

# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	<b>MIRA Ltd</b>	
	<b>Issue No: 034</b>	<b>Issue date: 12 March 2009</b>
<p>Watling Street Nuneaton Warwickshire CV10 0TU</p>	<p><b>Contact: Mr G Beddoe</b>  <b>Tel: +44 (0)2476 355000</b>  <b>Fax: +44 (0)2476 355355</b>  <b>E-Mail: graham.beddoe@mira.co.uk</b>  <b>Website: www.mira.co.uk</b></p>	
<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
Motor Vehicles Motor Vehicle Accessories and Components Bicycles (powered) Construction Plant and Equipment Electrical/Electronic Components Electrical/Electronic Products Electro-mechanical Devices Electronic Products, Digital Generators: Power Industrial Trucks Lawnmowers Rescue Appliances Vehicle Security Devices Military Vehicles and Devices	1 EMC Tests  1.1 Automotive EMC Tests  1.1.1 Conducted Emissions 9 kHz to 200 MHz	CISPR 25:Section 3:1995 BS EN 55025:2003 (CISPR 25:2002) Section 6 VDE 0879:Part 3:1981
	1.1.2 Radiated Emissions 9 kHz to 26.5 GHz Whole vehicle and components	CISPR 12:2001 Except Appendices E + F CISPR 25:Section 2:1995 BS EN 55025:2003 (CISPR 25:2002), sections 5 and 6 ECE Regulation 10.01 ECE Regulation 10.02:1997, Annexes 4, 5, 7 and 8 72/245/EEC 75/322/EEC 2000/2/EC 95/54/EC, Annexes IV, V, VII and VIII 2004/104/EC, Annexes IV, V, VII and VIII 97/24/EC, Chapter 8 Annexes II, III, V, VI SAE J551/2:1994 SAE J551/4:1994 SAE J1113-41:1995 ISO 13766:2006



1105

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As listed on Page 1	1 EMC Tests (cont'd)  1.1 Automotive EMC Tests (cont'd)  1.1.3 Transient Testing DC and AC supply construction and coupling Exported Transients	ISO 7637-1:1990, Except Pulse 5 ISO 7637-2:1990, Except Pulses 1, 2, 5 ISO 7637-1:2002 ISO 7637-2:2004 2004/104/EC Annex X ISO 7637-3:1995 ISO 13766:2006
	1.1.4 Radiated Immunity  Whole vehicle: 10 kHz to 30 MHz: 150 V/m 30 MHz to 40 MHz: 100 V/m 40 MHz to 1 GHz: 200 V/m 1 GHz to 18 GHz: 250 V/m (with 1.2 GHz to 1.4 GHz, 2.7 GHz to 3.1 GHz and 4 GHz to 10 GHz: 600 V/m)  Component: 10 kHz to 1 GHz: 300 V/m 1 GHz to 18 GHz: 250 V/m (with 1.2 GHz to 1.4 GHz, 2.7 GHz to 3.1 GHz and 4 GHz to 10 GHz: 600 V/m)	ISO 11451-1:2005 ISO 11451-2:1995 ISO 11451-2:2005 ISO DIS 11451-3:2003 ISO 11451-4:1995 ISO 11452-1:2005 ISO 11452-2:1995 ISO 11452-2:2004 ISO 11452-3:1995 ISO 11452-4:1995 ISO 11452-5:1995 ISO 11452-3:2001 ISO 11452-5:2002 SAE J1113-21:1998 95/54/EC, Annexes VI, IX 2004/104/EC Annexes VI, IX 2000/2/EC ECE Regulation 10.02:1997, Annexes 6 and 9 ECE Regulation 13.08 97/24/EC, Chapter 8, Annexes IV, VII SAE J551/11:1994 SAE J551/13:1994 ISO 13766:2006



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As listed on Page 1	1 EMC Tests (cont'd)  1.1 Automotive EMC Tests (cont'd)  1.1.5 Electrostatic Discharge Up to 25 kV	ISO TR 10605/E:1994 (Component and whole vehicle) ISO 10605:2001 Ford L-410, Section 4.3:12/96 SAE J551/15:1994 SAE J1113-4:1997 ISO 13766:2006
	1.1.6 Conducted Immunity 150 kHz to 400 MHz, 10 V	ISO 11451-4:1995 ISO 11452-4:2005 SAE J1113-4:1998
OEM: Ford, GM, Chrysler:	1.2 AEMCLRP Testing  1.2.1 Conducted Emissions  Chambers: RFI, CTL Voltage and Current 0.15 - 200 MHz	CISPR 25:2002 DC 11224-2007 ES-XW7T-1A278-AC GMW 3097:2006
	1.2.2 Radiated Emissions  Chambers: RFI, CTL 150 KHz - 2.5 GHz	CISPR 25:2002 SAE J1113-41:1995 DC 11224-2007 ES-XW7T-1A278-AC GMW 3097:2006
OEM: Ford, GM, Chrysler:	1.2.3 Absorption Chamber Substitution and Closed Loop Methods  Chambers: RFI 200 MHz-3.2 GHz - 200 V/m  Chambers: RFI 1.2-1.4 GHz and 2.7-3.1 GHz - 600 V/m	SAE J1113-21:1998 ISO 11452-2:2004 DC 11224-2007 ES-XW7T-1A278-AC GMW 3097:2006



