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THE TANZANIA METEOROLOGICAL AUTHORITY ACT,
(CAP. 157)

REGULATIONS

(Made under section 54)

THE TANZANIA METEOROLOGICAL AUTHORITY (METEOROLOGICAL EQUIPEMENT AND INSTRUMENTS) REGULATIONS, 2021

ARRANGEMENT OF REGULATIONS

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SCHEDULE

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PART I
PRELIMINARY PROVISIONS

Citation

1. These Regulations may be cited as the Tanzania Meteorological Authority (Meteorological Equipment and Instruments) Regulations, 2021.

Application

2. These Regulations shall apply to meteorological station operators, equipment and instruments related in the provision of meteorological services.

Interpretation

3. In these Regulations, unless the context otherwise requires-

Cap. 157

"Act" means the Tanzania Meteorological Authority Act;

"Authority" means the Tanzania Meteorological Authority established under section 4 of the Act;

"calibration" means a comparison of two instruments or measuring devices one of which is a standard of known accuracy traceable to detect, correlate, report or eliminate by adjustment, any discrepancy in accuracy of the instrument measuring device being compared to the standard;

"maintenance regime" means the recommended maximum interval between inspections of the entire measuring system to confirm correct site exposure, radiation shield or screen and other mechanical mounting fixtures are clean and serviceable and the logger or weather station is clean and serviceable;

"meteorological instruments" means the equipments used

to sample the state of atmosphere at a given time;

"resolution" means the smallest quantity that should be available from the measuring systems data output;

"starting threshold" means the smallest environmental stimulus required for a sensor to produce an output;

"traceability" means the linking of measurement standards or measuring instruments to relevant national or international standards through an unbroken chain of comparisons;

"uncertainty" means an interval around a measured value such that any repetition of the measurement will produce a new result that lies within this interval;

"verification regime" means the recommended maximum interval between field verifications performed against traceable travelling references in suitable conditions; and

"weather observing systems" means systems which-

(a) sense meteorological parameters, process and disseminate;

(b) detect, process and produce imergeries; and

(c) receive space based meteorological data, process and produce imergeries or forecasts.

PART II
METEOROLOGICAL INSTRUMENTS AND OBSERVING SYSTEMS

Meteorological instruments

4.-(1) For the purpose of monitoring the situation of the atmosphere, there shall be measuring instruments for making meteorological observations.

(2) Subject to subregulation (1), the instruments shall include-

(a) thermometers;

(b) barometers;

(c) raingauge;

(d) wind anemometer;

(e) wind vane;

(f) global radiation sensor;

(g) diffused radiation sensor;

(h) direct radiation and sunshine recorder;

(i) soil temperatures;
(j) evaporation pan;
(k) visibility sensor;
(l) present weather sensor; and
(m) any other instrument deems necessary.

(3) For proper surface observations, the instrument shall be positioned as prescribed under these Regulations.

Thermometers

5.-(1) The thermometer mounting height for air temperature measurement shall be 1.25 to 2 m above ground level.

(2) The exposure and siting requirement for thermometer shall be-

(a) a flat, horizontal land, surrounded by an open space, slope inclination less than ⅓ (19°); and
(b) the ground covered with natural and low vegetation less than 10cm representative of the region.

(3) The temperature measurement point shall be situated-

(a) at more than 30 m from artificial heat sources or reflective surfaces;
(b) at more than 30 m from an expanse of water; and
(c) away from all projected shade when the sun is higher than 7°.

(4) When electrical thermometers are used, separate maximum and minimum thermometers shall not be required for measurement of extreme values, if connected to a continuously operating data recording system.

Barometers

6.-(1) The barometer shall be mounted-

(a) in such a manner as to avoid mechanical shock and vibration; and
(b) away from electromagnetic sources.

(2) Without prejudice to subregulation (1), the barometers with digital read-outs shall be mounted where there is good general lighting and shall not face a window or other strong light sources.

Rain gauge

7. The siting and exposure requirement for a rain gauge shall be-

(a) a flat, horizontal land, surrounded by an open area, slope less than ⅓ (19°); and

(b) such that no obstacles situated at a distance at least twice the height of the obstacle with respect to the catchment's height of the raingauge.

