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Prequalification Team Inspection Services
WHO PUBLIC INSPECTION REPORT
(WHOPIR)
Quality Control Laboratory

Part 1	**General information**		
Inspected laboratory details			
Name of Laboratory	Pusat Pengembangan Pengujian Obat dan Makanan Nasional National Quality Control Laboratory of Drug and Food (NQCLDF)		
Address of inspected laboratory site	National Quality Control Laboratory of Drug and Food, Building 1, Third Floor of PPPOMN, Jalan Percetakan Negara 23, Jakarta Pusat, 10560, Indonesia		
Inspection details			
Dates of inspection	18-20 February 2019		
Type of inspection	Routine inspection		
Introduction			
Brief description of testing activities	**Type of Analysis**	**Finished Products**	**Active Pharmaceutical Ingredients**
	Physical/Chemical analysis	pH, Water Content (Karl Fischer), Loss on Drying, Dissolution, Uniformity of Dosage (mass or content)	Not applicable
	Identification tests	HPLC (UV-Vis, PDA, fluorescence, RI detection), Spectrophotometry and basic tests	Not applicable
	Assay, impurities and related substances	HPLC (UV-Vis, PDA, fluorescence, RI detection), GC-FID, Spectrophotometry, Volumetric and Potentiometric Titrations and Gravimetry	Not applicable
	Microbiological analysis	Not applicable	Not applicable
	Miscellaneous	Not applicable	Not applicable

General information about the laboratory	The Medicines Laboratory of the Physical Chemistry of Medicines, Narcotics and Psychotropic Section within the Therapeutic Product and Hazardous Substances Division (PTBB) for the National Quality Control Laboratory of Drug and Food (PPOMN) of the National Agency of Drug and Food Control (Badan POM) was established in 2001 by BPOM SK number 02001/SK/KBPOM tahun 2001. It is a government laboratory independent of the Indonesian Ministry of Health. The Medicines Laboratory is responsible for providing quality analytical testing of therapeutic product to the government of Indonesia. It is one of four laboratories within PTBB dedicated to ensuring the quality of therapeutic products by performing testing to confirm and or investigate medicines quality under the mandate of SK 02001/SK/KBPOM tahun 2001, Article 318. In addition to product testing, the Medicines Laboratory is mandated to develop analytical methods and provide training for testing therapeutic product and hazardous substances for 33 provincial quality control laboratories throughout Indonesia. In February 2018, the name of The Medicines Laboratory of the Physical Chemistry of Medicines, Narcotic and Psychotropic Section within PTBB Division for PPOMN was changed into Medicines Sub Division within Chemical Division of Medicines, Narcotic, Psychotropic, Precursor, and Addictive Substances (NAPPZA) of PPPOMN". The change was due to regulation of National Agency of Drug and Food Control Number 26, 2017.
History	This was the second WHO PQ inspection of the NQCLDF. The first inspection was conducted in May 2018, non-compliant. In 2018, the laboratory was accredited to ISO 9001:2015 and ISO 17025:2005. The laboratory will go for the ISO 17025:2017 accreditation by the end of 2020.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	- Quality Management System - Documentation and Records - Premises and Equipment - Validation - Qualification - Calibration - Laboratory Practices - Reference standards - Reagents – Water
Restrictions	Not applicable

Out of scope	The microbiological laboratory was not included in the scope of this inspection. Also, testing of active pharmaceutical ingredients was out of the scope of this inspection.

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
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 the findings and comments

1. Organization and Management

The National Agency of Drug and Food Control (NADFC) is an institution which has the authority to conduct quality assurance and safety of drugs and food circulating in the territory of the Republic of Indonesia. Therefore, a reliable quality testing laboratory is required to provide recommendations for follow-up and supervision. Based on the Regulation of National Agency of Drug and Food Control Regulation Number 26, 2017 concerning the Organization and Work Management of National Agency of Drug and Food Control, The National Quality Control Laboratory of Drug and Food (NQCLDF) conducts quality testing of medicines and food products.

Chemical Division of Medicines NAPPZA is defined in NQCLDF organizational structure which is regulated in NADFC Regulation Number 26 of 2017 addressing Organization and Work Management for the National Agency of Drug and Food Control. The National Quality Control Laboratory of Drug and Food is under coordination and reports to the Permanent Secretary of the NADFC.

