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Prequalification Unit Inspection services
WHO PUBLIC INSPECTION REPORT
of the Quality Control laboratory
(WHOPIR)

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<tr><th>Part 1</th><th>General information</th></tr>
<tr><td colspan="2">Laboratory Details</td></tr>
<tr><td>Name of the laboratory</td><td>Food and Drugs Authority, Accra – Ghana
– Centre for Laboratory Services and Research: Drug Laboratory Department – Drug Physicochemical Unit</td></tr>
<tr><td>Address of inspected laboratory</td><td>17th Indian Ocean Street
Nelson Mandela Avenue, South Legon Commercial Area Shiashie
Legon, Accra
Ghana</td></tr>
<tr><td>GPS Coordinates</td><td>Latitude: 5.6253
Longitude: -0.1805</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Dates of inspection</td><td>• 29-30 November 2021 on-site
• 2&6 December 2021 virtual</td></tr>
<tr><td>Type of inspection</td><td>Follow-up</td></tr>
<tr><td colspan="2">Introduction</td></tr>
<tr><td>Brief description of testing activities</td><td>
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<tr><th>Type of analysis</th><th>Finished products</th><th>Active pharmaceutical ingredients</th></tr>
<tr><td>Physical/ Chemical analysis</td><td>pH, Loss on drying, Water content (KF), Dissolution, Uniformity of dosage units (by mass or content)</td><td>pH, Loss on drying, sulphated ash, acid insoluble ash, water content (KF)</td></tr>
<tr><td>Identification</td><td>HPLC, UV-Vis spectrophotometry, FT-IR spectrophotometry, Polarimetry, TLC, Basic tests.</td><td>HPLC, UV-Vis spectrophotometry, FT-IR spectrophotometry, TLC, Basic tests.</td></tr>
<tr><td>Assay, impurities and related substances</td><td>HPLC, UV-Vis spectrophotometry, Volumetric titrations, potentiometric titration</td><td>HPLC, UV-Vis spectrophotometry, FT-IR spectrophotometry, TLC, Basic tests.</td></tr>
</table>
</td></tr>
<tr><td>General information</td><td>The Food and Drugs Authority was established by the Food and Drugs Law of 1992 (PNDC Law 305B) as an Agency of the Ministry of Health. Its mandate is to control the manufacture, importation, exportation, distribution, use and</td></tr>
</table>

	advertisement of food, drugs, cosmetics, chemical substances, medical devices, blood and biological products and tobacco products. Testing Laboratory Departments of the Centre for Laboratory Services and Research (CLSR) are – Microbiology Laboratory Department – Food Laboratory Department – Drug Laboratory Department – Medical Devices Laboratory Department and – Veterinary Laboratory Department CLSR operates in a permanent facility at the national capital, Accra. The Drug Physicochemical and Pharmaceutical Microbiology Laboratories of the FDA provides the following testing services: – Chemical and other pharmaceutical evaluations – Testing on active pharmaceutical ingredients (API) and finished pharmaceutical products (FPP) – Test at the request of clients (FDA Drug Division and Requests) – Locally manufactured and imported FPP and imported API to determine whether such drugs or medicinal substances comply with applicable standards.
History	The laboratory was previously inspected by WHO in June 2017 and October 2019.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	The inspection was restricted to the activities of the Drug Physico-chemical laboratory with the Pharmaceutical Microbiology laboratory excluded from the scope of the inspection. The following areas were inspected: – Organization and management – Quality Management System – Data processing – Premises – Physico-Chemical – Evaluation of test results, including investigation of OOS – Personnel, including training and safety – Documentation and Records – Equipment – Calibration / Qualification – Performance check – Validation and verification of the methods – Traceability and records – Sample and material management, including water qualification

	– Suppliers and contractors
Out of Scope	• Pharmaceutical and Food Microbiology Laboratory • Food Physicochemical Laboratory • Cosmetic & Household Chemical Substances and • Medical Devices Laboratories

