


# Schedule of Accreditation

Issued by

## United Kingdom Accreditation Service

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

 <p>Accredited to ISO/IEC 17025:2017</p>	<b>QinetiQ Ltd</b>	
	<b>Issue No:</b> 001	<b>Issue date:</b> 15 February 2021
<b>MOD Pendine</b> <b>Llanmiloe</b> <b>Carmarthen</b> <b>SA33 4UA</b>	<b>Contact: Andrew Leahy</b> <b>Tel: +44 (0) 1994 452289</b> <b>E-Mail: ajleahy@qinetiq.com</b>	
<b>Testing performed at the above address only</b>		

### DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
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	<u><b>EXTERNAL BALLISTICS</b></u>	DEF STAN 07-085 Part 4 Issue 2 DGM ISS Plans (various depending on calibre and nature), NATO Multi calibre MOPI-AEP -97EdB
	<u>ACCURACY</u> <u>HORIZONTAL PLANE</u>  Surveyed Lines – 1 m to 7000 m Tapes - 300 mm to 30 m	Surveyed Lines, Measuring Wheels Clinometers, Theodolites
	<u>VERTICAL PLANE</u>  Angular measurement - ( $\pm 1$ mil)	Clinometers, Tapes
	<u>VELOCITIES</u>  PCC – up to 30 m base DR – $50 \text{ ms}^{-1}$ to $2000 \text{ ms}^{-1}$ VAS-1 $\mu\text{s}$ to $100\mu\text{s}$ (Resolution)	Photoelectric Counter Chronometer (PCC) Doppler Radar (DR) Velocity Analysing System (VAS)
	HSDV: - Frame rates from 1000 fps to 150000 fps with an exposure of 300 nanoseconds Tapes – 300 mm to 30 m	High Speed Digital Video (HSDV) Calibrated Tapes



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



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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.
<b><u>2.5 PROJECTILE FUNCTIONING</u></b>  (chaff, smoke, illuminating tracer, fuses)  HSDV: - (Acc. ± 1 Frame) Colour CCTV -25 and 240 fps Time - 0 to 180 mins	Visual observation, HSDV CCTV, Stopwatches	



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



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



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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\text{s}</math> to 100 <math>\mu\text{s}</math> (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\text{s}</math> to 100 <math>\mu\text{s}</math> (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	<p><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</p> <p><b><u>DROP TESTS</u></b></p> <p>Impact velocity - HSDV <math>\pm</math> 1 Frame Weapon response - HSDV <math>\pm</math> 1 Frame/Genesis Blast - Piezo to 200 KPa</p>	<p>STANAG 4375 JAIS (EDITION 3) - SAFETY DROP, MUNITION TEST PROCEDURE</p> <p>HSDV, CCTV</p> <p>Blast gauges</p>
	<p><b><u>FUEL FIRE</u></b></p> <p>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</p>	<p>STANAG 4240 PPS (EDITION 2) – LIQUID FUEL / EXTERNAL FIRE, MUNITION TEST PROCEDURES</p> <p>Thermocouples, data logger</p> <p>Blast gauges HSDV and CCTV with audio output</p>
	<p><b><u>SLOW COOK OFF</u></b></p> <p>Temperature vs time – K type thermocouple to 1200 °C 25m/s per channel</p> <p>Blast – B12 Piezo to 200KPa Store response diary – Genesis from 15 ns res</p>	<p>STANAG 4382 PPS (EDITION 2) – SLOW HEATING, MUNITIONS TEST PROCEDURES</p> <p>Thermocouples, data logger</p> <p>Blast gauges HSDV and CCTV with audio output</p>



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UK IN SERVICE MUNITIONS (cont'd)	<p><b><u>CREDIBLE ACCIDENT</u></b> (cont'd)</p> <p><b><u>BULLET ATTACK</u></b></p> <p>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</p>	<p>STANAG 4241 (EDITION 2) BULLET IMPACT, MUNITION TEST PROCEDURES</p> <p>PCC, Foils</p> <p>HSDV, CCTV with audio output</p> <p>Blast gauges</p> <p>Survey</p>
	<p><b><u>FRAGMENT ATTACK</u></b></p> <p>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</p>	<p>STANAG 4496 (EDITION 1) FRAGMENT IMPACT, MUNITION TEST PROCEDURES</p> <p>PCC, Foils</p> <p>HSDV, CCTV with audio output</p> <p>Blast gauges</p> <p>Survey</p>
	<p><b><u>SYMPATHETIC REACTION</u></b></p> <p>Store response diary – Genesis from 15ns res Store response (blast) – Piezo to 200 KPa Fragmentation or debris plot</p>	<p>STANAG 4396 PPS (EDITION 2) – SYMPATHETIC REACTION, MUNITION TEST PROCEDURES</p> <p>HSDV, CCTV with audio output</p> <p>Blast gauges</p> <p>Survey</p>





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



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MORTAR PROPELLANTS FOR WEAPONS UP TO 120MM	<p>PROPELLANT PROOF</p> <p>Barrel pressure – Cu crushers to 200 MPa and transducers to 600 MPa</p> <p>Velocity – 50 – 300 ms<sup>-1</sup></p>	<p>BAE Spec DOCUMENT No. 53691S1 EX03 Propellant</p> <p>BAE Spec DOCUMENT NO 53692S1 Belgium Ball Powder</p> <p>Assembly of 81mm Mortar Bombs - Test Procedure PEN/WI/MAG/022</p> <p>Customer Specifications, NATO STANAGs/AOPs, NATO AEPs and In-House Procedures based on above specifications using the equipment listed</p> <p>Mk8 pressure gauges Kistler pressure gauges</p> <p>Doppler radar</p>
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>



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TARGETS AMMUNITION WARHEADS, MISSILES FUZES AND SAFUS RADOMES PENETRATORS EJECTOR SEATS ROCKET MOTORS ELECTRONIC COMPONENTS SUB-MUNITION EJECTORS ACCIDENT SIMULATION ETC.	<b><u>DYNAMIC FIRINGS</u></b>  <b><u>LONG TEST TRACK (LTT)</u></b> Dynamic firings against armour,  concrete, structures, etc. Fuze functioning and discrimination  LTT (1500 m): Velocity up to 1100 ms <sup>-1</sup> Acceleration up to 130 g Sensors.	STANREC 4536 Edition 2 Customer Specifications, NATO STANAGs/AOPs, NATO AEPs and In-House Procedures based on above specifications using the equipment listed  CCTV, HSDV, installed CPMU (Coil pulse measuring unit)
END		