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| Tested in Accordance with | **Standard Operating Conditions** |
|  | Fuel | Run on aviation turbine (AVTUR) diesel-substitute fuel. |
| Test Mass | Vehicle ballasted up to Gross Vehicle Mass (unless otherwise appropriate). |
| Electrical Load | Test with A/C at maximum and simulate load on electrical system with load bank. |
| Tyre Pressures | Run at operating tyre pressures, as specified by manufacturer. |
| **Basic Safety** |
| ISO 16333 | Static tilt test | Vehicle is tilted, both left and right, to first wheel lift then roll over if required on a calibrated tilt table. Fuel loss is assessed. |
| UN Reg. 46 | Visibility | Rearward visibility using mirrors is assessed at set distances and angles. |
| EU1008/20\*\* | Wash/wipe | Capability of windscreen wash/wipe system, including performance and capacity. |
| ISO 7401 | J Turn | J turns under controlled conditions to assess vehicle handling, reaction and recovery characteristics. |
| ISO TR3888, NATO STANAG 4357/8 | Double lane change | Lane changes under controlled conditions to assess vehicle handling characteristics and reactions. VBox instrumentation is added to vehicle to measure velocity. Cones are laid out in a lane change turn to the left, then back to the right or vice versa. Cone spacing is calculated based on dimensions of vehicle and speed measurements at lane entry/exit are triggered by lasers. |
| ISO 14793 | Brake-in-turn | Assessment of vehicle stability under braking whilst driving under controlled conditions at a constant radius until a certain lateral acceleration value is achieved at specified speeds. |
| ISO 4138 | Steady state turn | Assessment of vehicle stability whilst driving under controlled conditions at a constant radius at an incrementally increasing speed until lateral stability limit is achieved or vehicle starts to under steer / over steer. |
| UN Reg. 79 | Steering effort | Steering wheel is instrumented and the force required to operate the steering under a variety of conditions is measured. |
| MBK PHP003 | Wire cutter capability | Wire cutter rig used to assess vehicle cutters’ ability to cut wire at several angles of impact and set heights. In accordance with internal Millbrook test procedure on a numerous MoD vehicles. |
| UN Reg. 13/13H | Hand brake hold | Assessment of parking brake system’s ability to hold vehicle stationary in both vehicle directions on gradients between 7 – 60% under laden and unladen conditions. |
| UN Reg. 13/13H | Secondary braking | Where appropriate, hand brake is used to emergency stop vehicle at speeds up to 50 km/h. |
| Def. Stan. 61-5Def. Stan. 23-09 & Def. Stan. 59-411 | Electrical isolation | Electrical systems such as lights, A/C & Bowman are switched on, battery is then isolated and battery current draw is measured. |
| Def. Stan. 00-25 | 12v and 24v DC outputs | Visual and functional assessment of electrical outputs. |
| Def. Stan. 59-411, JSP392 & 20\*\*/104/EC | EMC | Measurement of electromagnetic radiation from the vehicle’s electrical systems in specialised EMC anechoic test facility. |
| Def. Stan. 00-25 | Fuel gauge accuracy | Fuel gauge checked at various tank fill conditions from full to empty. |
| 75/443/EEC | Speedometer accuracy | Compare accurate GPS speed to indicated speed, tolerance must be within legislative requirements. |
| 70/157/EEC | Drive-by noise | Conducted on ISO compliant noise testing surface, noise emissions from vehicle are measured at set points as vehicle passes by. |
| Def. Stan 08-06 | Thermal signature | Thermal emissions from vehicle are assessed with an infra-red thermal imaging camera. |
| Def. Stan 08-06 | Acoustic signature | Sonic emissions from vehicle are assessed in an anechoic chamber. |
| Def. Stan 08-25 | Under body protection | Review of performance of under body protection from scrapes and impacts normally conducted during BFM inspection process. |
| UN Reg. 34 | Fuel tank safety | Physical check to legislative standards. |
| **Powertrain/Brakes** |
| Def. Stan. 23-06 | Baseline acceleration/braking | Instrumented vehicle tested at various load states on even, level terrain using tow dynamometer. |
| Def. Stan. 23-06. | Net power available at wheels | Vehicle is driven from a standstill up a 7% gradient and its increase in speed is recorded via GPS. Used to inform power-to-weight ratio and Mobility Class against. |
