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| **Form C.1 Candidate Data Package checklist for ACEA Oil Sequence conformance** |
| **Conducted by:**  **Additive package designation:**  **Viscosity grades:**  **Lubricant codes:**  **ATC data package reference number (if available):**    **Included in this Data Package Yes No**  **1 Laboratory tests for formulations** 🞎🞎  **listed above**  **2 Formulations for all test lubricants** 🞎🞎  **3 Results of all registered ASTM, JASO and CEC** 🞎🞎  **engine tests**  **4 Test declared ‘out of control’** 🞎🞎  **5 Test(s) declared ‘not available’** 🞎 🞎  **6 Applicable test stand reference data** 🞎🞎  **7 Properties and identity of base stocks used** 🞎🞎  **8 Formulation modifications and read-across** 🞎🞎  **documentation**  **9 Test programme design document** 🞎 🞎 |
| **Signed on behalf of (company):**  **Function:**  **Authorised name:**  **Authorised signature:**  **Date:**  **Company reference document number:** |

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| **Form C.2 Programme Extension Data checklist for ACEA Oil Sequence conformance** |
| **Checklist for engine lubricant development programme** |
| **Lubricant Code(s):**  **Viscosity grade(s) covered by this Data Package:** |
| **Included in this Data package Yes No**   1. **Form C.1 completed** 🞎 🞎   ***For formulations developed in the programme extension***  **2 Formulations for all test lubricants** 🞎🞎  **3 Results of all laboratory tests on the final** 🞎🞎  **candidates**  **4 Results of all registered ASTM, JASO and CEC** 🞎🞎  **engine tests**  **5 Test has been declared ‘out of control’** 🞎🞎  **6 Test(s) declared ‘not available’** 🞎🞎  **7 Applicable test stand reference data** 🞎🞎  **8 Properties and identity of base stocks used** 🞎🞎  **9 Read-across documentation (VGRA, VMI, BOI)** 🞎 🞎 |
| **Signed on behalf of (company):**  **Function:**  **Authorised Name:**  **Authorised Signature:**  **Date:**  **Company reference document number:** |

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| **Form C.3 ACEA performance data set for ACEA Oil Sequence qualification** | |
| **Part A**  **Details of the lubricant marketer and engine lubricants** | |
| **Details of lubricant marketer**  Company:  Address:  Contact Person: Function:  Phone No: Fax No:  Email address: | |
| **Lubricant details**  Brand Name: SAE J300 viscosity grade:  Lubricant Code Number: ACEA performance(1): | |
| **Details of any rebrands**  Brand Name(s): | |
| (1) List each applicable ACEA Oil Sequence category | |
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| **Form C.3 ACEA Performance Data Set for ACEA Oil Sequence**  **qualification** | | | | | |
| **Part B Laboratory tests** | | | | | |
| **Laboratory test** | **Parameter** | **Test method** | **Units** | **Test result** | **Limits** |
| SAE Viscosity | Kinematic viscosity at 100 °C  Low‑temperature cranking viscosity  Low‑temperature pumping viscosity | ASTM D445  ASTM D5293  ASTM D4684 | mm2/s  mPa.s  mPa.s |  |  |
| Shear Stability | Viscosity after 30 cycles measured at 100 °C | CEC L-14-93  Or ASTM D6278  Or ASTM D7109 | mm2/s |  |  |
| Shear Stability | Viscosity after 90 cycles measured at 100 °C | ASTM D7109 | mm2/s |  |  |
| HTHS Viscosity | Viscosity at 150 °C and 106 s-1 shear rate  Viscosity at 100 °C and 106 s-1 shear rate | CEC L-36-A-90 | mPa.s  mPa.s |  | ........  Report |
| Evaporative loss | Weight loss after 1 h at 250 °C | CEC L-40-93 | mass % |  |  |
| TBN |  | ASTM D2896  ASTM D4739 | mg KOH/g |  |  |
| Sulphur |  | ASTM D5185  Or ASTM D4951 | mass % |  |  |
| Phosphorus |  | ASTM D5185  Or ASTM D4951 | mass % |  |  |
| Sulphated Ash |  | ASTM D874 | mass % |  |  |
| Chlorine |  | ASTM D6443 | mass % |  |  |
| Oil/Elastomer Compatibility | Max. variation of characteristics after immersion for 7 days in fresh oil without pre-ageing  RE-6  Tensile strength  Elongation at rupture  Volume variation  RE-7  Tensile strength  Elongation at rupture  Volume variation  RE-8  Tensile strength  Elongation at rupture  Volume variation  RE-9  Tensile strength  Elongation at rupture  Volume variation | CEC L-112-16 | %  %  %  %  %  %  %  %  %  %  %  % |  | Report  -70 / +20  Report  -65 / +15  Report  -51 / + 9  Report  -65 / +19 |
| Foaming Tendency | Tendency - stability | ASTM D892  Seq. I (24 °C)  Seq II (94 °C)  Seq. III (24 °C) | mL  mL  mL |  | 10 - nil  .........  10 - nil |
| High Temp  Foaming | Tendency - stability | ASTM D6082  Seq. IV(150 °C) | mL |  | 100 - nil |
| Oil Oxidation with Biodiesel for Engine Oils operating in the presence of Biodiesel Fuel | Oil Oxidation @ 168h  (DIN 51453)  Oil Oxidation @ 216h (EOT)  (DIN 51453)  Viscosity Increase, relative at 168h  (Delta KV100)  Viscosity Increase, relative at 216h  (Delta KV100 at EOT 216h) | CEC L-109-14 | A/cm  A/cm  %  % |  |  |