Wind anemometer and wind vane

8. The siting and exposure requirement for wind anemometer and wind vane shall be such that-

(a) the mast be located at a distance of at least 10 times the height of the surrounding obstacles; and

(b) the sensors be situated at a minimum distance of 15 times the width of thin obstacles over 8 m high.

Global and diffused radiation sensor

9. The siting and exposure requirement for the global and diffused radiation sensor shall be such that-

(a) no shade projected onto the sensor when the sun is at an angular height of over 7°; and

(b) no non-shading reflecting obstacles with an angular height above 7° and a total angular width above 20°.

Direct radiation and sunshine recorder

10. The siting and exposure requirement for the direct radiation and sunshine recorder shall be such that no shade projected onto the sensor when the sun is at an angular height of over 5.

Soil thermometer

11.-(1) The site for soil temperature measurements shall be a level plot of bare ground and typical of the surrounding soil for which information is required.

(2) The thermometers shall not be in shadows cast while the elevation of the sun is 3˚ or greater above the horizon and shall not be placed in a hollow where water can accumulate.

(3) The soil shall be representative of the soil for the locality and not disturbed by civil works and the water

table shall not rise to the level of the deepest thermometer.

(4) The standard depths for soil temperature measurements shall be 5, 10, 20, 50 and 100 cm below the surface and additional depths may be included.

Stevenson screen

12.-(1) The Stevenson screen shall be installed in the instrument enclosure.

(2) The base of the screen shall be 4 feet above the level of the surrounding ground.

(3) The bulbs of the thermometers or the electrical transducers in shelters of the Stevenson screen shall be at the height of approximately 4½ feet above ground level.

Evaporation pan

13.-(1) The standard evaporation pan shall be circular, 4 feet in diameter and 10 inches deep.

(2) The interior of the evaporation pan shall be painted with a black bituminous paint to absorb as much as possible of the incoming solar radiation, and the exterior including the protective mesh grid, shall be painted with aluminium paint to reduce radiation loss.

(3) The site requirements shall be such that-

(a) no obstructions which shall cast a shadow onto the pan when the sun is at an elevation of 3˚ or greater;

(b) the ground surface surrounding the pan be relatively level and have the vegetative cover trimmed to a few centimetres above the ground; and

(c) the distance of the evaporation pan from isolated obstructions which are higher than the top of the pan be not less than ten times and preferably thirty times their height above the rim of the pan.

Runway visual range

14.-(1) The runway visual range shall be at 120m literally from the centre of the runway and at a height of between 2 and 3 metres.

(2) The path of the light beam between the transmitting and receiving shall not be closer to the ground than 1.5 metres at any point.

Present weather sensor

15.-(1) The present weather sensor shall be at the height of approximately 1.5 metres above the ground level.

(2) The siting and exposure requirement shall be such that no obstacles situated at a distance at least twice the height of the obstacle.

Meteorological parameters

16.-(1) The meteorological station operator shall ensure that there is compliance with the standards of instruments in the following measuring meteorological parameters-

(a) atmospheric pressure;
(b) air temperature;
(c) relative humidity;
(d) precipitation;
(e) wind direction;
(f) wind speed;
(g) solar radiation;
(h) visibility;
(i) runway visual range;
(j) present weather;
(k) cloud height;
(l) soil temperature;
(m) soil moisture;
(n) soil ph; and
(o) any other related meteorological parameter.

(2) Any person intending to procure meteorological instrument shall submit specifications to the Authority for verification.

Classes of meteorological instruments

17.-(1) The meteorological station operator shall categorise meteorological instruments into the following classes:

(a) Class A-Reference Climatological Stations and Research Stations;
(b) Class B- Synoptic Stations and Controlled Aeronautical Stations;
(c) Class C- Well-Maintained Public Weather Stations; and
(d) Class D- Measurements at Crowdsourced

Weather Stations.

(2) The performance of the classes shall be as prescribed in the Schedule to these Regulations.

Meteorol-ogical instruments approval

18.-(1) The meteorological station operators shall be required to ensure that meteorological instruments are approved by the Authority, based on classes of instruments and issue a certificate.

(2) The approved instruments shall not be modified without the approval by the Authority.

Instruments uncertainty

19. The meteorological station operators shall be required to ensure that the instruments used for meteorological purposes have uncertainty in instruments performance specification as prescribed in the Schedule to these Regulations.

