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**Establishment and operation of assaying and hallmarking Centres —
General requirements**

Draft for stakeholders' comments only

TANZANIA BUREAU OF STANDARDS

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Foreword

This Tanzania Standard was published under the authority of the Board of Director of Tanzania Bureau of Standards.

Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established by the Standards Act Cap. 130.

Tanzania Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. The Technical Committees work under the supervision of Divisional (sectoral) Committees. The Standards are developed in accordance with the Guide and Procedure for Development of Tanzania Standards and TZS 0, *Guide for presentation of Tanzania Standards*.

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This Tanzania Standard was developed under the supervision of the Mining and Minerals Divisional Standards Committee [MMDC]. The Technical Committee responsible for the standard is *MMDC 7 Jewellery, gemstones and Precious Metals*.

Establishment and operation of Assaying and Hallmarking Centres — General Requirements

1 Scope

This Tanzania Standard specifies the general requirements for the establishment, competence, structural operation, and quality management of assaying and hallmarking centres handling precious metal articles.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 2855 / ISO 9202, Jewellery and precious metals — Fineness of precious metal alloys

TZS 2463 / ISO 11426, Determination of gold in gold jewellery alloys — Cupellation method (fire assay)

TZS 2989 / ISO 13756, Determination of silver in silver jewellery alloys — Volumetric (potentiometric) method using potassium bromide

TZS 2455 / ISO/IEC 17043, Conformity assessment — General requirements for proficiency testing

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

ISO 17034, General requirements for the competence of reference material producers

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9202 and the following apply. ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online Browsing Platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Artefact

Any finished, semi-finished, hallmarked, or unhallmarked item, article, object, or component manufactured wholly or partly from precious metals or precious metal alloys, including jewellery, coins, medals, utensils, or decorative objects.

3.2 Article

A single unit, piece, or item of precious metal or precious metal alloy presented individually or as part of a set for assaying or hallmarking.

3.3 Assay

A quantitative chemical or physical analytical test performed to accurately determine the proportion of precious metal (fineness) present in an alloy, expressed in parts per thousand (‰).

3.4 Base Metal

Any non-precious metal or alloy (such as copper, zinc, nickel, or brass) incorporated into, or coated by, a precious metal artefact.

3.5 Fineness

The ratio of the mass of a specific precious metal present in an alloy relative to the total mass of the alloy, expressed in parts per thousand (‰) by weight.

3.6 Jeweller

A person or legal entity engaged in the business of manufacturing, procuring for manufacture, or selling precious metal articles.

3.7 Registered Jeweller

A Jeweller who has been granted a formal certificate of registration by the relevant authority to manufacture, procure for sale, or sell precious metal articles only after they have been duly hallmarked.

3.8 Hallmarking Centre

An independent testing laboratory, assay office, or facility officially recognized, accredited, or approved by the National Standards Body or designated authority to determine the fineness of precious metal alloys and apply the official mark of conformity.

3.9 Marking / Hallmarking

The physical or digital process of applying an official emblem, fineness mark, centre identification mark, or sponsor mark onto an artefact using mechanical impact punches or high-precision laser engravers.

3.10 Solder

A joining alloy used to unite parts of precious metal artefacts, designed to melt at a lower temperature than the parts being joined, and meeting the fineness requirements specified by relevant standards.

3.11 Hallmark

official emblem, fineness mark, centre identification mark, or sponsor mark onto an artefact using mechanical impact punches or high-precision laser engravers

4.0 General Requirements

4.1 Impartiality

4.1.1 The centre's activities shall be undertaken impartially, structured, and managed to safeguard operational objectivity. Work allocation shall strictly ensure impartiality; for instance, management personnel (such as quality managers), receipt staff, and delivery personnel shall not engage in fire assay activities.

4.1.2 The centre's management shall demonstrate commitment to impartiality through:

- a) Objective personnel selection and recruitment processes;
- b) Explicit integration of impartiality commitments within the quality policy; and
- c) Robust governance and operational management.

4.1.3 The centre shall hold full responsibility for the impartiality of its activities and shall not permit commercial, financial, or other pressures to compromise its objectivity.

4.1.4 The centre shall identify risks to its impartiality on an ongoing basis. This assessment shall cover risks arising from its activities, operational relationships, or the relationships of its personnel, including:

- a) Ownership, governance, and management structures;
- b) Shared resources, financial ties, and contractual agreements; and
- c) Marketing, branding, sales commissions, or referral inducements for acquiring new customers.

4.1.5 Where a risk to impartiality is identified, the centre shall demonstrate how it effectively eliminates or minimizes such risk.

4.2 Confidentiality

4.2.1 The centre shall be held legally accountable, through enforceable commitments, for managing all information obtained or generated during its performance of centre activities.

- a) The centre shall inform the customer in advance of any information it intends to place in the public domain.
- b) All other information shall be considered proprietary and kept strictly confidential, except:
 - i) Information made publicly available by the customer; or
 - ii) Disclosures mutually agreed upon between the centre and the customer (e.g., for complaint resolution).

4.2.2 When the centre is legally mandated or contractually authorized to release confidential information, the customer or individual concerned shall be notified of the disclosure, unless prohibited by law.

4.2.3 Customer information obtained from third-party sources (such as complainants or regulators) shall remain strictly confidential between the provider and the centre.

- a) The identity and details provided by the source shall remain confidential to the centre.
- b) These details shall not be disclosed to the customer unless consented to by the provider or regulator.

4.2.4 All personnel acting on the centre's behalf shall maintain strict confidentiality regarding all operational information, except as required by law. This obligation applies directly to:

- a) Internal staff and committee members;
- b) Subcontractors and personnel from external bodies;
- c) Calibration and maintenance service providers; and
- d) Consultants, external auditors conducting internal quality audits, or appointed representatives.

5 Structural Requirements

5.1 The centre shall be a legal entity, or a defined part of a legal entity, that is legally responsible for its centre activities.

5.2 The centre shall identify management that has overall responsibility for the centre.

5.3 The centre shall define and document the scope of recognition for which it conforms with this document. The centre shall only claim conformity with this document for the defined scope of recognition.

5.4 The centre's activities shall be carried out in such a way as to meet the requirements of this document, the centre's customers, regulatory authorities, and organizations providing recognition.

- a) This shall include centre activities performed at all permanent or temporary locations covered under the scope of recognition.
- b) The centre shall not perform hallmarking activities at any other facility except those explicitly covered under its scope of recognition.

