World Health Organization

20, AVENUE APPIA – CH-1211 GENEVA 27 – SWITZERLAND – TEL CENTRAL +41 22 791 2111 – FAX CENTRAL +41 22 791 3111 – WWW.WHO.INT

WHO Prequalification Unit (PQT) - Inspection Services Team (INS)
WHO PUBLIC INSPECTION REPORT
of the Quality Control laboratory
WHOPIR

Part 1	**General information**		
Laboratory Details			
Name of the Laboratory	National Institute of Drug Quality Control (NIDQC)		
Address of inspected Laboratory	48 Hai Ba Trung Street Hoan Kiem District Hanoi Vietnam		
GPS Coordinates	21.02507° N 105.85055° E		
Dates of inspection	19-22 November 2024		
Type of inspection	Routine		
Introduction			
Brief description of testing activities	*Type of analysis*	*Finished products*	*Active pharmaceutical ingredients*
	Physical/ Chemical analysis	pH, density, refractometry, viscosity, loss on drying, water content, disintegration, dissolution, uniformity of dosage units (mass, content), friability, tablet hardness, particulate matter test.	pH, density, refractometry, specific optical rotation, viscosity, loss on drying, melting point, water content, heavy metals, sulfated ash, acid insoluble ash, acid value, iodine value, ester value, acetyl value, peroxide value, saponification value.
	Identification	HPLC (UV-Vis, DAD, fluorescence, light scattering detection, refractive index, electrochemical),	HPLC (UV-Vis, DAD, fluorescence, light scattering detection, refractive index,

		LC/MS/MS, GC (FID, ECD), GC/MS, ICP/MS, TLC, HPTLC, UV-VIS spectrophotometry, IR, AAS	electrochemical), LC/MS/MS, GC (FID, ECD), GC/MS, ICP/MS, TLC, HPTLC, UV-VIS spectrophotometry, IR, FTIR, AAS, chemical reaction
	Assay, impurities and related substances	HPLC (UV-Vis, DAD, fluorescence, light scattering detection, refractive index, and electrochemical), LC/MS/MS, GC (FID, ECD), GC/MS, ICP/MS, TLC, HPTLC, UV-VIS spectrophotometry, AAS, fluorimetry, volumetric titrations, amperometry, potentiometry, nitrogen assay	HPLC (UV-Vis, DAD, fluorescence, light scattering detection, refractive index, electrochemical), LC/MS/MS, GC (FID, ECD), GC/MS, ICP/MS, TLC, HPTLC, UV-VIS spectrophotometry, AAS, fluorimetry, volumetric titrations, amperometry, potentiometry, nitrogen assay, thermal analysis (DSC)
	Microbiological tests	Sterility test, microbial limit test, test for pyrogens, bacterial endotoxins test (LAL), microbial assay	Sterility test, microbial limit test, test for pyrogens, bacterial endotoxins test (LAL), microbial assay
	Stability studies	WHO conditions	WHO conditions
General information	The National Institute of Drug Quality Control (NIDQC) was established in 1957 under Decision No. 845-BYT/ND, issued on 29th July 1957 by the Minister of Health. The institute's leadership comprises a Director and Deputy Directors. NIDQC operates 17 units, including 6 functional departments, 9 laboratories, and 2 centers, each managed by 1 to 3 leaders. In Vietnam, the government, through the Ministry of Health, leads the pharmaceutical regulatory system, overseeing regulatory bodies, inspectorates, and quality control institutes. Health departments and facilities at the provincial, district, and commune levels are responsible for implementing policies to ensure the quality, safety, and distribution of medicines within the regulated market.		

	The Laboratory's activities include quality analysis and monitoring of drugs, pharmaceutical ingredients, cosmetics, packaging, medical devices, and chemicals; scientific research and technological development, bioequivalence and bioavailability studies, network supervision, training specialized staff, and equipment calibration. Customers include the Drug Administration of Vietnam (DAV), provincial QC centers, manufacturers, and UN organizations like WHO and UNDP. Two interpreters assisted the inspectors during the documentation review, as well as during discussions and interviews. Additionally, translation support was provided by colleagues from the WHO Country Office.
History	NIDQC was first inspected by the Drug Administration of Vietnam (DAV) in 2003, with subsequent inspections occurring every three years, the most recent of which took place in 2020. The laboratory has also maintained ISO/IEC 17025 accreditation since 2001, undergoing annual inspections by the Bureau of Accreditation of Vietnam (BoA), with the latest inspection conducted in 2023. Additionally, NIDQC was initially WHO prequalified in 2008, with inspections conducted every three years, the most recent concluded in 2020. Evidence of these inspections was included in the LIF, dated February 2024.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	Organization and management including: - Structure - QMS - Documentation and records - Computerized systems Planning and strategic management including: - Service providers and suppliers - Performance management - Quality Risk management Resources including: - Personnel - Premises - Equipment qualification - Reagents, RS Technical activities including - Handling of samples - Validation, verification, and transfer of analytical methods - Testing, evaluation, and reporting of results & OOS Safety

Restrictions	Endotoxin testing was conducted in a separate building located at a considerable distance from the inspected facility; therefore, only the analytical sheets of one sample were reviewed for verification purposes.
Out of Scope	Stability studies and the processes related to the research and evaluation of bioequivalence and bioavailability of medicines were not assessed.
Abbreviations	**Meaning**
ALCOA	Attributable, legible, contemporaneous, original and accurate
API	Active pharmaceutical ingredient
CoA	Certificate of analysis
CAPA	Corrective action & Preventive action
DQ	Design qualification
FPP	Finished pharmaceutical product
FTIR	Fourier transform infrared spectrophotometry or spectrophotometer
GC	Gas chromatography or Gas chromatography equipment
GMP	Good manufacturing practices
HPLC	High-performance liquid chromatography (or high-performance liquid chromatography equipment)
IQ	Installation qualification
IR	Infrared spectrophotometry
KF	Karl Fischer titration
LIF	Laboratory information file
LIMS	Laboratory information management system
MB	Microbiology
MR	Management review
N	Normality
NC	Non-conformity
NCA	National control authority
NCL	National control laboratory
NRA	National regulatory agency
OOS	Out-of-specifications test result
OQ	Operation qualification
Ph.Eur.	European Pharmacopoeia
PM	Preventive maintenance
PQ	Performance qualification
PQR	Product quality review
PQS	Pharmaceutical quality system
PT	Proficiency testing
PTS	Proficiency testing scheme
PW	Purified water
QA	Quality assurance
QC	Quality control

QCL	Quality control laboratory
QM	Quality manual
QMS	Quality management system
QRM	Quality risk management
RA	Risk assessment
RCA	Root cause analysis
SOP	Standard operating procedure
TLC	Thin layer chromatography
TOC	Total organic carbon
URS	User requirements specifications
USP	United Stated Pharmacopoeia
UV	Ultraviolet-visible spectrophotometry or spectrophotometer
VMP	Validation master plan
VS	Volumetric solution

Part 2	**Summary of reviews during the inspection**

1. Organization and management

1.1. Structural and general requirements

A presentation outlining the Laboratory's structure and activities was provided during the opening meeting.

