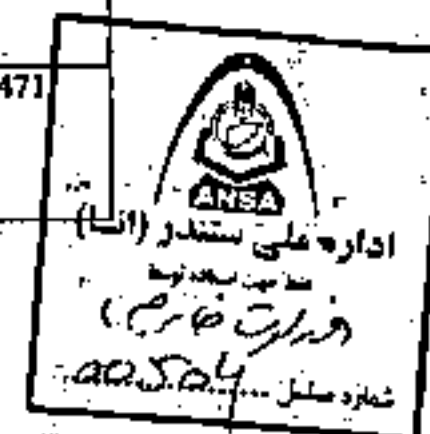
| No. | Property                                                                                                                                                                                                                          | Unit                         | Acceptable Limits                        | Test Method                      |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------------|
| 1   | Viscosity at 150°C, high shear rate (HTHS), min.                                                                                                                                                                                  | mPa.s                        | 3.5                                      | ASTM D4683 /<br>D4741 / D5481    |
| 2   | Corrosion test at 135°C:<br>– Increase in copper concentration in the oil, Max<br>– Increase in lead concentration in the oil, Max<br>– Increase in tin concentration in the oil, Max<br>– Copper strip corrosion (per ISIRI 336) | mg/kg<br>mg/kg<br>mg/kg<br>- | 20<br>120<br>To be reported<br>Grade 3   | ASTM D6594<br>(HT CBT)           |
| 3   | Elastomer compatibility:<br>a. Polyacrylate Rubber (ACM):<br>– Volume change<br>– Hardness change<br>– Tensile strength change<br>– Change in Elongation at break                                                                 | %<br>Grade<br>%<br>%         | +5, -3<br>+8, -5<br>+18, -15<br>+10, -35 | ASTM D7216,<br>D471, D2240, D412 |



|                                                                                                                                  |                                               |       |               |  |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------|---------------|--|
|                                                                                                                                  | <b>b. Hydrogenated Nitrile Rubber (HNBR):</b> |       |               |  |
|                                                                                                                                  | - Volume change                               | %     | +5, -3        |  |
|                                                                                                                                  | - Hardness change                             | Grade | +7, -5        |  |
|                                                                                                                                  | - Tensile strength change                     | %     | +10, -TMC1006 |  |
|                                                                                                                                  | - Change in Elongation at break               | %     | +10, -TMC1006 |  |
|                                                                                                                                  | <b>c. Silicone Rubber (VMQ):</b>              |       |               |  |
|                                                                                                                                  | - Volume change                               | %     | +TMC1006, -3  |  |
|                                                                                                                                  | - Hardness change                             | Grade | +5, -TMC1006  |  |
|                                                                                                                                  | - Tensile strength change                     | %     | +10, -45      |  |
|                                                                                                                                  | - Change in Elongation at break               | %     | +20, -30      |  |
|                                                                                                                                  | <b>d. Fluorocarbon Rubber (FKM):</b>          |       |               |  |
|                                                                                                                                  | - Volume change                               | %     | +5, -2        |  |
|                                                                                                                                  | - Hardness change                             | Grade | +7, -5        |  |
|                                                                                                                                  | - Tensile strength change                     | %     | +10, -TMC1006 |  |
|                                                                                                                                  | - Change in Elongation at break               | %     | +10, -TMC1006 |  |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |                                               |       |               |  |

**Table 5— Specific Properties for API CJ-4 Quality Level**

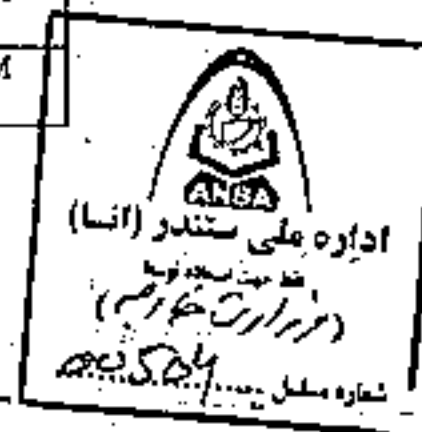
| No. | Property                                                                                                                                                                       | Unit       | Acceptable Limits |                  | Test Method                     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------|------------------|---------------------------------|
| 1   | Sulfated ash, max.                                                                                                                                                             | Mass %     | 1.0               |                  | ISIRI 194 / ASTM D874           |
| 2   | Phosphorus, max.                                                                                                                                                               | Mass %     | 0.12              |                  | ISIRI 9377 / ASTM D4951         |
| 3   | Sulfur, max.                                                                                                                                                                   | Mass %     | 0.4               |                  | ISIRI 9377 / ASTM D4951         |
| 4   | Viscosity at 150°C, high shear rate (HTHS), min.                                                                                                                               | mPa.s      | 3.5               |                  | ASTM D4683 / D4741 / D5481      |
| 5   | Shear stability – Minimum viscosity after 90 cycles                                                                                                                            | mm²/s      | SAE xW-40<br>12.5 | SAE xW-30<br>9.3 | ASTM D7109                      |
| 6   | Corrosion test at 135°C:<br>- Increase in copper concentration in the oil, Max<br>- Increase in lead concentration in the oil, Max<br>- Copper strip corrosion (per ISIRI 336) | mg/kg      | 20<br>120<br>3    |                  | ASTM D6594<br>(HT CBT)          |
| 7   | Elastomer compatibility:<br><b>a. Polyacrylate Rubber (ACM):</b><br>- Volume change<br>- Hardness change                                                                       | %<br>Grade | +5, -3<br>+8, -5  |                  | ASTM D7216, D471<br>D2240, D412 |



