

Contents

| | |
|--|-----------|
| 00 - Technical data | 1 |
| 1 Identification | 1 |
| 1.1 Engine identification number/engine data | 1 |
| 2 Safety precautions | 2 |
| 2.1 Safety precautions when working on the fuel supply system | 2 |
| 2.2 Safety precautions when using testers and measuring instruments during a road test | 4 |
| 2.3 Safety precautions when working on the cooling system | 5 |
| 2.4 Safety precautions when working on the ignition system | 6 |
| 2.5 Reducing fuel pressure in high-pressure section | 6 |
| 3 Repair instructions | 8 |
| 3.1 Rules for cleanliness | 8 |
| 3.2 Foreign particles in engine | 8 |
| 3.3 Contact corrosion | 8 |
| 3.4 Routing and attachment of pipes, hoses and wiring | 9 |
| 3.5 Installing radiators and condensers | 9 |
| 3.6 Checking vacuum system | 9 |
| 10 - Removing and installing engine | 10 |
| 1 Removing and installing engine | 10 |
| 1.1 Removing engine | 10 |
| 1.2 Separating engine and gearbox | 24 |
| 1.3 Securing engine to engine and gearbox support | 24 |
| 1.4 Installing engine | 26 |
| 2 Assembly mountings | 29 |
| 2.1 Exploded view - assembly mountings | 29 |
| 2.2 Adjusting assembly mountings | 31 |
| 2.3 Checking adjustment of assembly mountings (engine/gearbox mountings) | 35 |
| 3 Engine cover panel | 37 |
| 3.1 Removing and installing engine cover panel | 37 |
| 13 - Crankshaft group | 38 |
| 1 Cylinder block (pulley end) | 38 |
| 1.1 Exploded view - poly V-belt drive | 38 |
| 1.2 Exploded view - sealing flange (pulley end) | 40 |
| 1.3 Removing and installing poly V-belt | 41 |
| 1.4 Removing and installing vibration damper | 43 |
| 1.5 Removing and installing bracket for ancillaries | 44 |
| 1.6 Renewing crankshaft oil seal (pulley end) | 47 |
| 1.7 Removing and installing sealing flange (pulley end) | 50 |
| 2 Cylinder block (gearbox end) | 55 |
| 2.1 Exploded view - cylinder block (gearbox end) | 55 |
| 2.2 Removing and installing flywheel | 56 |
| 2.3 Removing and installing sealing flange (gearbox end) | 57 |
| 3 Crankshaft | 60 |
| 3.1 Exploded view - crankshaft | 60 |
| 3.2 Crankshaft dimensions | 62 |
| 3.3 Measuring axial clearance of crankshaft | 62 |
| 3.4 Measuring radial clearance of crankshaft | 63 |
| 3.5 Renewing needle bearing in crankshaft | 64 |
| 3.6 Removing and installing chain sprocket | 65 |
| 4 Pistons and conrods | 67 |
| 4.1 Exploded view - pistons and conrods | 67 |

| | | |
|-----------|--|------------|
| 4.2 | Checking pistons and cylinder bores | 68 |
| 15 | Cylinder head, valve gear | 70 |
| 1 | Cylinder head | 70 |
| 1.1 | Exploded view - cylinder head | 70 |
| 1.2 | Removing and installing cylinder head | 73 |
| 1.3 | Removing and installing cylinder head cover | 85 |
| 1.4 | Checking compression | 87 |
| 2 | Toothed belt drive | 90 |
| 2.1 | Exploded view - toothed belt | 90 |
| 2.2 | Removing and installing toothed belt | 96 |
| 3 | Valve gear | 118 |
| 3.1 | Exploded view - valve gear | 118 |
| 3.2 | Measuring axial clearance of camshaft | 121 |
| 3.3 | Removing and installing camshaft oil seal | 121 |
| 3.4 | Removing and installing camshaft | 126 |
| 3.5 | Removing and installing camshaft adjuster | 129 |
| 3.6 | Removing and installing camshaft control valve 1 N205 | 132 |
| 3.7 | Removing and installing valve stem oil seals | 135 |
| 4 | Inlet and exhaust valves | 143 |
| 4.1 | Checking valve guides | 143 |
| 17 | Lubrication | 144 |
| 1 | Sump/oil pump | 144 |
| 1.1 | Exploded view - sump/oil pump | 144 |
| 1.2 | Removing and installing sump | 145 |
| 2 | Engine oil cooler | 151 |
| 2.1 | Removing and installing engine oil cooler | 151 |
| 3 | Oil filter/oil pressure switch | 154 |
| 3.1 | Exploded view - oil filter housing/oil pressure switch | 154 |
| 3.2 | Checking oil pressure and oil pressure switch | 156 |
| 3.3 | Draining oil filter housing | 157 |
| 3.4 | Removing and installing oil filter housing | 158 |
| 4 | Balance shaft assembly | 163 |
| 4.1 | Exploded view - balance shaft assembly | 163 |
| 4.2 | Removing and installing balance shaft assembly | 164 |
| 4.3 | Pre-tensioning chain tensioner | 168 |
| 19 | Cooling | 169 |
| 1 | Cooling system/coolant | 169 |
| 1.1 | Connection diagram - coolant hoses | 169 |
| 1.2 | Checking cooling system for leaks | 170 |
| 1.3 | Draining and filling cooling system | 171 |
| 2 | Coolant pump/thermostat assembly | 177 |
| 2.1 | Exploded view - coolant pump and thermostat | 177 |
| 2.2 | Exploded view - electric coolant pump | 178 |
| 2.3 | Removing and installing coolant pump | 178 |
| 2.4 | Removing and installing map-controlled engine cooling system thermostat F265 | 180 |
| 3 | Coolant pipes | 182 |
| 3.1 | Removing and installing coolant pipes | 182 |
| 4 | Radiator/radiator fans | 185 |
| 4.1 | Exploded view - radiator/radiator fans | 185 |
| 4.2 | Removing and installing radiator | 185 |
| 4.3 | Removing and installing radiator cowl with radiator fan | 188 |

| | | |
|-----------|--|------------|
| 4.4 | Removing and installing radiator fans | 190 |
| 21 | - Turbocharging/supercharging | 191 |
| 1 | Turbocharger | 191 |
| 1.1 | Exploded view - turbocharger | 191 |
| 1.2 | Removing and installing turbocharger | 195 |
| 1.3 | Checking vacuum unit for turbocharger | 203 |
| 1.4 | Adjusting vacuum unit for turbocharger | 205 |
| 1.5 | Renewing vacuum unit for turbocharger | 210 |
| 2 | Charge air system | 211 |
| 2.1 | Overview - charge air system | 211 |
| 2.2 | Exploded view - charge air system | 212 |
| 2.3 | Exploded view - hose connections for charge air system | 212 |
| 2.4 | Removing and installing charge air cooler | 213 |
| 2.5 | Checking charge air system for leaks | 214 |
| 26 | - Exhaust system | 217 |
| 1 | Exhaust pipes/silencers | 217 |
| 1.1 | Exploded view - silencers | 217 |
| 1.2 | Removing and installing front exhaust pipe | 218 |
| 1.3 | Stress-free alignment of exhaust system | 221 |
| 1.4 | Checking exhaust system for leaks | 222 |