5.5 The centre shall:

- a) Define the organization and management structure of the centre, its place in any parent organization, and the relationships between management, technical operations, and support services;
- b) Specify the responsibility, authority, and interrelationship of all personnel who manage, perform, or verify work affecting the results of the centre's activities; and
- c) Document its procedures to the extent necessary to ensure the consistent application of its centre activities and the validity of the results.

5.6 The centre shall have personnel who, irrespective of other responsibilities, have the authority and resources needed to carry out their duties, including:

- a) Implementation, maintenance, and improvement of the management system;
- b) Identification of deviations from the management system or from the procedures for performing centre activities;
- c) Initiation of actions to prevent or minimize such deviations;
- d) Reporting to centre management on the performance of the management system and any need for improvement; and
- e) Ensuring the effectiveness of the centre's activities.

5.7 Centre management shall ensure that:

- a) Communication takes place regarding the effectiveness of the management system and the importance of meeting customers' and statutory requirements; and
- b) The integrity of the management system is maintained when changes to the management system are planned and implemented

6. Resource Requirements

6.1 General

The centre shall have available the personnel, facilities, equipment, systems, and support services necessary to manage and perform its centre activities.

6.2 Personnel

6.2.1 All personnel of the centre, whether internal or external, that could influence the centre activities shall act impartially, be competent, and work in accordance with the centre's management system.

6.2.2 The centre shall document the competence requirements for each function influencing the results of centre activities, including requirements for education, qualification, training, technical knowledge, skills, and experience.

6.2.3 The centre shall ensure that personnel have the competence to perform the centre activities for which they are responsible and to evaluate the significance of deviations.

6.2.4 The management of the centre shall communicate to personnel their duties, responsibilities, and authorities.

6.2.5 The centre shall have procedure(s) and retain records for:

- a) Determining competence requirements;
- b) Selection of personnel;
- c) Training of personnel;
- d) Supervision of personnel;
- e) Authorization of personnel; and
- f) Monitoring competence of personnel.

6.2.6 The centre shall authorize personnel to perform specific centre activities, including but not limited to:

- a) Verification of methods;
- b) Analysis of results, including statements of conformity or opinions and interpretations; and
- c) Reporting, review, and authorization of results.

6.3 Facilities and Environmental Conditions

6.3.1 The facilities and environmental conditions shall be suitable for the centre's activities and shall not adversely affect the validity of results. Influences that can adversely affect results include, but are not limited to: contamination, dust, electromagnetic disturbances, radiation, humidity, electrical supply, temperature, and vibration.

6.3.2 The requirements for facilities and environmental conditions necessary for the performance of the centre's activities shall be documented.

6.3.3 The centre shall monitor, control, and record environmental conditions in accordance with relevant specifications, methods, or procedures, or where they influence the validity of the results.

6.3.4 Measures to control facilities shall be implemented, monitored, and periodically reviewed, and shall include, but not be limited to:

- a) Control of access to and use of areas affecting centre activities;
- b) Prevention of contamination, interference, or adverse influences on centre activities;
- c) Effective separation between areas with incompatible centre activities; and
- d) Installation and maintenance of surveillance cameras, ensuring all activities of the centre are captured day and night for security and process verification purposes.

6.4 Equipment

6.4.1 The centre shall have access to equipment required for the correct performance of centre activities and that can influence the results. An indicative list of equipment and reagents is provided in **Annex A** and **Annex B**.

6.4.2 The centre shall not use equipment outside its permanent control or outside the locations covered under its scope of recognition.

6.4.3 The centre shall have a documented procedure for the handling, transport, storage, use, and planned maintenance of equipment to ensure proper functioning and to prevent contamination or deterioration.

6.4.4 The centre shall verify that equipment conforms to specified requirements according to relevant testing method standards before being placed into or returned to service.

6.4.5 The equipment used for measurement shall be capable of achieving the measurement accuracy and/or measurement uncertainty required to provide a valid result.

6.4.6 Measuring equipment shall be calibrated when:

- a) The measurement accuracy or measurement uncertainty affects the validity of the reported results; and

- b) Calibration of the equipment is required to establish the metrological traceability of the reported results.

(NOTE — Types of equipment having an effect on the validity of reported results include: direct measuring equipment such as micro-analytical balances, thermometers, hydrometers, digital temperature controllers for furnace systems, and XRF analyzers; and check/proof metals used for empirical corrections.)

6.4.7 The centre shall establish a calibration programme, which shall be reviewed and adjusted as necessary to maintain confidence in the calibration status. Guidelines for verification/calibration of equipment and availability of certified reference materials are provided in **Annex C**.

6.4.8 All equipment requiring calibration or having a defined period of validity shall be labeled, coded, or otherwise identified to allow users to readily identify the status of calibration or period of validity.

6.4.9 Equipment that has been subjected to overloading or mishandling, gives questionable results, or has been shown to be defective or outside specified requirements shall be taken out of service. It shall be isolated or clearly labeled as out of service until verified to perform correctly. The centre shall examine the effect of the defect or deviation and initiate nonconforming work procedures (see 7.10).

6.4.10 When intermediate checks are necessary to maintain confidence in equipment performance, these checks shall be carried out according to a defined procedure and records retained.

6.4.11 When calibration and reference material data include reference values or correction factors, the centre shall ensure these values and factors are updated and implemented as appropriate.

6.4.12 The centre shall take practicable measures to prevent unintended adjustments of equipment that could invalidate results.

6.4.13 Records shall be retained for equipment that can influence centre activities, including:

- a) Identity of equipment, including software and firmware versions;
- b) Manufacturer's name, type identification, and serial number;
- c) Evidence of verification of conformity;
- d) Current location;
- e) Calibration dates, results, adjustments, acceptance criteria, and next due date;
- f) Documentation of reference materials, period of validity, and results;
- g) Maintenance plan and maintenance carried out to date; and
- h) Details of any damage, malfunction, modification, or repair.

6.5 Metrological Traceability

6.5.1 The centre shall establish and maintain metrological traceability of its measurement results by means of a documented, unbroken chain of calibrations, each contributing to the measurement uncertainty, linking them to an appropriate reference.

6.5.2 The centre shall ensure that measurement results are traceable to the International System of Units (SI) through:

- a) Calibration provided by a competent ISO/IEC 17025 accredited calibration laboratory having the requisite scope of accreditation; and
- b) Certified values of certified reference materials provided by a competent producer accredited to ISO 17034 or an ISO/IEC 17025 accredited centre.