|                                                                                                                                  |       |               |  |
|----------------------------------------------------------------------------------------------------------------------------------|-------|---------------|--|
| - Tensile strength change                                                                                                        | %     | +18, -15      |  |
| - Change in Elongation at break                                                                                                  | %     | +10, -35      |  |
| <b>b. Hydrogenated Nitrile Rubber (HNBR):</b>                                                                                    |       |               |  |
| - Volume change                                                                                                                  | %     | +5, -3        |  |
| - Hardness change                                                                                                                | Grade | +7, -5        |  |
| - Tensile strength change                                                                                                        | %     | +10, -TMC1006 |  |
| - Change in Elongation at break                                                                                                  | %     | +10, -TMC1006 |  |
| <b>c. Silicone Rubber (VMQ):</b>                                                                                                 |       |               |  |
| - Volume change                                                                                                                  | %     | +TMC1006, -3  |  |
| - Hardness change                                                                                                                | Grade | +5, -TMC1006  |  |
| - Tensile strength change                                                                                                        | %     | +10, -45      |  |
| - Change in Elongation at break                                                                                                  | %     | +20, -30      |  |
| <b>d. Fluorocarbon Rubber (FKM):</b>                                                                                             |       |               |  |
| - Volume change                                                                                                                  | %     | +5, -2        |  |
| - Hardness change                                                                                                                | Grade | +7, -5        |  |
| - Tensile strength change                                                                                                        | %     | +10, -TMC1006 |  |
| - Change in Elongation at break                                                                                                  | %     | +10, -TMC1006 |  |
| <b>e. polymer (VAMAC G):</b>                                                                                                     |       |               |  |
| - Volume change                                                                                                                  | %     | +TMC1006, -3  |  |
| - Hardness change                                                                                                                | Grade | +5, -TMC1006  |  |
| - Tensile strength change                                                                                                        | %     | +10, TMC1006  |  |
| - Change in Elongation at break                                                                                                  | %     | +10, -TMC1006 |  |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority: |       |               |  |

Table 6 – Specific Properties for API CK-4 and API FA-4 Quality Levels

| No. | Property           | Unit   | Acceptable Limits |       |          | Test Method             |
|-----|--------------------|--------|-------------------|-------|----------|-------------------------|
|     |                    |        | API CK-4          |       | API FA-4 |                         |
|     |                    |        | xW-30             | xW-40 | xW-30    |                         |
| 1   | Sulfated ash, max. | Mass % | 1.0               |       |          | ISIRI 194 / ASTM D874   |
| 2   | Phosphorus, max.   | Mass % | 0.12              |       |          | ISIRI 9377 / ASTM D4951 |
| 3   | Sulfur, max.       | Mass % | 0.4               |       |          | ISIRI 9377 / ASTM D4951 |





# Annex A

The viscosity of engine lubricating oils shall comply with SAE J300:2015.

Table A-1: SAE Viscosity Grades for Engine Oils (SAE J300 2015)

| SAE Viscosity Grade | Apparent Viscosity at Low Temperature <sup>a</sup> (mPa·s) |                                         | Viscosity at 100°C at Low Shear Rate <sup>b</sup> (mm <sup>2</sup> /s) <sup>c</sup> |         | Viscosity at 150°C at high shear rate (HTHS) <sup>d</sup> (mPa·s) Min |
|---------------------|------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------|
| SAE Viscosity Grade | Related to engine start-up <sup>a</sup> (Maximum)          | Related to oil pumpability <sup>d</sup> | Minimum                                                                             | Maximum | High-Shear Viscosity at 150°C (e), Minimum                            |
| 0W                  | 6200 at -35°C                                              | 60000 at -40°C                          | 3.8                                                                                 | -       | -                                                                     |
| 5W                  | 6600 at -30°C                                              | 60000 at -35°C                          | 3.8                                                                                 | -       | -                                                                     |
| 10W                 | 7000 at -25°C                                              | 60000 at -30°C                          | 4.1                                                                                 | -       | -                                                                     |
| 15W                 | 7000 at -20°C                                              | 60000 at -25°C                          | 5.6                                                                                 | -       | -                                                                     |
| 20W                 | 9500 at -15°C                                              | 60000 at -20°C                          | 5.6                                                                                 | -       | -                                                                     |
| 25W                 | 13000 at -10°C                                             | 60000 at -15°C                          | 9.3                                                                                 | -       | -                                                                     |
| 8                   | -                                                          | -                                       | 4.0                                                                                 | <6.1    | 1.7                                                                   |
| 12                  | -                                                          | -                                       | 5.0                                                                                 | <7.1    | 2.0                                                                   |
| 16                  | -                                                          | -                                       | 6.1                                                                                 | <8.2    | 2.3                                                                   |
| 20                  | -                                                          | -                                       | 6.9                                                                                 | <9.3    | 2.6                                                                   |
| 30                  | -                                                          | -                                       | 9.3                                                                                 | <12.5   | 2.9                                                                   |
| 40                  | -                                                          | -                                       | 12.5                                                                                | <16.3   | 3.5 (grades 0W-40, 5W-40, 10W-40)                                     |
| 40                  | -                                                          | -                                       | 12.5                                                                                | <16.3   | 3.7 (grades 15W-40, 20W-40, 25W-40, and 40)                           |
| 50                  | -                                                          | -                                       | 16.3                                                                                | <21.9   | 3.7                                                                   |
| 60                  | -                                                          | -                                       | 21.9                                                                                | <26.1   | 3.7                                                                   |

<sup>a</sup> ISIRI 5512/ASTM D5293

<sup>b</sup> ISIRI 340/ASTM D445

<sup>c</sup> 1 mPa·s=1 cP; 1 mm<sup>2</sup>/s=1 cSt

<sup>d</sup> ASTM D4684 (MRV)

<sup>e</sup> ASTM D4683, ASTM D4741 or ASTM D5481 (HTHS)



**Annex B**  
**(Informative)**  
**API classification**

**Table B-1: API Classification for Base Oils**

**Table B-1: API Classification for Base Oils**

| Group                  | Viscosity index  | Saturates content (mass %) | Sulfur (mass %) | Other                                           |
|------------------------|------------------|----------------------------|-----------------|-------------------------------------------------|
| I                      | $\geq 80, < 120$ | $< 90$                     | and/or $> 0.03$ | -                                               |
| II                     | $\geq 80, < 120$ | $\geq 90$                  | and $\leq 0.03$ | -                                               |
| III                    | $\geq 120$       | $\geq 90$                  | and $\leq 0.03$ | -                                               |
| IV                     | -                | -                          | -               | PAO <sup>a</sup>                                |
| V                      | -                | -                          | -               | All other base oils not included in Groups I-IV |
| (a) Poly alpha olefins |                  |                            |                 |                                                 |