2. Quality management system

The Quality Manual was prepared as a guideline on the structure and scope of Quality Management System of the Chemical Division of Medicines, Narcotic, Psychotropic, Precursor and Addictive Substances (Chemical Division of Medicines NAPPZA) within the National Quality Control Laboratory of Drug and Food and refers to the Management System Guidelines which integrates the requirements of the relevant WHO TRS Guidelines (WHO TRS 957, 2010 Annex 1; WHO TRS 986, 2014 Annex 2; WHO TRS 996, 2016 Annex 5; WHO TRS 981, 2013, Annex 2; WHO TRS No. 937, Annex 4; WHO TRS 996, 2016 Annex 4; ICH Q9, Quality Risk Management Version 4, 2005 with ISO/IEC 17025).

The updated quality manual incorporated the data management procedure to ensure data integrity. This amendment was made in response to the observation raised by the WHO PQ inspection team on good data and record management practices in the last audit.

The SOP for internal audit was in place. This procedure has not been made effective as training has not been imparted yet. The qualification criteria for the internal auditors were incorporated in the revised procedure. The checklist used for the internal audit was revised based on the recommendation of WHO TRS 957.

The SOP for the management review / MR was discussed. The MR was performed at least once per year to ensure the effectiveness of the quality management system. The topics that are discussed as part of this reviews included external/internal audits, change management, document control system, corrective and preventive action efficiency, the activity of testing, staff training etc. In general, the procedure appeared to be exhaustive and covered several laboratory activities as part of the MR.

The issues related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

3. Control of documentation

Chemical Division of Medicines NAPPZA implements Good Documentation Practices by establishing and controlling all internal and external documents and other quality documents. The document used is updated and approved, has unique identification numbers with version control, has clarity and not having a double meaning, reviewed and distributed in accordance with the Procedure on Document Control. Before issuance of the document, it should be approved, signed and dated by authorized personnel. Documents are created, revised, verified, authorized, distributed, stored, obsoleted (if applicable) and destroyed/retained in accordance with the defined procedure.

The SOP for the document control was discussed. The documents were divided into four levels namely:

- Level 1: Quality Manual: Describe the outline of the policy of quality management system of Chemical Division of Medicines NAPPZA, NQCLDF.
- Level 2: Standard Operating Procedure: description of the quality manual to control work activities conducted at Chemical Division of Medicines NAPPZA.
- Level 3: Work Instruction: Instruction for each step for performing activities include operational equipment or necessary other specific activities
- Level 4: Supports: Comprising forms, references, equipment manual, quality records, and others. For a specific purpose, documents can be translated into English

The procedure defined the retention policy for both hard and soft copies of the documents. Both hard and soft copies were retained for 5 years from the obsolete date. A separate procedure "Electronic and quality document data backup" was in place. This procedure provided a guideline for backup of electronic data.

Hard or soft copy of documents is controlled by designated Quality Team members. Master documents of quality documents are stored in soft copy. Only original documents and controlled copy of the Quality Manual, Standard Operating Procedures and Work Instructions are available in hard copy. The distribution of hard copies and soft copies is controlled by designated Quality Team members. Quality system documents are evaluated in the annual basis and stored for 5 (five) years from the obsolete date.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

4. Records

The laboratory established procedures for the documentation, identification, collection, compilation, indexing, retrieval, storage, maintenance, disposal and access of all technical and testing records. All technical and quality records made are legible, readily available, and kept in appropriate conditions to prevent changes, deterioration, damage, and loss. The original records (e.g. the analyst laboratory notebook) were kept in a secure manner by the assigned responsible personnel to ensure confidentiality. Records were managed in accordance with the procedure on Record Control.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

5. Data processing equipment

Computer software is used to collect, process, record, report, store and retrieve data. Data management procedures were available to ensure data integrity. The Access Right Control system and the Audit Trail system in instrument devices were in place to ensure that documentary evidence of the sequence of activities that occurred was captured and prevent electronic data/records from possible access and tampering by unauthorized personnel. Electronic data was backed up in accordance with the Procedure on Electronic Data Backup and Quality Document to prevent data loss.

