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Prequalification Unit Inspection Services
WHO PUBLIC INSPECTION REPORT
WHOPIR
Finished Product Manufacturer

Part 1	**General information**
Manufacturers details	
Name of manufacturer	**PharmEvo (Pvt.) Ltd.**
Corporate address of manufacturer	402, Business Avenue, Block-6, P.E.C.H.S, Shahrah-e-Faisal, Karachi – 75400, Pakistan
Inspected site	
Name & address of inspected manufacturing site	A-29 North Western Industrial Zone, Port Qasim, Karachi – 75020, Pakistan Latitude: 24.8273262 Altitude: 67.29502950000006
Unit / block / workshop number	Tablet manufacturing area Liquid manufacturing area
Manufacturing license number	Manufacture License (Form 2): No. 000504 Validity: 5 October 2022 – 5 October 2027 GMP Certificate No. 003/2024-DRAP (K) Validity: 10 January 2024 – 9 January 2027
Inspection details	
Dates of inspection	11 – 13 September 2024
Type of inspection	Routine inspection
Inspection record number	INSP-FPP-2023-0031
Introduction	
Brief description of the manufacturing activities	The site is engaged in the manufacture of a wide range of pharmaceutical products and dosage forms, including 1. Non-cephalosporin dosage forms 1.1. Oral solids (tablets, capsules, and sachets) 1.2. Oral liquids (syrup) 1.3. Dry powder inhaler (DPI) 2. Cephalosporin dosage forms 2.1. Oral solids (tablets and capsules) 2.2. Dry powder suspension 2.3. Sterile powder in vials and ampoules 3. Nutraceutical products
General information about	PharmEvo (Pvt.) Limited was incorporated on the 7th of October 1999 as a healthcare company, which is engaged in the manufacture, and marketing of

the company and site	pharmaceutical products, including over-the-counter (OTC) medicines, and nutraceuticals. Products manufactured at the site are for the domestic market local consumption as well as for the export markets.
History	This is the fourth WHO PQ inspection of PharmEvo (Pvt.) Limited, Karachi. The manufacturing site was previously inspected by WHO PQ in July 2018, March 2020 and September 2022.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	The inspection covered the following areas: • Tablet manufacturing area • Liquid manufacturing area • Quality control • Warehouse including raw materials warehouse, packaging materials warehouse and finished goods warehouse
Restrictions	Due to time limitations, the "self-inspection, quality audits, and suppliers' audits and approval" was not covered in depth. This area was previously well covered during the last WHO inspection in 2022.
Out of scope	Products and facilities not related to WHO Prequalification
WHO products numbers covered by the inspection	DI009 Zinc (sulfate) Tablet, Dispersible 20mg DI010 Zinc (sulfate) Syrup 10mg/5ml
Abbreviations	**Meaning**
AHU	Air handling unit
ALCOA	Attributable, legible, contemporaneous, original and accurate
API	Active pharmaceutical ingredient
APR	Annual product review
APS	Aseptic process simulation
BMR	Batch manufacturing record
BPR	Batch production record
CC	Change control
CFU	Colony-forming unit
CIP	Cleaning in place
CoA	Certificate of analysis
CpK	Process capability
DQ	Design qualification
EDI	Electronic deionization
EM	Environmental monitoring
FMEA	Failure modes and effects analysis
FPP	Finished pharmaceutical product
FTA	Fault tree analysis
GMP	Good manufacturing practices
GPT	Growth promotion test
HEPA	High efficiency particulate air
HPLC	High performance liquid chromatography (or high performance liquid chromatography equipment)
HVAC	Heating, ventilation and air conditioning

IQ	Installation qualification
LAF	Laminar air flow
LIMS	Laboratory information management system
MB	Microbiology
MBL	Microbiology laboratory
MF	Master formulae
MFT	Media fill Test
MR	Management review
NC	Nonconformity
NCA	National control authority
NCL	National control laboratory
NRA	National regulatory agency
OQ	Operational qualification
PHA	Process hazard analysis
PLC	Programmable logic controller
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
RO	Reverse osmosis
SIP	Sterilization in place
SMF	Site master file
SOP	Standard operating procedure
URS	User requirements specifications
UV	Ultraviolet-visible spectrophotometer
WFI	Water for injection

Part 2	**Summary of the findings and comments (where applicable)**

1. Pharmaceutical quality system

The company had a well-documented pharmaceutical quality system (PQS), which was demonstrated through the quality manual, policies, protocols, and written procedures covering essential GMP principles at the site.