**Annex C**  
**(Informative)**  
**Performance Tests (Engine Tests)**

**Table C-1 – Performance (Engine) Tests for Various Quality Levels of Four-Cylinder Diesel Engine Oils Based on API Classification**

| Engine Test        |                    |                            |                            |                               |                            |                        |                              |                               | Quality level |
|--------------------|--------------------|----------------------------|----------------------------|-------------------------------|----------------------------|------------------------|------------------------------|-------------------------------|---------------|
| ASTM D8047 (COAT)  | ASTM D5966 (RFT)   | ASTM D8048 (VOLVO T13)     | ASTM D7468 (Cummins ISM)   | ASTM D7484 (Cummins ISB)      | ASTM D7422 (Mack T12)      | ASTM D7156 (Mack T11)  | ASTM D 6750 Caterpillar 1N   | ASTM D7549 (caterpillar C13)  | CK4 FA4       |
| ASTM D 6894 (EOAT) | ASTM D 5966 (RFT)  | ASTM D 6984 (Sequence IIE) | ASTM D 7468 (Cummins ISM)  | ASTM D 7484 (Cummins ISB)     | ASTM D 7422 (Mack T12)     | ASTM D 7156 (Mack T11) | ASTM D 6750 (caterpillar 1N) | ASTM D 7549 (caterpillar C13) | CJ-4          |
|                    | ASTM D 6894 (EOAT) | ASTM D 5966 (RFT)          | ASTM D 6984 (Sequence IIE) | ASTM D 6975 (Cummins M11-EGR) | ASTM D 5967 (Mack T8)      | ASTM D 6987 (Mack T10) | ASTM D 6750 (caterpillar 1K) | ASTM D 6923 (caterpillar 1R)  | CI-4          |
|                    | ASTM D 6894 (EOAT) | ASTM D 5966 (RFT)          | ASTM D 6984                | ASTM D 6838 (Cummins M11)     | ASTM D 5967                | ASTM D 6483            | ASTM D 6750                  | ASTM D 6681                   | CH-4          |
|                    |                    |                            |                            | ASTM D 5966 (RFT)             | ASTM D 5533 (Sequence IIE) | ASTM D 5967 (Mack T8)  | ASTM D 6750 (caterpillar 1N) | ASTM D 5119 (CRL-38)          | CG-4          |



**Continuation of Table C-1 – Performance (Engine) Tests for Various Quality Levels of Four-Cylinder Diesel Engine Oils Based on API Classification**

| Engine Test |  |  |  |                                     |                                       |                                       |                                          |                                  | Quality level |
|-------------|--|--|--|-------------------------------------|---------------------------------------|---------------------------------------|------------------------------------------|----------------------------------|---------------|
|             |  |  |  |                                     | ASTM RR:<br>D02:<br>1220 (Mack<br>T7) | ASTM RR:<br>D02:<br>1219 (Mack<br>T6) | ASTM D<br>6750<br>(Caterpillar<br>1K)    | ASTM D<br>5119<br>(CRC L-<br>38) | CF-4*         |
|             |  |  |  | ASTM D5290<br>(Cummins NTC-<br>400) | ASTM RR:<br>D02:<br>1220 (Mack<br>T7) | ASTM RR:<br>D02:<br>1219 (Mack<br>T6) | ASTM STP<br>509 (Caterpillar<br>1G2)     | ASTM D<br>5119<br>(CRC L-<br>38) | CE            |
|             |  |  |  |                                     |                                       |                                       | ASTM STP<br>509 (Caterpillar<br>1G2)     | ASTM D<br>5119<br>(CRC L-<br>38) | CD            |
|             |  |  |  |                                     |                                       | (LTD)                                 | ASTM STP<br>315H<br>(Caterpillar<br>1H2) | ASTM D<br>5119<br>(CRC L-<br>38) | CC            |