Display of labels

20. The Authority shall affix the following approval labels to the approved meteorological instruments:

(a) logo of the Authority;
(b) type of the equipment;
(c) alphanumeric identifications; and
(d) any other label as the Authority may consider appropriate.

Installation of approved meteorolo-gical instrument

21.-(1) The meteorological instruments shall be installed by qualified technical personnel.

(2) The installation shall be inspected and certified by the Authority before the use of the instrument.

Weather observing systems

22.-(1) The meteorological station operators shall establish weather observing systems performing meteorological observations, detection of severe weather events and alerts.

(2) The weather observing systems established shall include-

(a) automatic weather station;
(b) semi-automatic weather station;
(c) automatic weather observing system;
(d) low level wind shear alert system;

(e) lightening detection system;
(f) upper air station;
(g) observing satellite;
(h) weather radars; and
(i) any other weather observing system.

Installation of weather observing systems

23. Subject to regulation 11, the weather observing systems shall be installed by a qualified meteorological technician under supervision of meteorological engineer according to standards and manufacturer guidelines and such installations shall be certified by the Authority before the use of the system.

PART III
MAINTENANCE AND CALIBRATION OF METEOROLOGICAL INSTRUMENTS

Performance of calibration

24.-(1) The meteorological station operators shall be required to ensure that calibration are performed when the calibration cycle is due or the observation instrument show an error caused by natural disaster or other causes.

(2) The calibration of meteorological instrument shall be conducted at a calibration laboratory.

(3) On site calibration may be performed upon request and application of the exclusive observation station under at least one of the following conditions-

(a) the instrument is too big to move;
(b) the instrument is hard to tear apart; or
(c) the instrument may be exposed to damages or lose its accuracy while moving or any other consideration.

(4) The observation instrument sent for calibration shall bear marks of the brand of production or factory logo, serial number of production, engraved scale and the vernier, the attached technical document or brochures shall also be submitted for calibration's reference.

(5) Auto-recording types of instrument for calibration shall be submitted with its recording or displaying device and power supply exclusively used for the instrument shall also be submitted.

(6) Where the instrument sent for calibration has two or more scales and after calibration, any one of them fails to meet the performance criteria, the whole instrument shall be considered as failed.

(7) For weather observing systems requiring calibration, such as weather radars, manufacturer calibration procedures shall be used.

Calibration certificate

25. The Authority shall-

(a) issue a certificate to the instruments that passed the calibration;

(b) mark obsoletes all instruments if calibration fails; and

(c) provide recommendations or advice to customer in accordance with the requirements.

Traceability

26. The meteorological station operators shall ensure traceability of calibration of meteorological instruments through recognized national and international institutions dealing with standards.

Calibration regime

27. The meteorological station operators shall ensure that calibration cycles of meteorological instruments follow manufacturer recommendations and the calibration cycles as prescribed in the Schedule to these Regulations.

Instruments maintenance

28.-(1) The meteorological station operators may establish preventive maintenance schedule for instruments as a means of preventing prolonged downtime, costly repairs, data loss and quality control.

(2) The maintenance schedule referred to under subregulation (1) shall follow manufacturer recommendations.

(3) The corrective maintenance shall be done within reasonable time to minimize downtime.

Verification

29.-(1) The meteorological station operators shall be required to carried out performance verification to ensure that meteorological instruments perform normal operations.

(2) The performance verification under

subregulation (1) shall follow manufacturer guideline and the Schedule to these Regulations.

PART IV
GENERAL PROVISIONS

General penalty

30. A person who contravenes any provision under these Regulations, where no specific penalty has been provided for under the Act, commits an offence and shall, upon conviction, be liable to a fine of not less than one million shillings but not exceeding three million shillings or to imprisonment for a term of not less than six months but not exceeding twelve months or to both.

