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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	The ACME Laboratories Ltd.
Corporate address of manufacturer	Court de la ACME 1/4, Kallayanpur, Mirpur Road, Dhaka-1207, Bangladesh
Inspected site	
Name & address of inspected manufacturing site if different from that given above	The ACME Laboratories Ltd., Solid Dosage Unit, Dhulivita, Dhamrai, Dhaka-1350, Bangladesh
Unit / block / workshop number	Unit-02 (SDU)
Inspection details	
Dates of inspection	19-21 July 2022
Type of inspection	Initial inspection
Introduction	
Brief description of the manufacturing activities	Unit-02 (SDU) was established in 2011 and the building consists of seven floors Level 1 Production Floor Level 2 Training Hall & Technical Floor Level 3 QC & MIC Laboratories Level 4 Production Floor Level 5 Office Area & Technical Floor Level 6 QA Office Area, QC Laboratory (PM) Level 7 WTP Only solid dosage forms (tablets, capsules, sachets and powders/pellets for suspension) are manufactured on site. No cytotoxic, hormonal or beta-lactam products are manufactured in this facility.

General information about the company and site	ACME was established in 1954. The ACME campus is located on the outskirts of Dhaka, at Dhulivita, Dhamrai, approximately 40Km northwest of Dhaka International Airport. There are six independent units established on the ACME campus, namely: Unit 01- General & Administrative Unit; GNU Unit 02 - Solid Dosages Unit; SDU Unit 03 - Cephalosporin Unit; CPU Unit 04 – Liquid,Semi Solid ,Solid & Parenteral Unit; BLS Unit 05 - Hormone & Steroid Unit; HSU Unit 06 - Penicillin Unit; PNU
History	This was the first WHO PQ inspection. Unit-02 was inspected by MHRA in October 2018. The site is periodically inspected by DGDA.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	Documents reviewed including but not limited: - Job descriptions for key personnel - Training - Product Quality Review - Management Review - Complaints and Recalls - Deviation control - Change Control - OOS/OOT and investigations - Validation/ Qualification/ Calibration - Sampling and testing of materials - Batch processing records - Materials Management System - HVAC System Site visited: - Manufacturing areas Unit 2 (SDU) - QC laboratories - Stability chambers and retained samples area - Warehouses (raw materials, packaging materials, finished products)
Restrictions	The inspection was restricted to the production, quality control and storage of Zinc Sulphate 20mg dispersible tablets manufactured in Unit-02 (SDU)
Out of scope	All other products and units were outside of the inspection scope and were not visited.
WHO products covered by the inspection	DI013 Zinc Sulphate 20mg dispersible tablets.

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
BSE	Bovine spongiform encephalopathy
CC	Change control
CAPA	Corrective Action and Preventive Action
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	Non conformity
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
QM	Quality Management
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
TSE	Transmissible spongiform encephalopathies
SOP	Standard operating procedure
URS	User requirements specifications
UV	Ultraviolet-visible spectrophotometer
VMP	Validation Master Plan
WFI	Water for injection
WTP	Water Treatment Plant

Part 2	**Summary of the findings and comments**

1. Pharmaceutical quality system

A PQS was established, and it was common for all manufacturing units in the campus. The company's principles, policies and objectives were detailed in the quality manual. Management review meetings were held according to a written procedure. Meetings were held monthly and had a set agenda. The minutes of the two most recent meetings were presented.

The facility organization chart document showed the overall high level site positions and reporting relationships. QA, QC, Microbiology, Validation, Training and Development were each separate sections that reported independently to the Quality Operations in-charge. Production operations, Research and Development and Engineering operations reported separately to the Executive Director, Plant operations.

Quality Risk Management

Quality risk management was applied to different operations, activities, processes and systems across the Unit. It was incorporated in the PQS as a written procedure. Risk assessments were carried out by a team and FMEA was the tool of choice for conducting these assessments, although other tools could also be used. The risk assessment of Zinc Sulphate 20mg dispersible tablets was reviewed in detail. In addition, the risk assessment for prioritizing vendor audits was checked. The risk assessments related to the deviations and changes were also checked.