A `Laboratory data integrity using LabSolutions software` procedure was drafted after the last WHO PQ inspection. The procedure is applicable to laboratory equipment such as HPLC, GC, UV-VIS and IR spectrometer. In addition, a separate procedure was drafted for handling manual integration for GC and HPLC equipment. It was noted that administrator privileges were given to IT personnel and vendor. Other than GC, HPLC, FTIR, and UV-VIS, the rest of all the laboratory equipment/instruments were standalone.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

6. Personnel

Chemical Division of Medicines NAPPZA has adequate qualified personnel with the relevant academic qualification, training, competence, technical knowledge and working experience for the scope of works.

The Top Manager is the Head of the National Quality Control Laboratory of Drug and Food who has a task, authority, and responsibility to establish technical policies and quality management system, to implement, monitor, evaluate and reported.

The Technical Manager is the Head of Chemical Division of Medicines NAPPZA who has a task, authority and responsibility to establish technical policy, sample handling in the laboratory, testing of chemical substances of drug, narcotic, psychotropic, precursor and addictive substances, issuing certificates of analysis and to ensure the availability of sufficient resources for the testing operation.

The Quality Manager is the Lead of the Quality Assurance Team or Quality Team who has task to ensure the compliance of quality management system implementation, to identify deviations occurred in the quality management system and initiate actions to prevent or minimize deviations, to report the management system performance and improvements needed and also to ensure the effectiveness of laboratory activities.

The Administrative Manager is the Head of Administration Sub Division who has task, authority, and responsibility to conduct and manage the administration of samples receipt for testing, transfer to the laboratory and delivered the testing reports to the customer.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

7. Premises

The laboratory facility on the third floor of the building is compartmentalized into multiple rooms for various functions layout in a logical manner. Overall the laboratory is an adequate size, designed and appropriate layout for its operation. The layout including the placement of the instrument was made according to the functional needs of each room to ensure the quality, safety, and effectiveness of the testing conducted.

The laboratory is effectively ventilated, cleaned, sufficiently lighted with adequate electricity resources and the environmental condition is monitored, controlled and recorded to ensure a safe work environment.

The individual rooms of the laboratory are equipped with the appropriate instruments and equipment for its function. Some of these rooms include the weighing room, sample preparation room, instrument rooms (individually for HPLC and UV, GC, Dissolution Tester, FTIR), reagent storage room and archive storage room. Reference standard storage room and sample storage room are available for ambient conditions, cold temperatures, and freezing temperatures.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

8. Equipment, instruments and other devices

Chemical Division of Medicines NAPPZA is adequately equipped for its operation and the testing equipment was appropriately designed, constructed, located, calibrated, qualified/verified and maintained based on the conditions and needs of each instrument. The types of equipment and instruments were available in sufficient quantities, and they were regularly maintained and conditioned in a ready state to provide valid testing, validation, and verification. The equipment was operated by qualified personnel.

It was noted that for the eleven units of balances 4 printers were available. The micro balance was equipped/connected with a printer, the 6 units of analytical balances was equipped/connected with two printers (one printer for 3 balances each), one analytical balances equipped/connected with one printer. Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

9. Contracts

The laboratory does no.perform any third party contacting with other laboratories.

The Chemical Division of Medicines NAPPZA has a procedure on selection and purchase of goods and services to support testing which can affect the test results. Proposals for procuring goods and services specifications are submitted by the Chemical Division of Medicines NAPPZA and the procurement is conducted by the Administrative Sub-Division as directed by the Presidential Regulation Number 4 of 2015.

The observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

10. Reagents

Chemical Division of Medicines NAPPZA uses reagents from qualified and approved suppliers with quality as specified in applicable specifications. Reagents that were directly used or prepared in the laboratory were labeled to ensure proper identification, traceability and the assigned responsible personnel. The limits on the use of reagent were established and monitored to ensure expired reagents are not used for testing. The preparation of reagents for use by the laboratory is in accordance with the appropriate compendial method and are required to be documented.

Preparation and handling of volumetric solutions: It was noted that procedure was revised since the last WHO PQ inspection pertaining to the preparation and standardization of volumetric solutions. The US Pharmacopoeia was referred for the preparation and standardization. A separate procedure was also in place "testing by titration of the volumetric solution". Separately, another procedure "sample testing" was in place describing acceptance criteria for titrations. A logbook was maintained recording the details of volumetric solutions preparation including printouts from the analytical balance. It was noted that the laboratory has made an improvement regarding the handling and documentation of volumetric solutions. It is recommended to avoid having multiple SOPs on the same subject.