The Laboratory was legally authorized to operate and held accountable for its test results, certificates of analysis, and other activities it performs.

The Director was responsible for establishing, implementing, and maintaining the quality system and data governance system by ensuring the availability of appropriate policies, training, and technical systems.

Organizational charts outlined the laboratory's organizational and management structure, its position within the parent organization, and the relationships between management, technical operations, support services, and the quality management system.

Precise responsibility allocation, including the designation of specific units for particular types of medicines, was ensured as necessary.

Trained substitutes or deputies were appointed for key management and specialized scientific personnel. A designated quality manager was responsible for ensuring QMS compliance and had direct access to the highest level of management.

Observations related to structural and general requirements have been addressed in the respective CAPA plan.

1.2. Quality management system

The quality manager was responsible for ensuring the establishment, implementation, and maintenance of the QMS.

Before implementation, the Quality Manual was effectively communicated to and understood by the appropriate personnel. All system elements were documented in paper format.

The QM included:

- A quality policy statement outlining service standards, a commitment to the effectiveness of the QMS, compliance with guidelines, and access to management system documentation.
- The organizational structure.
- Operational and functional activities related to quality.
- Documentation structure within the QMS.
- Internal quality management procedures and standard operating procedures.
- Policies covering audits, corrective/preventive actions, complaints, management reviews, analytical procedures, atypical results, data governance, reference substances, proficiency testing, risk and opportunity management, and the evaluation of service providers and suppliers.
- Standard operating procedures for administrative and technical operations, including personnel management, document control, change control, corrective/preventive actions, internal audits, complaints, procurement, equipment qualification and maintenance, sampling, testing and validation procedures, result validity, nonconforming work, cleaning, environmental and storage monitoring, and disposal.

The Laboratory had not yet conducted a gap analysis or implemented the revised WHO guidelines on good practices for pharmaceutical quality control laboratories (TRS 1052, Annex 4). The inspection was conducted in alignment with these guidelines to support the Laboratory in initiating the implementation of the specified requirements into their practices.

Observations related to the QMS have been addressed in the respective CAPA plan.

1.3. Control of documentation

Control of the quality documentation was specified in the Control of Document procedure.

Procedures for controlling and reviewing documents ensured that:

- Each document had a unique identifier, version number, and implementation date.
- Authorized standard operating procedures were readily accessible.
- Documents were regularly reviewed and updated as necessary.
- Invalid documents were promptly replaced with authorized, revised versions.

- Revised documents included references to previous versions, which were retained in archives for traceability.
- Staff received training on new and revised procedures.
- Documentation, including records, was retained for a minimum of five years in accordance with national legislation.

Staff were informed of new and revised procedures as they came into effect. The quality management system ensured that:
- Revised documents were prepared, reviewed, and approved at the same level as the original.
- Staff acknowledged their awareness of changes and implementation dates through signatures or other approved mechanisms.

Observations related to the Control of documentation have been addressed in the respective CAPA plan.

1.4. Change Control

The Laboratory implemented an SOP for Change Control, which was reviewed and discussed during the inspection with the respective documentation.

Observations related to the Change control have been adequately addressed in the respective CAPA plan.

1.5. Control of Records

The applicable SOPs outlined the processes for identification, collection, indexing, retrieval, storage, backup, access, maintenance, and disposal of all quality and technical or scientific records.

All original observations, including calculations, derived data, calibration, validation, and verification records, as well as final results, were retained for a minimum of five years, in compliance with national legislation or contractual agreements.

Records were maintained on analytical worksheets with consecutively numbered pages, referencing relevant appendices. Tests performed across different departments required each department to assemble and number the analytical sheets for their respective activities. The compilation was subsequently verified by the department responsible for planning and general affairs.

Procedures to control the issuance of blank paper templates for data recording were in place.

Records for each test contained sufficient information for repetition or recalculation, including the identification of the personnel involved.

The laboratory did not deploy a digital LIMS.

Samples tested in the laboratory were retained for specific periods based on product type and applicable regulations or contractual agreements.

Quality, technical, or scientific records were legible, readily retrievable, and appropriately stored. Original records were maintained under confidential conditions, with access restricted to authorized personnel.

Quality management records included reports from internal and external audits, inspections, management reviews, risk assessments, complaints, and their investigations, as well as corrective and preventive actions.

Observations related to the Control of records have been addressed in the respective CAPA plan.

1.6. Control of Data / Computerized Systems

The Laboratory used several commercial off-the-shelf software systems within their designed application range, and a list of computerized systems was provided.

Computerized systems were protected from unauthorized access and should be operated in compliance with the provider or laboratory's specifications as outlined in the applicable SOP. Data integrity was maintained through regular monthly data restoration, with evidence of this activity recorded on a designated form, which was presented, reviewed, and discussed.

Observations related to the Computerized systems have been addressed in the respective CAPA plan.

1.7. Corrective and preventive actions

Nonconforming work or doubts regarding compliance with the policies and procedures of the Quality Management System were managed in accordance with SOP for Control of Nonconforming Work.

The laboratory:

- Had identified responsible personnel for necessary actions and had established timelines for implementation.
- Reviewed the effectiveness of corrective actions implemented.
- Prepared and retained reports documenting deviations, root causes, subsequent actions, and the results of corrective actions.

Potential situations leading to deviations or nonconformities were generally addressed, resulting in the implementation of preventive actions to mitigate risks.

Observations related to the CAPA plan have been addressed in the respective CAPA plan.