6.6 Externally Provided Products and Services

6.6.1 The centre shall ensure that only suitable externally provided products (such as cupels, distilled water, reagents/acids, proof gold, silver, copper, lead, nickel, palladium, XRF standards, and reference weights) and

services (such as calibration services and annual maintenance contracts) affecting centre activities are used, when such products and services:

- a) Are intended for incorporation into the centre's own activities; and
- b) Are used to support the operation of the centre.

6.6.2 The centre shall have a procedure and retain records for:

- a) Defining, reviewing, and approving the centre's requirements for externally provided products and services;
- b) Defining criteria for evaluation, selection, monitoring of performance, and re-evaluation of external providers;
- c) Ensuring that externally provided products and services conform to established requirements before use; and
- d) Taking any actions arising from evaluations, performance monitoring, and re-evaluations.

6.6.3 The centre shall communicate its requirements to external providers for:

- a) Products and services to be provided;
- b) Acceptance criteria;
- c) Competence and required qualifications of personnel; and
- d) Activities that the centre or its customer intends to perform at the external provider's premises.

7 Process Requirements

7.1 Review of Requests, Tenders and Contracts

7.1.1 The centre shall have a procedure for the review of requests, tenders, and contracts. The procedure shall ensure that:

- a) Requirements are adequately defined, documented, and understood; and
- b) The centre has the capability and resources to meet the requirements.

7.1.2 Differences between the request/tender and the contract shall be resolved before centre activities commence. Each contract shall be acceptable to both the centre and the customer. Deviations requested by the customer shall not impact the integrity of the centre or the validity of results.

7.1.3 The customer shall be informed of any deviation from the contract.

7.1.4 If a contract is amended after work has commenced, the contract review shall be repeated and amendments communicated to all affected personnel.

7.1.5 The centre shall cooperate with customers or their representatives to clarify requests and monitor centre performance regarding the work performed.

7.1.6 Records of reviews, significant changes, and pertinent discussions with customers regarding requirements or results shall be retained.

7.2 Selection and Verification of Methods

7.2.1 The centre shall use test methods described in the latest valid version of relevant standards and maintain documented procedures/work instructions for:

- a) Receiving;
- b) Preliminary examination for homogeneity check and segregation;
- c) Sampling;
- d) Assaying;
- e) Laser marking;

- f) Verification of marking and damages incurred;
- g) Packaging and return of cornets (if any); and
- h) Final dispatch/delivery.

7.2.2 All methods, procedures, standards, manuals, and reference data shall be kept up to date and readily available to personnel.

7.2.3 The centre shall use the latest valid version of a method unless it is not appropriate or possible. Supplemental details shall be added when necessary to ensure consistent application.

7.2.4 The centre shall verify it can properly perform methods before introducing them. Verification records shall be retained. If a method is revised by the issuing body, verification shall be repeated as necessary.

7.3 Sampling

Sampling shall be performed according to the following criteria:

- a) **Sampling Plans:** Conducted per Annex D (sampling plan) and Annex E (guidelines). Detailed site-specific plans may be prepared if required.
- b) **Tools & Instructions:** Performed using specialized tools to obtain representative samples according to relevant standard test methods and documented centre instructions.
- c) **Record Keeping:** Retain records detailing the sampling method, sample identification, linkage to identified lots/sub-lots, personnel involved, and exact date/time.
- d) **Traceability:** Samples shall maintain clear traceability between the lot and the test result.
- e) **Availability:** Sampling plans and methods shall be available at the sampling site.

7.4 Handling of Test or Calibration Items

7.4.1 The centre shall maintain a documented procedure covering the transportation, receipt, handling, protection, storage, retention, and disposal/return of test items, including measures to protect item integrity and precautions against contamination, loss, or damage.

7.4.2 Unambiguous identification shall be maintained while items are under the centre's responsibility, supported by physical and documentary safeguards to prevent confusion and handle item sub-divisions.

7.4.3 Security & Storage: Secure all jewellery articles/artefacts during working hours and overnight in a safe.

7.4.4 Insurance: Maintain insurance coverage for jewellery/artefacts under process/stock reflecting total valuation.

7.4.5 Turnaround Time: Complete the hallmarking process within 48 hours (any deviation requires recorded written justification). Return cornets alongside hallmarked or rejected jewellery articles.

7.5 Packaging

7.5.1 Maintain identification and protection of all articles and cornets for received consignments during and after hallmarking.

7.5.2 Record any deviations from specified conditions upon receipt. Monitor, record, and maintain conditions when item suitability is doubtful or fails receipt conditions.

7.6 Technical Records

7.6.1 Technical records shall be maintained for each activity and include:

- a) Results, test reports, and sufficient operational data;

- b) Information identifying factors affecting measurement results and associated measurement uncertainty;
- c) Details enabling activity repetition under conditions close to the original;
- d) Dates and identities of personnel responsible for receipt, sampling, assaying, hallmarking, and delivery; and
- e) Original observations, calculations, and data captured at the time of activity, linked directly to the specific task.

7.6.2 Retention Period: Retain all records (including licensee hallmarking records) for a minimum of 5 years.

7.6.3 Tracking Amendments: Amendments must be traceable to previous versions or original observations. Retain both original and amended files/data, recording the alteration date, specific aspects altered, and responsible personnel.

7.7 Evaluation of Measurement Uncertainty

7.7.1 Identify all contributions to measurement uncertainty and account for significant factors using valid analytical methods.

7.7.2 Evaluate measurement uncertainty for testing. Where rigorous evaluation is precluded by the method, make estimations based on theoretical principles or practical experience.

7.8 Ensuring the Validity of Results

7.8.1 Internal Monitoring Procedure: The centre shall monitor result validity using statistical techniques where practicable. Planned monitoring includes:

- a) Use of reference materials or quality control materials;
- b) Functional checks of measuring and testing equipment;
- c) Check/working standards with control charts (where applicable);
- d) Intermediate checks on measuring equipment;
- e) Replicate tests using same or different methods;
- f) Retesting of retained items; and
- g) Systematic review of reported results.

7.8.2 External Comparison & Proficiency Testing (PT):

7.8.2.1 Gold Alloys PT: Participate annually in PT for at least one gold alloy grade per TZS 2855 / ISO 9202. Cover grades near 916.0‰, 750.0‰, and 585.0‰ on a rotational basis. For white gold or fineness above 990.0‰, rotate PT participation across these grades within a 3-year cycle.