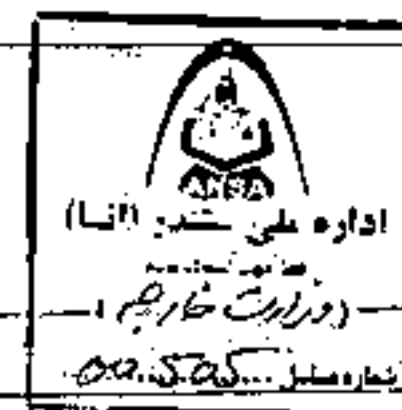




Table 1 – General Properties of Gasoline Engine Oils

| No. | Property                                                                                                          | Unit               | Acceptable Limits <sup>a</sup>                                                                                                                    | Test Method                           |
|-----|-------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 1   | Kinematic viscosity at 100°C, low shear rate                                                                      | mm <sup>2</sup> /s | As per SAE J300 (Annex A)                                                                                                                         | ISIRI 340 / ASTM D445                 |
| 2   | Viscosity at 150°C, high shear rate (HTHS)                                                                        | mPa·s              | As per SAE J300 (Annex A)                                                                                                                         | ASTM D4683 / D5481 / D4741            |
| 3   | Apparent low-temp viscosity (CCS) <sup>b</sup>                                                                    | mPa·s              | As per SAE J300 (Annex A)                                                                                                                         | ISIRI 5512 / ASTM D5293               |
| 4   | Apparent low-temp viscosity (MRV) <sup>b</sup>                                                                    | mPa·s              | As per SAE J300 (Annex A)                                                                                                                         | ASTM D4684                            |
| 5   | Viscosity Index                                                                                                   | -                  | Report                                                                                                                                            | ISIRI 195 / ASTM D2270                |
| 6   | Shear stability (Viscosity at 100°C after test)                                                                   | -                  | Oil must remain within viscosity grade                                                                                                            | ISIRI 17764 / ISIRI 3780 / ASTM D5800 |
| 7   | Volatility, max.                                                                                                  | Mass percent (%)   | Grades 40, 50, 60: 5%<br>Grades 20, 30, 25W-X: 6%<br>Grade 20W-X: 10%<br>Other grades: 15%                                                        | ISIRI 3780 / ASTM D5800               |
| 8   | Flash point, min                                                                                                  | °C                 | SAE grades 40, 50, 60 → 220<br>Others → 200                                                                                                       | ISIRI 198 / ASTM D92                  |
| 9   | Foaming test (foam tendency/stability), max.:<br>– Stage 1: at 24°C<br>– Stage 2: at 93.5°C<br>– Stage 3: at 24°C | mL                 | 0–10<br>0–50<br>0–10                                                                                                                              | ISIRI 196 / ASTM D892                 |
| 10  | Pour point, max.                                                                                                  | °C                 | Grade 40, 50, 60: -9°C<br>Grade 20, 30, 25W-X: -18°C<br>Grade 15W-X, 20W-X: -24°C<br>Grade 10W-X: -30°C<br>Grade 5W-X: -33°C<br>Grade 0W-X: -39°C | ISIRI 201 / ASTM D97                  |
| 11  | Elements                                                                                                          | Mass (%)           | As per the specification of the additive used                                                                                                     | ISIRI 3281 / ISIRI 9377 / ASTM D4951  |
| 12  | Total Base Number (TBN) <sup>b</sup>                                                                              | mg KOH/g           | API SJ & above: min 6<br>API SC to SJ: min 4                                                                                                      | ISIRI 2772 / ASTM D4739               |
| 13  | Total Acid Number (TAN)                                                                                           | mg KOH/g           | Report                                                                                                                                            | ISIRI 18030 / ASTM D974               |

a) This test is mandatory for multi grade oils.  
d) If the TBN value differs in the additive datasheet, that value shall be considered acceptable.

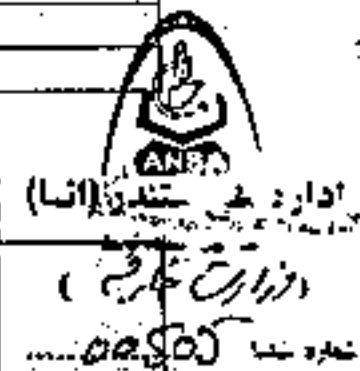


**Table 2 – Special Properties for API SH Quality Level**

| No.                                                                                                                              | Property                                    | Unit             | Acceptable Limits |                         | Test Method             |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------------|-------------------|-------------------------|-------------------------|
|                                                                                                                                  |                                             |                  | SAE 15W-40        | SAE 5W-30<br>SAE 10W-30 |                         |
| 1                                                                                                                                | Filterability <sup>a</sup> (EOFT test), max | % flow reduction | 50                | -                       | ASTM D6795              |
| 2                                                                                                                                | Homogeneity & Compatibility <sup>a</sup>    | -                | Must Pass         |                         | ASTM D6922              |
| 3                                                                                                                                | Rust Prevention <sup>a</sup> (BRT), min     | -                | 100               |                         | ASTM D6557              |
| 4                                                                                                                                | Phosphorus                                  | Mass %           | Min 0.06          | Max 0.12                | ASTM D5185 / ISIRI 9377 |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |                                             |                  |                   |                         |                         |

**Table 3 – Special Properties for API SJ and API SL Quality Levels**

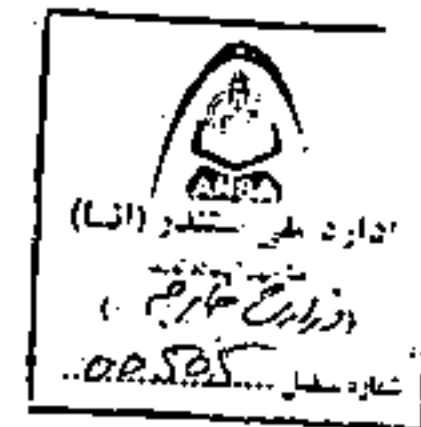
| No.                                                                                                                              | Property                                     | Unit             | Acceptable Limits                                 |              |                                                                |              | Test Method              |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------|---------------------------------------------------|--------------|----------------------------------------------------------------|--------------|--------------------------|
|                                                                                                                                  |                                              |                  | API SNJ                                           |              | API SL                                                         |              |                          |
|                                                                                                                                  |                                              |                  | SAE 0W-20<br>SAE 5W-20<br>SAE 5W-30<br>SAE 10W-30 | Other grades | SAE 0W-20<br>SAE 5W-20<br>SAE 0W-30<br>SAE 5W-30<br>SAE 10W-30 | Other grades |                          |
| 1                                                                                                                                | Foaming Test at 150°C, 1 min, max (Stage IV) | mL               | 200 - 50                                          |              | 100 - 0                                                        |              | ISIRI 9378               |
| 2                                                                                                                                | Filterability <sup>a</sup> (EOFT test), max  | % flow reduction | 50                                                |              | 50                                                             |              | ASTM D6795               |
|                                                                                                                                  | Filterability <sup>a</sup> (EOWTT test), max |                  |                                                   |              |                                                                |              | ASTM D6794               |
|                                                                                                                                  | 0.6% water                                   | % flow reduction | Report                                            |              | 50                                                             |              |                          |
|                                                                                                                                  | 1.0% water                                   |                  | Report                                            |              | 50                                                             |              |                          |
|                                                                                                                                  | 2.0% water                                   |                  | Report                                            |              | 50                                                             |              |                          |
| 3.0% water                                                                                                                       |                                              | Report           |                                                   | 50           |                                                                |              |                          |
| 3                                                                                                                                | Oxidation <sup>a</sup> :                     |                  |                                                   |              |                                                                |              | ASTM D6335<br>ASTM D7097 |
|                                                                                                                                  | TEOST 33 Test, max                           | mg               | 60                                                |              | 45                                                             |              |                          |
| 4                                                                                                                                | Homogeneity & Compatibility <sup>a</sup>     | -                | Pass                                              |              | Pass                                                           |              | ASTM D6922               |
| 5                                                                                                                                | Gelation index <sup>a</sup> , max            | -                | 12                                                | -            | 12                                                             | -            | ASTM D5133               |
| 6                                                                                                                                | Rust Prevention <sup>a</sup> (BRT), min      | -                | 100                                               |              | 100                                                            |              | ASTM D6557               |
| 7                                                                                                                                | Phosphorus                                   | Mass %           | 0.06-0.1                                          | Min 0.06     | 0.06-0.1                                                       | Min 0.06     | ISIRI 9377/ASTM D5185    |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |                                              |                  |                                                   |              |                                                                |              |                          |