1.8. Internal audits

The internal audits were conducted as specified in the Internal Audits procedure:

- The internal audit program was conducted annually, covering all elements of the Management System, including testing and calibration activities.
- The interval between internal audits could be reduced in response to customer complaints, non-conforming work, requests from customers, or as a supplementary assessment following corrective action implementation.
- The program was also used in cases of non-conformities related to testing/calibration results provided to customers or issues identified during proficiency testing.
- The Technical and Quality Management Unit was responsible for establishing, implementing, and maintaining the audit program as directed by the Board of Directors.
- Quality Management Unit also created the audit reports and monitored and verified corrective actions conducted by the respective units.

It was recommended to use ISO 19011 as a reference for organizing internal audits. This standard provides guidance on aligning terminology, methodology, and practices to ensure consistency and compliance with established auditing principles.

The observation related to Internal audits has been addressed in the respective CAPA plan.

1.9. Complaints

The Review and Resolve of Complaints procedure was established to manage complaints effectively.

The procedure outlined the process for receiving, verifying, investigating, and tracking complaints, as well as determining necessary actions. While assurance was provided that appropriate actions were taken, only the respective unit received the complaint description. Investigation outcomes were communicated if feasible and upon request.

Where possible, a staff member not directly involved in the matter was assigned to handle the complaint. The process included the collection, verification, and recording of all relevant information, and the complainant was informed of the outcome if their identity was available.

The Laboratory has regularly collected all complaints received and recorded them in a related Complaint logbook. The number of registered complaints varied from year to year.

Observations related to the Complaints have been addressed in the respective CAPA plan.

1.10. Management Review

Laboratory management reviews were conducted at planned intervals, at least annually, to monitor the effectiveness of the management system, as outlined in SOP for Management Reviews.

Outcomes of management reviews were documented, and records included, to some extent, the following information:

- Status of actions from previous reviews
- Results of internal and external audits or inspections, including any required follow-up actions
- Adequacy of resources
- Training programs
- Effectiveness of implemented improvements
- Results of external quality control activities

Observations related to the Management Review have been addressed in the respective CAPA plan.

1.11. Improvement

The Laboratory had an annual plan for internal proficiency testing schemes (PTS) and conducted tests following the plan. The technical managers were responsible for organizing these proficiency tests and evaluating their outcomes.

The observation related to Improvement has been addressed in the respective CAPA plan.

2. Planning and strategic management

2.1. Externally-provided services and supplies

The process for selecting and purchasing products and services was defined in the respective SOP. This included measurement materials, chemical and biological reference substances, equipment, reagents, and services such as calibration, qualification, sampling, testing, maintenance, proficiency testing schemes, and assessment and auditing.

The Laboratory maintained records of the review and approval of its requirements for externally provided products and services. Additionally, it documented the criteria for evaluating, selecting, monitoring, and re-evaluating the performance of external providers.

The Laboratory communicated its requirements to external providers, specifying the products and services to be delivered along with their acceptance criteria and competence requirements. A master list of suitable external suppliers for essential products and services was maintained by the laboratory.

The observation related to Service providers has been addressed in the respective CAPA plan.

2.2. Review of tenders and contracts

The Laboratory did not outsource any activities to external laboratories. However, it maintained an agreement with a company to conduct quality assurance testing of pharmaceutical products, including anti-malarial pharmaceuticals, based on a specified product list. A long-term agreement was established between the Laboratory, as the service provider, and the respective company to formalize this collaboration.

2.3. Performance Management

This topic is discussed in other sections of this report.

2.4. Quality Risk Management

The Laboratory implemented a formal risk management approach as outlined in the applicable SOP, which covered the identification, assessment, treatment, prioritization, monitoring, and review of risks.

Observations related to Risk Management have been addressed in the respective CAPA plan.

2.5. Crisis Management

There were no dedicated procedures for crisis management. However, SOP for data control and information management included a section on disaster management and data recovery (Section 6.4.3). This section primarily addressed data storage on servers. Data recovery exercises were conducted periodically, every six months, to verify system functionality. A copy of the SOP was provided for review.

Observations related to Crisis management have been addressed in the respective CAPA plan.

2.6. Communication management

This topic is discussed in other sections of this report

3. Resources

3.1. Personnel

In general, personnel had the necessary education, training, technical knowledge, and experience for their assigned technical activities. Competence requirements for each function were documented, and the laboratory adhered to procedures and criteria for selecting and assessing personnel competence according to the QMS.

Managerial and technical staff were generally provided with the necessary authority and resources to perform their duties.

Training activities were conducted in alignment with the applicable SOP, which outlined the processes for training new staff, including the development of training plans, monitoring progress, and evaluating the effectiveness of training programs.

Staff undergoing training were supervised, and their performance was assessed upon completion, with all assessments documented. The laboratory director or a designated person authorized personnel to perform specific laboratory activities, ensuring that only qualified and trained individuals were permitted to carry out these tasks.

Procedures and criteria for the continuous assessment of personnel competence were documented, with training or requalification provided as needed. A comprehensive list or matrix detailing the competencies of each staff member, along with documented procedures and criteria for ongoing competence assessment, was maintained.

3.2. Premises

The laboratory's layout was presented, and the facility was deemed appropriate in size, construction, and location.

The premises adequately met the requirements of a pharmaceutical testing laboratory. The sample reception area was visited and found to be suitable.

Ancillary areas (e.g. refreshment rooms, toilets, etc.), were separate from the laboratory areas. Changing areas were easily accessible and sufficient for the number of users.

Storage facilities, except for the waste storage, were generally well-organized to ensure the correct storage of samples, reagents, and equipment. Separate, secure storage areas were maintained with appropriate temperature and humidity controls and were kept securely locked. Controlled substances were clearly labeled and stored separately to ensure compliance with regulatory requirements.

The laboratory was equipped with instruments and equipment, including workbenches, workstations, and fume hoods. Separate instrument rooms were available for different measurement techniques as required.

Weighing areas were located in controlled environments where temperature and humidity were maintained within specified limits.

Archive facilities were provided to ensure proper storage and retrieval of all documents.

Microbiological testing was conducted in a contained laboratory unit with a dedicated air supply. Separate air-handling units and provisions, including temperature and humidity controls, were maintained for the microbiological laboratory. The air supplied to the laboratory was regularly tested to ensure appropriate quality and prevent contamination, in accordance with SOP for HVAC system

maintenance. The most recent report for cleanroom maintenance, including AHU, dated 30 October 2024, was available. Personnel demonstrated awareness of proper entry and exit procedures, including gowning. The SOP for cleanroom requalification was reviewed during the inspection.

The requalification report for the biosafety cabinet, performed on 20 August 2024, was available and reviewed.