Abbreviations	**Meaning**
ALCOA	Attributable, legible, contemporaneous, original and accurate
API	Active pharmaceutical ingredient
CoA	Certificate of analysis
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)
KF	Karl Fisher titration
LIMS	Laboratory information management system
MB	Microbiology
MR	Management review
NC	Non-conformity
NCA	National control authority
NCL	National control laboratory
NRA	National regulatory agency
OOS	Out-of-specifications test result
PM	Preventive maintenance
PQ	Performance qualification
PQR	Product quality review
PQS	Pharmaceutical quality system
PW	Purified water
QA	Quality assurance
QC	Quality control
QCL	Quality control laboratory
QMS	Quality management system
QRM	Quality risk management
RA	Risk assessment
RCA	Root cause analysis
SOP	Standard operating procedure
URS	User requirements specifications
UV	Ultraviolet-visible spectrophotometry or spectrophotometer

Part 2	Summary of findings and recommendations

1. Organization and management

The Drug Physicochemical laboratory under the scope of the inspection is in the unique situation that it is one of 7 testing laboratories of the overarching Centre for Laboratory Services and Research that forms part of the national food and drug regulatory authority of Ghana, the FDA headed by the Chief Executive Officer (CEO), Mrs. Delese Mimi Darko. The final oversight of the work of the Centre for Laboratory Services and Research (CLSR) rests with the CEO. CLSR provides testing services to support the Authority's regulatory mandate in ensuring that foods, drugs, cosmetics, household chemical substances, blood & biological products, and medical devices locally manufactured, imported, exported, sold and distributed are safe and of good quality.

Management review includes a formal documented review by top management of CLSR of the key performance indicators of the quality management system and presented to the CEO.

The Drug Physicochemical laboratory had a defined organization and management structure. The responsibility, authority and interrelationship of the personnel was specified. There were arrangements (including statement in the quality manual) to ensure that its management and personnel were not subjected to commercial, political, financial and other pressures or conflicts of interest that might adversely affect the quality of their work and the confidentiality of information contained in marketing authorizations and test reports, however some deficiencies in this regard were noted.

2. Quality management system

The scope of accreditation of the laboratory with regards to the physicochemical tests being performed by the laboratory (and that applicable to the scope of this inspection includes: chromatography, spectrophotometry, pH, dissolution, loss on drying, moisture determination by Karl Fischer, uniformity of dosage units, identification (FT-IR & TLC), assay, optical rotation, and pH repeated determination).

The Quality Management System was implemented and maintained as specified in the quality system documents. The system's documentation was communicated to, understood by, available to, and implemented by the appropriate personnel.

Internal audits

The laboratory had established a system of planned and documented internal Quality Audits to verify whether activities complied with planned arrangements, the requirements of the Quality Management System, the ISO/IEC 17025-2017 norm, WHO-GPPQCL and to determine effectiveness of the Quality System. Audits was planned to be conducted annually.

Internal quality audits were planned as per the respective SOP with observations classified as "Critical", Major", "Minor" or "Observation" depending on the level of criticality.

Selection and qualification criteria for auditors were specified. The selection was based on:
- Educational qualifications
- Experience in pharmaceutical industry
- Knowledge and skills

The independency of the auditors was ensured, and corresponding training records of the lead auditor was in place.

Management Review
SOP for Management review was discussed The latest Management review report was discussed with the agenda items and investigations available, together with decision, responsible person and plan date.

Handling of deviations and corrective-preventive actions (CAPA)
Corrective and preventive actions (CAPA) were addressed using the SOP for corrective and preventive actions. There was a form in place for the investigation of deviations (non-conformances) and CAPA. Non-conformances and the corresponding corrective actions should be analysed for possible root causes such as:
- customer requirements,
- samples,
- sample specifications,
- methods and procedures,
- staff skills and training,
- consumables,
- equipment and its calibration.

Complaints
Customer complaints needed to be received through designated channel, recorded and acknowledged according to the applicable SOP. Complaints were investigated within specific timelines. Following a complaint, actions are documented as a corrective action using a CAPA form.

Change Control
According to the relevant SOP the following events were required to be managed through change control request arrangement:
- Personnel changes
- Equipment changes
- Test method changes
- Process changes
- Physical changes, and
- Document changes.