Forms or certificates

31. The format of the form or certificate to be issued under these Regulations shall be determined by the Authority.

SCHEDULE

(Made under regulations 17(2), 19, 27 and 29(2))

Instrument Classes, Calibration, Maintenance and Verification Regime

	ITEM	CLASS A	CLASS B	CLASS C	CLASS D
Thermometer	Uncertainty	0.3 K	0.5 K	1.0 K	Greater than Class C or unknown
	Resolution	0.1 K	0.1 K	1 K	None or unknown
	Calibration Regime	Yearly	3 years	5 years	None or unknown
	Verification Regime	Every 6 months	Yearly	Yearly	None or unknown
	Maintenance Regime	Yearly	Yearly	Yearly	None or unknown
Hygrometer	Uncertainty	3 %RH	6 %RH	10 %RH	Greater than Class C or unknown
	Resolution	0.1 %RH	1 %RH	1 %RH	None or unknown
	Calibration Regime	Yearly	2 years	3 years	None or unknown
	Verification Regime	Every 6 months	Yearly	Yearly	None or unknown
	Maintenance Regime	Yearly	Yearly	Yearly	None or unknown
Barometer	Uncertainty	0.15 hPa	0.5 hPa	1.0 hPa	Greater than Class C or unknown

GN. NO. 598 (Contd.)

	ITEM	CLASS A	CLASS B	CLASS C	CLASS D
	Resolution	0.1 hPa	0.1 hPa	1 hPa	None or unknown
	Calibration Regime	Yearly	2 years	3 years	None or unknown
	Verification Regime	Every 6 months	Yearly	Yearly	None or unknown
	Maintenance Regime	Yearly	Yearly	Yearly	None or unknown
Wind Anemometer	Uncertainty	Greater of 2 % or 0.1 m/s	Greater of 10 % or 0.5 m/s	Greater of 15 % or 1.0 m/s	Greater than Class C or unknown
	Resolution	0.1 m/s	0.5 m/s	1.0 m/s	None or unknown
	Calibration Regime	Yearly	2 years	5 years	None or unknown
	Verification Regime	Yearly	Yearly	3 years	None or unknown
	Maintenance Regime	Yearly	Yearly	3 years	None or unknown
Wind Vane	Uncertainty	5°	10°	15°	Greater than Class C or unknown
	Resolution	1°	1°	5°	None or unknown
	Calibration Regime	Yearly	2 years	5 years	None or unknown
	Verification Regime	Yearly	Yearly	3 years	None or unknown
	Maintenance Regime	Yearly	Yearly	3 years	None or unknown

GN. NO. 598 (Contd.)

	ITEM	CLASS A	CLASS B	CLASS C	CLASS D
Rain recorder	Uncertainty	Greater of 2 % or 0.1 mm	Greater of 5 % or 0.2 mm	Greater of 10 % or 0.5 mm	Greater than Class C or unknown
	Resolution	0.1 mm	0.2 mm	0.5 mm	None or unknown
	Calibration Regime	Yearly	2 years	3 years	None or unknown
	Verification Regime	Yearly	Yearly	Yearly	None or unknown
	Maintenance Regime	Monthly	Every 6 months	Yearly	None or unknown
Rain gauge	Uncertainty	Greater of 5 % or 0.1 mm/h	Greater of 10 % or 0.5 mm/h	Greater of 15 % or 2 mm/h	Greater than Class C or unknown
	Resolution	0.01 mm/h	0.1 mm/h	1 mm/h	None or unknown
	Calibration Regime	Yearly	2 years	3 years	None or unknown
	Verification Regime	Yearly	Yearly	Yearly	None or unknown
	Maintenance Regime	Monthly	Every 6 months	Yearly	None or unknown
Sunshine duration	Uncertainty	120Wm^{-2}±20%	120Wm^{-2}±30%	120Wm^{-2}±50%	Greater than Class C or unknown
	Resolution	1 second	1 minute	1 minute	None or unknown
	Calibration Regime	Yearly	2 years	3 years	None or unknown

GN. NO. 598 (Contd.)

	ITEM	CLASS A	CLASS B	CLASS C	CLASS D
	Verification Regime	Yearly	Yearly	Yearly	None or unknown
	Maintenance Regime	Monthly	Every 6 months	Yearly	None or unknown
Visibility (Meteorological Optical Range)	Uncertainty	Greater of 10 % or 20 m	Greater of 20 % or 50 m	Greater of 30 % or 100 m	Greater than Class C or unknown
	Resolution	1 m	1 m	10 m	None or unknown
	Calibration Regime	Yearly	Yearly	Yearly	None or unknown
	Verification Regime	Yearly	Yearly	Yearly	None or unknown
	Maintenance Regime	Monthly or on alert or error	Yearly or on alert or error	Yearly or on alert or error	None or unknown

Signature…… Date ……

Official Seal

Dodoma,
23th June, 2021

LEONARD M. CHAMURIHO
Minister for Work and Transport