

# **CERTIFICATE OF ACCREDITATION**

*In terms of section 22(2)(b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-*

**GEROTEK TEST FACILITIES**  
**A Division of**  
**ARMSCOR DEFENCE INSTITUTES (PTY) LTD**  
**Co. reg no: 1990/003885/07**

Facility Accreditation Number: **T0005**

is a South African National Accreditation System accredited Testing Laboratory  
provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying schedule of accreditation,  
Annexure "A", bearing the above accreditation number for

**ELECTRICAL, MECHANICAL, PHYSICAL,  
PERFORMANCE AND EMC TESTING**

*The facility is accredited in accordance with the recognised International Standard*

**ISO/IEC 17025:2005**

*The accreditation demonstrates technical competency for a defined scope and the operation of a  
laboratory quality management system*

While this certificate remains valid, the Accredited Facility named above is authorised to  
use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

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**Mr R Josias**  
**Acting Chief Executive Officer**

**Effective Date: 31 May 2006**  
**Certificate Expires: 31 May 2011**

## ANNEXURE A

### SCHEDULE OF ACCREDITATION

Testing Laboratory Number: T0005

<p><b><u>Permanent Address of Laboratory:</u></b> Gerotek Test Facilities, a Division of Armscor Defence Institute (Pty) Ltd</p> <p><b><u>Elandsfontein Site:</u></b> Church Street Ext Elandsfontein Pretoria</p> <p><b><u>Centurion Site:</u></b> Tek Base Entrance Trichardt Road Centurion</p> <p><b><u>Postal Address:</u></b> P O Box 7413 Pretoria 0001</p> <p>Tel : (012) 371-2000 Fax : (012) 371-2001 E-mail : <a href="mailto:altona@gerotek.co.za">altona@gerotek.co.za</a></p>	<p><b><u>Technical Signatories</u></b></p> <p>Mr DJ Yssel : Item 1 all methods excluding item 1.14 Mr WAA van Zyl : Item 1 all methods (Vehicle) : Item 2.1; 2.2; 2.3; 2.4; 2.5; 2.6; 2.7; 2.16; 2.27; 2.28; 2.33; 2.34; 2.36 Mr HG van der Merwe : Item 1 all methods excluding item 1.14 (Vehicle) Mr R van den Berg : Item 1 all methods (Environmental and Vehicle) : Item 2.1; 2.2; 2.3; 2.4; 2.5; 2.6; 2.7; 2.16; 2.27; 2.28; 2.33; 2.34; 2.36 Mrs K Bredenkamp : Item 3 all methods (Vehicle Acoustics and : Item 2.8; 2.9; 2.10; 2.11; 2.12; 2.13; 2.14; 2.15; Ergonomics) 2.17; 2.18; 2.19; 2.20; 2.21; 2.22; 2.23; 2.24; 2.25; 2.26; 2.29; 2.30; 2.31; 2.32; 2.35; 2.37; 2.38; 2.39 Mr P Marais : Item 2.8; 2.9; 2.10; 2.11; 2.12; 2.13; 2.14; 2.15; (Vehicle Acoustics and : 2.17; 2.18; 2.19; 2.20; 2.21; 2.22; 2.23; 2.24; 2.25; Ergonomics) 2.26; 2.29; 2.30; 2.31; 2.32; 2.35; 2.37; 2.38; 2.39 Mr L Beukes : Item 1.9;1.10;1.11;1.12;1.13; 2.8; 2.9; 2.10; 2.11; (Vehicle and Acoustics) 2.12; 2.13 Mr JF Smit : Item 3 all methods (Environmental) Mr IJ Griebenouw : Item 3 all methods (Environmental) Mr H Prinsloo : Item 3 all methods (Environmental) Mr A van Dyk : Item 3.37 only (Environmental) Mr V Govender : Item 4 all methods (EMC) Mr I Myaluza : Item 4 all methods (EMC)</p> <p><b><u>Nominated Representative</u></b> : Mr A Arendse</p> <p>Issue No. : 17 Date of issue : 03 May 2010 Expiry date : 31 May 2011</p>	
Materials/Products Tested	Types of Tests/Properties Measured, Range of Measurement	Standard Specifications, Equipment/ Techniques Used
ELANDSFONTEIN Site and On-site Testing		
<p><b><u>Vehicle Testing</u></b></p> <p>All vehicle types</p>	<p>Road vehicles with two axles - Determination of centre of gravity</p> <p>Code of practice for the measurement of fuel consumption of motor vehicles</p>	<p><b><u>Item 1</u></b> Item 1.1 ISO 10392:1992(E) Item 1.2 SANS 0171: 1980 / SABS 0171: 1980</p>