Product Quality Review

PQRs were performed according to a written procedure. A PQR plan was established based on product assessment priority. The company had not manufactured any commercial batches of the WHO PQ Zinc Sulphate 20mg disp. tab. at the time of inspection. Three validation batches were manufactured in July 2022.

The following Zinc Sulphate (local market) PQRs were reviewed:
Baby Zinc 20 disp. tab. (Apr. 2021- Mar. 2022)
Baby Zinc 20 disp. tab. (Apr. 2020- Mar. 2021)

Change Control

The company had a change management procedure in place. The change control coordinator was responsible for assessing the impact of the change and for communicating with relevant personnel requesting their evaluation and input. Changes were categorized as major or minor depending on the impact assessment. The SOP was applicable to all changes that had a direct or indirect impact on product quality and the QMS. The 2021 and 2022 list of changes were presented.

Deviations

A procedure for handling deviations was presented. It described the system and assigned roles and responsibilities for reporting and managing non-conforming incidents. A check for recurrence was performed. Deviations were categorized as critical, major or minor. The 2021 and 2022 deviation registers were spot-checked.

CAPA

Corrective and preventive actions were identified, monitored, implemented and evaluated according to a written SOP. A spreadsheet was used to monitor implementation. Extensions for CAPA implementation could be granted upon justification, impact assessment and approval from Head QA. Adequacy of CAPA was evaluated within 3 to 6 months after implementation depending on the remedial action.

2. Good manufacturing practices for pharmaceutical products

Manufacturing processes were generally clearly defined and systematically reviewed. Qualifications/ validations, calibrations and maintenance were performed according to prepared protocols and followed the relevant established procedures. Necessary resources including qualified and trained personnel, adequate premises, suitable equipment and services, appropriate materials, approved procedures and instructions were provided for the current operational level of manufacturing and testing. Manufacturing steps were recorded in batch manufacturing and packaging record. BMRs and BPRs were made available during the tour of the facilities.

Reprocess and Rework

Reprocess and rework activities were guided by a written procedure. The procedure required the conduct of risk assessments and prior approval of rework/reprocess activities by QA. The reprocess/rework logbooks for 2021 and 2022 were reviewed in detail along with BMRs of some reprocessed batches.

3. Sanitation and hygiene

Premises and equipment were maintained at a satisfactory level of cleanliness at the time of inspection. There was appropriate gowning in all areas for staff including pictorials and hand washing and sanitization before entry to production areas. Instructions for entry and hygiene of visitors and contractors were in place.

4. Qualification and validation

A Validation Master Plan was prepared yearly according to an SOP. The 2022 VMP was reviewed. Validations were performed by cross-functional teams.

Re/Qualification of facilities/HVAC/Equipment

Re-qualification of equipment and utilities was performed based on a written procedure and plan. The latest equipment/system/utility qualification contained the list of equipment to be qualified in 2022.

The performance requalification for the tablet machine used in the compression of zinc sulphate dispersible tablets, was reviewed. This was performed using three batches of five different products with varying parameters including turret speed, feeder speed, and compression force.
Periodic review record for the compression machine for the period January 2021 to June 2022 was reviewed. The parameters included, frequency of use, breakdowns, criticality, preventive maintenance, repairs replacement, calibration and deviations. Risk levels were assigned to each parameter.

Requalification protocol for the HVAC system was checked in detail. The parameters considered in the requalification were HEPA filter leakage test, temperature and relative humidity, air change rate, room differential pressure, air borne particle count monitoring, microbiological environmental monitoring, and recovery test. The observed results were within acceptable limits.

Cleaning Validation

The cleaning validation SOP was presented and discussed in detail. The protocol for selection of the worst- case product was reviewed. The toxicological report for the worst case molecule was made available. Literature references and the toxicologist CV were reviewed.

5. Complaints

Customer complaints were handled in accordance with a written procedure. The customer complaint coordinator (member of the QA unit) was responsible for receiving, logging, transcribing, pre-investigating, tracking of complaints, updating of logbooks, trending of complaints and archiving complaint documents. Complaints were classified as critical, major or minor depending on the potential impact on the health of the consumer, with critical complaints being those most likely to cause death or life-threatening adverse events. Different timelines for the investigation of different complaint categories were provided. The procedure provided for the root cause investigation, impact assessments, CAPA and review of customer complaints on a quarterly basis.