Management review meetings were conducted quarterly as per the SOP. The managing director at the site chaired the management review meetings, while the general manager of quality operations approved the agenda and minutes of the meetings. An agenda for the management meeting was defined in the procedure, and a review of various aspects of the QMS was included.

Minutes of Q3/2024 and minutes of the Q4/2024 meetings were selected for review. The records contained a list of participants, action points, responsibilities, and timelines for actions.

Quality risk management
Quality risk management procedure was in place. The scope was applicable to all products, systems, and GMP compliance at the site. The SOP described the responsibility of all persons involved in the risk management process. The head of Quality Operations was responsible for approving risk assessment reports and mitigation plans. Risk assessment committees of Subject Matter Experts (SMEs) were constituted by the senior manager QA to conduct the risk assessment. Risk assessment tools, including Failure Mode Effects and Criticality Analysis (FMECA), Hazard analysis and critical control points (HACCP), Fault Tree Analysis (FTA), and Preliminary Hazard Analysis (PHA), were described in the procedure. A risk matrix was used to assess the risk rating through the calculation of Risk Priority Numbers (RPNs).

Risk assessment plan for the site was in place. Several risk assessments were planned for the year 2024, including risk for contamination and cross contamination of products.

A risk assessment report using FMECA for the risk of cross-contamination of non-cephalosporin products with cephalosporin products was selected for review. As part of the risk assessment, an environmental performance qualification protocol for the prevention of cross-contamination at the site were discussed. This included sampling various “hot spot” locations for the detection of residues of cefixime (worst-case product) in the environment. The report showed no residues of cefixime were detected in the environment.

Product quality review
Product quality reviews were performed annually as per the relevant procedure. The procedure was revised since the previous inspection to include, among others, further elaboration of trending and process capability. At least ten batches were required to perform trend analysis using control charts and process capability. Batches from the previous year could be considered if the number of manufactured batches was less than 10. The acceptance limit for the CpK was set as 1.33, below which an investigation and CAPA were required.

A product quality review plan covering all products manufactured at the site for the year 2024 was in place and included product names and review periods. An extension of 60 days could be granted to complete PQRs, if necessary.

Product quality review reports for Zinc Sulphate 20mg tablet for the period from January 2019 to March 2021 and for Zinc Sulphate 10mg/5ml syrup for the period from January 2019 to March 2021 were selected for review.

Additional PQRs for products not related to WHO prequalification were selected for review to verify compliance with the product quality review program.

2. Good manufacturing practices for pharmaceutical products

In general, the main concepts and principles of GMP were followed by PharmEvo throughout the production and quality control of medicinal products. The documentation of the manufacturing

processes (production and control) was captured in several records, including the batch dispensing records, batch production records, batch packaging records, and analytical records.

3. Sanitation and hygiene

In general, premises were maintained at an acceptable level of sanitation and hygiene. Production areas, quality control areas, and warehouses, as well as equipment, tools, and utensils, were subject to cleaning and sanitation at regular intervals as per the respective procedures.

4. Qualification and validation

Several key documents, including the validation master plan and the relevant procedures (e.g., the procedure for process validation), guided the qualification and validation activities, including the process validation.

The manufacturing of commercial batches of Zinc sulfate dispersible tablets was executed following the change control procedure. The mentioned change was still open by the time of the inspection and had not yet been completed since some related activities were pending. The change controls involved a wide range of activities, including checks of materials, updates of documents, process validation, cleaning validation, analytical method verification, hold time study, and charging the batches on the stability program.

The manufacturing of commercial batches of Zinc sulfate syrup was completed following the change control procedure. The mentioned change control has not yet been completed pending the completion of the cleaning validation. The change controls involved a wide range of activities, including checks of materials, updates of documents, process validation, cleaning validation, analytical method verification, hold time study, and charging the batches on the stability program.

The process validation protocol of Zinc Sulphate syrup was completed as documented within the process validation report. Three batches were considered for PV. The batch dispensing record, batch manufacturing record, batch packaging record, and analytical records of one of the three PV batches was spot-checked.