3. Control of documentation

The laboratory had established a document control system including preparation, revision, distribution, return, archiving of SOPs.

The Laboratory had an electronic Master list of the SOPs to keep the overview of the SOPs. The current version status and distribution of documents were identified on the SOP master list. SOPs had a unique identifier, version number, date of implementation including reference to the previous version.

All documents were reviewed by the Head of Quality Assurance and approved by the Director of the Centre for Laboratory Services Research (D/CLSR), for Laboratory specific documents approved by the Head of the Laboratory with the Chief Executive Officer / D/CLSR approving the Quality Manual before issue. The SOPs were available at the relevant location. The relevant staff was trained on new and revised SOPs; the personnel acknowledged by signature that they were aware of the content. The quality documentation system of the CLSR was hybrid (containing hard copies and e-documents) and consisted of a set of documents including:

- Quality Manual
- Standard Operating Procedures
- Forms and Formats
- Lists
- Logbooks

4. Records

Records were made of analytical tests (including calculation, and derived data), instrument use, calibrations, maintenance and sample receipt in logbooks containing consecutively numbered pages. Technical and quality documents were produced. Technical records were those generated from testing of samples, verification of test methods, calibration, maintenance, and qualification of equipment, staff training and qualification, and certificate of analysis. Quality records included reports from internal audits, management reviews, corrective actions, and preventive actions. Information related to testing of samples were recorded in chemist worksheets issued and controlled by the head of QA.

5. Data processing equipment

The computerized systems used in the laboratories were managed in accordance with the relevant SOP.

An inventory of all computerised systems was available. The inventory provided information such as unique identification, status, and software utilized on the respective systems.

The IT-department was responsible for providing a backup for electronic data generated by LIMS software. For any other electronic data, the backup was performed weekly on one external drive and uploaded unto a cloud platform. The backup was required to be performed in accordance with the relevant SOP. The restoration of data was properly documented on a respective template.

6. Personnel

The laboratory had sufficient personnel with the necessary education, training, technical knowledge and experiences for their assigned functions. The Laboratory maintained current job descriptions for all personnel involved in tests and/or calibrations, validations and verifications. The laboratory also maintained records of all technical personnel, describing their qualifications, training and experience.

Personnel meeting minimum qualification and competence requirements specified for their function occupied organizational positions and performed all activities including the operation of specific equipment, performing tests, evaluating results, and signing test reports.

The laboratory had a documented system by which training needs were identified and provided, to ensure that persons carrying out activities affecting quality had the requisite skills and knowledge. A training matrix is available.

An appropriate SOP addressing General Health and Safety Practices was available.

7. Premises

The laboratory facilities were of suitable size and design to suit the functions and to perform the operations to be conducted. Storage facilities were maintained for samples, retained samples, reagents, laboratory accessories and reference substances, if necessary, under refrigeration (2-8°C). The environmental conditions of rooms were adequately monitored, and trending of temperatures was performed. The flammable substances, fuming and concentrated acids and bases were kept in the reagent store. Access to the laboratory facilities was restricted to designated personnel and the keys were kept with the laboratory management. Environmental conditions were monitored and documented.

8. Equipment, instrument and other devices

A list of equipment used in the laboratory, with information about brand and model was available in the LIF.

Equipment and/or related qualification documentation were available to support the adequacy of their calibration/validation certificates.

9. Contracts

The laboratory had a procedure in place for Purchasing, receiving of services and supplies. Procurement was performed in accordance with the Ghana Public Procurement Act.

The laboratory subcontracted some testing of samples to the USP Ghana laboratory with a list of approved suppliers available.

10. Reagents

The reagents used were of appropriate quality and correctly labelled. The reagents were kept in a container room, locked with restricted access. Environmental conditions were monitored.

The laboratory used de-ionized or ultra-pure water produced by two separate water systems for all analytical activities, including rinsing of glassware. Records for the verification of water quality was available.