Water: the laboratory uses Milli-Q water for the preparation of reagents and solutions. The ASTM standard specification for Reagent Water was referred to for monitoring the quality of the water. As per the ASTM standard, water was graded from Type I to IV. Water used for preparing reagent was graded as Type-I. The laboratory routinely monitors the water and record the temperature, resistivity, and TOC twice a day from Milli-Q display and does not perform another testing.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

11. Reference substances and reference materials

For analysis purposes, the laboratory uses reference standards. For calibration/qualification of laboratory measuring equipment, the laboratory uses traceable reference materials. The SOP on the handling of reference standards was in place which provided the responsibility, use for bin card (aka stock card) and other details. It was noted that the laboratory does not prepare and use working standards. The stock card was maintained for the usage of reference standards. An excel sheet was maintained for all reference standards and was verified for their expiry and differentiated using different color codes (red for expired standard etc.). The excel sheet was updated every two months and expiry of the standards was verified before their usage.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

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

A Master List of Equipment was available for the main equipment and supporting equipment. Measuring instruments were calibrated regularly. Calibration of the measuring instrument by external parties was done through the evaluation of vendor selection and provision of the written contract. Equipment qualifications were conducted for new equipment, when equipment is moved or when there is a replacement in major equipment part that can affect the measurement results with the objective to ensure the equipment is in good working condition according to its designation.

The NQCLDF has a contract with the vendor. Based on the calibration due date of respective equipment, the laboratory contacts the vendor. A protocol was prepared by the vendor listing tests to be performed as part of the calibration of equipment and instruments. GC Nexis was calibrated by Shimadzu.

Equipment operating procedure was discussed. The procedure delineated calibration and qualification procedure for the equipment and instruments used by the medicines laboratory. The instruments were qualified by the vendors whereas calibration was performed either by in-house personnel or by the external party. Another procedure "equipment qualification" was in place. The protocol for the qualification of equipment was prepared by the vendor and was approved by the laboratory. The procedure was developed based on the references provided under the OMCL Network of the Council of Europe.

The vendor had performed Operation Qualification for GC, HPLC, and other equipment however it was merely the calibration. The GC and HPLC systems were calibrated once every year as stated in the respective operating procedure.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

13. Traceability

The laboratory ensures that testing is conducted using traceable verified/ validated method of analysis and materials, including reference material used, calibration or qualification of instruments using certified and traceable reference materials to the International Standard unit.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

14. Incoming samples

Chemical Division of Medicines NAPPZA conducts testing in term medicine quality control or investigation testing and for analysis method development. Testing for drug quality control is conducted with an adequate amount of sample that is enough for conducting retest and for the retained sample. The exception applies for investigation testing. Sample receipt is provided with a unique identification number.

A test sample may come from internally NADFC which may include the Directorate of Control of Distribution and Service of Drugs, Narcotics, Psychotropic, and Precursor Drugs; Directorate of Control of Safety, Quality, and Exports Imports for Drugs and NAPPZA; Provincial QC Laboratory, as well as other sections. External samples may come from the Police, Customs, Ministry of Health or other parties.

Customers who will submit testing should fill out the Test Request Form which contains, among other things, the test objectives, test parameters, and analytical methods. Review of testing requests is carried out by the Chemical Division of Medicines NAPPZA laboratory personnel. Base on the confirmation from the Sample Receiving Unit, to ensure that the laboratory has sufficient capabilities and resources to meet the customer demands. The sample receiving officer checks the suitability of the data and the condition of the sample with the accompanying document. The Test Request Form is signed by the customer and laboratory personnel as proof of approval for the test request.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

15. Analytical worksheet

Chemical Division of Medicines NAPPZA uses Test Record, Analytical Record Sheet and Notebooks to record the process and test data for each sample tested. Analytical record sheet which was an attachment to a Certificate or Test Report contained information of the sample been tested, testing conducted, the raw data produced at the time of analysis and/or traceable to the data source, calculation, and conclusion of test results. The notebook was an analyst record contains each analyst's work information in conducting testing including sample information, work method, raw data produced, data analysis, calculations, and conclusions.