5. Complaints

Complaints related to product quality were managed in accordance with the SOP on product technical complaints. QA was responsible for logging complaints and assigning unique complaint numbers, while Head of Production, QA, and QC were responsible for participation in the investigation of complaints. The complaint investigation process involved an initial assessment of the received complaint, using checklist and root cause analysis using the 6M method.

Complaints were classified as Classes I (critical complaints), II (Major complaints), and III (Minor complaints) depending on the significance of the impact on the quality of the product and on the health of patients. Timelines for managing the different complaint classes were described in the SOP. A separate procedure namely SOP for processing, evaluating and reporting of adverse drug events and safety related product complaints was in place to manage safety related complaints. Records of complaints were required to be reviewed during APQRs and management review meetings and trended on a quarterly basis.

The complaints log document was reviewed and few complaints were spot-checked.

6. Product recalls

Product recalls were managed according to the relevant procedure. Recalls were classified into classes I, II, and III based on the level of impact on the health of defective products, with recall levels A (patient level), B (retailer level), and C (distributor level). Timelines for the initiation and conclusion of recalls were described in the SOP. A recall committee was responsible for managing the recall decision.

The recall log was reviewed and the most recent recall of was spot-checked.

Mock recalls were required to be performed each year if an actual recall was not executed. An example of mock recall report was presented.

7. Contract production, analysis, and other activities

PharmEvo contracted out no production activities. Very few testing activities, on the other hand, were outsourced to qualified service providers.

Due to limitations at Pharmevo for testing DEG/EG using GC, Pharmevo outsourced the testing for DEG/EG to an external laboratory named Dow University of Health Sciences (DUHS). A quality agreement was in place between Pharmevo and DUHS. A supplier evaluation was completed was performed through an onsite audit.

8. Self-inspection, quality audits, and suppliers' audits and approval

This was not covered during the inspection due to time limitations and considering the fact that this area was previously well covered during the last WHO inspection in 2022.

9. Personnel

PharmEvo had adequate personnel covering the key GMP functions at the facility. Personnel were observed to have several qualifications in science areas such as pharmacy and chemistry. Key personnel interviewed were observed to be knowledgeable and experienced in their areas of expertise. Job descriptions and organization charts were in place.

10. Training

Training at PharmEvo was managed in accordance with the SOP for training program. A training coordinator from the QA department was involved in the process of conducting a training needs analysis in collaboration with the Head of department concerned. The training plan included various GMP topics such as data integrity awareness, deviation management, and training on safety aspects, among others.

Several training records were selected for review. Training records, including participants' attendance records, assessment reports, and training evaluations, were in place.

11. Personal hygiene

Documented sanitation and personnel hygiene measures were generally in place. The sanitation and hygiene measures in place during inspection were generally acceptable. Personnel working in the cephalosporin section were dedicated and required to wear different color-coded gowns.

12. Premises

PharmEvo's premises were, in general, well designed, qualified, and maintained. The premises were observed to fit the manufacturing, production, and control purposes. A new multi-story building was under construction and was planned to serve as dedicated warehouse. The premise's design and finishes supported the ease of personnel and materials movements as well as the cleaning and sanitation processes.

Minor changes had been introduced to the premises since the last WHO inspection.

13. Equipment

In general, the equipment was well-designed, qualified, and maintained. The equipment was observed to fit the manufacturing including production and control purposes. A few changes have been made to the equipment since the last WHO inspection. Some of these changes were spot-checked.

14. Materials

In response to concerns of DEG/EG contamination of finished products and based on quality alerts made by WHO, Pharmevo executed the SOP for quality alert including completion of the respective form for quality alert notification. The quality alert notification form successfully captured the risks of contamination with DEG/EG in both raw materials and finished products. Actions considered within the alert notification included:

- testing of already purchased materials for DEG/EG traces.
- revision of the suppliers list and disqualification of suppliers not able to ensure low risks of contamination with DEG/EG traces within the supplied materials.
- amendment of the SOP for inspection, sampling, and dispensing of raw materials where sampling of each container of each batch of sorbitol and glycerin was indicated.
- amendment of the test method of sorbitol and test method of glycerin where testing for DEG/EG traces in each container of each batch of sorbitol and glycerin was indicated.
- verification testing of three batches of potential finished products for traces of DEG/EG.

Pharmevo outsourced the testing for DEG/EG to an external laboratory. A quality agreement was in place between Pharmevo and that laboratory. A supplier evaluation was completed through an onsite audit. The analytical method verification report for detection of EG and DEG by GC/MS at the concerned laboratory was spot-checked.