7.8.2.2 Silver Alloys PT: Participate annually in PT for one silver alloy grade on a rotational basis, choosing fineness as close as possible to TZS 2855 / ISO 9202 specifications.

(NOTE — If a specific grade is outside recognition scope or PT providers are unavailable, test an alternative close grade or conduct Inter-Laboratory Comparisons per 7.8.2.3.)

7.8.2.3 Inter-Laboratory Comparisons (ILC): May initiate or participate in ILCs annually. Mandatory if a PT provider for a specific grade is unavailable.

7.8.3 Control & Data Utilization: Analyze monitoring data to control and improve centre activities. Take immediate corrective actions if analysis falls outside predefined acceptance criteria.

7.9 Reporting of Results

7.9.1 General Requirements: Review and authorize results prior to release. Provide accurate, clear, unambiguous, and objective test reports. Include agreed customer information, interpretation requirements, and method specifications. Retain all issued reports as technical records.

7.9.2 Minimum Report Contents:

7.9.2.1 Reports shall include:

- a) Title (e.g., "Test Report");
- b) Name and address of the centre;
- c) Activity location (including temporary/mobile facilities);
- d) Unique identification (ensuring complete page traceability and clear end-mark);
- e) Customer name and contact information;
- f) Test method identification;
- g) Description, unambiguous identification, and condition of item;
- h) Receipt date and sampling date (where critical to validity);
- i) Date(s) of centre performance activities;
- j) Report issue date;
- k) Reference to sampling plan and method used (where relevant);
- l) Statement that results relate only to items tested;
- m) Measurement units (where appropriate);
- n) Method additions, deviations, or exclusions;
- o) Authorization identity; and
- p) Clear marking for results originating from external providers.

(NOTE — Include a statement prohibiting partial reproduction without written approval.)

7.9.2.2 Customer Data & Disclaimers: The centre is responsible for all report data, except customer-supplied information. Customer-supplied data must be clearly identified with disclaimers if it impacts result validity. State clearly when the centre was not responsible for sampling ("*Results apply to the sample as received*").

7.9.3 Sampling-Specific Reporting: Include sampling date, item/material identification, sampling location (diagrams/photos), sampling plan references, environmental conditions, and uncertainty evaluation data when responsible for sampling.

7.9.4 Laser Marking Specifications:

7.9.4.1 Perform marking via laser according to documented procedures per TZS 2855 / ISO 9202 ensuring legibility and durability.

7.9.4.2 Conform gold and silver marking to *Annex F* and *Annex G*, respectively.

7.9.4.3 Permissible Hallmark Sizes (Height):

Table 1 — Sizes (Height) of Hallmark

S/No	Gold (mm)	Silver (mm)
i.	1.5	4.0
ii.	1.0	2.0
iii.	0.75	1.5
iv.	0.50	1.0

NOTE: In case of gold articles below 2 gms marking size (height) of 0.3 mm is also permitted.

7.9.4.4 Apply markings to all easily removable or replaceable detachable parts.

7.9.4.5 Mark only permitted articles per *Annex F* and *Annex G*.

7.9.4.6 Maintain continuous vigilance during laser operation to prevent unauthorized use.

7.9.4.7 Retain complete marking records for all customers.

7.9.5 Amendments to Reports:

7.9.5.1 Identify changes and state reasons for alteration when amending reports.

7.9.5.2 Issue post-release amendments as supplementary documents stating: *"Amendment to Report, Serial Number [X]"*.

7.9.5.3 Reference original reports uniquely when issuing complete replacements.

7.10 Complaints

7.10.1 Maintain a documented process to receive, evaluate, and decide on complaints. Make the complaint handling process available to interested parties upon request. Confirm whether a complaint relates to centre activities upon receipt. The centre retains full responsibility for all decisions throughout the process.

7.10.2 Process Elements: The complaint handling system shall include:

- a) Receiving, validating, investigating, and deciding on response actions;
- b) Tracking and recording complaints and resolutions; and
- c) Ensuring appropriate resolution execution.

7.10.3 Gather and verify all necessary information to validate complaints.

7.10.4 Provide progress reports and acknowledgments to complainants whenever possible.

7.10.5 Ensure resolution communications are reviewed and approved by personnel independent of the subject activity.

7.10.6 Provide formal notice of complaint closure to the complainant where possible.

7.11 Nonconforming Work

7.11.1 Control Procedure: Implement a procedure when centre activities or results fail to conform to procedures or customer requirements. The procedure shall ensure:

- a) Defined responsibilities and authorities for nonconforming work management;
- b) Risk-based actions (halting work, withholding reports);
- c) Significance evaluation and impact analysis on previous results;
- d) Decisions regarding nonconforming work acceptability;
- e) Prompt customer notification and work recall (if necessary); and
- f) Defined authorization for work resumption.

7.11.2 Retain records of nonconforming work and actions taken under 7.11.1 (b) to (f).

7.11.3 Implement corrective actions if evaluation indicates nonconforming work could recur or operation conformity is doubtful.

7.12 Control of Data and Information Management

7.12.1 Ensure full access to necessary data and operational information.

7.12.2 Information System Validation: Validate information management systems prior to introduction. Authorize, document, and validate software modifications and system changes before implementation.

(NOTE — Commercial off-the-shelf software within its designed operating range is considered sufficiently validated.)

7.12.3 System Controls: Information management systems shall be protected against unauthorized access, safeguarded against tampering, operated within specified environments, maintained to safeguard data integrity, and record system failures alongside corrective actions.

7.12.4 Off-Site Management: Ensure external system providers comply with all applicable requirements of this document.

7.12.5 Maintain accessible user instructions, manuals, and reference data for personnel.

7.12.6 Check calculations and data transfers systematically

8 Management System Requirements

8.1 Options

8.1.1 General

The centre shall establish, document, implement and maintain a management system that is capable of supporting and demonstrating the consistent achievement of the requirements of this document and assuring the quality of the centre results. In addition to meeting the requirements of Clauses 4 to 7, the centre shall implement a management system in accordance with 8.1.2.

8.1.2 As a minimum, the management system of the centre shall address the following:

- a) Management system documentation (see 8.2);
- b) Control of management system documents (see 8.3);
- c) Control of records (see 8.4);
- d) Actions to address risks and opportunities (see 8.5);
- e) Improvement (see 8.6);
- f) Corrective actions (see 8.7);
- g) Internal audits (see 8.8); and
- h) Management reviews (see 8.9).

8.2 Management System Documentation

8.2.1 Centre management shall establish, document and maintain policies and objectives for the fulfillment of the purposes of this document and shall ensure that the policies and objectives are acknowledged and implemented at all levels of the centre organization.

