


# Schedule of Accreditation

Issued by

## United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

 <p><b>20085</b></p> <p>Accredited to ISO/IEC 17025:2017</p>	<p><b>QinetiQ Ltd</b></p> <p><b>Issue No: 002      Issue date: 30 January 2025</b></p>	
	<p><b>MOD Pendine</b> <b>Llanmiloe</b> <b>Carmarthen</b> <b>SA33 4UA</b></p>	<p><b>Contact: Andrew Leahy</b> <b>Tel: +44 (0) 1994 452289</b> <b>E-Mail: ajleahy@qinetiq.com</b></p>
<p><b>Testing performed at the above address only</b></p>		

### DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
<p>MORTARS UP TO 120MM SMALL ARMS UP TO 12.7MM CANNON AND SMOOTH BORE UP TO 40MM RECOIL-LESS WEAPONS PYROTECHNICS AMMUNITION FOR ABOVE FREE FLIGHT ROCKETS GUIDED WEAPONS WARHEADS</p>	<p><b><u>EXTERNAL BALLISTICS</u></b></p>	<p>DEF STAN 07-085 Part 4 Issue 2 DGM ISS Plans (various depending on calibre and nature), NATO Multi calibre MOPI-AEP -97EdB</p>
	<p><b><u>ACCURACY</u></b> <b><u>HORIZONTAL PLANE</u></b></p> <p>Surveyed Lines – 1 m to 7000 m Tapes - 300 mm to 30 m</p>	<p>Customer Specifications, NATO STANAGs/AOPs, NATO AEPs and In-House Procedures based on above specifications using the equipment listed</p>
	<p><b><u>VERTICAL PLANE</u></b></p> <p>Angular measurement - (<math>\pm 1</math> mil)</p>	<p>Surveyed Lines, Measuring Wheels Clinometers, Theodolites</p>
	<p><b><u>VELOCITIES</u></b></p> <p>PCC – up to 30 m base DR – 50 ms<sup>-1</sup> to 2000 ms<sup>-1</sup> VAS-1 <math>\mu</math>s to 100<math>\mu</math>s (Resolution)</p> <p>HSDV: - Frame rates from 1000 fps to 150000 fps with an exposure of 300 nanoseconds Tapes – 300 mm to 30 m</p>	<p>Clinometers, Tapes</p> <p>Photoelectric Counter Chronometer (PCC) Doppler Radar (DR) Velocity Analysing System (VAS)</p> <p>High Speed Digital Video (HSDV) Calibrated Tapes</p>



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As listed on page 1	<b><u>EXTERNAL BALLISTICS</u></b> (cont'd)  <b><u>PROJECTILE STABILITY</u></b>  HSDV - ( $\pm 1^\circ$ ) Colour CCTV -25 and 240 pps for 30 mins Yaw Cards - 1 mm to 200 mm	HSDV, CCTV, Yaw Cards IRIG (Inter-range instrumentation group) Atomic timecode
	<b><u>PENETRATION</u></b>  Up to 3 m	Measurement by calibrated instruments (e.g. rules, length bars, depth micrometres and Vernier callipers), manual measurements (e.g. rules and probes)
	<b><u>DURATION</u></b>  Up to 180 mins @ 25 fps UP to 30 mins @ 240 fps	Stopwatches, Digital Timers, CCTV
	<b><u>RICOCHET</u></b>  VAS-1 $\mu\text{s}$ to 100 $\mu\text{s}$ (Resolution) Witness Screens - (Acc $\pm 5$ mm)	VAS, Witness Screens
	<b><u>BLAST OVERPRESSURES</u></b>  Piezo-up to 2000 kPa	Pressure transducers



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As listed on page 1	<b><u>INTERNAL BALLISTICS</u></b>	DEF STAN 07-085 Part 4 Issue 2 DEF STAN 05-101 Part 1 Issue 1 DEF STAN 05-101 Part 2 Issue 1 DGM ISS Plans (various depending on calibre and nature), NATO Multi Calibre MOPI –AEP-97 EdB
	<b><u>PRESSURE</u></b>  Transducers-up to 750 MPa Copper crushers-up to 200 MPa	Customer Specifications, NATO STANAGs/AOPs, NATO AEPs and In-House Procedures based on above specifications using the equipment listed  Variety of Pressure, Transducers with Copper Crushers
	<b><u>TEMPERATURE</u></b>  -60 °C to +1000 °C	Thermocouples + Data Logger
	<b><u>FUNCTIONING</u></b>  Component wear Bores up to 120 mm	Plugs, Electronic bore gauges, Intra-scope Photography.
	<b><u>2.4 ENVIRONMENTAL CONDITIONING</u></b>  -60 °C to + 75 °C Humidity 15% to 95%	Conditioning chambers, Data Loggers.