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<b>ELANDSFONTEIN Site and On-site Testing</b>		
<p><b>Vehicle Testing</b> All vehicle types</p>	<p>Motor vehicle safety specification for speedometer equipment on motor vehicles</p> <p>Motor vehicle safety specification for braking</p> <p>Machines for underground mines-Mobile machines working underground-Safety. Part 1: Rubber Tyred vehicles</p> <p>Uniform provisions concerning the approval of categories M, N and O with regard to braking.</p> <p>The braking performance of trackless underground mining vehicles - Load haul dumpers and dump trucks</p> <p>Vehicle stability: double lane change (wheeled vehicles)</p> <p>Motor vehicle safety: Lights and light-signalling devices installed on motor vehicles and trailers</p> <p>Determining the performance of audible warning devices after installation in a motor vehicle</p> <p>The measurement of noise emitted by motor vehicles in motion</p> <p>Measurement of noise emitted by road vehicles when stationary</p> <p>The measurement of noise inside motor vehicles</p> <p>Braking (motor and towed vehicles, designed for low speed or for use off public roads) Part 1: low speed vehicles</p>	<p>Item 1.3 SANS 1441:1987 / SABS 1441:1987</p> <p>Item 1.4 SANS 1207:1998 / SABS 1207:1998</p> <p>Item 1.5 BS EN 1889-1:2003 Clause 5.10 Braking</p> <p>Item 1.6 SANS 20013:2004 edition 2/ECE R13:004 revision 5, Excluding annexure 13</p> <p>Item 1.7 SANS 1589:1994 / SABS 1589:1994</p> <p>Item 1.8 ISO/TR 3888:1975</p> <p>Item 1.9 SANS 1046:1990 incorporating: Annex 76/756/EEC, 80/233/EEC, 82/244/EEC, 83/276/EEC, 84/8/EEC and 89/278/EEC with modifications; SANS 20048:2007/ECE R48:2006</p> <p>Item 1.10 SANS 10169:2004</p> <p>Item 1.11 SANS 10205:2007</p> <p>Item 1.12 SANS 10181:2003</p> <p>Item 1.13 SABS 0211:2000</p> <p>Item 1.14 SANS 1447-1:2000, 76/432/EEC</p>
<p><b>Earth-moving machinery</b></p>	<p>Methods of measuring the masses of whole machines, their equipment and components.</p> <p>Determination of ground speed</p>	<p><b>Item 2</b></p> <p>Item 2.1 ISO 6016:1998 Earth - moving machinery - Methods of measuring the masses of whole machines, their equipment and components.</p> <p>Item 2.2 ISO 6014:1998 Earth - moving machinery - Determination of ground speed</p>

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<b>ELANDSFONTEIN Site and On-site Testing</b>		
<b><u>Earth - moving machinery</u></b>	Steering requirements	Item 2.3 ISO 5010:2007 Earth - moving machinery - Rubber-tyred machines - Steering requirements.
	Determination of turning dimensions	Item 2.4 ISO 7457:1997 Earth - moving machinery - Determination of turning dimensions of wheeled machines
	Determination of units and dimensions	Item 2.5 ISO 9248:1992 Earth - moving machinery - Units for dimensions, performance and capabilities, and their measuring accuracies
	Braking systems of rubber-tyre machines	Item 2.6 ISO 3450:1996 Earth - moving machinery - Braking systems of rubber-tyre machines - Systems and performance requirements and test procedures.
	Retarders – Performance tests.	Item 2.7 ISO 10268:1993 Earth - moving machinery - Retarders for dumpers and tractor-scrapers - Performance tests.
	Exterior noise emitted. Stationary test conditions Note: Deviation from method with regards to calibration requirement to IEC 61672-1	Item 2.8 ISO 6393:2008 Acoustics - Measurements of exterior noise emitted by earth moving machinery - Stationary test conditions.
	Operators' position of noise emitted. Stationary test conditions. Note: Deviation from method with regards to calibration requirement to IEC 61672-1	Item 2.9 ISO 6394:2008 Acoustics - Measurements at operators position of noise emitted by earth moving machinery - Stationary test conditions.
	Exterior noise emitted. Dynamic test conditions Note: Deviation from method with regards to calibration requirement to IEC 61672-1	Item 2.10 ISO 6395:2008 Acoustics - Measurements of exterior noise emitted by earth moving machinery - Dynamic test conditions.
	Operators' position of noise emitted. Dynamic test conditions. Note: Deviation from method with regards to calibration requirement to IEC 61672-1	Item 2.11 ISO 6396:2008 Acoustics - Measurements at operators position of noise emitted by earth moving machinery - Dynamic test conditions.
	Determination of emissions values	Item 2.12 ISO 4871:1996 Acoustics - Declaration and verification of noise emission values of machinery and equipment