11. Reference substances and reference materials

Reference substances (RS) were appropriately stored where the environmental conditions were monitored, and expiry dates monitored. Only official pharmacopeial standards in their original containers were used for the purposes described in the corresponding monographs. Reference standards were re-used once open. The identification number was quoted on the analytical worksheets whenever the reference substance was used. Certificate of analysis and safety data sheet were available.

12. Calibration, verification of performance and qualification of equipment, instruments and other devices

Each instrument was uniquely identified. Labels indicated the status of the calibration and the date when recalibration was due. Balances were checked daily according to the SOP using internal calibration and certified test weights. Requalification was performed using certified reference weights. Records/logbooks were kept for items of equipment with information to identify the device, current location, maintenance carried out, history of damage, malfunction, modification or repair. Use of the instrument was recorded in instrument dedicated logbooks.
The validation/qualification policies of the laboratory were documented in the validation master plan supported by the necessary instrument/equipment specific SOPs.

13. Traceability

Test results were traceable, were appropriate, ultimately to primary reference substances.

14. Incoming samples

The laboratory did not normally participate in collection of samples. Samples were typically submitted by internal or external customers, i.e.:

- The FDA product registration department, i.e. registration samples
- The FDA unit responsible for post marketing surveillance
- Various directorates through the FDA.

A test request accompanied each sample submitted to the laboratory and contained the following information:

- description of the sample
- specification to be used for testing
- required storage conditions

The test requests were reviewed by the laboratory to ensure that the laboratory had the resources to meet them and that the selected tests/methods were capable to meet the customers' requirements.

All delivered samples and accompanying documents were assigned a sample registration number. An electronic register was kept in which the following information was recorded:

- registration number of the sample,
- date of receipts,
- unit to which the sample was forwarded.

Prior to testing, the samples were stored in the sample room. The samples were sent for testing to the specific laboratory together with the test request by the sample custodian.

15. Analytical worksheet

The analysts recorded information about samples, performed testing procedures, calculations, and results in analytical worksheet.

The worksheets contained the following information:

- The test starting date
- Reference to specifications
- Identification of test equipment used
- Reference substances, reagents and solvents employed
- Interpretation of the results and the conclusion whether the sample was found to comply with the specifications

The completed analytical worksheet pages were signed by the responsible analyst and verified, approved and co-signed by the supervisor.

16. Validation of analytical procedures

Most current compendial methods of internationally recognised pharmacopoeias were mainly used, but manufacturer methods were also used by the laboratory. Standard methods were subject to verification in accordance to the SOP for method verification to ensure suitability for intended use.

17. Testing

Test procedures were described in analyst worksheets and certificate of analysis (COA) were issued by the laboratory based on information recorded in analytical worksheets. The COA further included the following information:

- reference to the specifications and methods used
- the results of all tests performed (or numerical result with the SD of all tests performed)

An SOP for the management of deviations in the laboratory was available.

18. Evaluation of test results and OOS investigation

An SOP was in place describing the management and review of results in laboratory worksheets. An SOP was also in place describing the conduct of investigations of OOS test. When a doubtful result (suspected OOS result) was identified, a review of the procedures applied during the testing process was undertaken by the supervisor and the analyst.

19. Certificate of analysis

A certificate of analysis was prepared for each sample/batch of a substance or product and contained series of information, among others:

- the results of the tests performed with the prescribed limits
- a conclusion as to whether or not the sample was found to be within the limits of the specification
- the date on which the tests were completed

20. Retained samples

The laboratory indicated that they were not responsible for the retainment of samples, as this is the responsibility of the FDA (regulator).

21. Safety

In general, adequate measures were put in place for the safeguard of personnel.

22. Quality Risk Management

An SOP was in place for risk management which specified the steps involved, stakeholders, roles and responsibilities associated with risk management in the laboratory. A multidisciplinary team (consisting of members of all division as appointed by the Director of the Centre) is responsible for the implementation of the procedure and management of identified risks.