| Oxidation | Oxidation Induction time (PDSC) | CEC-L-085-99 | min |  |  |
| Low temperature pumpability | MRV  Yield stress  (MRV at SAE J300 temperatures applicable for the fresh oil viscosity grade) | CEC-L-105-12 | mPas  Pa |  |  |
| Corrosion | Copper increase  Lead increase  Copper strip rating | ASTM D6594 | ppm  ppm  max |  |  |
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| **Form C.3 ACEA performance data set for ACEA Oil Sequence qualification** | | | | | | |
| **Part C Engine test results – light duty engines** | | | | | | |
| **Engine test** | **Parameter** | **Test method** | **Units** | **Test result** | **Ref. oil result** | **Limits** |
| EP6CDT | Piston Cleanliness  Turbo charger deposits | CEC L-111-16 | merit  merit |  |  |  |
| Sequence IVB | Average intake lifter volume loss (8 position average)  End of test Iron | ASTM D8350 | mm3  ppm |  |  |  |
| Sequence VH | Average engine sludge  Rocker cover sludge  Average piston skirt varnish  Average engine varnish  Compression ring (hot stuck)  Oil screen clogging | ASTM D8256 | merit  merit  merit  merit  % |  |  | ³ 7.6  ³ 7.7  ³ 8.6  ³ 7.6  none  Report |
| M271 EVO | Engine sludge, average | CEC L-107-19 | merit |  |  | ³ 8.3 |
| M111 | Fuel economy improvement vs reference oil RL 191 (SAE 15W-40) | CEC L-54-96 | % |  |  |  |
| JASO FE | Fuel economy improvement | JASO FE M366  (Toyota 2ZR-FXE) | % |  |  | ≥ 0.0 |
| TOYOTA 1KD-FTV | Turbo Charger Compressor Deposit | CEC L-114-19 | merit |  |  | ≥ 25 |
| Sequence IX | Low Speed Pre-Ignition events  Average number for 4 iterations  Number of events per iteration | ASTM D8291 | Number  Number |  |  | ≤ 5  ≤ 8 |
| Sequence X | Chain wear GDI  Elongation of timing chain | ASTM D8279 | % |  |  | ≤ 0.085 |
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| **Form C.3 ACEA performance data set for ACEA Oil Sequence qualification** | | | | | | |
| **Part C Engine test results - light-duty diesel engines** | | | | | | |
| **Engine test** | **Parameter** | **Test method** | **Units** | **Test result** | **Ref. oil result** | **Limits** |
| DV6C | Absolute viscosity increase at  100 °C and 5.5 % soot  Piston merit | CEC L-106-14 | mm2/s  merit |  |  | £ 0.9xRL248  ³ 2.5 |
| VW TDI | Piston cleanliness  Cylinder-spreading limit  No ring sticking, max for any ring | CEC L-117-20 | merit  merit  ASF |  |  | ≥ RL276 – 5  ≤ 13  0 |
| OM646LA | Cam wear outlet, average  Cam wear inlet, average  Cylinder wear, average  Bore polishing  Tappet wear inlet, average  Tappet wear outlet, average  Piston cleanliness, average  Engine sludge, average | CEC L-099-08 | µm |  |  |  |
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| **Form C.3 ACEA performance data set for ACEA Oil Sequence qualification** | | | | | | |
| **Part C Engine test results - heavy-duty diesel engines** | | | | | | |
| **Engine test** | **Parameter** | **Test method** | **Units** | **Test result** | **Ref. oil result** | **Limits** |
| OM646LA | Cam wear outlet, average | CEC L-099-08 | µm |  |  |  |
| Mack T8-E | Relative viscosity at 4.8 % soot | ASTM D5967 |  |  |  | £ 2.1 |
| OM471 | Piston cleanliness (grooves and piston undercrown), average  Oil consumption | CEC L-118-21 | %  g/h |  |  |  |
| CAT 1N | Weighted demerits (WDN)  Top Groove Fill (TGF)  Top Land Heavy Carbon (TLHC)  Oil Consumption (0-252h)  Piston, ring and liner scuffing  Piston ring sticking | ASTM D6750 | Demerit  %  %  g/kWh |  |  |  |
| CAT C13 | Merit rating  Hot stuck rings | ASTM D7549 | **Merit** |  |  |  |
| Cummins ISM | Merit rating  Top ring mass loss  Crosshead, weight loss  Oil Filter Diff. Press at 150 h  Engine sludge  Adj. screw weight loss | ASTM D7468 | Merit  mg  mg  kPa  merit  mg |  |  |  |
| Mack T-12 | Merit  Average Liner wear  Average top ring weight loss  End of test lead concentration, mass fraction  Delta lead 250-300 h, mass fraction  Oil consumption phase 1 | ASTM D7422 | µm  mg  ppm  ppm  g/h |  |  |  |
| OM646LA BIO | Piston cleanliness  Ring sticking  Sludge | CEC L-104-16 | merit  ASF  merit |  |  |  |
| Volvo T-13 | KV increase (300-360h)  Oxidation peak hight  Nitration peak hight  Oil consumption (avg 48-192h) | ASTM D8048 | %  A/cm  A/cm  g/h |  |  |  |
| COAT | Aeration | ASTM D8047 | % |  |  |  |
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| **Form C.3 ACEA performance data set for ACEA Oil Sequence**  **qualification** |
| **Part D Qualification conformance** |
| I hereby attest to using and satisfying the guidelines as defined in ATIEL Code of Practice.  Name of Authorised Company Representative:  Function:  Phone no: Email address:  Signature of Authorised Company Representative:  Date:  Company document reference no: |