Laboratory activities, including sample preparation, media and equipment preparation, and microorganism enumeration, were segregated either spatially or temporally, as applicable, to minimize risks of cross-contamination and to avoid false-positive or false-negative results. Sterility testing was conducted in a dedicated room with an appropriately classified area, following zone classification recommendations outlined in the respective SOP.

The environmental monitoring program described in the SOP included active air monitoring, air settling, contact plates, and monitoring of temperature and pressure differentials. Pressure gauges were labelled to indicate the areas served and the acceptable specifications. Alert and action limits were defined, and trending of environmental monitoring results was performed following SOP for the establishment of alert and action limits.

The environment complied with the non-viable and viable particle limits. Verification of high-efficiency particulate air (HEPA) filter integrity and room airflows was performed. Documentation for the biosafety cabinet used for sterility testing and the classified area (Grade B) related to their where the biosafety cabinet was located, was reviewed. Mapping locations for sample points for routine monitoring and exposure durations were documented, and the frequency of microbiological environmental monitoring was specified in the respective SOP.

A documented cleaning and disinfection plan for the Microbiology Unit, outlined in the respective SOP was available.

Sterility testing was conducted within a Grade A biosafety cabinet, situated within a cleanroom with a Grade B background. The facility layout and room airflow patterns were designed to ensure that unidirectional airflow was not disrupted, maintaining the required environmental conditions for sterility testing.

Entry to the cleanroom was controlled through a system of airlocks and a changing room, where operators were required to put on appropriate cleanroom garments. The final changing room maintained “at rest” conditions consistent with the grade of the room it served. The changing area was adequately sized to facilitate ease of use, with clear demarcation of different zones.

Environmental microbiological monitoring employed a combination of air and surface sampling methods suitable for the facility, including:
- Active air sampling,
- Settle (exposure) plates, and
- Surface contact sampling.

The applicable SOP outlined the procedures for cleaning all glass, plastic, and inox apparatus used in the microbiology laboratory. Additionally, another SOP detailed the cleaning procedures for the laboratory's testing areas. Both SOPs were reviewed and discussed during the inspection.

Observations related to Premises have been addressed in the respective CAPA plan.

3.3. Equipment, instruments, and other devices

The laboratory was required to have the necessary apparatus, equipment, instruments, and systems for pharmacopeial analyses and quality control testing in line with the Marketing Authorization Holder's procedures to ensure the correct performance of tests and related activities.

A master validation plan for the equipment of each laboratory was prepared annually and made available in paper form. The frequency of calibration and performance verification was determined based on applicable requirements.

All equipment, modules, and accessories were uniquely identified, including details of the manufacturer, identification numbers, location, and equipment specifications.

The documentation for the following equipment was reviewed to verify whether the analytical equipment was adequately qualified, demonstrated fitness for its intended purpose, complied with pharmacopeial requirements, and/or adhered to manufacturer recommendations. The laboratory retained the ultimate responsibility for equipment qualification. Performance verification of the equipment was conducted by the NIDQC Calibration Unit, which issued the corresponding certifications.
- Balance
- Autoclave used for sterility.
- Eppendorf ThermoStat plus used for endotoxin testing
- Dissolution tester
- HPLC
- Refrigerator for the storage of Reference Standards
- The FTIR Thermo iS 50 with Attenuated Total Reflection was used for the analysis, conducted at the Lab for Physical and Metrology Testing.
- Karl Fischer (Volumetric)
- Disintegration Pharmatest PTZ-S

The procedures outlining the responsibilities, content, and steps for selecting and purchasing services and supplies to ensure the availability of services (e.g., training, calibration, bioequivalence assessment) and supplies, solvents, and equipment for testing and calibration activities at NIDQC were detailed in SOP for purchasing services and supplies. Additionally, another SOP defined the procedures for the management of equipment used in testing and calibration activities.

It was noted that an SOP was available for the qualification procedure IQ-OQ-PQ; however, it did not apply to software systems.

An annual preventive maintenance schedule plan for analytical equipment was established by each laboratory unit, to be carried out either internally or by a competent external service provider.

All calibrations and equipment qualifications were traceable to appropriate references, and any changes to analytical equipment required a documented change control process. Requalification was mandated following specific changes.

Defective equipment had to be removed from service, repaired, requalified, and clearly labelled before being returned to use.

The document for the purchase of the calibration kit for the UV-VIS was available and reviewed. The Laboratory ensured that a user specification requirement was in place prior to the purchase. An agreement was also available to cover installation and other after-purchase services. The qualification of the device (IQ, OQ, and PQ) was executed in accordance with written protocols.

Equipment logbooks were required to be maintained to document the equipment history, including records of maintenance, calibration, and qualification activities.

The stability of temperature, uniformity of temperature distribution, and time required to achieve equilibrium conditions in incubators, water baths, ovens, and temperature-controlled rooms were initially established and documented, particularly concerning their typical uses. These processes were defined in an SOP, which outlined the calibration procedure for thermal cabinets at the Drug Institute.

In addition to directly monitoring the autoclave's temperature, the effectiveness of its operation during each cycle was verified using chemical or biological indicators for sterilization or decontamination purposes. The laboratory maintained a separate autoclave specifically for decontamination purposes.

SOP for the requalification of the HIRAYAMA HV-110 II autoclave was available and reviewed. The requalification included a heat distribution test in an empty condition, a heat penetration test in a fully loaded condition, and a biological challenge of the equipment.

Observations related to Equipment have been addressed in the respective CAPA plan.

3.4. Reagents and materials

Reagents and chemicals, including solvents and materials used in tests and assays, were required to meet appropriate quality standards and be suitable for their intended use. Commercial reagents were sourced from verified and approved qualified providers, accompanied by certificates of analysis.

Reagent management encompassed their entire life cycle, from purchasing and preparation to use and disposal. This process was governed by SOP for the Management of Reagents and Chemicals, SOP for the Management and Treatment of Waste, and SOP for Purchasing Services and Supplies.

Labelling requirements included essential information such as the substance name, receipt and opening dates, expiry date, storage conditions, concentration, manufacturer details, batch number, and personnel identifiers.

In-house reagents prepared by the laboratory were subject to specific labelling requirements to ensure traceability and proper identification. Additionally, the production and labelling of water followed established procedures to maintain quality and compliance.

CULTURE MEDIA

Media was supplied by approved and qualified vendors. Growth promotion tests, and where appropriate, other suitable performance tests, were conducted on all batches and shipments of media.