| - | Calibration/gearbox susceptibility | Vehicle ascends and descends a 60% slope, including stopping half way and returning or continuing. This is designed to highlight any gearbox/engine calibration issues. |
| STANAG 4101, STANAG 4007, against 77/389/EEC, 661/20\*\*/EC, 1005/20\*\*/EU | Towing | A suitably rated and equipped trailer/casualty vehicle is hitched to the vehicle and the coupling’s suitability is assessed subjectively both statically and dynamically. Strain gauges and dynamic strenuousness can be added as required. |
| UN Reg. 13/13H | Engine/exhaust braking | Vehicle is driven down gradients between 7 – 26% and effect of exhaust braking system is assessed. |
| UN Reg. 13/13H | Baseline stopping/fade tests | Fifteen maximum retardation brake stops from specified speeds in laden and unladen conditions recording G force, brake temperatures etc. |
| - | Transmission locking | From a standstill, drive forwards and backwards over zero friction rollers on 25% slope to prove functionality of differential locks in all combinations. |
| **Mobility** |
| Def. Stan. 23-06 | Articulation | Determination of Vehicle’s Automotive Performance over various obstacles in unladen and laden conditions. |
| Def. Stan. 23-06 | Gradeability | Vehicle is driven over gradients up to 35% Gravel Hill & 60% Concrete Hill. |
| Def. Stan. 23-06 | Ground pressure | Axle weights and tyre contact patches are used to calculate this value. |
| Def. Stan. 23-06 | Ground clearance | Approach/departure & breakover angles are measured. |
| Def. Stan. 23-06 | Wading | Vehicle is driven through 0.75 m of water and brought to a halt for 10 minutes to assess water ingress. |
| Def. Stan. 23-06 | Dynamic tilt | Vehicle is driven over side slopes of up to 25° to assess dynamic lateral stability. |
| Def. Stan. 23-06 | Step Climb | Vehicle is drive forwards and backwards over steps perpendicularly and at 45°. |
| Def. Stan. 23-06 | Turning circle | Turning circle is measured using both the wheel-to-wheel and curb-to-curb methods. |
| Def. Stan. 23-06 | Masses & Dimensions | Assessed using measuring devices and a weigh bridge. |
| **Human Factors** |
| Def. Stan. 00-42, ISO 2631/3, ISO 8041, 20\*\*/10/EC & 20\*\*/44/EC | Noise & Vibration | Vehicle is driven once over each surface defined in Battlefield Mission D107D for TSV. Accelerometers are mounted in relevant and pre-determined positions to measure hand/arm/ whole body vibration, against legislative requirements. Sound probe used to determine noise level produced in and out of vehicle, against legislative requirements. |
| Def. Stan. 00-25. | Egress & Ingress | The ease of entry and exit to cabin is subjectively assessed using 50th and 95th percentile humans in appropriate battle order. |
| Def. Stan. 00-25 | Ergonomics | The ease of operating and reaching the key controls within the cabin/on the vehicle is subjectively assessed. |
| **Range** |
| MBK D99,Def. Stan. 00-42 | Distance travelled on one tank of fuel | Drive Battlefield Mission D99 specifically designed to expose range as defined by MoD Fuels Group. Fuel tank is brimmed, vehicle is then run dry and the distance travelled before fuel runs out is recorded via GPS. |
| - | Self-priming | Fuel tank and fuel system is depleted by the engine. The tank is then refilled and a functionality check is carried out on the ignition by starting the engine to ensure fuel is automatically delivered through entire fuel system. |
| - | Low speed patrol | Vehicle is driven at 4 km/h for 60 mins in 24 period to assess how vehicle behaves at slow speed. |
| **Climatic** |
| - | Cold Start | Attempt to start vehicle at temperatures incrementing down to -18°C. |
| Def. Stan. 00-35 | Cold Test | Test performed on whole vehicle in controlled temperature test environment, including full thermocouple instrumentation at both hot and cold temperatures over a nominal one week test period using diurnal temperature cycles as laid out in the standard. |
| Def. Stan. 00-35 | Hot Test |
| Def. Stan. 00-35 | Rain | Vehicle is doused with consistent rain fall in order to assess ability of seals, covers and cases to resist ingress and pooling. |
| Reg. (EU) 672/20\*\* | Defrost/demist windscreen ability | HVAC systems performance assessed in humidity chamber, in cold climatic chamber down to -18°C. |
| Def. Stan. 00-35 | Sand & Dust | Chamber-based test lasting 2 × 48hrs whereby the vehicle is subjected to blasts of sand and dust to assess bearing ingress, filter clogging etc. |