15. Documentation

The documentation system at PharmEvo was generally well-established. Procedures on creating SOPs and control of quality documents and records were available. The issuance, revision, superseding and withdrawal of documents were controlled. Specifications were established for raw materials and finished products. Batch related records were maintained for each product manufactured at the facility.

16. Good practices in production

Dispensing operations were guided by the procedure for dispensing raw materials in non-cephalosporin, cephalosporin, and nutraceutical warehouses. Two dispensing booths equipped with unidirectional airflow were in place to facilitate dispensing operations. The dispensing operations for one product (tablets) were observed.

Packaging operations were guided by the procedure for secondary packing operations in the non-cephalosporin production packing area. The packaged units were not weighed individually; rather, a number of packages were weighed collectively versus some acceptance range based on some calculation of individual package weight. The actual packaging operations of few products were observed by the WHO inspection team.

17. Good practices in quality control

The inspection team toured the quality control laboratory including the wet chemistry laboratory, the instruments laboratory, and the microbiological laboratory where the related equipment and documents were inspected, and spot checked. In general, the quality control premises were clean and adequate for the exercise of different testing and control activities.

Sample receipt and management.

Samples for raw and finished product testing were received in the laboratory for testing according to the SOP for raw material and finished product analysis. Sample details, including material name, sampling date, and total quantity sampled, among others, were entered in a sample receipt logbook. Laboratory samples were allocated to analysts based on the competence matrix.

Standard test procedures, specifications, and results.

Standard test procedures were maintained for each product tested at the laboratory. Results for each test were recorded in analyst dedicated laboratory notebooks. The notebooks were observed to be controlled and periodically reviewed by a designated senior analyst. Raw data was transcribed into LIMS and reviewed prior to the generation of test results. The review procedure for laboratory results included a review of batch audit trails in the case of instruments such as HPLCs.

Compliance of instruments such as HPLCs with data integrity requirements was verified. SOP for access control of laboratory analytical instruments described the user levels and privileges for instruments like HPLC. Three levels namely technician, chemist, and admin were defined for accessing the HPLC instruments.

Out of Specification results

Handling of Out of Specification (OOS) results was described in the relevant procedure. The procedure described a 3-phase approach to the investigation of OOS results, including phase Ia, Ib, II and III. Extended investigations into manufacturing operations and hypothesis testing were included as part of the investigation procedure.

A number of OOS results were selected for review.

Out of Trend results

Handling of Out of Trend (OOT) SOP was in place and described the management of out-trend results in the laboratory. Two-phase investigations were initiated to determine any OOT result. Phase I laboratory investigation involves the investigation for assignable cause, and phase II involves a detailed laboratory investigation, including hypothesis testing according to a pre-defined criterion in checklist.

Reference standards

Primary and working standards were available and used in the testing of products. Two household refrigerators were available and used in the storage of standards at 2 – 8°C and freezer conditions (-

20°C). The validity of primary standards was verified monthly while working standards were used within 30 days from the date of opening. Records for the usage of working standards were maintained.

The SOP for stability studies program was in place. Three recently produced validation batches were considered within the stability program.

In general, the instruments at the microbiological laboratory were well-qualified and maintained. The PQ of the autoclave installed at the microbiological laboratory was performed by a contractor.

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, a decision on the compliance of ***PharmEvo (Pvt.) Ltd.***, located at ***A-29 North Western Industrial Zone, Port Qasim, Karachi – 75020, Pakistan*** with WHO guidelines on good manufacturing practices for pharmaceutical products will be made after the manufacturer's response to the observations has been assessed.

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 manufacturer, 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 GMP Guidelines referenced in the inspection report

1. WHO good manufacturing practices for pharmaceutical products: main principles. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-eight Report Geneva, World Health Organization, 2014 (WHO Technical Report Series, No. 986), Annex 2.
   Short name: WHO TRS No. 986, Annex 2
   https://www.who.int/publications/m/item/trs986-annex2

2. 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

3. WHO guidance on good practices for desk assessment of compliance with good manufacturing practices, good laboratory practices and good clinical practices for medical products regulatory decisions. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-second Report. Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1010), Annex 9.
   Short name: WHO TRS 1010, Annex 9
   https://www.who.int/publications/m/item/trs1010-annex9