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As listed on Page 1  OEM: Ford, GM, Chrysler:	1 EMC Tests (cont'd)  1.2 AEMCLRP Testing (cont'd)  1.2.4 Bulk Current Injection  Substitution and Closed Loop methods  Chambers: RFI, CTL 1 MHz to 400 MHz - 500 mA	ISO 11452-4:2005 SAE J1113-4:1998 DC 11224-2007 ES-XW7T-1A278-AC GMW 3097:2006
	1.2.5 ESD Up to 25 kV  Chamber: Reverb (Screened Enclosure)  Chamber: CTL (Field Coupled)	ISO 10605:2001 SAE J1113-4:1997 DC 11224-2007 ES-XW7T-1A278-AC GMW 3097:2006
	1.3 Military EMC Tests  1.3.1 Conducted Emissions 9 kHz to 200 MHz	DEF STAN 59-41:Part 3:1995 DCE01 and DCE02 DEF STAN 59-41:Part 3: 2003 DCE01.3 and DCE02.3 DEF STAN 59-411:Part 4:2007 DCE01 and DCE02 DEF STAN 59-411:Part 3: A1:2008 DCE01.B and DCE02.B
	1.3.2 Radiated Emissions 9 kHz to 40 GHz	DEF STAN 59-41:Part 3:1995 DRE01 and DRE03 DEF STAN 59-41:Part 3: 2003 DRE01.3 and DRE03.3 MIL STD 461E:1999, RE102 DEF STAN 59-411:Part 4:2007 DRE01 DRE03 and DRE04 DEF STAN 59-411:Part 3: A1:2008 DRE01.B and DRE03.B



1105

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As listed on Page 1	1 EMC Tests (cont'd)  1.3 Military EMC Tests (cont'd)  1.3.3 Radiated Immunity  Whole vehicle: 10 kHz to 30 MHz: 150 V/m 30 MHz to 40 MHz: 100 V/m 40 MHz to 1 GHz: 200 V/m 1 GHz to 18 GHz: 250 V/m (with 1.2 GHz to 1.4 GHz, 2.7 GHz to 3.1 GHz and 4 GHz to 10 GHz: 600 V/m) Component: 10 kHz to 1 GHz: 300 V/m 1 GHz to 18 GHz: 250 V/m (with 1.2 GHz to 1.4 GHz, 2.7 GHz to 3.1 GHz and 4 GHz to 10 GHz: 600 V/m)	DEF STAN 59-41:Part 3:1995 DRS02 DEF STAN 59-41:Part 3: 2003 DRS02.3 MIL STD 461E:1999, RS103 DEF STAN 59-411:Part 4:2007 DRS02 DEF STAN 59-411:Part 4:2007 Low Level Swept Current
	1.3.4 Electrostatic Discharge Up to 25 kV	DEF STAN 59-41:1995 & 2003 DCS10 DEF STAN 59-41:Part 3:2003 DCS10.3
	1.3.5 Conducted Immunity 20 Hz to 400 MHz and 10 V	DEF STAN 59-41:Part 3:1995 DCS02 & DCS03 DEF STAN 59-41:Part 3: 2003 DCS02.3 & DCS03.3 DEF STAN 59-411:Part 4:2007 High level bulk current injection DEF STAN 59-411: Part 3:A1:2008 DCS05 DEF STAN 59-411: Part 4:A1:2008 DCS05



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As listed on Page 1	1 EMC Tests (cont'd)	
	1.3 Military EMC Tests (cont'd)	
	1.3.6 Power Frequency Magnetic Field Immunity  Frequency: 20 Hz to 100 kHz  H-Field Emissions: 20 Hz to 100 kHz	DEF STAN 59-41:Part 3:1995 DRS01 DEF STAN 59-41:Part 3:2003 DRS01.3  DEF STAN 59-41:Part 3:1995 DRE02 DEF STAN 59-41:Part 3: 2003 DRE02.3
	1.3.7 Electrical Transients  Frequency: 20 Hz to 150 Hz	DEF STAN 61-5: Part 6: Issue 6:February 2009 Annexes A and B (All Sections)
1.4 Civil EMC Tests		
1.4.1 Conducted Emissions 9 kHz to 30 MHz	EN 55011:1998 EN 55014-1:1997 EN 55022: 1998 Excluding telecom ports according to Clause 9.5 CISPR 11:1997 CISPR 14-1:1997 CISPR 22:1997 ANSI C63.4:1992 FCC Code of Federal Regulations 47, Part 15:1998 ANSI C63.4:1992 FCC Code of Federal Regulations 47, Part 15:1998	