The suitability of culture media, diluents, and other suspension fluids was verified following the respective SOP. The tests included evaluating the appearance of the media, the pH after autoclaving, sterility, and growth promotion and/or inhibitory properties of the media.

The documentation for the quality control of culture media used for a randomly selected sample, dated 11 January 2023, for Thioglycolate, was reviewed and discussed. The records were documented on a form.

The repartition of media after sterilization was performed under unidirectional airflow to minimize the potential for environmental contamination, including during the cooling process. The shelf life of prepared media under defined storage conditions was determined and verified.

Observations related to Reagents and materials have been addressed in the respective CAPA plan.

3.5. Reference substances and reference materials

Reference substances were obtained either from the department within NIDQC, specifically the "Lab for Establishment of Standards & Reference Substances," or from pharmaceutical product manufacturers. The latter were required to have their reference substances approved by the national medicines licensing authority before use. These reference substances were used to ensure accuracy, consistency, and compliance in analytical and quality control procedures.

The control of reference substances and materials was overseen by a designated staff member to ensure proper management and traceability.

Each reference substance and material was assigned a unique identification number, which was referenced in analytical worksheets for traceability during testing activities.

A comprehensive register was maintained for all reference substances and materials, documenting details such as identification number, source, receipt date, batch designation, intended use, storage location, expiry or retest date, certificates, and safety data sheets.

The intended use and the expiry or retest date of each reference substance were verified before use. This information was also included in the corresponding test reports to ensure accuracy and compliance.

Reference cultures

Reference cultures were required to establish the acceptable performance of media (including test kits), validate methods, verify the suitability of test methods, and evaluate ongoing performance.

Traceability was ensured by using reference strains of microorganisms obtained directly from recognized national or international collections, such as ATCC.

Reference strains were subcultured once to create reference stocks. Purity and biochemical checks were conducted in parallel, as appropriate, to confirm the integrity of the strains. Reference stocks were stored in aliquots, typically deep-frozen, to maintain their viability and prevent contamination. Working cultures for routine use were prepared as primary subcultures derived from the reference stock. Once reference stocks were thawed and used for the preparation of working cultures, they were neutralized in the autoclave and subsequently discarded.

Working stocks were not subcultured further. Subculturing was limited to no more than five generations (or passages) from the original reference strain. This limitation was defined by a standard method or supported by documentary evidence from the laboratory demonstrating that no relevant properties of the strain had changed.

The observation related to the Reference substance has been addressed in the respective CAPA plan.

4. Technical activities

4.1. Sampling

Since the Laboratory was responsible for sampling pharmaceutical products for subsequent testing, an SOP was established to include the sampling plan, ensuring the collection of representative samples and measures to maintain an effective chain of custody. These activities were performed in accordance with SOP for Sampling.

The procedure outlined responsibilities, authorities, and the steps required for collecting drug samples for QC. It also defined the roles of the Department of Planning and General Affairs, the laboratories, and the concerned staff. A dated list of staff responsible for sample collection, last updated on 28 November 2022, was available for reference.

The laboratory implemented a sampling plan for the collection of substances, materials, or products intended for subsequent testing or calibration. The plan considered factors necessary to ensure the validity of testing or calibration results.

Records of sampling data, forming part of the testing process, were retained by the laboratory on a form titled "Minutes of Drug Sampling for Quality Control." These records included the following details, where applicable:
- Reference to the sampling method used
- Date and time of sampling
- Information to identify and describe the sample (e.g., amount, name, number, and correspondence to the container from which it was taken, if applicable)
- Identification of personnel performing the sampling
- Environmental or transport conditions during sampling
- Batch status of the product before sampling.

4.2. Incoming samples

A standard test request form was required to be completed for every sample submitted to the laboratory.

The test request form included the necessary details as outlined in the SOP, which governed the receipt and handling of sample analysis requests:
- Name and date of receipt of the provider.
- Material source.
- Detailed sample description, including composition, international nonproprietary name, and brand names.
- Packaging details.
- Dosage form, concentration or strength, manufacturer's name, and batch or lot number.
- Sample size.
- Reason for analysis request.
- Sampling date.
- Consignment size (if applicable).
- Expiry date or retest date (if known).
- Reference documents and testing specifications.
- Additional comments or discrepancies found.

The laboratory ensured the following conditions were met for every sample submitted:
- An adequate sample quantity was provided to perform the requested tests.
- The laboratory possessed the necessary capability and resources to conduct the tests.
- The laboratory verified its ability to meet customer requirements with the available tests or methods.
- Any issues or discrepancies were resolved with the request originator before proceeding with testing, and a record of the review was retained.

If the laboratory determined which samples to test, the test request form was adjusted accordingly to reflect the updated scope of testing.

A contract was signed between the customer and the institute, where all requirements and responsibilities were discussed and confirmed.

Each sample, along with its accompanying documentation, was assigned a unique registration number. Separate registration numbers were allocated for requests involving different medicines, dosage forms, batches, or sources.

Each sample container was labelled with its unique registration number, ensuring that no other markings or inscriptions on the container were obscured. Retained samples were coded using markers for identification and traceability.

A paper-based register was maintained, recording:
- Sample registration number.
- Receipt date.
- Specific unit(s) designated for analysis.

Upon receipt, each sample underwent a visual inspection by laboratory staff to verify its conformity with the information provided in the test request. Any discrepancies or damages identified during the inspection were promptly recorded on the test request form, and queries were directed back to the sample provider for clarification or resolution.

Samples retained prior to testing and after completing the required tests were stored appropriately. In compliance with local law, samples could be retained for up to 24 months after receipt.

The specific unit responsible for testing was determined by the laboratory director or a designated person.

Verbal requests for analysis, even in emergencies, were not accepted.

Once a product was accepted at reception, the receptionist made copies of the request form and forwarded the samples to the units assigned for the specific testing activities. Each unit received a separate request form for the activities it performed.

Upon completion of analytical tests, all documentation accompanying each numbered sample was returned to the specific unit, i.e., the Department for Planning and General Affairs. This documentation was verified to ensure it contained the correct identification number, origin, purpose, and any additional information relevant to receipt and testing activities.

Observations related to Incoming samples have been addressed in the respective CAPA plan.

4.3. Selection, validation, and verification of analytical procedures

The laboratory selected the appropriate analytical procedures to be used for testing—either compliance testing or investigative testing—before commencing the analysis.

