

TANZANIA BUREAU OF STANDARDS



PROFICIENCY TESTING SCHEME SCHEME DESCRIPTION

TBS

Proficiency Testing

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CHANGE HISTORY

Revision	Publication date	Summary of changes
Rev. 00	2025-09-01	Original version

Scheme Aims and Organization

The primary aim of the TBS Proficiency Testing Scheme (TPTS) is to enable laboratories performing the analysis of products to monitor their performance and compare it with that of their peers. TPTS also aims to provide information to participants on technical issues and methodologies relating to the chemical and physical examination of products.

The TPTS scheme year operates from July to June. Further information about TPTS, including test material availability, round dispatch dates and reporting deadlines, are available on the current TPTS application form.

Test Materials

Details of test materials available in TPTS are given in Appendix A. The test parameters are continually reviewed to ensure they meet the needs of current laboratory testing and regulatory requirements.

Test material batches are tested for homogeneity for at least one test parameter where deemed appropriate. Details of homogeneity tests performed and results are given in the TPTS Scheme Reports.

Some aspects of the scheme, such as test material production, homogeneity testing and stability assessment, can from time to time be subcontracted. When subcontracting occurs, it is placed with a competent subcontractor and TBS is responsible for this work. The planning of the scheme, the evaluation of performance and the authorization of the final report will never be subcontracted.

Statistical Analysis

Information on the statistics used in TPTS can be found in the General Protocol and in the Scheme Report. Methods for determining assigned values and the values for SDPA used for individual samples are given in Appendix A.

Methods

Methods are listed in application form. Please select the most appropriate method in the result form. If none of the methods are appropriate, then please report your method as 'Other' and record a brief description in the Comments Section in result form.

Results and Reports

TPTS results are returned through our email address, pt@tbs.go.tz, full instructions for which are provided by email.

TPTS reports will be send to all participants via email within 45 working days of round closure.

APPENDIX A - Description of abbreviations used

Assigned Value (AV)

The assigned value may be derived in the following ways:

- From the robust mean (median) of participant results (RMean). This is the median of participant results after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. Generally, the assigned value will be set using results from all methods, unless the measurement is considered method-dependent, in which case the assigned value will be set by method as illustrated in the report tables.

For some items, where there is a recognized reference method for that type of measurement, this may be used as the assigned value for a particular item i.e. it would be applied to results obtained by any method.

Traceability: Assigned values which are derived from the participant results, or a sub-set of the results are not traceable to an international measurement standard. The uncertainty of assigned values derived in this way is estimated from the participant results, according to ISO 13528.

- From a formulation value (Formulation). This denotes the use of an assigned value derived from sample preparation details, where known and exact quantities of analyte have been used to prepare the sample.

Traceability: Assigned values calculated from the formulation of the test sample are traceable, via an unbroken metrological traceability chain, to an international measurement standard. The measurement uncertainty of the assigned value is calculated using the contributions from each calibration in the traceability chain.

- From a qualitative formulation (Qual Form). This applies to qualitative tests where the assigned value is simply based on the presence/absence of the analyte in the test material.

Traceability: Assigned values calculated from the qualitative formulation of the test sample are traceable to a certified reference standard or a microbiological reference strain.

- From expert labs (Expert). The assigned value for the analyte is provided by an 'expert' laboratory.

Traceability: Assigned values provided by an 'expert' laboratory may be traceable to an international measurement standard, according to the laboratory and the method used. The uncertainty of measurement for an assigned value produced in this way will be provided by the laboratory undertaking the analysis. Details of traceability and the associated uncertainty will be provided in the report for the scheme/round.

Range

This indicates the concentration range at which the analyte may be present in the test material.

SDPA

SDPA represents the 'standard deviation for proficiency assessment' which is used to assess participant performance for the measurement of each item. This may be a fixed value (as stated),

a percentage (%) of the assigned value or based on the robust standard deviation of the participant measurement results, either across all methods or by method depending on whether the measurement made is method dependent (see assigned value).

Units

This indicates the units used for the assessment of data. These are the units in which participants should report their results. For some item in some schemes participants may have a choice of which units to report their results, however, the units stipulated in this scheme description are the default units to which any results reported using allowable alternative results will be converted to.

Decimal places - DP

This indicates the number of decimal places to which participants should report their measurement results.