**Table 4 – Special Properties for API SM Quality Level**

| No. | Property                                        | Unit             | Acceptable Limits                                              |              | Test Method              |
|-----|-------------------------------------------------|------------------|----------------------------------------------------------------|--------------|--------------------------|
|     |                                                 |                  | SAE 0W-20<br>SAE 5W-20<br>SAE 0W-30<br>SAE 5W-30<br>SAE 10W-30 | Other grades |                          |
| 1   | Foaming Test at 150°C, 1 min, max (Stage IV)    | mL               | 100 - 0                                                        |              | ISIRI 9378               |
| 2   | Filterability <sup>a</sup> (EOFT test), max     | % flow reduction | 50                                                             |              | ASTM D6795               |
|     | Filterability <sup>a</sup> (EOWTT test), max    | % flow reduction | 50<br>50<br>50<br>50                                           |              | ASTM D6794               |
|     | 0.6% water                                      |                  |                                                                |              |                          |
|     | 1.0% water                                      |                  |                                                                |              |                          |
|     | 2.0% water                                      |                  |                                                                |              |                          |
|     | 3.0% water                                      |                  |                                                                |              |                          |
| 3   | Oxidation <sup>a</sup> :<br>TEOST MHT Test, max | mg               | 35                                                             | 45           | ASTM D6335<br>ASTM D7097 |
| 4   | Homogeneity & Compatibility <sup>a</sup>        | -                | Pass                                                           |              | ASTM D6922               |
| 5   | Gelation Index <sup>a</sup> , max               | -                | 12                                                             | -            | ASTM D5133               |
| 6   | Rust Prevention <sup>a</sup> (BRT), min         | -                | 100                                                            |              | ASTM D6557               |
| 7   | Phosphorus                                      | Mass %           | 0.06–0.08                                                      | Min 0.06     | ISIRI 9377/ASTM<br>D5185 |

a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority.



**Table 5 – Special Properties for API SN Quality Level**

| No.        | Property                                         | Unit             | Acceptable Limits                                                                        |              |                                      |              | Test Method              |         |    |     |
|------------|--------------------------------------------------|------------------|------------------------------------------------------------------------------------------|--------------|--------------------------------------|--------------|--------------------------|---------|----|-----|
|            |                                                  |                  | SAE 0W-16<br>SAE 5W-16<br>SAE 0W-20<br>SAE 5W-20<br>SAE 0W-30<br>SAE 5W-30<br>SAE 10W-30 | Other grades | API SN (RC <sup>a</sup> )            |              |                          |         |    |     |
| 1          | Foaming Test at 150°C, 1 min, max. (Stage IV)    | mL               | 100 - 0                                                                                  |              |                                      |              | ISIRI 9378               |         |    |     |
| 2          | Filterability <sup>a</sup> (EOFT test), max      | % flow reduction | 50                                                                                       |              |                                      |              | ASTM D6795               |         |    |     |
|            | Filterability <sup>a</sup> (EOWTT test), max     | % flow reduction | 50<br>50<br>50<br>50                                                                     |              |                                      |              | ASTM D6794               |         |    |     |
|            | 0.6% water                                       |                  |                                                                                          |              |                                      |              |                          |         |    |     |
|            | 1.0% water                                       |                  |                                                                                          |              |                                      |              |                          |         |    |     |
| 2.0% water |                                                  |                  |                                                                                          |              |                                      |              |                          |         |    |     |
|            | 3.0% water                                       |                  |                                                                                          |              |                                      |              |                          |         |    |     |
| 3          | Oxidation <sup>a</sup> :                         | mg.              | -                                                                                        | -            | SAE 0W-20                            | Other grades | ASTM D6335<br>ASTM D7097 |         |    |     |
|            | TEOST 33C Test, max                              |                  |                                                                                          |              | -                                    | 30           |                          |         |    |     |
|            | TEOST MHT Test, max                              |                  |                                                                                          |              | 35                                   | 45           |                          | 35      | 35 |     |
| 4          | Homogeneity & Compatibility <sup>a</sup>         | -                | Pass                                                                                     |              |                                      |              | ASTM D6922               |         |    |     |
| 5          | Gelation Index <sup>a</sup> , max                | -                | 12                                                                                       | -            | 12                                   |              | ASTM D5133               |         |    |     |
| 6          | Rust Prevention <sup>a</sup> (BRT), min          | -                | 100                                                                                      |              |                                      |              | ASTM D6557               |         |    |     |
| 7          | Sulfur, max:                                     | Mass %           | 0.5                                                                                      | -            | 0.5                                  |              | ISIRI 9377 / ISIRI 8402  |         |    |     |
|            | Grades: 0W-16, 0W-20, 0W-30, 5W-16, 5W-20, 5W-30 |                  |                                                                                          |              |                                      |              |                          |         |    |     |
|            | 10W-30 grades                                    |                  |                                                                                          |              |                                      |              |                          | 0.6     | -  | 0.6 |
|            | Other grades                                     |                  |                                                                                          |              |                                      |              |                          | -       | -  | 0.6 |
| 8          | Phosphorus                                       | Mass %           | 0.06-0.08                                                                                | Min 0.06     | 0.06-0.08                            |              | ISIRI 9377/ASTM D5185    |         |    |     |
| 9          | Elastomer compatibility <sup>a</sup> :           | %<br>Grade<br>%  | -                                                                                        |              |                                      |              | ASTM D7216               |         |    |     |
|            | a. Polyacrylate Rubber (ACM-1):                  |                  |                                                                                          |              |                                      |              |                          |         |    |     |
|            | - Volume change                                  |                  |                                                                                          |              |                                      |              |                          | 9, -5   |    |     |
|            | - Hardness change                                |                  |                                                                                          |              |                                      |              |                          | 10, -10 |    |     |
|            | - Tensile strength change                        | 40, -40          |                                                                                          |              | ASTM D471<br>ASTM D2240<br>ASTM D412 |              |                          |         |    |     |
|            |                                                  |                  |                                                                                          |              |                                      |              |                          |         |    |     |