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As listed on Page 1	1 EMC Tests (cont'd)	
	1.4 Civil EMC Tests (cont'd)	
	1.4.2 Radiated Emissions 30 MHz to 1 GHz	EN 55011:1998 EN 55014-1:1997 EN 55022:1998 CISPR 11:1997 CISPR 14-1:1997 ANSI C63.4:1992 FCC Code of Federal Regulations 47, Part 15:1998
	1.4.3 Transient Testing DC and AC supply  EFT/Burst and Surge	EN 61000-4-4:1995 BS EN 61000-4-5:2006
	1.4.4 Radiated Immunity	BS EN 61000-4-3:1997
	1.4.5 Electrostatic Discharge Up to 25 kV	BS EN 61000-4-2:1995 (including Amendments A1:1998 and A2:2001)
	1.4.6 Conducted Immunity 150 kHz to 400 MHz and 10 V	BS EN 1000-4-6:1996 (including Amendments A1, A2, & A3: 2005)
	1.4.7 Power Frequency Magnetic Field Immunity Frequency: 50 Hz Field Strength: Up to 10 A/m	IEC 1000-4-8:1993 EN 61000-4-8:1994
1.5 EMC Tests  These Generic and Product specific specifications are included in this schedule, but limited to those referred basic standards that are explicitly listed in Sections 1.1 to 1.4.	EN 55014-2:1997 CISPR 14-2:1997 EN 61000-6-1:2001 EN 61000-6-2:2001 EN 61000-6-3:2001 EN 61000-6-4:2001 BS EN 50082-1:1998 BS EN ISO 14982:1998 ISO 13766:2006	



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As listed on Page 1	1 EMC Tests (cont'd)  1.5 EMC Tests (cont'd)	BS EN 61326:1996 IEC 61326:1997 (Immunity only) EN 13309:2000 EN 301 489-1:V1.4.1:2002 EN 301 489-3:V1.4.1:2002 72/245/EEC ECE Reg 97, Annex 7 Section 1 95/56/EC Annex IV 3.2, 5.2.12 and 8.2 ECE Reg 116, Rev 2, Annex 9, Section 1 DEF STAN 59/41 Part 3 (1995 & 2003) MIL STD 461-E:1999 DEF STAN 59/411 Part 4 :2007
	Facilities for EMC Testing:  <b>Semi-anechoic Chamber (SAC)</b> 22 m x 10 m x 7 m high Door size: 3 m x 4.7 m high Max Load: 10 tonne  <b>Anechoic Chamber (RFI)</b> 9.35 m x 7.35 m x 5.17 m high Door size: 4 m x 3.75 m high Max Floor Loading: 12 tonne  <b>Component Test Laboratory (CTL)</b> Semi-anechoic Chamber 8 m x 4.5 m x 5 m  <b>Transient Test Laboratory 1 &amp; 2 (TTL)</b> Capable of performing Vehicle and component transients  <b>Heavy Vehicle Semi-Anechoic Chamber (HVSAC)</b> 22 m x 11 m x 7 m high Door size: 4 m x 4 m Max Load: 70 tonne	<b>Screened room (REVERB)</b> 5 m x 3 m x 4 m high Door size: 1 m x 2 m high  <b>Open Area Test Site (OATS)</b> Range up to 30 metres Max size: 4.5 m high, 4 m wide Max weight: 14 tonnes (uncovered: 100 tonnes) Turntable diameter: 8 m  <b>Vehicle Electrical Test Laboratory (EWS)</b> Vehicle preparations and Transients



