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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 °CLow‑temperature cranking viscosityLow‑temperature pumping viscosity | ASTM D445ASTM D5293ASTM D4684 | mm2/smPa.smPa.s |  |  |
| Shear Stability | Viscosity after 30 cycles measured at 100 °C | CEC L-14-93Or ASTM D6278Or 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 rateViscosity at 100 °C and 106 s-1 shear rate | CEC L-36-A-90 | mPa.smPa.s |  | ........Report |
| Evaporative loss | Weight loss after 1 h at 250 °C | CEC L-40-93 | mass % |  |  |
| TBN |  | ASTM D2896ASTM D4739 | mg KOH/g |  |  |
| Sulphur |  | ASTM D5185Or ASTM D4951 | mass % |  |  |
| Phosphorus |  | ASTM D5185Or 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-ageingRE-6 Tensile strength Elongation at rupture Volume variationRE-7 Tensile strength Elongation at rupture Volume variationRE-8 Tensile strength Elongation at rupture Volume variationRE-9 Tensile strength Elongation at rupture Volume variation | CEC L-112-16 | %%%%%%%%%%%% |  | Report-70 / +20Report-65 / +15Report-51 / + 9Report-65 / +19 |
| Foaming Tendency | Tendency - stability | ASTM D892Seq. I (24 °C)Seq II (94 °C)Seq. III (24 °C) | mLmLmL |  | 10 - nil.........10 - nil |
| High Temp Foaming | Tendency - stability | ASTM D6082Seq. IV(150 °C) | mL |  |  |
| Oil Oxidationwith Biodieselfor Engine Oils operatingin the presenceof 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/cmA/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 | mPasPa |  |  |
| Corrosion | Copper increaseLead increaseCopper strip rating | ASTM D6594 | ppmppmmax |  |  |
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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 CleanlinessTurbo charger deposits | CEC L-111-16 | meritmerit |  |  |  |
| Sequence IVB | Average intake lifter volume loss(8 position average)End of test Iron | ASTM D8350 | mm3ppm |  |  |  |
| Sequence VH | Average engine sludgeRocker cover sludgeAverage piston skirt varnishAverage engine varnishCompression ring (hot stuck)Oil screen clogging | ASTM D8256  | meritmeritmeritmerit% |  |  | ³ 7.6³ 7.7³ 8.6³ 7.6noneReport |
| 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 eventsAverage number for 4 iterationsNumber of events per iteration | ASTM D8291 | NumberNumber |  |  | ≤ 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 % sootPiston merit | CEC L-106-14 | mm2/smerit |  |  | £ 0.9xRL248³ 2.5 |
| VW TDI  | Piston cleanlinessCylinder-spreading limitNo ring sticking, max for any ring | CEC L-117-20  | meritmeritASF |  |  | ≥ RL276 – 5≤ 130 |
| OM646LA | Cam wear outlet, averageCam wear inlet, averageCylinder wear, averageBore polishingTappet wear inlet, averageTappet wear outlet, averagePiston cleanliness, averageEngine 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), averageOil 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 scuffingPiston ring sticking | ASTM D6750 | Demerit%%g/kWh |  |  |  |
| CAT C13 | Merit ratingHot stuck rings | ASTM D7549 | **Merit** |  |  |  |
| Cummins ISM | Merit ratingTop ring mass lossCrosshead, weight lossOil Filter Diff. Press at 150 hEngine sludgeAdj. screw weight loss | ASTM D7468  | MeritmgmgkPameritmg |  |  |  |
| Mack T-12 | MeritAverage Liner wearAverage top ring weight lossEnd of test lead concentration, mass fractionDelta lead 250-300 h, mass fractionOil consumption phase 1 | ASTM D7422 | µmmgppmppmg/h |  |  |  |
| OM646LA BIO | Piston cleanlinessRing stickingSludge | CEC L-104-16 | meritASFmerit |  |  |  |
| Volvo T-13 | KV increase (300-360h)Oxidation peak hightNitration peak hightOil consumption (avg 48-192h) | ASTM D8048 | %A/cmA/cmg/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: |