Edible Salt – C01
Supplied as

Analysis of Edible Salt
250g of solid edible salt

Parameter	Method	Range	AV	SDPA	Units	DP
Calcium	EDTA titrimetric/AAS	All	Median	30	mg/kg	2
Magnesium	EDTA titrimetric/AAS	All	Median	30	mg/kg	2
Moisture at 105°C	Weight after drying in an oven at 105°C	0-8	Median	30	% m/m	2
Sulphate	Gravimetrically	0-20	Median	30	% m/m	2
Matter-insoluble in water	Gravimetrically	0-10	Median	30	% m/m	2
Chloride (expresses as NaCl)	Argentometric titration	60-99	Median	1	mg/l	2
Iodate content (Iodine)	Thiosulphate titration	10-70	Median	17	mg/kg	2

Fertilizer – C02
Supplied as

Analysis of Fertilizer
250g of solid Fertilizer

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture content	Vacuum desiccator	All	Median	30	% m/m	2
Total Nitrogen	Kjeldahl titration	All	Median	12	% m/m	3
Total Phosphorus	Gravimetrically	All	Median	15	% m/m	2
Heavy metals	Spectrometry technique	Max 1	Median	15	ppm	3
Potassium as K ₂ O	STPB	All	Median	15	% m/m	2
Nitrate-Nitrogen	Computational	All	Median	15	% m/m	2

Ammoniacal nitrogen	AOAC:955.04	All	Median	15	% m/m	2
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**Water – C03
Supplied as**

Analysis of Water
250ml of mineral water – SAMPLE A

Parameter	Method	Range	AV	SDPA	Units	DP
Iron	ICP OES	0-1	Median	10	ppm	2
Copper	ICP OES	0-1	Median	10	ppm	2
Nickel	ICP OES	0-1	Median	10	ppm	2
Lead	ICP OES	0-1	Median	10	ppm	2
Zinc	ICP OES	0-1	Median	10	ppm	2
Calcium	ICP OES	0-1	Median	10	ppm	2

**Water – C03
Supplied as**

Analysis of Water
500ml of Soft water – SAMPLE B

Parameter	Method	Range	AV	SDPA	Units	DP
pH	Electrode	4 - 9	Median	Robust SD	-	2
Total dissolved Solids	Gravimetric	All	Median	Robust SD	mg/l	2
Total Hardness	EDTA Titration	0 - 800	Median	Robust SD	mg/l	2
Total Alkalinity	Titration	0 - 800	Median	Robust SD	mg/l	2
Chloride	Titration	0 - 500	Median	Robust SD	mg/l	2
Nitrate	APHA 4500 NO3-F	All	Median	Robust SD	mg/l	2
Sulphate	Photometric	All	Median	Robust SD	mg/l	2
Electrical Conductivity	Potentiometric method	All	Median	Robust SD	µS/cm	2
Orthophosphate	APHA 4500 PO4-F	All	Median	Robust SD	mg/l	2
Turbidity	ISO 7027	0 - 15	Median	Robust SD	NTU	2

**Lubricant – C04
Supplied as**

Analysis of Lubricants
250ml of lubricant

Parameter	Method	Range	AV	SDPA	Units	DP
Viscosity index	STMD 7042	All	Median	Robust SD	-	2
Kinetic viscosity at 40°C	STMD 7042	All	Median	Robust SD	mm ² /s	2
Pour point	ASTM D 97	All	Median	Robust SD	°C	2
Sulphated ash	ASTM D 874	0 – 5	Median	Robust SD	%m/m	2
Total Oil content	Chromatographic technique	0 - 100	Median	Robust SD	%m/m	2
Total base number	ASTM D 2896	0 - 15	Median	Robust SD	Mg KOH/g	2
Kinetic viscosity at 100°C	STMD 7042	All	Median	Robust SD	mm ² /s	2

**Honey – F01
Supplied as**

Analysis of Honey
200 – 250g of honey

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture	EAS 36	14-22	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Hydroxymethylfurfural (HMF)	AOAC 980.23	1-40	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	mg/kg	1
Ash Content	EAS 36	0.1-1.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1

Acidity	EAS 36	1-50	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	Milliequivalent acids/kg	1
Water insoluble matter	EAS 36	0.1-1.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Reducing sugar content calculated as invert sugar	EAS 36	60-90	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Sucrose	EAS 36	1-10	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Fructose/ glucose ratio	EAS 36	1-2	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model		1
Lead	ICP-MS, ICP- OES, AAS	0.1-2.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	mg/kg	1
Zinc	ICP-MS, ICP- OES, AAS	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	mg/kg	1