8.2.2 The policies and objectives shall address the competence, impartiality and consistent operation of the centre.

8.2.3 Centre management shall provide evidence of commitment to the development and implementation of the management system and to continually improving its effectiveness.

8.2.4 All documentation, processes, systems, records, related to the fulfilment of the requirements of this document shall be included in, referenced from, or linked to the management system.

8.2.5 All personnel involved in centre activities shall have access to the parts of the management system documentation and related information that are applicable to their responsibilities.

8.3 Control of Management System Documents

8.3.1 The centre shall control the documents (internal and external) that relate to the fulfillment of this document.

(NOTE — In this context, "documents" can be policy statements, procedures, specifications, manufacturer's instructions, calibration tables, charts, text books, posters, notices, memoranda, drawings, plans, etc. These can be on various media, such as hard copy or digital.)

8.3.2 The centre shall ensure that:

- a) Documents are approved for adequacy prior to issue by authorized personnel;
- b) Documents are periodically reviewed, and updated as necessary;
- c) Changes and the current revision status of documents are identified;
- d) Relevant versions of applicable documents are available at points of use and, where necessary, their distribution is controlled;
- e) Documents are uniquely identified; and
- f) The unintended use of obsolete documents is prevented, and suitable identification is applied to them if they are retained for any purpose.

8.4 Control of Records

8.4.1 The centre shall establish and retain legible records either in hard form or soft form or in combination of both, to demonstrate fulfillment of the requirements in this document.

8.4.2 The centre shall implement the controls needed for the identification, storage, protection, back-up, archive, retrieval, retention time, and disposal of its records.

- a) The centre shall retain records for a period consistent with its regulatory obligations.
- b) Access to these records shall be consistent with the confidentiality commitments, and records shall be readily available.
- c) All records including that for jewellery/artefacts hallmarked for each customer shall be retained for a period of minimum five (5) years.

(NOTE — Additional requirements regarding technical records are given in 7.6.)

8.5 Actions to Address Risks and Opportunities

8.5.1 The centre shall consider the risks and opportunities associated with the centre activities in order to:

- a) Give assurance that the management system achieves its intended results;
- b) Enhance opportunities to achieve the purpose and objectives of the centre;
- c) Prevent, or reduce, undesired impacts and potential failures in the centre activities; and
- d) Achieve improvement.

8.5.2 The centre shall plan:

- a) Actions to address these risks and opportunities;
- b) How to integrate and implement these actions into its management system; and evaluate the effectiveness of these actions.

(NOTE — although this document specifies that the centre plans actions to address risks, there is no requirement for formal methods for risk management or a documented risk management process. Centre can decide whether or not to develop a more extensive risk management methodology than is required by this document, for example through the application of other guidance or standards.)

8.5.3 Actions taken to address risks and opportunities shall be proportional to the potential impact on the validity of centre results.

(NOTES:

1 Options to address risks can include identifying and avoiding threats, taking risk in order to pursue an opportunity, eliminating the risk source, changing the likelihood or consequences, sharing the risk, or retaining risk by informed decision.

2 Opportunities can lead to expanding the scope of the centre activities, addressing new customers, using new technology and other possibilities to address customer needs.)

8.6 Improvement

8.6.1 The centre shall identify and select opportunities for improvement and implement any necessary actions.

(NOTE — Opportunities for improvement can be identified through the review of the operational procedures, the use of the policies, overall objectives, audit results, corrective actions, management review, suggestions from personnel, risk assessment, analysis of data, and proficiency testing results.)

8.6.2 The centre shall seek feedback, both positive and negative, from its customers. The feedback shall be analyzed and used to improve the management system, centre activities and customer service.

(NOTE — Examples of the types of feedback include customer satisfaction surveys, communication records and review of reports with customers.)

8.7 Corrective Actions

8.7.1 When a non-conformity occurs, the centre shall:

a) React to the nonconformity and, as applicable:

- i) Take action to control and correct it; and
- iii) Address the consequences.

b) Evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:

- i) Reviewing and analysing the nonconformity;
 - ii) Determining the causes of the nonconformity; and
 - iii) Determining if similar nonconformities exist, or could potentially occur.
- c) Implement any action needed;
 - d) Review the effectiveness of any corrective action taken;
 - e) Update risks and opportunities determined during planning, if necessary; and
 - f) Make changes to the management system, if necessary.

8.7.2 Corrective actions shall be appropriate to the effects of the nonconformities encountered.

8.7.3 The centre shall retain records as evidence of:

- a) The nature of the nonconformities, cause(s) and any subsequent actions taken; and
- b) The results of any corrective action.

8.8 Internal Audits

8.8.1 The centre shall conduct internal audits at planned intervals to provide information on whether the management system:

- a) Conforms to:
- j) The centre's own requirements for its management system, including the centre activities;
- a) ii) The requirements of this document; and
- b) Is effectively implemented and maintained.

8.8.2 The centre shall:

- a) Plan, establish, implement and maintain an audit programme including the frequency, methods, responsibilities, planning requirements and reporting, which shall take into consideration the importance of the centre activities concerned, changes affecting the centre, and the results of previous audits;
- b) Define the audit criteria and scope for each audit;
- c) Ensure that the results of the audits are reported to relevant management;
- d) Implement appropriate correction and corrective actions without undue delay; and
- e) Retain records as evidence of the implementation of the audit programme and the audit results.

(NOTE — ISO 19011 provides guidance for internal audits.)

8.9 Management Reviews

8.9.1 The centre management shall review its management system at planned intervals, in order to ensure its continuing suitability, adequacy and effectiveness, including the stated policies and objectives related to the fulfillment of this document.

8.9.2 The inputs to management review shall be recorded and shall include information related to the following:

- a) Changes in internal and external issues that are relevant to the centre;
- b) Fulfillment of objectives;
- c) Suitability of policies and procedures;
- d) Status of actions from previous management reviews;
- e) Outcome of recent internal audits;
- f) Corrective actions;
- g) Assessments by external bodies;
- h) Changes in the volume and type of the work or in the range of centre activities;
- i) Customer and personnel feedback;
- j) Complaints;
- k) Effectiveness of any implemented improvements;
- l) Adequacy of resources;
- m) Results of risk identification;
- n) Outcomes of the assurance of the validity of results; and
- o) Other relevant factors, such as monitoring activities and training.