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As listed on page 1	<b><u>INTERNAL BALLISTICS</u></b> (cont'd)  <b><u>PREMATURES</u></b>  HSDV - (Acc. $\pm 1$ Frame) Colour CCTV - 25 and 240 fps Time - 0 to 180 mins	Visual observation, HSDV, CCTV, Stopwatches
	<b><u>RATE OF FIRE</u></b>  Recorders - Up to 10 000 rounds/min.  HSDV: - (Acc. $\pm 1$ Frame) @ 300 ns exposure Colour CCTV - 25 and 240 fps Time - 0 to 180mins	Rate of Fire Recorders, CCTV, HSDV, Stopwatches
	<b><u>RECOIL/VIBRATION</u></b>  Accel - 0 to 250 g (linear) Load Cells - 0 to 160 kN  HSDV: - (Acc. $\pm 1$ Frame) @ 300 ns exposure LVDT - 2.5 mm to 12 mm	Accelerometers, Load Cells, HSDV, Linear Variable Differential Transformer (LVDT)
	<b><u>FLASH</u></b>  HSDV: - (Acc. $\pm 1$ Frame) @ 300 ns exposure Colour CCTV - 25 and 240fps Time 0 -180 mins	HSDV, CCTV, Visual observations
	<b><u>WEAPON STABILITY ON FIRING</u></b>  HSDV: - (Acc. $\pm 1$ Frame) @ 300 ns exposure Colour CCTV - 25 and 240 fps Time 0 -180 mins	HSDV, CCTV, Visual observations



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As listed on page 1	<b><u>INTERNAL BALLISTICS</u></b> (cont'd)  <b><u>BLAST</u></b>  Piezo-up to 2000 kPa	Pressure transducers
	<b><u>PRESSURE &amp; THRUST</u></b>  Pressure transducers - Piezo-up to 2000 kPa Load cells - up to 200 kN	Pressure transducers, Load cells
	<b><u>PROOF</u></b>  Proof of propellant samples Transducers-up to 750 MPa Copper crushers-up to 200 MPa Scales - 0.001 g to 32 kg	Copper crushers and Pressure transducers, Weighing Scales
	<b><u>SAFETY DROP TESTS</u></b>  HSDV: - (Acc. $\pm 1$ Frame) Colour CCTV - 25 and 240 fps  Explosive stores up to 50 kg Stores up to 500 kg Heights up to 30m Scales - up to 1000 kg	HSDV CCTV, Visual Observations, Rules, Tapes, Weighing Scales.



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As listed on page 1	<p><b><u>INTERNAL BALLISTICS</u></b> (cont'd)</p> <p><b><u>ENVIRONMENTAL TEMPERATURE TESTS</u></b></p> <p>Colour CCTV - 25 and 240 fps HSDV: - (Acc. <math>\pm 1</math> Frame) Transducers up to 750 MPa Temp:- up to + 1000 °C</p>	<p>Thermocouples, CCTV, HSDV, Pressure Transducers</p> <p>CCTV, HSDV, PCC, VAS Pressure transducers</p>
	<p><b><u>BULLET ATTACK</u></b></p> <p>Colour CCTV - 25 and 250 fps HSDV: - (Acc. <math>\pm 1</math> Frame) VAS-1 <math>\mu</math>s to 100 <math>\mu</math>s (Resolution) Transducers up to 750 MPa PCC – up to 30 m base</p>	
<p>TARGETS AMMUNITION PROPELLANTS EXPLOSIVE STORES PACKAGING FUEL TANKS ROCKET MOTORS FUZES AND SAFUS DECOY SYSTEMS</p>	<p><b><u>PERFORMANCE</u></b></p> <p><b><u>PENETRATION AND EMPLACEMENT OF FRAGMENTS VELOCITY RETARDATION</u></b></p> <p>Flash X Ray - 0 to 450 kV VAS - 1 <math>\mu</math>s to 100 <math>\mu</math>s (Resolution) HSDV - (Acc. <math>\pm 1</math> Frame) Linear - Up to 5000 mm</p>	<p>DEF STAN 07-085 Part 4 Issue 2 DEF STAN 05-101 Part 1 Issue 1 DEF STAN 05-101 Part 2 Issue 1 DGM ISS Plans (various depending on calibre and nature) NATO Multi Calibre MOPI –AEP-97 EdB</p> <p>Customer Specifications, NATO STANAGs/AOPs, NATO AEP's and In-House Procedures using the equipment listed</p> <p>Measuring jigs, Flash X Ray (FXR), HSDV, Witness screens, Strawboard packs, RHA plate, Calibrated Instruments (e.g. rules, length bars, depth micrometres and Verniers), manual measurement (e.g. rules and probes)</p>