Fruit Juice – F02
Supplied as

Analysis of Fruit Juice
 200 - 250ml of fruit juice

Parameter	Method	Range	AV	SDPA	Units	DP
pH	pH meter	3.0-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	-	1
Brix	refractometer	8.5- 12.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	°Bx	1
Alcohol content	Densitometer	0-0.5	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	%v	1
Acidity	Titration	0.1-0.7	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Ascorbic acid (Vitamin C)	HPLC, Titration	0.3-1.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Copper	ICP-MS, ICP- OES, AAS	1-5	Robust mean, Reference	Robust SD, Experts	mg/kg	1

			values, formulation	decision on fitness for purposes, Horwitz model		
Arsenic	ICP-MS, ICP-OES, AAS	0.1-0.2	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	mg/kg	1
Lead	ICP-MS, ICP-OES, AAS	0.1-0.3	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	mg/kg	1

**Energy drink – F03
Supplied as**

**Analysis of Energy drink
250 - 300ml of energy drink**

Parameter	Method	Range	AV	SDPA	Units	DP
pH	pH meter	2.0-4.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	-	1
Brix	refractometer	2-19	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	°Bx	1
Caffeine	HPLC	200-320	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for	mg/l	1

				purposes, Horwitz model		
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Maize grains – F04**Analysis of Maize Grains****Supplied as**

200g (for grading), 150g (for moisture content), 100g (for aflatoxin)

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture content	EAS 901, ISO 712	8-14	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Other grains	Physical analysis/ Grading	0.5-3.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Inorganic matters	Physical analysis/ Grading	0.1-0.75	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Broken kernels	Physical analysis/ Grading	0.1-2.5	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Pest damaged kernels	Physical analysis/ Grading	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Discoloured grains	Physical analysis/ Grading	0.1-2.5	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for	% m/m	1

				purposes, Horwitz model		
Toxic seeds	Physical analysis/ Grading	0.1-2.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Total defectives	Physical analysis/ Grading	1-14	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Aflatoxin B1	HPLC, LC MSMS, ELISA, AGRA STRIPS, etc	1-10	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1
Total aflatoxin		5-25	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1

Rice grains – F05
Supplied as

Analysis of Rice Grains

100g (for grading), 100g (for moisture content), 100g (for aflatoxin)

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture content	EAS 901, ISO 712	8-14	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Red and red streaked kernels	Physical analysis/ Grading	1-12	Robust mean, Reference	Robust SD, Experts decision on fitness for	% m/m	1

			values, formulation	purposes, Horwitz model		
Paddy/ husked rice	Physical analysis/ Grading	0.1-3.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Broken kernels	Physical analysis/ Grading	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Inorganic matters	Physical analysis/ Grading	0.1-3.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Aflatoxin B1	HPLC, LC MSMS, ELISA, AGRA STRIPS, etc	1-10	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1
Total aflatoxin		5-25	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1

Peanut butter – F06
Supplied as

Analysis of Peanut butter
200-260g of peanut butter

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture content	EAS 60	1.0-3.0	Robust mean, Reference	Robust SD, Experts decision on fitness for	% m/m	1

			values, formulation	purposes, Horwitz model		
Fat content	EAS 60	35-60	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Salt content as NaCl	EAS 60	0.1-3.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Acidity of extracted fat as oleic acid	EAS 60	0.1-4.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Total ash	EAS 60	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Aflatoxin B1	HPLC, LC MSMS, ELISA, AGRA STRIPS, etc	1-10	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1
Total aflatoxin		5-25	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	µg/kg	1

**Spices – F07
Supplied as**

**Analysis of Spices
100-200g of spices**

Parameter	Method	Range	AV	SDPA	Units	DP
Moisture content	ISO 939	8.0-14.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Nonvolatile ether extract	EAS 60	0.1-6.5	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Acid insoluble ash	EAS 60	0.1-3.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Total ash	EAS 60	1.0-7.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% m/m	1
Lead	EAS 60	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% mg/kg	1
Arsenic	EAS 60	0.1-0.5	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% mg/kg	1
Cadmium	EAS 60	0.1-5.0	Robust mean, Reference	Robust SD, Experts decision	% mg/kg	1

			values, formulation	on fitness for purposes, Horwitz model		
Iron	EAS 60	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% mg/kg	1
Copper	EAS 60	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% mg/kg	1
Zinc	EAS 60	0.1-5.0	Robust mean, Reference values, formulation	Robust SD, Experts decision on fitness for purposes, Horwitz model	% mg/kg	1