8.9.3 The outputs from the management review shall record all decisions and actions related to at least:

- a) The effectiveness of the management system and its processes;
- b) Improvement of the centre activities related to the fulfillment of the requirements of this document;
- c) Provision of required resources; and
- d) Any need for change.

ANNEX A

(Normative)

List of Equipment and Reagents for Gold Assaying and Hallmarking by Cupellation Method

A.1 List of Equipment

- a) **Cupellation furnace** (temperature range up to 1 150 °C, accuracy ± 1 °C)
- b) **Annealing furnace** (temperature range up to 900 °C)
- c) **Micro-weighing balance** (installed on an anti-vibration platform in a dust-free room; sensitivity 0.002 mg for $\leq 990\%$ fineness and 0.001 mg for $> 990\%$ fineness)
- d) **Laser marking machine** (capable of high-precision engraving)
- e) **XRF machine** (capable of detecting Cd, Pb, Ir, Ru, Os, and other platinum group elements)
- f) **Air conditioner** (environmental control)
- g) **Standby Generator** (uninterrupted power supply for cupellation furnace)

- h) **Balling pliers**
- j) **Cupels**
- k) **Cleaning brushes**
- m) **Hammer (400 g) and anvil** or power press
- n) **Scraping tools** (micro-drills, chisels, scrappers)
- p) **Magnifying glass** (10× magnification)
- q) **Emery paper** (various fine grades)
- r) **Aluminium / Stainless steel trays**
- s) **Thermometer** (range up to 110 °C)
- t) **Hydrometer** (1.0 SG to 2.0 SG)
- u) **Parting tray with Pt, Pt/Ir, Pt/Rh, or unglazed silica thimbles** (bottom base of parting tray shall not touch container base)
- v) **Graphite crucibles** (pure graphite for melting scrapings)
- w) **Hot plate**
- y) **Jeweller's rolling mill**
- z) **Scorification dishes** (50 mm diameter, required for white gold testing)
- aa) **Tongs and forceps**
- bb) **Anti-vibration table/platform**
- cc) **Numbering device / number punches**
- dd) **Fume-hood with acid scrubber system**
- ee) **Melting furnace for scrapings** (range up to 1 050 °C)
- ff) **Micrometer** (least count 0.01 mm)
- gg) **Reference gold samples** (585‰, 750‰, 833‰, 916‰, 958‰, and 995‰ fineness depending on scope)

A.2 List of Reagents

(See TZS 2463 / ISO 11426 for specifications of reagents, chemicals, and consumables.)

ANNEX B

(Normative)

List of Equipment and Reagents for Silver Assaying and Hallmarking by Gravimetric and Potentiometric Methods

B.1 List of Equipment

- a) **XRF machine** (capable of detecting Cd and Pb)
- b) **Laser marking machine** (capable of marking small and large articles)
- c) **Weighing balance** (installed in a dust-free room on an anti-vibration platform; sensitivity 0.01 mg)
- d) **Air conditioner** (dust control and temperature stabilization)
- e) **Hot plate** (suitable size for silver assaying, up to 250 °C)
- f) **Electric drying oven** (up to 200 °C)
- g) **Hammer** (1 kg)
- h) **Rolling mill** (capable of rolling silver buttons into thin strips)
- j) **Standby Generator** (uninterrupted power supply)
- k) **Scraping tools** (micro-drills, scrappers, scissors, chisels)
- m) **Magnifying glass** (10× magnification)
- n) **Burette / dropping pipette**
- p) **Metallic trays**
- q) **Watch glass** (75 mm diameter)
- r) **Glass funnels**
- s) **Glass beakers** (250 mL)
- t) **Tongs and forceps**
- u) **Desiccator**
- v) **Filter vacuum pump**
- w) **Sintered glass crucibles** (No. 3, porosity G3 and G4)
- y) **Anti-vibration table**
- z) **Distilled water plant**
- aa) **Glass rods**
- bb) **Wash bottles with fine jet**
- cc) **Reference silver samples** (fineness depending on scope of recognition)

B.2 List of Apparatus for Potentiometric Method

a) **Automatic titrator** (capable of delivering increments of 0.05 mL at the equivalence point)

b) **Titration beakers**

B.3 List of Reagents

(See TZS 2989 / ISO 13756 for details of chemical reagents and consumables.)

ANNEX C

(Normative)

(Clause 6.4.7)

GUIDELINES FOR VERIFICATION/CALIBRATION OF EQUIPMENTS AND AVAILABILITY OF CERTIFIED REFERENCE MATERIALS (CRMs)

C.1 Traceability: Equipment and reference materials shall be calibrated/certified with metrological traceability to National or International Standards, preferably via ISO/IEC 17025 accredited laboratories or ISO 17034 reference material producers.

C.2 Measurement Uncertainty: Calibration certificates shall explicitly state observed values along with the associated measurement uncertainty.

Table C.1 — Calibration and Verification Schedule

S/No.	Equipment/Material	Minimum Calibration / Verification Requirement	Recommended Minimum Frequency
i)	Micro balance	Initial calibration with traceability calibrated weights for regular internal checks	1 Year
ii)	Cupellation and annealing furnace temperature indicators	Calibration with traceability	1 Year
iii)	XRF machine	Initial calibration by supplier and regular internal checks with certified reference standards of gold/silver of different fineness	—
iv)	Standard weights for internal checks of micro balance	Calibration with traceability	2 Years
v)	Gold/silver standards of different fineness (as per requirement) for XRF machine verification	a) Calibration provided by a competent ISO 17025 accredited calibration centre, having requisite scope of accreditation; and b) Certified values of certified reference materials-provided by a competent producer — ISO 17034 accredited Reference Material Producer or ISO 17025 accredited Centre	Minimum 2 number standards of different fineness covering usage range

vi)	Proof gold/silver/lead/copper — Material for assaying as per TZS 2989:/ ISO 13756 or TZS 2463/ISO 11426	a) Calibration provided by a competent ISO 17025 accredited calibration Centre, having requisite scope of accreditation; and b) Certified values of certified reference materials-provided by a competent producer — ISO 17034 accredited Reference Material Producer or ISO 17025 accredited Centre	Sufficient quantity to be available
vii)	Distilled water or water of equivalent purity free from halides and suspended impurities	Test certificate from supplier or testing of sample from a lab or self testing arrangement	—
viii)	Nitric acid free from halides and suspended impurities	Test certificate from supplier or testing of sample from a lab or self testing arrangement	—

ANNEX D

(Normative)

Sampling Plan for Assaying and Hallmarking

(Follow steps in downward order based on consignment evaluation)

Step 1: Receipt and physical verification of consignment offered by a registered Jeweller.