All analytical procedures employed for testing were ensured to be suitable for their intended use. For non-pharmacopeial substances or products, preference was given to the manufacturer's approved methods. In the absence of such methods, the laboratory validated the method to be used. This validation process also established acceptance criteria for system suitability tests, which were subsequently applied to verify the analytical procedure before analysis, as outlined in the applicable SOP. According to this SOP, validation was performed following an approved validation protocol, which included verifying the analytical performance characteristics of the selected procedures. The results of the validation should be thoroughly documented in the corresponding validation report.

For investigative testing, well-documented screening procedures were established, along with confirmatory analytical procedures to verify the identity of the substance or its ingredients.

Pharmacopeial procedures and those approved by the marketing authorization authority were considered validated for the specific use described in the monograph. In cases where validation was not required, method verification was required to be conducted according to an approved protocol or procedure. This verification demonstrated the laboratory's ability to successfully execute the method and confirmed that the pharmacopeial procedure was suitable for the sample being tested. These requirements were to be carried out following the respective SOP.

If a pharmacopeial method was adapted for a purpose other than that described in the pharmacopeia, it should be validated for the new intended use.

System suitability tests were conducted both before and throughout the analysis of samples to ensure that the entire analytical system—including instruments, reagents, columns, and analysts—remained continuously suitable for the intended application.

Observations related to Method validation/verification have been addressed in the respective CAPA plan.

4.4. Technical records

The receptionist at the sample reception contacted the respective unit to collect samples for specific testing areas.

The approval of certificates of analysis was the responsibility of the Deputy Director, who also served as the Quality Manager. After completing the analytical sheet, the analyst submitted it to the Head of the laboratory, who reviewed all analytical data to ensure the validity of the test results.

The analytical sheets were then sent to the Planning and General Affairs department for compilation. This department also checked the format, appearance, and completeness of the documentation, ensuring that all tests were conducted in accordance with SOP for Reporting Testing/Calibration Results and SOP for Control of Testing/Calibration Quality.

The analytical worksheet, or a suitable alternative document, was an internal document used by the analyst to record detailed information about the sample, the test procedure, reagents, standards, materials, calculations, and testing results. It included all raw data generated during the analysis.

The analytical worksheet provided documentary evidence to confirm whether the sample met the specified requirements or to substantiate any out-of-specification results observed during the testing process.

A unique analytical worksheet was assigned to each numbered sample or group of samples. The worksheet was a standardized template linked to the respective SOP. The issuance of the template was documented on a designated form, with both the issuer and the analyst signing to confirm the activity. Each worksheet was signed by the issuer, and the distribution number was recorded in the upper right corner of each page, in accordance with an applicable SOP. Completed analytical worksheets from different units pertaining to the same sample were consolidated into a single set of documentation to ensure comprehensive and traceable records.

The analytical worksheet provided the following information:

- registration number of the sample;
- page numbering, including the total number of pages (including annexes);
- date of the test request;
- dates on which the analysis was started and completed;
- name and signature of the analyst;
- a description of the sample received;
- references to the specifications and a complete description of the test methods used to analyze the sample, including applicable limits. Alternatively, a traceable reference to the test method was considered acceptable to ensure clarity and traceability;

- identification of the test equipment used;
- reference substances used;
- results of the system suitability test, if applicable, as well as any analytical acceptance criteria;
- identification of reagents, solvents, and columns (if applicable) employed;
- results obtained, including those obtained from another internal analytical section or external laboratory, if applicable;
- an interpretation of the results and conclusions, indicating whether the sample complied with the specifications. These interpretations and conclusions were reviewed, approved, and signed by designated qualified personnel;
- further comments, such as any deviations from a prescribed procedure. These deviations were approved and documented or treated as nonconforming work, in accordance with SOP for the control of testing, and recorded on the designated form. Additionally, the worksheet noted whether the sample had been forwarded to another unit or a contract laboratory for specific analysis, including the dates of transfer and receipt of the results.
- All values obtained from each test, including blank results, were immediately entered on the analytical worksheet, and all graphical data, whether obtained from recording instruments or plotted by hand, were attached or traceable to an electronic record file or document.

The completed analytical worksheet was signed by the responsible analyst and subsequently reviewed and approved by designated qualified personnel. All calculations and data transfers were verified systematically to ensure accuracy. When applicable, these calculations were controlled by Excel sheets.

Any changes made to original records, whether in paper or electronic format, were required to be fully traceable. This included details of what was changed, who made the change, when it was made, and the reason for the change. Deletion of data was prohibited. If a mistake occurred in an analytical worksheet or if data or text needed to be amended, the correction was required to be documented in a manner that ensured traceability.

The analytical worksheet, along with any attachments—including calculations and recordings of instrumental analyses—was archived together with the corresponding specification to ensure complete and organized documentation.

4.5. Testing

Testing methods used for compliance with the specifications were provided by the medicine licensing authority or described in the monographs of the appropriate pharmacopeia. Additionally, in-house method specifications, referred to as TCCS (In-house Criteria in the local language), were supplied by the manufacturer and registered with DAV. The laboratory received these specifications directly through DAV.

The reporting of testing and calibration results was outlined in the applicable SOP.

Detailed guidance on pharmacopeial requirements was typically provided in the general notices and specific monographs of the pharmacopeia or the specifications issued by DAV. Test procedures were adequately described, providing sufficient information for trained analysts to perform analyses reliably and reproducibly.

Random samples were selected for review of their respective documentation, covering the entire process from receipt of the sample to the issuance of the CoA, including sample retention. If applicable, the investigation of any OOS results was also reviewed.

4.6. Evaluation of test results

For compliance testing, the product was required to meet all acceptance criteria specified in the approved specification. Test results were compared with the specification limits to determine whether the sample met the requirements, and a conclusion was drawn regarding its conformity to the specification.

All test results were traceable to a suitable primary reference substance, either from a pharmacopeia, a manufacturer (TCCS), or, where applicable, a certified reference material.

Atypical results were subject to investigation to determine their cause and ensure accuracy.

Test results were reviewed and either approved or rejected by designated qualified personnel in accordance with the competency master list or matrix.

4.7. Measurement uncertainty

The uncertainty of measurement results was described in the respective SOP. This procedure defined the methodology for calculating measurement uncertainty to ensure consistency within NIDQC across various scenarios, such as test development, customer requirements, and equipment calibration.

Additionally, SOP for Reporting Testing/Calibration Results outlined the laboratory's process for estimating measurement uncertainty and providing this information to customers upon request.

However, due to time constraints, the implementation of this section could not be verified during the inspection.

