

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:-

ESKOM ENTERPRISES (PTY) LTD
Co. reg no: 1999/002761/07

Laboratory Accreditation Number: **128**

is a South African National Accreditation System accredited Calibration 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

DC LOW FREQUENCY METROLOGY

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

Mr R Josias
Acting Chief Executive Officer

Effective Date: 30 September 2007
Certificate Expires: 30 September 2012

ANNEXURE A

SCHEDULE OF ACCREDITATION

DC LOW FREQUENCY METROLOGY

Laboratory Accreditation Number: 128

Permanent Address of Laboratory: Eskom Enterprises (Pty) Ltd PTM - Witbank Cnr Jellicoe & Watermeyer Street Witbank 1035		Technical Signatory : Mrs IP van der Walt	
Postal Address: P O Box 197 Witbank 1035		Nominated Representative : Mrs IP van der Walt	
Tel : (013) 693-3731 Fax : (013) 656-1801 E-mail : Ivan.seabourne@eskom.co.za		Issue No. : 08 Date of Issue : 20 May 2010 Expiry Date : 30 September 2012	
MEASURED QUANTITY INSTRUMENT OR GAUGE AND NOMINAL RANGE	NOMINAL FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (k=2)	NOTES
1	DC Voltage (up to 1100 V)		
1.1	DC voltage sources		
1.1.1	Single values		
	10 V	DC	$3 \cdot 10^{-6} \cdot U$ DC Reference Standard
1.1.2	Low values (≤ 10 V)		
	0 V to 10 V	DC	$2 \cdot 10^{-5} \cdot U + 1 \mu\text{V}$ DC Reference Standard 8½ Digit Multimeter
1.1.3	Intermediate values (>10 V to 1 100 V)		
	10 V to 1 000 V	DC	$2 \cdot 10^{-5} \cdot U$ DC Reference Standard 8½ Digit Multimeter
1.2	DC voltage meters		
1.2.1	Very low values (≤ 1 mV)		
	0 mV to 1 mV	DC	$1 \mu\text{V}$ Calibrator DC Reference Standard 8½ Digit Multimeter
1.2.2	Intermediate values (> 1 mV to 1100 V)		
	1 mV to 10 V	DC	$1 \cdot 10^{-5} \cdot U + 1 \mu\text{V}$
	10 V to 1 000 V	DC	$2 \cdot 10^{-5} \cdot U$ DC Reference Standard 8½ Digit Multimeter

Original date of accreditation: 1988

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The CMC, expressed as an expanded uncertainty of measurement, is stated as the standard uncertainty of measurement multiplied by a coverage factor $k = 2$, corresponding to a confidence level of approximately 95%

Field Manager

ANNEXURE A

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MEASURED QUANTITY INSTRUMENT OR GAUGE AND NOMINAL RANGE	NOMINAL FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (k=2)	NOTES
2	DC resistance		
2.1	DC resistance standards and sources		
2.1.1	Low values (<= 1 Ω)		
	1 mΩ	DC	$3 \cdot 10^{-4} \cdot R$
	10 mΩ	DC	$3 \cdot 10^{-4} \cdot R$
	0,1 Ω	DC	$3 \cdot 10^{-4} \cdot R$
2.1.2	Intermediate values (> 1 Ω to 1 MΩ)		
	1 Ω	DC	$5 \cdot 10^{-5} \cdot R$
	10 Ω	DC	$5 \cdot 10^{-5} \cdot R$
	100 Ω	DC	$5 \cdot 10^{-5} \cdot R$
	1 kΩ	DC	$5 \cdot 10^{-5} \cdot R$
	10 kΩ	DC	$5 \cdot 10^{-5} \cdot R$
	100 kΩ	DC	$1 \cdot 10^{-4} \cdot R$
	1 MΩ	DC	$1 \cdot 10^{-4} \cdot R$
2.1.3	High values (>1 MΩ)		
	10 MΩ	DC	$1 \cdot 10^{-4} \cdot R$
	100 MΩ	DC	$5 \cdot 10^{-3} \cdot R$
	200 MΩ	DC	$5 \cdot 10^{-3} \cdot R$
	500 MΩ	DC	$5 \cdot 10^{-3} \cdot R$
	1 GΩ	DC	$5 \cdot 10^{-3} \cdot R$
2.1.5	Multiple ranges		
	0,1 Ω to 10 kΩ	DC	$2 \cdot 10^{-4} \cdot R + 1 \text{ m}\Omega$
	10 kΩ to 100 MΩ	DC	$2 \cdot 10^{-4} \cdot R$
2.2	DC resistance meters		
2.2.1	Low values (<= 1 Ω)		
	100 mΩ to 1 Ω	DC	$2 \cdot 10^{-4} \cdot R + 1 \text{ m}\Omega$
2.2.2	Intermediate values (> 1 Ω to 1 GΩ)		
	1 Ω to 100 MΩ	DC	$2 \cdot 10^{-4} \cdot R$

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Field Manager

ANNEXURE A

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MEASURED QUANTITY INSTRUMENTS OR GAUGE AND NOMINAL RANGE	NOMINAL FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (k=2)	NOTES	
3	DC current (up to 100 A)			
3.1	DC current sources			
3.1.1	Low values (<= 0,1 mA)			
	1 µA to 100 µA	DC	$2 \cdot 10^{-4} \cdot I$	Resistance Standard 8½ Digit Multimeter
3.1.2	Intermediate values (> 0,1 mA to 20 A)			
	0,1 mA to 2 A	DC	$2 \cdot 10^{-4} \cdot I$	Resistance Standard
	2 A to 20 A	DC	$5 \cdot 10^{-4} \cdot I$	8½ Digit Multimeter
3.2	DC current meters			
3.2.1	Low values (<=0,1 mA)			
	1 µA to 100 µA	DC	$2 \cdot 10^{-4} \cdot I$	Resistance Standard 8½ Digit Multimeter Calibrator
3.2.2	Intermediate values (>0,1 mA to 20 A)			
	0,1 mA to 2 A	DC	$2 \cdot 10^{-4} \cdot I$	Resistance Standard
	2 A to 20 A	DC	$5 \cdot 10^{-4} \cdot I$	8½ Digit Multimeter Calibrator
5.2	AC voltage up to 1 000 V			
5.2.1	Sources			
	100 mV to 1 kV	40 Hz to 20 kHz	$3 \cdot 10^{-4} \cdot U$	Calibrator
5.2.2	Meter			
	100 mV to 1 kV	40 Hz to 20 kHz	$3 \cdot 10^{-4} \cdot U$	Calibrator
6	AC current			
6.2	AC current up to 100 A			
6.2.1	Sources			
	100 µA to 20 A	40 Hz to 1 kHz	$1 \cdot 10^{-3} \cdot I$	AC Shunts Calibrator
6.2.2	Meter			
	100 µA to 20 A	40 Hz to 1 kHz	$1 \cdot 10^{-3} \cdot I$	AC Shunts Calibrator
7	AC power			
7.1	AC power and energy			
7.1.1	Single phase (f<=400 Hz)			
	1 A to 10 A 50 V to 500 V	50 Hz	$1 \cdot 10^{-3} \cdot P$ at 1 PF	Power Meter

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ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Field Manager