The SOP for Sample Testing was discussed which essentially provided the sample analysis workflow. Issuing Certificate of Analysis or Testing Report procedure described how analytical results from the laboratory notebook were transferred to Analytical Record Sheet, Test Record before the certificate of analysis was prepared. It appeared that the number of procedures was in place for a similar subject which might cause confusion. The content of the certificate of analysis was verified against WHO recommended content and in general, appeared to be acceptable. It was commented that the conclusion should be specific as to test sample complies against which requirements/standards.

Analytical testing record using a standard template was in place which basically summarized the results from the laboratory notebook. However, it was noted that not all the sections of the analytical testing record were completed and left blank.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

16. Validation of analytical procedures

The laboratory uses validated analytical methods. Validation was conducted according to the validation protocol which consists of characteristics of performance analysis. The outcome of the validation including the results was documented in the validation report.

The SOP on analytical method validation was discussed. It was noted that analytical methods were validated if they were not in any pharmacopeia. The SOP on analytical method verification was also in place. Verification of Nevirapine tablet for assay test was discussed. Laboratory notebook captured the required dilutions and calculations except weighing balance printouts. From the review of the HPLC chromatograms, it was noted that some of the essential information e.g. date/time of the analysis, name of the analyst, equipment ID etc were not captured on the chromatograms printout. It was claimed that since December 2018, the laboratory had revised and started capturing all these details in the printout.

Validation of Lamivudine, Zidovudine and Nevirapine dispersible tablet for assay test was discussed. It was claimed that selectivity, specificity, precision, accuracy, linearity, robustness and force degradation study were performed as part of the analytical method validation. During the documentation review of the validation summary report, it was noted that the analyst laboratory notebook was not available as the analyst has kept it and she was on leave.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

17. Testing

The laboratory conducts sample testing using analytical methods according to customer requests. The test method is adjusted to the tested products using the current edition of the Indonesian Pharmacopoeia, United States Pharmacopeia, British Pharmacopoeia, or another international pharmacopoeia as a reference and where applicable.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

18. Evaluation of test results

Test results were evaluated in stages by the Verifier and the Technical Manager. Evaluation included all data generated from the test result, include raw data, calculation of test data result, print-out of measurement and other supporting data. If the test result ise identified as doubtful or suspected to be Out-of-Specification Test Result (OOS), an investigation would be conducted in accordance with the procedure on Handling Out-of-Specification Test Result.

Handling of Out of Specification (OOS) Result was discussed. The procedure was revised based on the WHO PQ inspection held in May 2018 and included phase wise investigation procedure. All OOS would be managed through Phase I (laboratory investigation) and Phase II (extended investigation) investigation

procedure. The procedure included the hypothesis testing for Phase-I. If the root cause was identified, initial results will be invalidated, and reanalysis will be performed in triplicate by the same analyst.

The Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

19. Certificate of analysis

Chemical Division of Medicines NAPPZA prepares Certificates of Analysis or Test Results Report as conclusions from each test sample. If needed, it can specify the value of measurement uncertainty.

Observations made related to this section have been adequately addressed by the laboratory and shall be verified during future inspections.

20. Retained samples

Retained samples are stored within the specified storage condition on the label of the product sample or based on customer requests. The number of samples provided must be of sufficient quantity for two full retests and stored in the final package. For samples that are limited in number, the remaining quantity of unused samples is considered as retained samples.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections.

21. Safety

Laboratory Safety procedures are available that describes on waste management, reagent handling procedures and sample handling procedures. During the work, each personnel equipped and required to put on the necessary personal protective equipment (PPE). Access to the laboratory of Chemical Division of Medicines NAPPZA is limited only for NQCLDF personnel.

The laboratory was equipped with safety equipment such as fire extinguishers, emergency showers, eye washers, spillage kits, fume hoods, cabinets that used for storage of flammable and acid reagents. Personnel working in laboratories apply hygiene satisfactorily and have appropriate personal protective equipment.

Observations made related to this section have been adequately addressed by the laboratory, and shall be verified during future inspections

Part 3	**Conclusion – Inspection outcome**

Based on the areas inspected, the people met and the documents reviewed, and considering the findings of the inspection, including the observations listed in the Inspection Report, ***National Quality Control Laboratory for Drug & Food***, located at ***Building 1, Third Floor of PPPOMN, Jalan Percetakan Negara 23, Jakarta Pusat, 10560, Indonesia*** was considered to be operating at an acceptable level of compliance with WHO GPPQCL 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 5	**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

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