4.8. Validity of test results

The validity of results was ensured by the laboratory through a procedure encompassing the review of various activities, including:

- Reference substances or reference materials
- Verification of measuring and testing equipment
- Appropriate quality control checks
- Replicate tests or calibrations using the same or different methods

- Retesting of retained samples
- Review of all raw data and reported results

If the analysis of data from monitoring activities revealed results outside predefined criteria, appropriate actions were taken to prevent the reporting of incorrect results. These actions were carried out in accordance with the applicable SOP, which addressed the treatment of OOS results.

4.9. Out-of-specification results

When a suspected OOS result was identified, a review of the procedures applied during the testing process was conducted by the supervisor in collaboration with the analyst or technician, using a checklist, before any retesting was performed. This process followed a specific SOP, and ensured the following:

- Stable original sample preparations were retained until the investigation was complete.
- Raw data were examined to identify potential discrepancies.
- All calculations were reviewed for accuracy.
- The equipment used was confirmed to be qualified, calibrated, and supported by acceptable system suitability tests.
- The appropriate reagents, solvents, and reference substances were verified for suitability.

If an error causing an aberrant result was identified, the result was invalidated, and a retest of the sample by the same analyst or technician was required.

Suspected OOS results could only be rejected if a clear, identified error explained the deviation. When the investigation was inconclusive, a confirmatory determination was conducted by other analysts.

All investigations and their conclusions were documented. In the event of an error, a root cause analysis was performed, and corrective actions were documented and implemented.

For microbiology testing, if the enumeration result indicated a negative outcome, it was reported as "not detected for a defined unit" or "less than the detection limit for a defined unit." The results were specified in alignment with the required specifications.

A presentation by MHRA on best practices for OOS investigations was delivered to the Quality Management staff during the inspection. This session aimed to enhance understanding and implementation of effective OOS investigation practices.

Observations related to the OOS investigation have been addressed in the respective CAPA plan.

4.10. Reporting of results

The Head of the Department compiled the analytical test report in hard copy, which included the analytical test results. This report was submitted for approval by the director or quality manager.

Once approved, the complete dossier, containing all information related to the sample—such as its origin, chain of custody, and analytical data—was forwarded to the Department for Planning and General Affairs for final review and archiving.

The analytical test report provided the following information:

- A title.
- The laboratory registration number of the sample.
- The laboratory test report number.
- The name and address of the laboratory testing the sample.
- The name and address of the originator of the request for analysis.
- The name, description, and batch number of the sample, where appropriate.
- An introduction giving the background to and the purpose of the investigation, if applicable.
- A reference to the specifications used for testing the sample or a detailed description of the procedures employed, including the limits.
- The results of all the tests performed or the numerical results, with the standard deviation of all the tests performed (if applicable).
- A discussion of the results obtained, where appropriate.
- A conclusion as to whether or not the samples were found to be within the limits of the specifications used.
- A statement to the effect that the results relate only to the items tested, calibrated, or sampled.
- A clear identification when results are from external providers.
- The date on which the tests were completed.
- The signature of the laboratory director or other authorized person reviewing and authorizing the report.
- The name and address of the original manufacturer.
- Whether or not the sample complies with the requirements.
- The date on which the sample was received.
- The expiry date or retest date, if applicable.
- A statement indicating that the analytical test report, or any portion thereof, cannot be reproduced without the authorization of the laboratory.

A certificate of analysis, containing the same information as the analytical test report, was prepared for each batch of a substance or product.

4.11. Nonconforming work (Refer to section 1.7)
This topic is discussed in other sections of this report.

4.12. Retained samples
The retained sample was stored in its original packaging to maintain its integrity.

Sample disposal criteria were defined in accordance with national legislation, specifying disposal 24 months after receipt of the sample. Additionally, applicable international recommendations or specific requirements set by the originator of the analysis request could also be considered.

5. Safety rules

Seminars on fire extinguisher use and related safety issues were conducted at predefined intervals, as outlined in the QMS documentation.

Special care was exercised when handling highly potent or infectious substances, ensuring appropriate procedures and safeguards were followed.

All containers of chemicals were properly labeled, including clear and prominent warnings such as "poison," or "flammable," where applicable.

First-aid materials were readily available, and staff received instruction in first-aid techniques and emergency care to ensure prompt and effective responses to accidents.

Protective clothing, including eye protection, masks, and gloves, was provided. Safety showers for eye and full-body use were installed at appropriate locations and were maintained in good working order. Rubber suction bulbs were used for manual pipetting to ensure safe laboratory practices.

Methods for the safe disposal of unwanted corrosive or dangerous products, such as neutralization or deactivation, were described in the relevant SOP. Additionally, the safe and complete disposal of mercury and its salts was specifically addressed.

Poisonous or hazardous products were clearly identified, appropriately labeled, and stored separately from other products to minimize risk and ensure compliance with safety protocols.

Observations related to Safety have been addressed in the respective CAPA plan.

Miscellaneous	
Assessment of the Laboratory Information File	The Laboratory Information File (LIF), Revision 8, dated 27 Feb 2024 was submitted and reviewed.
Annexes attached	N/A

Part 3 – Conclusion – Inspection outcome

Based on the areas inspected, the people met, and the documents reviewed, including the CAPA plan provided for the observations listed in the Inspection Report, ***National Institute of Drug Quality Control (NIDQC)***, located at ***48 Hai Ba Trung Street, Hoan Kiem District, Hanoi; Vietnam*** is considered to be operating at an acceptable level of compliance with WHO GPPQCL Guidelines.

The laboratory addressed all the non-compliances observed during the inspection, listed in the full report, and those reflected in the WHOPIR to a satisfactory level prior to the publication of the WHOPIR.