The complaints register for the last three years were reviewed and contained a small number of market complaints. Some complaints were selected for a detailed review.

6. Product recalls

Clear instructions on managing recalls were provided in a written SOP which was made available. The Head QA was responsible for the initiation and classification of recalls according to a risk assessment. The recall procedure provided for different classes of recalls;

Class I- Removal of defective product to customer level. Required the use of electronic media aids, newspaper and television.

Class II- Executed up to the level of the wholesale and retail clients.

Class III- Executed up to wholesale level

The procedure further provided for a mock recall for at least one batch of any product dispatched for sale where maximum distributors are involved to test the effectiveness of the arrangements of the recall as per mock recall protocol. This was to be performed at least once annually for the longest distribution chain for any one unit. The latest mock recall was reviewed.

7. Contract production, analysis and other activities

There were procedures and instructions in place for establishing contractual arrangements with third parties. The technical agreement with the company performing the toxicological assessment was briefly discussed.

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

Supplier evaluation and qualification was conducted according to a written procedure. It included initial paper assessment as well as sample evaluation. In addition, the vendor was also annually assessed by QC according to a written SOP in terms of quality, delivery (punctuality, quantity), pricing. Every three years, the supplier was requested to complete the vendor questionnaire and provide additional supportive documents (i.e TSE/BSE statement, CoA, GMP certificate, stability data etc.) in order maintain his status. Audits of suppliers were managed according to the principles detailed in a written procedure. Criteria for qualifying auditors were established and a list of qualified auditors was presented. Spot checks on the qualification of suppliers were made.

9. Personnel

There were approximately 900 staff working on site. In general, personnel had the necessary qualification and practical experience. Personnel interviewed during the inspection had sufficient knowledge of GMP standards. Responsibilities of staff and their duties were documented in written job descriptions. The job descriptions for the Assistant General Manager and Head of plant operations were reviewed and found acceptable and duly signed. Delegation of duties was detailed in the SOP for good documentation practices. A list of delegations was maintained using an established template. All delegations were approved by the Head of quality operations.

10. Training

There were procedures available for induction and continuous training. Each SOP included a section that identified the personnel that needed to undergo training. Training was provided before new SOPs became effective. Spot-checks on new and revised SOP trainings were made.

11. Personal hygiene

Procedures were in place for the conduct of medical examinations for all personnel upon recruitment, and thereafter annually. Personnel were encouraged to report any illness that might affect the quality of the product to their supervisors. Personnel hygiene measures such as handwashing, routine hand sanitisation and appropriate gowning were observed in core manufacturing areas.

12. Premises

Layouts of the facilities were made available. In general, premises were designed and maintained to suit the operations to be carried out and prevent the risk of contamination of materials and products.

Receiving and dispatch bays protected materials and products from weather conditions. Spot checks on rodent traps, insecticutors and their relevant maintenance cards were made. There were separate warehouses for storage of raw and packaging material and finished products (quarantine and released) and these were dedicated to Unit 2. Retention samples were stored in a separate building. The stability chambers of Unit2 were installed in the same area as the stability chambers of Unit 4. There were two manufacturing floors and materials were transferred by lift. Quality control laboratories were also housed on two separate floors. Entry to the premises was controlled and only authorized personnel had access to manufacturing areas

13. Equipment

Production equipment was of good standard and appeared to be well maintained. Spot-checks on production balances and differential pressure gauges indicated that equipment and devices were timely calibrated. The workflow in the facility was appropriately designed, and the equipment appeared to be installed in order to facilitate production and reduce the risk of contamination and mix ups. All production equipment reviewed was identified as to its content or purpose with cleanliness status identified by appropriate labels.

14. Materials

Written procedures for the receipt, identification, quarantine, storage, handling, sampling, approval or rejection of materials were checked. Material receipt operations were inspected in detail as well as management of stock. Incoming starting materials were quarantined after receipt until they were released for use. Temperature and relative humidity conditions were monitored. Inventory was maintained manually using bin cards which also included the location of the raw material in the warehouse. Finished products were sampled by QC prior to transfer to the warehouse. A procedure describing receipt of finished product at the warehouse was presented. The finished products were transferred to the finished product Quarantine Area and released for dispatch after the completion of the review of the batch record documents. The stock register of ACME ORS for UNICEF was checked.