Electric Cables – E01
Supplied as

Conductor Resistance Measurement
5m of electric cable

Parameter	Method	Range	AV	SDPA	Units	DP
Conductor Resistance	IEC 63294: 2021	0.5 – 16 mm ²	Median	Robust SD	Ohm/km	2
Insulation Thickness	IEC 60811-201	0.5 – 16 mm ²	Median	Robust SD	mm	2

Solar Panels – E02
Supplied as

Maximum power output Measurement
one piece of solar panel

Parameter	Method	Range	AV	SDPA	Units	DP
Maximum output power	IEC 60809	5 – 300 W	Median	Robust SD	W	1

Roofing sheet – ME01
Supplied as

Analysis of Roofing Sheet
3 pieces of 300 x 300 mm of Roofing sheet

Parameter	Method	Range	AV	SDPA	Units	DP
Tensile strength	ISO 6892-1	ALL	Median	Robust SD	MPa	1
Top color + primer	TZS 1477	ALL	Median	Robust SD	mm	3
Bottom color	TZS 1477	ALL	Median	Robust SD	Mm	3
Base metal thickness	TZS 353	ALL	Median	Robust SD	Mm	2
Bottom substrate	TZS 353	ALL	Median	Robust SD	Mm	3
Top substrate	TZS 353	ALL	Median	Robust SD	Mm	3

Steel bar – ME02
Supplied as

Analysis of Steel Bar
3 pieces of 500 mm of Steel Bars

Parameter	Method	Range	AV	SDPA	Units	DP
Mass Per unit Length	ISO 6892-1	ALL	Median	Robust SD	Kg/m	2
Chemical composition	ASTM E 415-21	ALL	Median	Robust SD	%	2
Upper yield stress	ISO 6892-1	ALL	Median	Robust SD	MPa	1
Tensile strength	ISO 6892-1	ALL	Median	Robust SD	MPa	1
Elongation at Fracture	ISO 6892-1	ALL	Median	Robust SD	%	1

Fish – MI01
Supplied as

Analysis of vibrio species in Fish
25g of Fish

Parameter	Method	Range	AV	SDPA	Reporting Units	DP
Vibrio cholerae	ALL	0 to 1,00	Qual Form	NA	Detected/Not detected 25g	NA

Water – MI02
Supplied as

Analysis of microorganisms
 50ml of portable Water

Parameter	Method	Range	AV	SDPA	Units	DP
Escherichia coli	ALL	0 to 30	Median	log10 0.25	cfu/10ml	0
Total Coliforms	ALL	0 to 30	Median	log10 0.25	cfu/10ml	0
Enterococcus	ALL	0 to 40	Median	log10 0.25	cfu/10ml	0
Total plate count at 22°C	ALL	0 to 50	Median	log10 0.25	cfu/ml	0
Total plate count at 37°C	ALL	0 to 50	Median	log10 0.25	cfu/ml	0

Ceramic Tiles – BC01

Analysis of ceramic tiles

Supplied as

3 pieces of (150 – 300) mm * (200 – 300) mm piece of ceramic tiles

Parameter	Method	Range	AV	SDPA	Units	DP
Thickness	ISO 10545-2	All	Median	Robust SD	mm	1
Water absorption	ISO 10545-3	All	Median	Robust SD	%	1
Breaking strength	ISO 10545-4	All	Median	Robust SD	N	1
Modulus of rupture	ISO 10545-4	all	Median	Robust SD	N/mm ²	1

Gypsum Boards – BC02

Analysis of Gypsum boards

Supplied as

3 pieces of 300 mm * 400 mm piece of gypsum board

Parameter	Method	Range	AV	SDPA	Units	DP
Thickness	EN 520	All	Median	Robust SD	mm	1
Transverse breaking load	EN 520	All	Median	Robust SD	N	1

Longitudinal breaking load	EN 520	all	Median	Robust SD	N	1
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HDPE Plastic pipes – BC03**Analysis of HDPE plastic pipes****Supplied as**

3 pieces of DN25 – 63 mm * 500 mm long piece of HDPE plastic pipe

Parameter	Method	Range	AV	SDPA	Units	DP
Outside diameter	ISO 3126	All	Median	Robust SD	mm	1
Wall thickness	ISO 3126	All	Median	Robust SD	mm	1
Hydrostatic strength at 20 °C	ISO 1167	All	Fail/No failure	NA	Swell/Burst or sustained at bars	2
Longitudinal reversion	ISO 2505	all	Median	Robust SD	%	1