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UK IN SERVICE MUNITIONS	<b><u>CREDIBLE ACCIDENT</u></b> - Any incident or accident that could reasonably take place during the transport and storage of UK in service munitions	
	<b><u>FUEL FIRE</u></b>  Temperature vs time – K type thermocouple to 1200 °C 25 m/s per channel Blast - Piezo to 200 KPa Store response diary – Genesis from 15 ns res	STANAG 4240 PPS (EDITION 2) – LIQUID FUEL / EXTERNAL FIRE, MUNITION TEST PROCEDURES  Thermocouples, data logger  Blast gauges HSDV and CCTV with audio output
	<b><u>SLOW COOK OFF</u></b>  Temperature vs time – K type thermocouple to 1200 °C 25m/s per channel  Blast – B12 Piezo to 200KPa Store response diary – Genesis from 15 ns res	STANAG 4382 PPS (EDITION 2) – SLOW HEATING, MUNITIONS TEST PROCEDURES  Thermocouples, data logger  Blast gauges HSDV and CCTV with audio output
	<b><u>BULLET ATTACK</u></b>  Bullet impact velocity – 1Mega/s/sec = 1µs res Store response diary – Genesis from 15ns res Store response (blast) – Piezo to 200 KPa Fragmentation or debris plot	STANAG 4241 (EDITION 2) BULLET IMPACT, MUNITION TEST PROCEDURES  PCC, Foils  HSDV, CCTV with audio output  Blast gauges  Survey



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UK IN SERVICE MUNITIONS (continued)	<b><u>CREDIBLE ACCIDENT (continued)</u></b>  <b><u>FRAGMENT ATTACK</u></b>  Bullet impact velocity – 1Mega/s/sec = 1µs res Store response diary – Genesis from 15ns res Store response (blast) – Piezo to 200 KPa Fragmentation or debris plot	STANAG 4496 (EDITION 1) FRAGMENT IMPACT, MUNITION TEST PROCEDURES  PCC, Foils  HSDV, CCTV with audio output  Blast gauges  Survey
	<b><u>SYMPATHETIC REACTION</u></b>  Store response diary – Genesis from 15ns res Store response (blast) – Piezo to 200 KPa Fragmentation or debris plot	STANAG 4396 PPS (EDITION 2) – SYMPATHETIC REACTION, MUNITION TEST PROCEDURES  HSDV, CCTV with audio output  Blast gauges  Survey





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EXPLOSIVE WARHEADS. INCLUDING MORTARS, ROCKET WARHEADS, FREE FALL BOMBS, GUIDED MISSILE WARHEADS. GRENADES	<b><u>ARENA TRIALS</u></b> - in order to establish ballistic characterisation of the warhead  Fragmentation patterns (Theta zones) Fragment recovery to establish mass and material – 0.001g - 20 kg Fragmentation velocity – VAS 1µs - 100 µs res Penetration criteria Rule 1-100mm Laser Scanning (via external source)  Thermal output K-Type (our standard) between - 200°C and 1260°C	ITOP 4-2-813:1993  Customer Specifications and In- House Procedures based on above specification using the equipment listed  Survey  Strawboard packs  VAS, HSDV  Customer specified materials    Thermal gauges
SHIPS STEELS	PENETRATION RESISTANCE TO SMALL ARMS WEAPONS   Plate specification and thickness – digital callipers ± 0.03 mm  Plate temperature - 450 °C magnet @ 0.1 °C res  Impact velocity of rounds - 1 µs res	NATO AEP-88 Edition A Version 1  Customer Specifications and In-House Procedures based on above specifications using the equipment listed  Certificate of conformity of supplied materials  Magnetic thermocouple with data logger  PCC



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SHIPS STRUCTURES	<p><u>BLAST RESISTANCE OF SHIPS HATCHES. STRUCTURAL INTEGRITY OF GRP/STEEL PLATE BONDING; WHEN SUBJECTED TO BLAST LOADINGS.</u></p> <p>Visual repose of items under test</p> <p>Blast pressure - piezo electric to 600 MPa Piezo resistive to 1300 KPa</p> <p>Strain rates within the hatches, bonding surfaces – 1% of gauge sensitivity</p>	<p>DES NAG-VR2 In-House Procedures and customer specifications based on the above authority</p> <p>HSDV, CCTV</p> <p>Piezo electric and Piezo resistive gauges</p> <p>Strain gauges coupled to data logger</p>
TARGETS AMMUNITION WARHEADS, MISSILES FUZES AND SAFUS RADOMES PENETRATORS EJECTOR SEATS ROCKET MOTORS ELECTRONIC COMPONENTS SUB-MUNITION EJECTORS ACCIDENT SIMULATION ETC.	<p><u><b>DYNAMIC FIRINGS</b></u></p> <p><u>LONG TEST TRACK (LTT)</u> Dynamic firings against armour,</p> <p>concrete, structures, etc. Fuze functioning and discrimination</p> <p>LTT (1500 m): Velocity up to 1100 ms<sup>-1</sup> Acceleration up to 130 g Sensors.</p>	<p>STANREC 4536 Edition 2 Customer Specifications, NATO STANAGs/AOPs, NATO AEPs and In-House Procedures based on above specifications using the equipment listed</p> <p>CCTV, HSDV, installed CPMU (Coil pulse measuring unit)</p>
END		