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<b>ELANDSFONTEIN Site and On-site Testing</b>		
<b><u>Earth - moving machinery</u></b>	<p>Forward and reverse audible warning alarm</p> <p>Access, Dimension, Door, Ladder and Stairways</p> <p>Controls, Operator (in cab), Symbols</p>	<p>Item 2.13 ISO 9533:1989 Earth - moving machinery - Machine - mounted forward and reverse audible warning alarm Sound test method.</p> <p>Item 2.14 ISO 2860:1992 Earth - moving machinery - Minimum access dimensions</p> <p>Item 2.15 ISO 2867:2006 Earth - moving machinery - Access System</p> <p>Item 2.16 ISO 6746-1:2003 Earth - moving machinery - Definitions of dimensions and codes - Part 1: Base machine</p> <p>Item 2.17 ISO 10968:2004 Earth - moving machinery - Operator's Controls</p> <p>Item 2.18 ISO 6405-1:2004 Earth - moving machinery - Symbols for operator controls and other displays - Part 1: Common symbols</p> <p>Item 2.19 ISO 6405-2:2004 Earth - moving machinery - Symbols for operator controls and other displays - Part 2: Specific symbols for machines, equipment and accessories</p> <p>Item 2.20 ISO 6682:1986 A1 Earth - moving machinery - Zones of comfort and reach for controls</p> <p>Item 2.21 ISO 6011:2003 Earth - moving machinery - Visual display of machine operation</p> <p>Item 2.22 ISO 3411:2007 Earth - moving machinery - Physical dimensions of operators and minimum operator space envelope</p> <p>Item 2.23 ISO 12508:1994 Earth - moving machinery - Operator station and maintenance areas - Bluntness of edges</p> <p>Item 2.24 ISO 3457:2003 Earth - moving machinery - Guards - Definitions and requirements</p> <p>Item 2.25 ISO 5353:1995 Earth - moving machinery, and tractors and machinery for agriculture and forestry - Seat index point</p>

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Materials/Products Tested	Types of Tests/Properties Measured, Range of Measurement	Standard Specifications, Equipment/ Techniques Used
<b>ELANDSFONTEIN Site and On-site Testing</b>		
<b><u>Earth - moving machinery</u></b>	Signs	Item 2.26 ISO 9244:1995 Earth - moving machinery - Safety signs and hazard pictorials – General principles
	Roll Over Protection	Item 2.27 ISO 3449:2005 Earth - moving machinery - Falling - object protective structures (FOPS) Laboratory tests and performance requirements
		Item 2.28 ISO 3471:1994 Earth - moving machinery - Roll over protective structures (ROPS) Laboratory tests and performance requirements
	Lights, Exterior (Reading), Reflectors, Visibility	Item 2.29 ISO 5006:2006 Earth - moving machinery - Operator's field of view - Test method and performance criteria Item 2.30 ISO 14401-1:2004 Earth - moving machinery - Field of vision of surveillance and rear-view mirrors - Part 1: Test methods Item 2.31 ISO 14401-2:2004 Earth - moving machinery - Field of vision of surveillance and rear-view mirrors - Part 2: Performance criteria Item 2.32 ISO 12509:2004 Earth - moving machinery - Lighting, signalling and marking lights, and reflex-reflector devices
	Lock, Cab and Dumper body support, Steering Frame & Unauthorized Start/Move	Item 2.33 ISO 13333:1994 Earth - moving machinery - Dumper body support and operator's cab tilt support devices Item 2.34 ISO 10570:2004 Earth - moving machinery - Articulated frame lock - Performance requirements
	Safety, General	Item 2.35 BS EN 294:1992 Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs
	Seat	Item 2.36 ISO 6683:2005 Earth - moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests

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Materials/Products Tested	Types of Tests/Properties Measured, Range of Measurement	Standard Specifications, Equipment/ Techniques Used
<b>ELANDSFONTEIN SITE and On-site Testing</b>		
<u>Earth - moving machinery</u>	Signs  Touchable Surfaces	Item 2.37 ISO 11112:1995 Earth - moving machinery - Operator's seat - Dimensions and requirements  Item 2.38 ISO 9244:1995 Earth - moving machinery - Safety signs and hazard pictorials - General principles  Item 2.39 ISO 13732-1:2006 Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces
<b>ELANDSFONTEIN SITE</b>		
<u>Environmental Testing</u>  Switch and control gear  Environmental testing	Performance from 1kv to 7.2kv  Current AC: 1mA - 600A  Temperature: - 55°C to ± 700°C  Power: AC 30W - 6 000W  Resistance: 10mΩ - 100MΩ  Frequency: 10Hz - 1 GHz  Humidity: To 95% RH  <u>Vibration</u>  1) Sinusoidal Acceleration 5Hz - 2kHz Up to 25g  2) Random Acceleration 10Hz - 2kHz Up to 12 g RMS  <u>Shock</u>  Acceleration Up to 1000g Duration 0,5ms to 33ms	<u>Item 3</u>  Item 3.1 IEC /TR 60932-1998  Item 3.2 IEC 60068-1 Part 1-1992  Item 3.3 IEC 60068 Part 2:Tests  Item 3.4 CEI IEC 60068-2-01 - 1990 Item 3.5 CEI IEC 60068-2-02 - 1993 Item 3.6 CEI IEC 60068-2-03 - 1969 Item 3.7 CEI IEC 60068-2-78 - 2001 Item 3.8 CEI IEC 60068-2-04 - 1960 Item 3.9 CEI IEC 60068-2-05 - 1975 Item 3.10 CEI IEC 60068-2-06 - 1995 Item 3.11 CEI IEC 60068-2-07 - 1983  Item 3.12 CEI IEC 60068-2-10 - 1988  Item 3.13 CEI IEC 60068-2-11 - 1981 Item 3.14 CEI IEC 60068-2-13 - 1966 Item 3.15 CEI IEC 60068-2-14 - 1984 Item 3.16 CEI IEC 60068-2-18 - 2000-10 Item 3.17 CEI IEC 60068-2-27 - 1987 Item 3.18 CEI IEC 60068-2-28 - 1990 Item 3.19 CEI IEC 60068-2-29 - 1987 Item 3.20 CEI IEC 60068-2-30 - 1980 Item 3.21 CEI IEC 60068-2-31 - 1969 Item 3.22 CEI IEC 60068-2-32 - 1975

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<b>ELANDSFONTEIN SITE</b>		
<b>Environmental Testing</b> Switch and control gear  Environmental testing  Enclosures  Operators Station	Altitude – Up to 50 000 ft	Item 3.23 CEI IEC 60068-2-33 - 1971 Item 3.24 CEI IEC 60068-2-34 -1983 Item 3.25 CEI IEC 60068-2-35 -1983 Item 3.26 CEI IEC 60068-2-36 - 1983 Item 3.27 CEI IEC 60068-2-37 - 1983 Item 3.28 CEI IEC 60068-2-38 - 1974 Item 3.29 CEI IEC 60068-2 39 - 1976 Item 3.30 CEI IEC 60068-2-40 -1983-07 Item 3.31 CEI IEC 60068-2-41 - 1983-07 Item 3.32 CEI IEC 60068-2-48 - 1982 Item 3.33 CEI IEC 60068-2-64 - 1999 Item 3.34 CEI IEC 60529 - 2001 Item 3.35 IEC 104/399/COV - 2006 Item 3.36 CEI IEC 61373-1999/01 Item 3.37 ISO 3795:1989
	Road vehicles, and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials	
<b>CENTURION SITE</b>		
<b>EMC Testing</b> Commercial, industrial, scientific, medical and Automotive (e.g. computers, UPS, circuit breakers, pain relief machines, alarms, tracking devices)	ISM limits	<b>Item 4</b> Item 4.1 CISPR 11 (Excluding Clause 7.1) (I/P current 15A max)
	Household limits	Item 4.2 CISPR 14 – 1 and 2 (Excluding Clause 4.2) (I/P current 15A max)
	IT limits	Item 4.3 CISPR 22 (Excluding Clause 10.3) (I/P current 15A max for conducted emissions)
	Electrostatic discharge	Item 4.4 IEC 61000-4-2:1998 AMD 1
	Radiated, radio frequency field	Item 4.5 IEC 61000-4-3:2001
	Electrical fast transient	Item 4.6 IEC 61000-4-4:1995
	Surge	Item 4.7 IEC 61000-4-5:2006

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<p><b>EMC Testing</b> Commercial, industrial, scientific, medical and Automotive (e.g. computers, UPS, circuit breakers, pain relief machines, alarms, tracking devices)</p> <p>Ground, air, sea equipment and subsystems</p>	<p>Conducted Disturbances, induced by radio frequency</p> <p>Power frequency magnetic field</p> <p>Pulsed magnetic field</p> <p>Voltage dips, short interruptions and variations</p> <p>Electric discharge - road vehicles</p> <p>Power 1nW to 200 W</p>	<p><b>Item 4</b> Item 4.8 IEC 61000-4-6:2001</p> <p>Item 4.9 IEC 61000-4-8:2001</p> <p>Item 4.10 IEC 61000-4-9:2001</p> <p>Item 4.11 IEC 61000-4-11:2001 (Excluding I/P current 15A max)</p> <p>Item 4.12 ISO TR 10605</p> <p>Item 4.13 RTCA DO 160D: Sections 17, 18, 19, 20 and 21</p>

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