|                                                                                                                                  |       |         |                                      |
|----------------------------------------------------------------------------------------------------------------------------------|-------|---------|--------------------------------------|
| <b>c. Silicone Rubber (VMQ-1):</b><br>- Volume change<br>- Hardness change<br>- Tensile strength change                          | %     | 40, -5  | ASTM D471<br>ASTM D2240<br>ASTM D412 |
|                                                                                                                                  | Grade | 10, -30 |                                      |
|                                                                                                                                  | %     | 5, -50  |                                      |
| <b>d. Fluorocarbon Rubber (FKM):</b><br>- Volume change<br>- Hardness change<br>- Tensile strength change                        | %     | 3, -2   | ASTM D471<br>ASTM D2240<br>ASTM D412 |
|                                                                                                                                  | Grade | 6, -6   |                                      |
|                                                                                                                                  | %     | 10, -65 |                                      |
| <b>E. AEM-1:</b><br>- Volume change<br>- Hardness change<br>- Tensile strength change                                            | %     | 30, -5  | ASTM D471<br>ASTM D2240<br>ASTM D412 |
|                                                                                                                                  | Grade | 10, -20 |                                      |
|                                                                                                                                  | %     | 30, 30  |                                      |
| a) Resource conserving                                                                                                           |       |         |                                      |
| a) This test depends on the availability of accredited laboratories equipped and authorized by the National Standards Authority. |       |         |                                      |



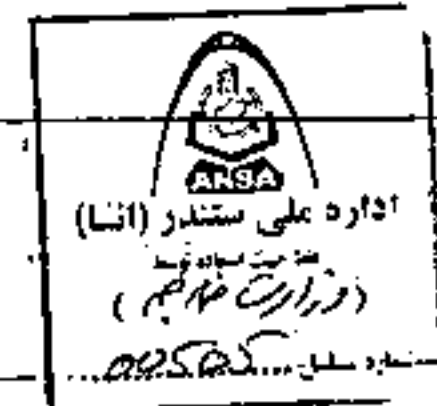
# Annex A

The viscosity of engine lubricating oils shall comply with SAE J300:2015.

Table A-1: SAE Viscosity Grades for Engine Oils (SAE J300 2015)

| SAE Viscosity Grade | Apparent Viscosity at Low Temperature <sup>a</sup> (mPa·s) |                                         | Viscosity at 100°C at Low Shear Rate <sup>b</sup> (mm <sup>2</sup> /s) <sup>c</sup> |         | Viscosity at 150°C at high shear rate (HTHS) <sup>e</sup> (mPa·s) Min |
|---------------------|------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------|
|                     | Related to engine start-up <sup>a</sup> (Maximum)          | Related to oil pumpability <sup>d</sup> | Minimum                                                                             | Maximum | High-Shear Viscosity at 150°C (e), Minimum                            |
| 0W                  | 6200 at -35°C                                              | 60000 at -40°C                          | 3.8                                                                                 | -       | -                                                                     |
| 5W                  | 6600 at -30°C                                              | 60000 at -35°C                          | 3.8                                                                                 | -       | -                                                                     |
| 10W                 | 7000 at -25°C                                              | 60000 at -30°C                          | 4.1                                                                                 | -       | -                                                                     |
| 15W                 | 7000 at -20°C                                              | 60000 at -25°C                          | 5.6                                                                                 | -       | -                                                                     |
| 20W                 | 9500 at -15°C                                              | 60000 at -20°C                          | 5.6                                                                                 | -       | -                                                                     |
| 25W                 | 13000 at -10°C                                             | 60000 at -15°C                          | 9.3                                                                                 | -       | -                                                                     |
| 8                   | -                                                          | -                                       | 4.0                                                                                 | <6.1    | 1.7                                                                   |
| 12                  | -                                                          | -                                       | 5.0                                                                                 | <7.1    | 2.0                                                                   |
| 16                  | -                                                          | -                                       | 6.1                                                                                 | <8.2    | 2.3                                                                   |
| 20                  | -                                                          | -                                       | 6.9                                                                                 | <9.3    | 2.6                                                                   |
| 30                  | -                                                          | -                                       | 9.3                                                                                 | <12.5   | 2.9                                                                   |
| 40                  | -                                                          | -                                       | 12.5                                                                                | <16.3   | 3.5 (grades 0W-40, 5W-40, 10W-40)                                     |
| 40                  | -                                                          | -                                       | 12.5                                                                                | <16.3   | 3.7 (grades 15W-40, 20W-40, 25W-40, and 40)                           |
| 50                  | -                                                          | -                                       | 16.3                                                                                | <21.9   | 3.7                                                                   |
| 60                  | -                                                          | -                                       | 21.9                                                                                | <26.1   | 3.7                                                                   |

