

Contents

| | |
|---|-----------|
| 00 - Technical data | 1 |
| 1 Identification | 1 |
| 2 Safety precautions | 2 |
| 3 Repair instructions | 3 |
| 10 - Removing and installing engine | 4 |
| 1 Removing and installing engine | 4 |
| 1.1 Removing engine | 4 |
| 1.2 Securing engine to engine and gearbox support | 19 |
| 1.3 Installing engine | 19 |
| 2 Assembly mountings | 26 |
| 2.1 Exploded view - assembly mountings | 26 |
| 2.2 Supporting engine in installation position | 28 |
| 2.3 Removing and installing engine mountings | 29 |
| 2.4 Removing and installing gearbox mounting | 30 |
| 3 Engine cover panel | 35 |
| 13 - Crankshaft group | 36 |
| 1 Cylinder block (pulley end) | 36 |
| 1.1 Exploded view - cylinder block (pulley end) | 36 |
| 1.2 Removing and installing poly V-belt | 36 |
| 1.3 Removing and installing tensioner for poly V-belt | 36 |
| 1.4 Removing and installing vibration damper | 36 |
| 1.5 Removing and installing bracket for ancillaries | 36 |
| 2 Cylinder block (gearbox end) | 38 |
| 3 Crankshaft | 39 |
| 4 Balance shaft | 40 |
| 5 Pistons and conrods | 41 |
| 15 - Cylinder head, valve gear | 42 |
| 1 Timing chain cover | 42 |
| 2 Chain drive | 43 |
| 3 Cylinder head | 44 |
| 3.1 Exploded view - cylinder head | 44 |
| 3.2 Removing and installing cylinder head | 44 |
| 3.3 Checking compression | 46 |
| 4 Valve gear | 47 |
| 4.1 Exploded view - valve gear | 47 |
| 4.2 Removing and installing camshaft | 47 |
| 4.3 Installing ball for slider | 49 |
| 4.4 Removing and installing actuators for camshaft adjustment | 49 |
| 4.5 Removing and installing camshaft control valve 1 N205 | 49 |
| 4.6 Removing and installing valve stem oil seals | 49 |
| 5 Inlet and exhaust valves | 50 |
| 17 - Lubrication | 51 |
| 1 Sump/oil pump | 51 |
| 1.1 Exploded view - sump/oil pump | 51 |
| 1.2 Engine oil | 51 |
| 1.3 Removing and installing sump (bottom section) | 51 |
| 1.4 Removing and installing oil pump | 52 |



| | | |
|-----------|---|------------|
| 1.5 | Removing and installing sump (top section) | 52 |
| 1.6 | Removing and installing oil level and oil temperature sender G266 | 52 |
| 2 | Engine oil cooler | 53 |
| 3 | Crankcase breather | 54 |
| 4 | Oil filter/oil pressure switches | 55 |
| 19 | Cooling | 56 |
| 1 | Cooling system/coolant | 56 |
| 1.1 | Connection diagram - coolant hoses | 56 |
| 1.2 | Checking cooling system for leaks | 58 |
| 1.3 | Draining and filling cooling system | 58 |
| 2 | Coolant pump/thermostat assembly | 64 |
| 2.1 | Exploded view - coolant pump/thermostat | 64 |
| 2.2 | Exploded view - electric coolant pump | 64 |
| 2.3 | Exploded view - coolant temperature senders | 68 |
| 2.4 | Removing and installing electric coolant pump | 68 |
| 2.5 | Removing and installing coolant pump | 69 |
| 2.6 | Removing and installing toothed belt for coolant pump | 70 |
| 2.7 | Removing and installing actuator for engine temperature regulation N493 | 70 |
| 2.8 | Removing and installing coolant temperature sender G62 | 70 |
| 2.9 | Removing and installing radiator outlet coolant temperature sender G83 | 71 |
| 2.10 | Removing and installing coolant valves | 71 |
| 3 | Coolant pipes | 74 |
| 3.1 | Exploded view - coolant pipes | 74 |
| 3.2 | Removing and installing coolant pipes | 75 |
| 4 | Radiator/radiator fans | 80 |
| 4.1 | Exploded view - radiator/radiator fans | 80 |
| 4.2 | Removing and installing radiator | 82 |
| 4.3 | Removing and installing radiator cowl | 87 |
| 4.4 | Removing and installing radiator fan V7 | 89 |
| 21 | Turbocharging/supercharging | 90 |
| 1 | Turbocharger | 90 |
| 1.1 | Exploded view - turbocharger | 90 |
| 1.2 | Removing and installing turbocharger | 90 |
| 2 | Charge air system | 92 |
| 2.1 | Exploded view - charge air system | 92 |
| 2.2 | Exploded view - hose connections for charge air system | 93 |
| 2.3 | Removing and installing charge air cooler | 93 |
| 2.4 | Removing and installing charge pressure sender G31 | 94 |
| 2.5 | Checking charge air system for leaks | 95 |
| 24 | Mixture preparation - injection | 96 |
| 1 | Injection system | 96 |
| 1.1 | Overview of fitting locations - injection system | 96 |
| 2 | Air cleaner | 105 |
| 2.1 | Exploded view - air cleaner housing | 105 |
| 2.2 | Removing and installing air cleaner housing | 105 |
| 3 | Intake manifold | 107 |
| 3.1 | Exploded view - intake manifold | 107 |
| 3.2 | Removing and installing intake manifold | 107 |
| 3.3 | Removing and installing throttle valve module J338 | 109 |
| 3.4 | Cleaning throttle valve module | 110 |
| 3.5 | Checking intake manifold change-over function | 110 |

| | | |
|-----------|---|------------|
| 4 | Injectors | 111 |
| 4.1 | Exploded view - fuel rail with injectors | 111 |
| 4.2 | Removing and installing fuel rail | 111 |
| 4.3 | Removing and installing injectors | 111 |
| 4.4 | Cleaning injectors | 111 |
| 5 | Senders and sensors | 112 |
| 5.1 | Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 | 112 |
| 5.2 | Removing and installing fuel pressure sender G247 | 112 |
| 5.3 | Checking fuel pressure sender G247 | 112 |
| 5.4 | Removing and installing fuel pressure sender for low pressure G410 | 113 |
| 6 | High-pressure pump | 114 |
| 7 | Lambda probe | 115 |
| 8 | Engine control unit | 116 |
| 8.1 | Removing and installing engine control unit J623 | 116 |
| 26 | - Exhaust system | 117 |
| 1 | Exhaust pipes/silencers | 117 |
| 1.1 | Exploded view - silencers | 117 |
| 1.2 | Separating exhaust pipes/silencers | 119 |
| 1.3 | Removing and installing front silencer | 120 |
| 1.4 | Removing and installing silencers | 121 |
| 1.5 | Stress-free alignment of exhaust system | 121 |
| 1.6 | Checking exhaust system for leaks | 122 |
| 2 | Emission control system | 123 |
| 2.1 | Exploded view - emission control system | 123 |
| 2.2 | Removing and installing catalytic converter | 123 |
| 2.3 | Removing and installing exhaust flap control unit J883 | 124 |
| 28 | - Ignition system | 126 |
| 1 | Ignition system | 126 |