

GOVERNMENT NOTICES GOEWERMENTSKENNISGEWINGS

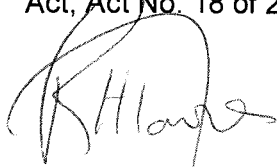
DEPARTMENT OF TRADE AND INDUSTRY DEPARTEMENT VAN HANDEL EN NYWERHEID

No. R. 368

31 May 2013

MEASUREMENT UNITS AND MEASUREMENT STANDARDS ACT, Act No. 18 of 2006 NATIONAL MEASUREMENT STANDARDS

I, Dr Rob Davies, Minister of Trade and Industry, do hereby amend Government Notice No. 133 of 18 February 2005, promulgated in terms of section 7 of the Measuring Units and National Measuring Standards Act, 1973 (Act No. 76 of 1973), by the substitution for the Schedule thereto of the Schedule hereto, in accordance with the Measurement Units and Measurement Standards Act, Act No. 18 of 2006.



Dr Rob Davies, MP
Minister of Trade and Industry

SCHEDULE NATIONAL MEASUREMENT STANDARDS

1. Length

- a) Length is realised with a Helium-neon laser, No. 1088, stabilised on the hyper fine absorption lines of iodine.
- b) Angle is realised by using a Moore index table No. 8-1440-43, an optical polygon No. 72704.1 and a flatness interferometer No. 97-16-65379.
- c) Form is realised by using a perfect geometrical element, such as a straight line, a plane, a circle, a cylinder, or a sphere, for which the deviation away from the "perfect" geometric element is measured traceable to the National Standard for length or angle.

2. Mass

A cylinder of platinum-iridium, replica No. 56 of the international prototype of the kilogram (IPK).

3. Time

- a) South African Standard Time (SAST) is defined as Coordinated Universal Time plus two (2) hours (or UTC + 02:00).
- b) Frequency: A group of four caesium beam atomic clocks:
 - i) Hewlett-Packard 5071A, No. 3608A01034;
 - ii) Agilent 5071A, No. US39301821;
 - iii) Symmetricom 5071A, No. US45382232; and
 - iv) Symmetricom 5071A, No. US45382233.
- c) Electric phase angle – A Clarke-Hess model 5500 phase standard, No. 217.

4. Electricity

- a) Electric potential: A 10 V Josephson Voltage Standard, No. ME-106/5.
- b) Electric resistance: A series of eight Leeds and Northrup Type 4210 1 Ω resistors, Nos. 681732, 681734, 681735, 755517, 1132427, 1146606, 1593469 and 1593473.
- c) Electric capacitance: A series of capacitors:
 - i) Four Andeen Hagerling Type AH1100 capacitors with nominal values from 1 pF to 100 pF, Nos. 01284, 01285, 01286 and 01287;
 - ii) Four General Radio Type 1409 capacitors with nominal values from 1 nF to 1 μ F, Nos. 18604, 27220, 27256 and 26977; and
 - iii) Two sets of Agilent Type 16380 capacitors, each set containing four capacitors, with nominal values from 1 pF to 10 μ F, Nos. 1840J01793 and 2519J00893.
- d) Electric inductance : A series of six type 1482 inductors with nominal values from 100 μ H to 10 H, Nos. 19399, 19604, 19515, 19723, 10916 and 19349.
- e) Electric AC voltage: A series of four thermal converters (AC to DC):
 - i) Type MJTC 301, No. 346-1;
 - ii) Type MJTC 312 with 900 Ω series resistor, No. 346-12;
 - iii) Type MJTC 308 with 10 k Ω series resistor, No. 346-8;
 - iv) Type MJTC 311 with 100 k Ω series resistor, No. 346-11; and
 - v) A Holt 12 low voltage thermal converter, No. 0943500001458.

- f) Electric AC current: A series of AC to DC thermal converters with current shunts:
 - i) Nos. AC-AO 1 & 2695008;
 - ii) Nos. AC-AO 4 & 795012;
 - iii) Nos. AC-AO 5 & 2215008;
 - iv) Nos. AC-AO 6 & 2610002;
 - v) Nos. TCC 203 & 2675006;
 - vi) Nos. AC-AO 8 & 810015;
 - vii) Nos. AC-AO 9 & 2695011;
 - viii) Nos. AC-AO 10 & 2605010;
 - ix) Nos. TCC 202 & 2680005;
 - x) Nos. AC-AO 11 & 770018;
 - xi) Nos. AC-AO 12 & 2525010;
 - xii) Nos. TCC 202 & 2735014;
 - xiii) Nos. AC-AO 14 & 2665013; and
 - xiv) Nos. TCC 201 & 2585007.
- g) Electric AC power: A Zera COM 3000 AC power comparator, No. 01-0018-04.
- h) Radio-frequency power:
 - i) 50 Ω measuring head, No. 50/01;
 - ii) 50 Ω , 0 dBm power sensor HP 8485A, No. 2942A11856;
 - iii) 50 Ω , -30 dBm power sensor HP 8485D, No. 3318A02445;
 - iv) 75 Ω measuring head, No. 75/01;
 - v) 75 Ω power sensor, HP 8483A, No. 3318A07099;
 - vi) 50 Ω , 0 dBm power sensor R & S NRV-Z55, No. 839728/002;
 - vii) 50 Ω , 0 dBm power sensor Agilent 8487A, No. 3318A04344; and
 - viii) 50 Ω , -30 dBm power sensor Agilent 8487D, No. MY41090317.
- i) Radio-frequency attenuation: Attenuator model WBCO 310, No. 103.
- j) Radio-frequency impedance: A group of 50 Ω coaxial air-dielectric transmission lines:
 - i) Connector-type PC-7 mm, Nos. 00628 and 00639;
 - ii) Connector-type PC-3,5 mm, Nos. 00235 and 00551;
 - iii) Connector-type N-7 mm, Nos. 00696 and 00744;
 - iv) Connector-type K-2,92 mm, No. K-50 Ω ; and
 - v) Connector-type PC-2,4 mm, Nos. 00968 and 00885.