Step 2: 100% XRF screening of each article in the lot for declared fineness, homogeneity, and absence of prohibited elements.

Step 3: Evaluate XRF results:

Option A: Fineness matches declaration **AND** lot is homogeneous → Proceed to **Step 4**.

Option B: Fineness differs from declaration **BUT** lot is homogeneous → Refer back to Jeweller for confirmation/acceptance.

Option C: Fineness differs **AND** lot is heterogeneous → Reject consignment and return to Jeweller.

Step 4: Classify lot structure:

Uniform lot (similar items): Proceed to sampling by Scrapping/Drilling or Cutting/Melting (see Annex E).

Non-uniform lot (different items): Divide into homogeneous sub-lots of similar articles, then proceed to sampling.

Step 5: Perform sampling per *Annex E*:

If observed fineness is accepted by Jeweller → Proceed to **Step 6**.

If rejected by Jeweller → Return consignment.

Step 6: For cutting/melting samples: melt under controlled reducing atmosphere to produce a homogeneous composite button.

Step 7: Draw duplicate assay samples according to TZS 2463 / ISO 11426 (gold) or TZS 2989 / ISO 13756 (silver).

Step 8: Carry out quantitative assaying.

ANNEX E

(Normative)

(Clause 7.3)

GUIDELINES ON SAMPLING

E1 PRELIMINARY EXAMINATION

E.1.1 Visual inspection for existing marks, solder quality, unauthorized base-metal fillings, or surface contamination (lacquer, polish residue).

E.1.2 100% XRF screening to check lot homogeneity and detect prohibited elements.

E2 SAMPLING

E2.1 The following methods of sampling may be used:

E.2.1 Cutting / Melting: Preferred method for highest accuracy.

E.2.2 Scraping / Drilling: Used when cutting is non-practicable. Hollow items must be sampled from both inner and outer surfaces.

E.2.3 Cleaning: Samples contaminated with oil, grease, or polishing media must be solvent-degreased prior to weighing/assaying.

E.3 Minimum Number of Samples and Assays

E.3.1 Consignment and Lot

E.3.1.1 A consignment shall be a collection of articles or artefacts submitted at one time of the same declared fineness from which samples are drawn and assayed to determine compliance with acceptance criteria. A consignment may consist of one or more distinct lots.

E.3.1.2 A lot shall be defined as a specific batch of articles within a consignment having the same declared fineness, item category, and design or manufacturing type.

E.3.2 Sampling and Assay Frequency: The minimum number of assays required, based on the total lot size and the chosen sampling method, shall conform to the sampling plan specified in **Table E.1**.

E.3.3 Where a selected sample item consists of multiple detachable or distinct structural parts, each individual component shall be sampled separately wherever technically practicable.

E.3.4 Where articles are suspected of containing unauthorized base-metal cores, solder concentrations, or non-precious fillings, the Assay Centre shall verify internal integrity by drilling, cutting, or immersing the sample in an appropriate chemical reagent.

Table E.1 — Lot Size and Minimum Sampling Requirements (Refer to E.3.2)

S/No	Item	Lot Size	Sampling by Scrapping/Drilling, Min Percent	Sampling by Cutting/ Melting, Min	Minimum Assays
i)	Jewellery	1 to 40	10	1	1
		41 to 280	10	One additional for every 60 pieces	One additional assay for every 60 pieces
		281 and above	10	One additional for every 100 pieces	One additional assay for every 100 pieces
ii)	Artefacts	1 to 500	—	One sample for every 100 pieces	One for every 100 pieces
		501 and above	—	One addition after every 250 pieces	One addition after every 250 pieces

NOTE — In case of mixed lot of up to 10 pieces having same fineness but different type/design, the sampling for testing may be permitted as follows:

- In case of sampling by scrapping/drilling, samples for testing shall be taken from a minimum of 20 percent of the pieces in the lot, subject to a minimum of two pieces;
- In the case of sampling by cutting/melting, sample for testing has to be taken from at least one piece; and
- In these types of lots, a minimum one assay has to be done.

ANNEX F

(Normative)

(Clause 7.9.4.2)

REQUIREMENTS FOR MARKING OF GOLD JEWELLERY, ARTEFACTS, AND BULLION

F1 MARKING

F1.1 Manner of Hallmarking

Hallmarking shall be done in either of the following manners:

- a) gold, gold alloys, jewellery, and artefacts shall be hallmarked exclusively by TBS-recognized Assaying and Hallmarking Centre.
- b) Hallmarked gold jewellery and artefacts shall carry the following mandatory markings:
 - i) TBS Standard Mark;
 - ii) Purity in karat or fineness (e.g., 22K or 916, 18K or 750);
 - iii) Assay Centre's identification mark or number; and
 - iv) Jeweller's or sponsor's registered identification mark or number.
- c) Hallmarked gold bullion and gold coins shall carry the following mandatory markings:
 - i) TBS Standard Mark;

- ii) Fineness;
- iii) Name or registered identification of the manufacturer or refiner; and
- iv) Unique serial number.

NOTE — In the case of small coins or medals, serial numbers may be marked on the tamper-evident outer packaging.

F1.1.1 Regulatory Compliance

The use of the Hallmark is governed by the Standards Act and the Rules and Regulations made thereunder. The conditions and procedures under which a licence for the use of the Standard Mark may be granted to jewellers or jewellery manufacturers shall be obtained directly from the Tanzania Bureau of Standards (TBS).

F1.1.2 Legibility, Dimensions, and Durability

- a) All markings shall be legible, indelible, and durable. Marks shall be clearly legible under **10× magnification** without causing damage or distortion to the article.
- b) The standard height of the hallmark components shall be **0.75 mm** (or **0.50 mm**). For small or lightweight gold jewellery or artefacts weighing less than **2 g**, a reduced mark height of **0.30 mm** is permissible.

F1.1.3 Removable or Separable Parts

Marking shall be applied to all principal parts of an article that can be easily removed or replaced, where technically feasible.

F1.2 Exclusions from Hallmarking

Gold jewellery or artefacts on which hallmarking shall not be applied are as follows:

- a) Any gold jewellery or artefact which has not been tested and assayed by a TBS-recognized Assaying and Hallmarking Centre;
- b) Any gold jewellery or artefact which fails to comply with the declared fineness and caratage;
- c) Any gold jewellery or artefact which is not solid or which is made with a hollow centre and then filled with base metal, cement, lac, or other foreign substance thereby giving the article a false or added weight or strength, unless the net weight of gold is explicitly declared by the jeweller and marked on the article by the Centre; and
- d) Gold jewellery or artefacts on which it is physically impossible to stamp, engrave, or mark due to surface design, extreme thinness, or structural delicacy.