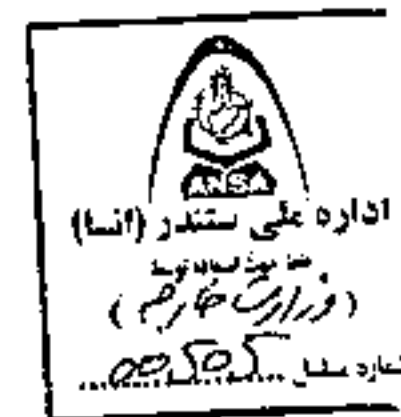
<sup>a</sup> ISIRI 5512/ASTM D5293  
<sup>b</sup> ISIRI 340/ASTM D445  
<sup>c</sup> 1 mPa·s=1 cP; 1 mm<sup>2</sup>/s=1cSt  
<sup>d</sup> ASTM D4684 (MRV)  
<sup>e</sup> ASTM D4683, ASTM D4741 or ASTM D5481 (HTHS)



**Annex B**  
**(Informative)**  
**API classification**

**Table B-1: API Classification for Base Oils**

| Group                  | Viscosity index  | Saturates content (mass %) | Sulfur (mass %) | Other                                           |
|------------------------|------------------|----------------------------|-----------------|-------------------------------------------------|
| I                      | $\geq 80, < 120$ | $< 90$                     | and/or $> 0.03$ | -                                               |
| II                     | $\geq 80, < 120$ | $\geq 90$                  | and $\leq 0.03$ | -                                               |
| III                    | $\geq 120$       | $\geq 90$                  | and $\leq 0.03$ | -                                               |
| IV                     | -                | -                          | -               | PAO*                                            |
| V                      | -                | -                          | -               | All other base oils not included in Groups I-IV |
| (a) Poly alpha olefins |                  |                            |                 |                                                 |



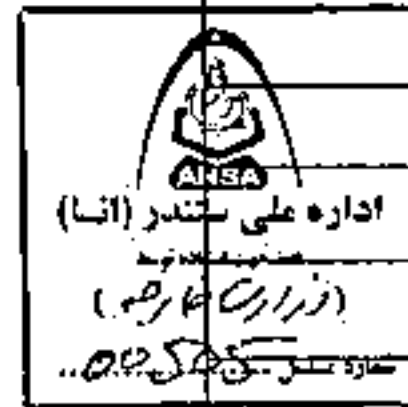
**Annex C**  
**(Informative)**  
**Performance Tests (Engine Tests)**

The performance (engine) tests related to various quality levels of diesel engine oils based on API classification are as follows:

**Table C-1 -- Performance (Engine) Tests for Various Quality Levels of Four-Cylinder Gasoline Engine Oils Based on API Classification**

| Engine test                 |                                    |                                |                                  |                                 |                                | Quality level   |
|-----------------------------|------------------------------------|--------------------------------|----------------------------------|---------------------------------|--------------------------------|-----------------|
|                             | ASTM D 6709<br>(Sequence VIII)     | ASTM D 6593<br>(Sequence VG)   | ASTM D 7589<br>(Sequence VID)    | ASTM D 6891<br>(Sequence IVA)   | ASTM D 7320<br>(Sequence IIIG) | SN <sup>a</sup> |
|                             | ASTM D 6709<br>(Sequence VIII)     | ASTM D 6593<br>(Sequence VG)   | ASTM D 6891<br>(Sequence IVA)    | (Sequence III GA)               | ASTM D 7320<br>(Sequence IIIG) | SM              |
|                             |                                    | ASTM D 6709<br>(Sequence VIII) | ASTM D 6593<br>(Sequence VG)     | ASTM D 6891<br>(Sequence IVA)   | ASTM D 6984<br>(Sequence IIIF) | SL              |
|                             |                                    | ASTM D 5302<br>(Sequence VE)   | ASTM D 5533<br>(Sequence IIIE)   | ASTM D 5844<br>(Sequence IID)   | ASTM D 5119<br>(CRC L-38)      | SJ              |
|                             |                                    | ASTM D 5302<br>(Sequence VE)   | ASTM D 5533<br>(Sequence IIIE)   | ASTM D 5844<br>(Sequence IID)   | ASTM D 5119<br>(CRC L-38)      | SH              |
|                             | ASTM STP 504A<br>(Caterpillar 1H2) | ASTM D 5302<br>(Sequence VE)   | ASTM D 5533<br>(Sequence IIIE)   | ASTM D 5844<br>(Sequence IID)   | ASTM D 5119<br>(CRC L-38)      | SG              |
|                             |                                    | ASTM STP 315H<br>(Sequence VD) | ASTM STP 315H<br>(Sequence IIID) | ASTM D 5844<br>(Sequence IID)   | ASTM D 5119<br>(CRC L-38)      | SF              |
|                             |                                    | ASTM STP 315F<br>(Sequence VC) | ASTM STP 315F<br>(Sequence IIIC) | ASTM STP 315D<br>(Sequence IIB) | ASTM D 5119 (CRC L-38)         | SE              |
| PTM 346<br>(Caterpillar 1H) | ASTM STP 315C<br>(Sequence VB)     | ASTM STP 315C<br>(Sequence IV) | ASTM STP 315D<br>(Sequence IIIB) | ASTM STP 315D<br>(Sequence IIB) | ASTM D 5119 (CRC L-38)         | SD              |
| (Caterpillar L-1)           | ASTM STP 315B<br>(sequence v)      | ASTM STP 315C<br>(Sequence IV) | ASTM STP 315B<br>(Sequence IIIA) | ASTM STP 315B<br>(Sequence IIA) | ASTM D 5119 (CRC L-38)         | SC              |

a) The Sequence VI engine series is used for testing the RC (Resource Conserving) property.