5. Temperature

Reproducing the International Temperature Scale of 1990 (ITS-90) by utilising suitable interpolation and extrapolation instruments in conjunction with a measuring array consisting of:

- a) Contact thermometry ($-200\text{ }^{\circ}\text{C}$ to $1085\text{ }^{\circ}\text{C}$):
 - i) Triple point cells of argon, No. TS-009;
 - ii) Triple point cells of mercury, No. TS-008;
 - iii) Triple point cells of water, No. TS-007;
 - iv) Melting point cells of gallium, Nos. TS-010 and TS-029;
 - v) Freezing point cells of tin, Nos. TS-006 and TS-018;
 - vi) Freezing point cells of zinc, Nos. TS-005 and TS-017;
 - vii) Freezing point cells of silver, Nos. TS-003 and TS-015; and
 - viii) Freezing point cells of gold and copper, Nos. TS-002 and TS-001.
- b) Radiation thermometry:
 - i) Model WB10 oil bath blackbody, No. TS-019, in conjunction with a suitable contact thermometer traceable to the contact thermometry measurement standards;

- ii) Model P550P blackbody furnace, No. TS-020, in conjunction with a suitable contact thermometer traceable to the contact thermometry measurement standards;
- iii) Freezing point cell of silver, No. TS-013;
- iv) Freezing point cell of copper, No. TS-115; and
- v) Narrow band radiation thermometer, No. TS-160.

6. Pressure

- a) Absolute Pressure: 0,133 Pa to 133 Pa; MKS Capacitance Diaphragm, Signal Conditioner No. 000206117, Measuring Head No. 95263482A.
- b) Pressure: 5 Pa to 500 MPa; DHI Piston Cylinder Unit No. 359, Weight Set No. 2080.

7. Sound Pressure in air (Acoustics)

Primary calibration of LS1P and LS2P microphones utilising the method as per IEC 61094-2 with microphones:

- a) LS1P: Brüel & Kjær 4160, Nos. 1292308, 1389478, 2740789, 2036145 and 2036167;
- b) LS2P: Brüel & Kjær 4180, Nos. 2049570, 1893477, 1886365, 2661008 and 2787487.

8. Radiation dosimetry

- a) Air kerma/air kerma rate:
 - i) X-rays (50 to 300) kV range: Ionization chamber together with a suitable electrometer, Nos. RD-04; RD-05; RD-06 and RD-08.
 - ii) Co-60: Ionization chamber together with a suitable electrometer, Nos. RD-04 and RD-05; and
 - iii) Co-60, Cs-137 and Am-241: Ionization chamber together with a suitable electrometer, Nos. RD-06 and RD-08.
- b) Absorbed dose to water or absorbed dose rate to water: High energy photons: Ionization chamber together with a suitable electrometer, Nos. RD-04 and RD-05.
- c) Absorbed dose to water or absorbed dose rate to water: Beta rays; set of beta sources, No. RD-03.
- d) Particle emission rate: Set of extended area sources (100 x 150) mm, No. RD-02.
- e) Reference air kerma rate: Re-entrant well-type Ionisation chamber together with a suitable electrometer, No. RD-10.

9. Force and torque

- a) A set of force transducers as follows:
 - i) Above 5 kN up to 50 kN, No. 90596
 - ii) Above 20 kN up to 200 kN, No. 113930115
 - iii) Above 30 kN up to 300 kN, No. 00281Q15
 - iv) Above 100 kN up to 1 MN, No. 82809
 - v) Above 500 kN up to 5 MN, No. 103430028
- b) Mass Stack: Dead Weight Machine 50 kN, No. 40588.

- c) Torque Rigs and weights as follows:
 - i) 10 N•m torque beam and Torque Rig and Weights, No. CRN TQ-0001;
 - ii) 1000 N•m Torque Beam and Torque Rig and Weights, No. CRN TQ-0002; and
 - iii) Torque Angle Rig, No. CRN TQ-0007.