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Radio Transmitting and Receiving Equipment	2 Radio Transmitter and Receiver Testing	EN 300 220-1:V 1.3.1:2000 EN 300 220-3:V 1.1.1:2000 EN 300 330-1:V 1.3.1:2001 EN 300 330-2:V 1.1.1:2001
Vehicle Security Devices	3 Vehicle Security Devices Type Approval Tests	95/56/EC, Annex VI 5.2.2.4, 5.2.2.5, 5.2.5, 5.2.6, 5.2.7, 5.2.9, 5.2.11, 5.2.13, 5.2.14 and 5.2.15 ECE Reg 97, 7.2.2.4, 7.2.2.5, 7.2.5, 7.2.6, 7.2.7, 7.2.9, 7.2.11, 7.2.13, 7.2.14 and 7.2.15 ECE Reg 116, Rev 2, Part II 6.4.2.2.4, 6.4.2.2.5, 6.4.2.5, 6.4.2.6, 6.4.2.7, 6.4.2.9, 6.4.2.11, 6.4.2.13, 6.4.2.14 and 6.4.2.15
Vehicle Brakes and Braking Systems Vehicles in EEC and ECE Categories M1, M2, M3, N1, N2, N3, O2, O3, O4  Plus Agricultural and Forestry Tractors	4 Straight line and static braking tests Type 0 Straight line braking (Full and part system) Type I, Type II and Type III Hot effectiveness (Fade tests) Park brake static and dynamic tests Static and dynamic system tests ABS efficiency and functional tests Temporary spare wheel tests  <i>The tests listed above would be carried out on cars, trucks, buses, trailers</i>	71/320 EEC as amended ECE Regulations 13.10 and 13H ECE Regulation 64.00 ECE Regulation 90.01 Police Brake Test Procedure FMVSS 135 Customer and MIRA derived test specifications (eg Pressure, Speed, and Temperature Sensitivity)
	Speed sensitivity tests Cold performance equivalence test  <i>The tests listed above would be carried out on cars, light vans and minibuses</i>	ECE Regulation 90.01



1105

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Vehicle Brakes and Braking Systems Vehicles in EEC and ECE Categories M1, M2, M3, N1, N2, N3, O2, O3, O4  Plus Agricultural and Forestry Tractors	4 (cont'd)  Straight line and static braking tests Type 0 Straight line braking Type I Hot effectiveness (Fade tests) Park brake static tests  <i>The tests listed above would be carried out on agricultural and forestry tractors</i>	76/432 EEC as amended Customer and MIRA derived test specifications
Vehicles in EEC and ECE Categories M1, M2, M3, N1, N2, N3	Speedometer calibration and reverse gear tests	75/443 EEC, as amended ECE Regulation 39.00
	Towing devices tests	77/389 EEC
Vehicles in EEC and ECE Categories M2, M3, N2, N3	Speed limiter tests (Track testing only)	92/24 EEC, as amended ECE Regulation 89.00
	Parameters measured:  (All pressures stated are Gauge)  Hydraulic pressure 0 to 150 bar Pneumatic pressure 0 to 10 bar Vacuum 0 to -0.9 bar Force 0 to 1000 N Temperature 0 to 300°C Deceleration 0 to 12 m/sec <sup>2</sup> Velocity 0 to 200 km/h Time resolved to 50 ms	



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<p>Road Restraint Systems:</p> <p>Breakaway Device Poles Crash Cushions Longitudinal Barriers Safety Barriers Security Barriers Support Structures Terminals and Transitions Truck Mounted Attenuators Work Zone Traffic Control Devices</p>	<p>5 Safety Performance Testing</p> <p>Speed range: up to 120 km/hr (for vehicle masses up to 40 tonnes)</p> <p>Angle: 0° to 165° (Roll, pitch, and yaw: up to 45°)</p> <p>System deformations/deflections (and lateral displacement): up to 3.5 m</p> <p>Post impact vehicle movement (including assessment of vehicle trajectory and response): up to 30 m</p> <p>Vehicle Cockpit Deformation Index (VCDI)</p> <p>Assessment of debris produced</p> <p>Computed measurements from onboard instrumentation:</p> <p>Theoretical Head Impact Velocity (THIV): 3 km/hr to 44 km/hr Occupant Impact Velocity (OIV): up to 12 m/s</p> <p>Post impact Head Deflection (PHD): up to 20 g Occupant Ride-down Acceleration (ORA): up to 20 g</p> <p>Acceleration Severity Index (ASI): 0.6 to 1.9</p>	<p>EN 1317-1:1998 EN 1317-2:1998 BS EN 1317-3:2000 EN 1317-4:2001 EN 12767:1999 Documented In-House Procedure CR/0502 NCHRP Report 350 (Excluding Chapter 7) PAS68:2007 (Excluding Para 11) SD-STD-02.01RevA March2003</p>



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Motor Vehicles Automotive Components and Equipment Rigidised Vehicles (Vehicle Bucks) Train Seats Aircraft Seats	6 Frontal, Rear, and Side Impact Simulation Tests using a HyGe Gun: (some tests include the use of Anthropomorphic Test Dummies)  Temperature range: 19°C to 23°C (ambient)  Acceleration: 2 g to 200 g (sled) 1 g to 2000 g (airbag firing) Load: up to 100 kN (3 axis) Pressure: 0.007 bar to 15 bar Displacement: up to 500 mm  Current: 1 mA to 20 A Voltage: 2.5 mV to 100 V Velocity: up to 20 m/s Time: 0.5 ms to 125 s	ECE 11.01 ECE 17.04 ECE 80.01 74/408/EEC FMVSS 208 FIA 8855:1999 AV/ST 9001 JAR 25.562
	END	