**TABLE 1 Detailed Requirements for Liquefied Petroleum Gases (LPG)**

| Specifications                                                                                                                                                                                               | Product Type                             |                                          |                                          |                                          | Test methods                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------------------------|
|                                                                                                                                                                                                              | Commercial Propane                       | Commercial Butane                        | Commercial PB Mixtures                   | Special-Duty Propane <sup>A</sup>        | ASTM Test Methods (see Section 2)                         |
| Vapor pressure at 37.8 °C (100 °F), kPa (psig) max <sup>B</sup>                                                                                                                                              | 1435 (208)                               | 483 (70)                                 | C                                        | 1435 (208)                               | D1267 <sup>B</sup> or D2598 or D6897                      |
| Heavier hydrocarbon contaminants: <sup>C</sup><br>Butane and heavier, % by volume, max                                                                                                                       | 2.5                                      | ...                                      | ...                                      | 2.5 <sup>1</sup>                         | D2163                                                     |
| Pentane and heavier, % by volume, max                                                                                                                                                                        | ...                                      | 2.0                                      | 2.0                                      | ...                                      | D2163                                                     |
| Propylene content, % by volume, max                                                                                                                                                                          | ...                                      | ...                                      | ...                                      | 5.0                                      | D2163                                                     |
| Residual matter<br>One of the following requirements shall be met:<br>(1) Residue on evaporation of 100 mL, mL, max,<br>and<br>Oil stain observation<br>or<br>(2) Residue by gas chromatography, mg/kg, max: | 0.05<br><br>Pass <sup>H</sup><br><br>350 | 0.05<br><br>Pass <sup>H</sup><br><br>350 | 0.05<br><br>Pass <sup>H</sup><br><br>350 | 0.05<br><br>Pass <sup>H</sup><br><br>350 | D2158 <sup>I</sup><br><br>D2158 <sup>I</sup><br><br>D7756 |
| Density at 15 °C or relative density at 15.6 °C/15.6 °C (60 °F/60 °F)                                                                                                                                        | J                                        | J                                        | J                                        | ...                                      | D1657 or D2598                                            |
| Corrosion, copper, strip, max                                                                                                                                                                                | No. 1                                    | No. 1                                    | No. 1                                    | No. 1                                    | D1838 <sup>K</sup>                                        |
| Sulfur, mg/kg (ppm by mass), max                                                                                                                                                                             | 185 <sup>L</sup>                         | 140 <sup>L</sup>                         | 140 <sup>L</sup>                         | 123 <sup>L</sup>                         | D6667                                                     |
| Hydrogen sulfide                                                                                                                                                                                             | pass                                     | pass                                     | pass                                     | pass                                     | D2420                                                     |
| Moisture content                                                                                                                                                                                             | pass                                     | ...                                      | ...                                      | pass                                     | D2713                                                     |
| Free water content                                                                                                                                                                                           | ...                                      | None <sup>M</sup>                        | None <sup>M</sup>                        | ...                                      | ...                                                       |

A) Equivalent to Propane HD-5 of GPA Standard 2140.

B) Note that the total pressure of a batch of LPG can be higher than the vapor pressure determined by Practice D2598 if there are any inert gases (such as nitrogen or carbon dioxide) present in the LPG. Test Method D2598 is a calculation method of the vapor pressure of all hydrocarbons identified in a batch of LPG by Test Method D2163, but this gas chromatographic method does not detect the presence of inert gases, if present, in a batch of LPG.

C) The permissible vapor pressures of products classified as PB mixtures shall not exceed 208 psig (1435 kPa) and additionally shall not exceed the pressure calculated in psig from the following relationship between the observed vapor pressure at 100 °F (37.8 °C) and the observed relative density at either 60 °F or 15.6 °C:



اداره ملی استاندارد (انسا)

به منظور استفاده توسط

شماره مسلسل



شماره مسلسل

به منظور استفاده توسط

شماره مسلسل

به منظور استفاده توسط

شماره مسلسل

به منظور استفاده توسط

شماره مسلسل

به منظور استفاده توسط

شماره مسلسل

به منظور استفاده توسط

Vapor pressure, psig, max

= 1167 - 1880 (relative density at 60°F/60°F)

= 1167 - 1880 (relative density at 15.6°C/15.6°C)

A specific mixture shall be designated by the vapor pressure at 100 °F in pounds per square inch gauge. To comply with the designation, the vapor pressure of the mixture shall be within +0 psi to -10 psi of the vapor pressure specified.

D) In case of dispute about the vapor pressure of a product, the value actually determined by Test Method D1267 shall prevail over the value calculated by Practice D2598 or measured by Test Method D6897.

E) See XI.2.2.3.

F) "Butane and heavier" includes all hydrocarbons (including olefins) with 4 or more carbon atoms.

G) "Pentane and heavier" includes all hydrocarbons (including olefins) with 5 or more carbon atoms.

H) An acceptable product shall not yield a persistent oil ring when 0.3 mL of solvent residue mixture is added to a filter paper, in 0.1 mL increments and examined in daylight after 2 min as described in Test Method D2158.

I) In case of dispute, Test Method D2158 shall be the referee test method.

J) Although not a specific requirement, the density or relative density can be needed for other purposes and should be reported. Additionally, the relative density of PB mixture is needed to establish the permissible maximum vapor pressure (see Footnote B).

K) This method may not accurately determine the presence of reactive materials (for example,  $H_2S$ ,  $S^0$ ) in liquefied petroleum gas if the product contains corrosion inhibitors or other chemicals which diminish the reaction with the copper strip.

L) The total sulfur limits in these specifications *do include* sulfur compounds used for stenching purposes.

M) The presence or absence of water may be determined by visual inspection of the samples on which the density or relative density is determined.



The proportions of propane and butane during different seasons of the year shall be as follows:

| Hydrocarbons | Spring – summer | Autumn – winter |
|--------------|-----------------|-----------------|
| Propane      | 30%             | 70%             |
| Butane       | 70%             | 30%             |

Note: The latest changes in the proportions of propane and butane during different seasons of the year are as follows:

| Hydrocarbons | Spring – summer | Autumn – winter |
|--------------|-----------------|-----------------|
| Propane      | 40-30           | 60-70           |
| Butane       | 60-70           | 30-40           |

Considering the data received from the esteemed Meteorological Department and the variations in temperature across different months and seasons, the following schedule is proposed for the use of imported fuel gases during winter and summer:

- Winter gas usage period: From 10th Aqrab (November 1) to 10th Hamal (March 30)
- Summer gas usage period: From 11th Hamal (March 31) to 9th Aqrab (October 31)