F1.2.1 Small Articles

Gold jewellery or artefacts of weight less than **2 g** may be hallmarked using the reduced mark height specified in F1.1.2 b).

ANNEX G

(Normative)

REQUIREMENTS FOR MARKING OF SILVER JEWELLERY, ARTEFACTS, AND BULLION

G1 MARKING

G1.1 Manner of Hallmarking

Hallmarking shall be done in either of the following manners:

- a) silver, silver alloys, jewellery, and artefacts shall be hallmarked exclusively by TBS-recognized Assaying and Hallmarking Centre.
- b) Hallmarked silver jewellery and artefacts shall carry the following mandatory markings:
 - i) TBS Standard Mark accompanied by the word **SILVER**;
 - ii) Purity grade or fineness (e.g., 999, 970, 925, 800);
 - iii) Assay Centre's identification mark or number; and
 - iv) Unique Alphanumeric Identification (issued by the Centre) or registered jeweller's/sponsor's mark.
- c) Hallmarked silver bullion and silver coins shall carry the following mandatory markings:
 - i) TBS Standard Mark accompanied by the word **SILVER**;
 - ii) Fineness;
 - iii) Name or registered identification of the manufacturer or refiner; and
 - iv) Unique serial number.

NOTE — In the case of small coins or medals, serial numbers may be marked on the tamper-evident outer packaging.

G1.1.1 Regulatory Compliance

The use of the Hallmark is governed by the Standards Act and the Rules and Regulations made thereunder. The conditions and procedures under which a licence for the use of the Standard Mark may be granted to Jewellers or jewellery manufacturers shall be obtained directly from the Tanzania Bureau of Standards (TBS).

G1.1.2 Legibility, Dimensions, and Durability

- a) All markings shall be legible, indelible, and durable. Marks shall be clearly legible under **10× magnification** without causing damage or distortion to the article.
- b) The standard height of hallmark components on silver jewellery and artefacts shall be **0.50 mm**.

G1.1.3 Removable or Separable Parts

Marking shall be applied to all principal parts of a silver article that can be easily removed or replaced, where technically feasible.

G1.2 Exclusions from Hallmarking

Silver jewellery or artefacts on which hallmarking shall not be applied are as follows:

- a) Any silver jewellery or artefact which has not been tested and assayed by a TBS-recognized Assaying and Hallmarking Centre;
- b) Any silver jewellery or artefact which fails to comply with the declared grade and fineness;
- c) Any silver jewellery or artefact which is not solid or which is made with a hollow centre and then filled with base metal, cement, lac, or other foreign substance thereby giving the article a false or added weight or strength, unless the net weight of silver is explicitly declared by the Jeweller and marked on the article by the Centre; and
- d) Silver jewellery or artefacts on which it is physically impossible to stamp, engrave, or mark due to surface design, extreme thinness, or structural delicacy.

(Informative)

Guidelines on qualifications and competency of personnel for assaying and hallmarking Centre

H1 GENERAL

Assaying and hallmarking centre's should ensure that all personnel involved in sampling, testing, assaying, quality control, and hallmarking operations possess the necessary education, training, technical knowledge, and practical experience to perform their duties competently.

H2 KEY PERSONNEL AND QUALIFICATION GUIDELINES

H2.1 Technical Manager / Head of Laboratory

- a) **Role:** Overall supervision of testing operations, quality control, implementation of ISO/IEC 17025 requirements, and authorization of assay results.
- b) **Education:** Degree or Advanced Diploma in Metallurgy, Analytical Chemistry, Chemical Engineering, Materials Science, or equivalent from a recognized institution.
- c) **Experience:** Minimum of **3 to 5 years** of practical experience in precious metals testing, laboratory management, or quality assurance.

H2.2 Assayer / Metallurgical Analyst

- a) **Role:** Execution of destructing and non-destructive assaying procedures (e.g., Fire Assay/Cupellation, Titration, ICP-OES).
- b) **Education:** Diploma or Degree in Analytical Chemistry, Metallurgy, Laboratory Technology, or related physical sciences.
- c) **Experience:** Minimum of **2 years** hands-on experience in precious metals chemical analysis and micro-weighing techniques.

H2.3 XRF Spectrometry Operator

- a) **Role:** Performing non-destructive preliminary screening of precious metal alloys and checking for prohibited elements using X-ray Fluorescence (XRF) equipment.
- b) **Education:** Certificate or Diploma in Technical/Physical Sciences or Laboratory Technology.
- c) **Training & Experience:** Specific training on XRF operation, radiation safety, calibration protocols, and a minimum of **1 year** experience in non-destructive testing.

H2.4 Hallmarking / Marking Operator

- a) **Role:** Application of official hallmarks on approved articles using press punch, hydraulic, or laser engraving systems.
- b) **Education:** Certificate in Mechanical/Technical Training, Jewelry Manufacturing, or secondary education with specialized vocational training.
- c) **Experience:** Minimum of **1 year** practical experience in precision engraving, punch marking, or delicate metal craftsmanship.

H2.5 Sampler / Receiving Officer

- a) **Role:** Receipt of consignments, preliminary visual inspection, weight verification, scraping, drilling, or cutting samples according to standard sampling protocols.
- b) **Education:** Certificate or Diploma in Science, Laboratory Techniques, or General Engineering.
- c) **Experience:** Minimum of **6 months to 1 year** experience in sample preparation and chain-of-custody documentation.

H3 Training and competency evaluation

H3.1 Initial and continuous training

Centre should maintain a documented training program covering:

- a) Fire assay precision and uncertainty measurement;
- b) Radiation safety and equipment calibration;
- c) Handling and custody of high-value bullion and jewellery; and
- d) Quality management system protocols.

H3.2 Physical and Visual Requirements

Personnel responsible for visual inspection, sampling, and fine hallmarking should undergo regular visual acuity and color-vision examinations (e.g., capable of clear vision under **10× magnification**).

H3.3 Competency Monitoring

Competence should be evaluated annually through:

- a) Participation in internal quality checks and blind sample testing;
- b) Results from Proficiency Testing (PT) schemes; and
- c) Periodic performance appraisals by the Technical Manager

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