This WHOPIR will remain valid for 3 years, provided that the outcome of any inspection conducted during this period is positive

Part 4 List of WHO Guidelines referenced in the inspection report

1. WHO Good Practices for Pharmaceutical Quality Control Laboratories. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-seventh Report, Geneva, World Health Organization, 2024 (WHO Technical Report Series, No. 1052), Annex 4.
   Short name: WHO GPPQCL Guidelines, TRS No 1052, Annex 4
   https://www.who.int/publications/i/item/9789240091030

2. WHO good practices for pharmaceutical microbiology laboratories. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report, Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 961), Annex 2.
   Short name: WHO TRS No. 961, Annex 2
   https://www.who.int/publications/m/item/trs961-annex2

3. WHO guidelines for sampling of pharmaceutical products and related materials. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Thirty-ninth Report, Geneva, World Health Organization, 2005 (WHO Technical Report Series, No. 929), Annex 4.
   Short name: WHO TRS No. 929, Annex 4
   https://www.who.int/publications/m/item/annex-4-trs-929

4. Guideline on data integrity. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-fifth Report, Geneva, World Health Organization, 2021 (WHO Technical Report Series, No. 1033), Annex 4.
   Short name: WHO TRS No. 1033, Annex 4
   https://www.who.int/publications/m/item/annex-4-trs-

5. Guideline on Good regulatory practices in the regulation of medical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-fifth Report, Geneva, World Health Organization, 2021 (WHO Technical Report Series, No. 1033), Annex 11.
   Short name: WHO TRS No. 1033, Annex 11
   https://www.who.int/publications/m/item/annex-4-trs-

6. WHO good manufacturing practices for pharmaceutical products: main principles. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-eighth Report, Geneva, World Health Organization, 2014 (WHO Technical Report Series, No. 986), Annex 2.
   Short name: WHO GMP guidelines or ***TRS No. 986, Annex 2***
   https://www.who.int/publications/m/item/trs986-

7. WHO good manufacturing practices for active pharmaceutical ingredients. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fourth Report, Geneva, World Health Organization, 2010 (WHO Technical Report Series, No. 957), Annex 2.
   Short name: WHO TRS No. 957, Annex 2
   https://www.who.int/publications/m/item/annex-2-trs-957

8. WHO Good Practices for Pharmaceutical Products Containing Hazardous Substances. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fourth Report, Geneva, World Health Organization, 2010 (WHO Technical Report Series, No. 957), Annex 3.
   Short name: WHO TRS No. 957, Annex 3
   https://www.who.int/publications/m/item/trs957-annex3

9. WHO good manufacturing practices for sterile pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report, Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 961), Annex 6.
   Short name: WHO TRS No. 961, Annex 6
   https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/production/trs961-annex6-gmp-sterile-pharmaceutical-products.pdf

10. WHO guidelines on transfer of technology in pharmaceutical manufacturing WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report, Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 961), Annex 7.
    Short name: WHO TRS No. 961, Annex 7
    https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/production/trs961-annex7-transfer-technology-pharmaceutical-manufacturing.pdf?sfvrsn=2e302838_0

11. Model guidance for the storage and transport of time-and temperature-sensitive pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report, Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 96, Annex 9)
    Short name: WHO TRS No. 961, Annex 9
    https://www.who.int/publications/m/item/trs961-annex9-modelguidanceforstoragetransport

12. General guidelines for the establishment maintenance and distribution of chemical reference substances. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-first Report, Geneva, World Health Organization 2007 (WHO Technical Report Series, No.943) Annex 3
    Short name: WHO TRS No. 943, Annex 3
    https://www.who.int/publications/m/item/trs943-annex3

13. Guidelines on heating, ventilation, and air-conditioning systems for non-sterile pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-second Report, Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1010), Annex
    Short name: WHO TRS No. 1010, Annex 8
    https://www.who.int/publications/m/item/Annex-8-trs-1010

14. WHO guidelines on quality risk management. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-seventh Report, Geneva, World Health Organization, 2013 (WHO Technical Report Series, No. 981), Annex 2.
    Short name: WHO TRS No. 981, Annex 2
    https://www.who.int/publications/m/item/trs981-annex2

15. WHO guidelines on variation to a prequalified product. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-seventh Report, Geneva, World Health Organization, 2013 (WHO Technical Report Series, No. 981), Annex 3.
    Short name: WHO TRS No. 981, Annex 3
    https://www.who.int/publications/m/item/annex-3-trs-981

16. WHO guidelines for preparing a laboratory information file. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report, Geneva. WHO Technical Report Series, No. 961, 2011, Annex 13.
Short name: WHO TRS No. 961, Annex 13
https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/quality-control/trs961-annex13-guidelines-preparing-laboratory-information-file.pdf?sfvrsn=54d1f397_2https://www.who.int/publications/i/item/9789241209922

17. WHO General guidance on hold-time studies WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-ninth Report, Geneva, World Health Organization, 2015 (WHO Technical Report Series, No. 992), Annex 4.
Short name: WHO TRS No. 992, Annex 4
https://www.who.int/publications/m/item/trs992-annex4

18. WHO Technical supplements to Model Guidance for storage and transport of time – and temperature–sensitive pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-ninth Report, Geneva, World Health Organization, 2015 (WHO Technical Report Series, No. 992), Annex 5.
Short name: WHO TRS No. 992, Annex 5
https://www.who.int/publications/m/item/trs992-annex5

19. Stability testing of active pharmaceutical ingredients and finished pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-second Report, Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1010), Annex 10.
Short name: WHO TRS No. 1010, Annex 10
https://www.who.int/publications/m/item/trs1010-annex10

20. Good chromatography practices. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-fourth Report, Geneva, World Health Organization, 2020 (WHO Technical Report Series, No. 1025), Annex 4.
Short name: WHO Good chromatography practices
https://www.who.int/publications/m/item/trs1025-annex4

21. Good manufacturing practices: guidelines on validation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-third report, Geneva, World Health Organization, 2020 (WHO Technical Report Series, No. 1019), Annex 3.
Short name: WHO TRS No. 1019, Annex 3
https://www.who.int/publications/m/item/trs1019-annex3

22. WHO model certificate of analysis. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-second report, Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1010), Annex 4.
Short name: WHO TRS No. 1010, Annex 4
https://www.who.int/publications/m/item/trs1010-annex4

23. Good manufacturing practices: water for pharmaceutical use. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-fifth report, Geneva, World Health Organization, 2021 (WHO Technical Report Series, No. 1033), Annex 3
Short name: WHO TRS No 1033, Annex 3
https://www.who.int/publications/m/item/annex-3-trs-1033

24. Guidelines on pre-approval inspections. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Thirty-sixth report, Geneva, World Health Organization, 2002 (WHO Technical Report Series, No. 902), Annex 7
Short name: WHO TRS No 902, Annex 7
https://www.who.int/publications/m/item/trs902-annex7

25. Prequalification of quality control laboratories: procedure for assessing the acceptability, in principle, of quality control laboratories for use by United Nations agencies. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-first report, Geneva, World Health Organization, 2017 (WHO Technical Report Series, No. 1003), Annex 3
Short name: WHO TRS No 1003, Annex 3
https://www.who.int/publications/m/item/annex-3-trs-1003