23. Data integrity

The laboratory had a written policy and SOP in place for data integrity. The laboratory had a SOP in place to ensure that good documentation practices are implemented for all paper data. An SOP for the routine review and approval of data requires the review of all data generated by a second qualified person. The review process is facilitated by a check list which provides guidance on what should be reviewed. Evidence of the review is maintained.

Data integrity related risks have been discussed at management review and an FDA strategic plan has been developed to upgrade the laboratory computerized systems to replace legacy systems.

Miscellaneous	
Assessment of the Laboratory Information File	LIF with effective date 9 November 2021 was provided.
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 the Inspection Report, the ***Food and Drugs Authority, Accra – Ghana, Centre for Laboratory Services and Research,*** located at ***17th Indian Ocean Street Nelson Mandela Avenue, South Legon Commercial Area Shiashie Legon, Accra, Ghana*** is considered to be operating at an acceptable level of compliance with WHO Good Practices for Pharmaceutical Quality Control Laboratories Guidelines.

All the non-compliances observed during the inspection that were listed in the full report as well as those reflected in the WHOPIR, were addressed by the Laboratory, 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. Forty-fourth Report. Geneva, World Health Organization, 2010 (WHO Technical Report Series, No. 957), Annex 1.
   Short name: WHO GPPQCL Guidelines or ***TRS No. 957, Annex 1***
   http://www.who.int/medicines/publications/44threport/en/

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
   http://whqlibdoc.who.int/trs/WHO_TRS_961_eng.pdf?ua=1

3. WHO good manufacturing practices: water for pharmaceutical use. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fourth-sixth Report. Geneva, World Health Organization, 2012 (WHO Technical Report Series, No. 970), Annex 2.
Short name: WHO TRS No. 970, Annex 2
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_970/en/

4. 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
http://whqlibdoc.who.int/trs/WHO_TRS_929_eng.pdf?ua=1

5. Guidance on good data and record management practices. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fiftieth Report Geneva, World Health Organization, 2016 (WHO Technical Report Series, No. 996), Annex 5.
Short name: WHO GDRMP guidance or ***WHO TRS No. 996, Annex 5***
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex05.pdf

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***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_986/en/

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***
http://www.who.int/medicines/publications/44threport/en/

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
http://www.who.int/medicines/publications/44threport/en/

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
http://whqlibdoc.who.int/trs/WHO_TRS_961_eng.pdf?ua=1

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
http://whqlibdoc.who.int/trs/WHO_TRS_961_eng.pdf?ua=1

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. 961), Annex 9. ***Short name: WHO TRS No. 961, Annex* 9**
http://whqlibdoc.who.int/trs/WHO_TRS_961_eng.pdf?ua=1

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***
http://whqlibdoc.who.int/trs/WHO_TRS_943_eng.pdf?ua=1

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 8. **Short name: WHO TRS No. 1010, Annex 8**
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_1010/en/

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***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_981/en/

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***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_981/en/

16. WHO guidelines for drafting a site master file. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-fifth Report Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 961), Annex 14. ***Short name: WHO TRS No. 961, Annex 14***
http://whqlibdoc.who.int/trs/WHO_TRS_961_eng.pdf?ua=1

17. WHO Guidelines on good manufacturing practices: validation, Appendix 7: non-sterile process validation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-ninth Report Geneva, World Health Organization, 2015 (WHO Technical Report Series, No. 992), Annex 3. ***Short name: WHO TRS No. 992, Annex 3***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/WHO_TRS_992_web.pdf

18. 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***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/WHO_TRS_992_web.pdf

19. 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***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/WHO_TRS_992_web.pdf

21. Supplementary guidelines on good manufacturing practices: validation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fortieth Report. Geneva, World Health Organization, 2006 (WHO Technical Report Series, No. 937), Annex 4.
Short name: WHO TRS No. 937, Annex 4
http://whqlibdoc.who.int/trs/WHO_TRS_937_eng.pdf?ua=1

22. Guidance for organizations performing in vivo bioequivalence studies. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fiftieth Report Geneva, World Health Organization, 2016 (WHO Technical Report Series, No. 996), Annex 9.
Short name: WHO BE guidance or ***TRS996 Annex 9***
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex09.pdf