4. WHO 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

5. 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

6. 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 TRS No. 1052, Annex 4
https://www.who.int/publications/i/item/9789240091030

7. 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

8. 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
https://www.who.int/publications/m/item/Annex-8-trs-1010

9. Guidelines on heating, ventilation and air-conditioning systems for non-sterile pharmaceutical products. Part 2: Interpretation of Guidelines on heating, ventilation and air-conditioning systems for non-sterile pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Third Report Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1019), Annex 2.
Short name: WHO TRS No. 1019, Annex 2
https://www.who.int/publications/m/item/trs1019-annex2

10. WHO guidelines on transfer of technology in pharmaceutical manufacturing WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Fifth Report Geneva, World Health Organization, 2022 (WHO Technical Report Series, No. 1044), Annex 4.
Short name: WHO TRS No. 1044, Annex 4
https://cdn.who.int/media/docs/default-source/medicines/norms-and-standards/guidelines/production/trs1044-annex4-technology-transfer-in-pharmaceutical-manufacturing.pdf

11. WHO good manufacturing practices for sterile pharmaceutical products. Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Fifth Report Geneva, World Health Organization, 2022 (WHO Technical Report Series, No. 1044), Annex 4.
Short name: WHO TRS No. 1044, Annex 2
https://www.who.int/publications/m/item/trs1044-annex2

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. 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

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 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
https://www.who.int/publications/m/item/tr961-annex14

17. Good Manufacturing Practices: Guidelines on validation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Third Report Geneva, World Health Organization, 2019 (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

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

https://www.who.int/publications/m/item/trs992-annex4

19. 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**
https://www.who.int/publications/m/item/trs961-annex9-modelguidanceforstoragetransport

20. 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

21. WHO Recommendations for quality requirements when plant – derived artemisinin is used as a starting material in the production of antimalarial active pharmaceutical ingredients. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Forty-Ninth Report Geneva, World Health Organization, 2015 (WHO Technical Report Series, No. 992), Annex 6.
Short name: WHO TRS No. 992, Annex 6
https://www.who.int/publications/m/item/trs-992-annex-6

22. 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-1033

23. WHO general guidance on variations to multisource pharmaceutical products. *WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifties Report* Geneva, World Health Organization, 2016 (WHO Technical Report Series, No. 996), Annex 10.
Short name: WHO TRS No. 996, Annex 10
https://www.who.int/publications/m/item/trs966-annex10
24. 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

25. Points to consider when including Health-Based Exposure Limits in cleaning validation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Fifth Report Geneva, World Health Organization, 2021 (WHO Technical Report Series, No. 1033), Annex 2.
Short name: WHO TRS No. 1033, Annex 2
https://www.who.int/publications/m/item/annex-2-trs-1033

26. Points to consider for manufacturers and inspectors: environmental aspects of manufacturing for the prevention of antimicrobial resistance. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Fourth Report Geneva, World Health Organization, 2020 (WHO Technical Report Series, No. 1025), Annex 6.
Short name: WHO TRS No. 1025, Annex 6
https://www.who.int/publications/m/item/trs-1025-annex-6

27. Production of water for injection by means other than distillation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Fourth Report. Geneva, World Health Organization, 2020 (WHO Technical Report Series, No. 1025), Annex 3.
Short name: WHO TRS No. 1025, Annex 3
https://www.who.int/publications/m/item/trs-1025-annex-3-water-for-injection

27. Good chromatography practice. 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 TRS No. 1025, Annex 4
https://www.who.int/publications/m/item/trs1025-annex4

28. Good trade and distribution practices for pharmaceutical starting materials. *WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifties Report* Geneva, World Health Organization, 2016 (WHO Technical Report Series, No. 996), Annex 6.
Short name: WHO TRS No. 996, Annex 6
https://www.who.int/publications/m/item/annex-6-trs-996

29. WHO guidelines for preparing a laboratory information file. *WHO Expert Committee on Specifications for Pharmaceutical Preparations.* Forty-Fifth Report Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 961), Annex 13.
Short name: WHO TRS No. 961, Annex 13
https://www.who.int/publications/m/item/trs961-annex13

30. WHO good manufacturing practices for excipients used in pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-seventh Report. Geneva, World Health Organization, 2024 (WHO Technical Report Series, No. 1052), Annex 1.
Short name: WHO TRS No. 1052, Annex 1
https://www.who.int/publications/i/item/9789240091030