15. Documentation

There was an umbrella QM applicable to all manufacturing units in the campus. There were site specific SOPs and SOPs common for all units. A “common” SOP was defined as a procedure being applicable to two units or more, this was defined in the scope section of each SOP. There was a procedure in place describing the preparation, approval, distribution and retrieval of SOPs. The SOP for managing labels was reviewed and discussed. It provided instructions on issuance, storage, use and control of labels and included the different label templates used.

16. Good practices in production

In general, dispensing and production operations followed defined procedures. Materials were transferred to the dispensary through a pass-box. There were procedures in place for the operation, maintenance and cleaning of the dispensing booths. Logbooks for these activities were maintained and spot-checked. Weighing and measuring devices were of suitable accuracy for the intended use. Calibration procedures and records for scales were presented. Dispensed material followed the established material flow. When necessary, a lift was used to transfer materials and bulk products to/from the second production floor. The logbook of the tablet press used for the compression of Zinc Sulphate 20mg disp. tab was checked. Tooling for the machine were kept in a separate room. Records for cleaning maintenance and issue of punches dies were available. Primary packaging was performed in Blister Line 8. BMRs reviewed during the facilities tour did not give rise to any significant comments.

17. Good practices in quality control

Quality Control (QC) operations were independent of production. The QC laboratories were appropriately designed and equipped with the necessary physicochemical and microbiological testing equipment. Reference and working standards were stored under appropriate conditions and were handled according to a written SOP. Stability chambers were installed in a separate area. Retention samples were kept in a room located in a different building and temperature was monitored. They were handled according to an established procedure. Specifications for raw material and finished products were established. There were instructions on the preparation of volumetric solutions. The analytical methods and specifications for WHO Zinc Sulphate 20mg disp. tablets were reviewed. Procedures for use, qualification and calibration of laboratory equipment were in place. The procedure for good chromatographic practices was reviewed.

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, *The ACME Laboratories Ltd*., *Solid Dosage Unit (Unit 02)*, located at *Dhulivita, Dhamrai, Dhaka, 1350, Bangladesh,* was considered to be operating at an acceptable level of compliance with WHO GMP 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 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 WHO 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-eighth Report Geneva, World Health Organization, 2014 (WHO Technical Report Series, No. 986), Annex 2. ***Short name: WHO TRS No. 986, Annex 2***
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_986/en/

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

3. WHO guidelines for sampling of pharmaceutical products and related materials. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Thirty-ninth Report. Geneva, World Health Organization, 2005 (WHO Technical Report Series, No. 929), Annex 4.
Short name: WHO TRS No. 929, Annex 4
http://whqlibdoc.who.int/trs/WHO_TRS_929_eng.pdf?ua=1

4. 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

5. 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

6. 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 TRS No. 957, Annex 1***
http://www.who.int/medicines/publications/44threport/en/

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

8. 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

9. 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

10. 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

11. 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

12. 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

13. 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/

14. 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/

15. 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

16. 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

17. 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

18. WHO general guidance on variations to multisource pharmaceutical products. *WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fiftieth Report* Geneva, World Health Organization, 2016 (WHO Technical Report Series, No. 996), Annex 10. ***Short name: WHO Multisource guidance*** or ***WHO TRS No. 996, Annex 10***
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex10.pdf

19. 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/

20. 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***
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex10.pdf

21. 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-detail/978-92-4-000182-4

22. 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***
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23. 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***
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https://www.who.int/publications/i/item/55th-report-of-the-who-expert-committee-on-specifications-for-pharmaceutical-preparations¨

25. 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 1033, Annex 3*** https://www.who.int/publications/i/item/55th-report-of-the-who-expert-committee-on-specifications-for-pharmaceutical-preparations

26. 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 1033, Annex 4*** https://www.who.int/publications/i/item/55th-report-of-the-who-expert-committee-on-specifications-for-pharmaceutical-preparations