10. Optical radiation

Radiation in the ultraviolet, visible and infrared regions:

- a) Luminous intensity (cd): Absolute radiometer system, No. ORP-001.RA.
- b) Luminous flux (lm): Goniophotometer system, No. ORP-004.GO.
- c) Radiant power (W): Absolute radiometer systems, Nos. ORP-000.RA and ORP-002.RA.
- d) Irradiance (W/m^2): Absolute radiometer systems, Nos. ORP-000.RA and ORP-002.RA.
- e) Spectral response (A/W or V/W or W/W): Absolute radiometer systems, Nos. ORP-000.RA and ORP-002.RA.
- f) Spectral irradiance ($(\text{W} \cdot \text{m}^{-2})/\text{nm}$): Tungsten-bromide lamps, No. ORS-303.SR.
- g) Reflectance (%):
 - i) Glossy ceramic tiles, No. ORP-014.SP; and
 - ii) Mat ceramic tiles, No. ORP-015.SP
- h) Transmittance (%): Neutral density filters, No. ORP-016.SP.

11. Humidity

- a) Dew point ($-75\text{ }^{\circ}\text{Cdp}$ to $+20\text{ }^{\circ}\text{Cdp}$):
 - i) Model S4000RS dew point hygrometer, No. HMS-100; and
 - ii) Model 373LX dew point hygrometer, No. HMS-110.
- b) Relative humidity – suitable interpolation instruments in conjunction with:
 - i) Salt solution ampoules (5 %rh), No. HGS-505;
 - ii) Salt solution ampoules (10 %rh), No. HGS-510;
 - iii) Salt solution ampoules (11 %rh), No. HGS-511;
 - iv) Salt solution ampoules (20 %rh), No. HGS-520;
 - v) Salt solution ampoules (35 %rh), No. HGS-535;
 - vi) Salt solution ampoules (50 %rh), No. HGS-550;
 - vii) Salt solution ampoules (65 %rh), No. HGS-565;
 - viii) Salt solution ampoules (75 %rh), No. HGS-575;
 - ix) Salt solution ampoules (80 %rh), No. HGS-580; and
 - x) Salt solution ampoules (95 %rh), No. HGS-595.

12. Fluid Flow

Gas Flow: BIOS MET LAB ML-800 Primary Flow Standard consisting of a ML-800 Base Unit No. 128789 with Flow cells:

- i) ML-800-3 Ultra-Low Flow Cell No. 128014;
- ii) ML-800-24 Medium Flow Cell No. 127325; and
- iii) ML-800-44 High Flow Cell No. 128098.

13. Amount of substance

- a) Gravimetrically prepared primary certified reference materials including primary gas reference mixtures and aqueous ethanol reference solutions as listed in the "NMISA Chemistry Reference Materials and Reference Measurements Register".

- b) Referee analyses through methods of measurement having the highest metrological qualities.
- c) Calibration services as listed in the "NMISA Chemistry Reference Materials and Reference Measurements Register".

14. Radioactivity Standards

- a) A Vinten Instruments Radionuclide Assay Calibrator No. 88175, comprising a model 671 ionisation chamber (pressurized, re-entrant well type) attached to a Vinten ISOCAL 284 electrometer/display module. The chamber is calibrated on an ongoing basis using primary standards so as to obtain radionuclide specific calibration factors.
- b) For gamma-emitting radionuclides: A detection system to apply the absolute $4\pi\beta\text{-}\gamma$ coincidence counting method using coincidence unit No. RS-019.
- c) For pure-beta and pure-electron-capture radionuclides: A detection system to apply both the Triple-to-Double Coincidence Ratio (TDCR) and CIEMAT/NIST methods, using coincidence unit No. RS-029.
- d) For iodine-125: A double NaI detection system.

15. Vibration

- a) Acceleration: A homodyne laser interferometer system with quadrature optical outputs based on a Melles Griot laser, type 05-STP-901, No. 21249, in compliance with ISO 16063-11 methods 1 and 3.
- b) Acceleration: A heterodyne laser interferometer system with quadrature optical outputs based on a POLYTEC laser vibrometer head type OFV-505, No. 0100339, in compliance with ISO 16063 part 11, method 3.
- c) Velocity & displacement: These are units derived from acceleration.

16. Viscosity

Kinematic Viscosity: A system consisting of;

- i) A group of three Ubbelohde Capillary Viscometers (Nominal Viscometer Constant $c = 0,002 \text{ mm}^2\text{s}^{-2}$) Nos. 37290, 37291 and 37292; and
- ii) Three Sanji Sport – 2100 Stopwatches Nos. TF05/16, TF05/17 and TF05/18.

The Kinematic Viscosity of distilled water at 20 °C and 101,325 kPa is accepted as being $\nu = 1,0034 \text{ mm}^2\text{s}^{-1}$.