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Prequalification Team Inspection services
WHO PUBLIC INSPECTION REPORT
(WHOPIR)
Active Pharmaceutical Ingredient Manufacturer

Part 1	**General information**
Manufacturers details	
Name of manufacturer	**Tianish Laboratories Private Limited (Unit-10)**
Corporate address of manufacturer	Plot No. 564/A/22, Road No. 92, Jubilee Hills, Film Nagar, Shaikpet, Hyderabad - 500 034, Telangana, India.
Inspected site	
Name & address of inspected manufacturing site if different from that given above	Tianish Laboratories Private Limited (Unit-10) Plot No. 86, Ramky Pharmacity (India) Ltd, SEZ Jawaharlal Nehru Pharma City Parawada (M), Anakapalli – 531019 Andhra Pradesh, India
Synthetic unit /Block/ Workshop	Unit-10

Product name	**Building**
Tenofovir Disoproxil Fumarate (TCF)	MB 1 MB 2 MB 3 MB 4
Abacavir sulfate (ABC)	MB 3 MB 4
Efavirenz (EAJ)	MB 3

Dates of inspection	15-19 January 2024
Type of inspection	Routine GMP inspection
Introduction	
Brief description of the manufacturing activities	Tianish's Unit-10 was started in 2012 as Mylan Laboratories Limited and is engaged in manufacturing intermediates and active pharmaceutical ingredients (APIs). The facility is located in the Special Economic Zone (SEZ) and produces intermediates and APIs for the domestic and international markets. It does not manufacture cephalosporins or highly potent substances like cytotoxics, steroids, and hormones. Note: Mylan Laboratories Limited has demerged its API business to Tianish Laboratories Private Limited, effective March 01, 2024.
General information about the company and	Tianish Laboratories Private Limited was founded in 2023. The company primarily produces Active Pharmaceutical Ingredients. The company has a corporate office in Jubilee Hills, Hyderabad, India.

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site	
History	This was the first on-site PQ inspection of Unit-10. The WHO PQ had conducted a desk assessment based on the inspection performed by the WHO-listed authorities. The Unit was also inspected by the USFDA, AGES, CDSCO and the State Authority of Andhra Pradesh.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	The following areas were inspected: - Quality management system - Personnel and training - Buildings and facilities - Qualification and validation - Production and packaging operations - Quality control laboratories - Warehouse - Utilities
Restrictions	None
Out of scope	The inspection was limited to the APIs submitted for Prequalification. Other APIs and intermediates were excluded from the inspection.
WHO APIs covered by the inspection	1. Efavirenz (EAJ), APIMF 071 2. Tenofovir Disoproxil Fumarate (TCF), APIMF 038 3. Abacavir sulfate (ABC), APIMF 010
Abbreviations	**Meaning**
AHU	Air handling unit
ALCOA	Attributable, legible, contemporaneous, original and accurate
API	Active pharmaceutical ingredient
APR	Annual product review
BMR	Batch manufacturing record
BPR	Batch production record
CC	Change control
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
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
KF	Karl Fisher

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LAF	Laminar airflow
LIMS	Laboratory information management system
MB	Microbiology
MBL	Microbiology laboratory
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
QCL	Quality control laboratory
QMS	Quality management system
QRM	Quality risk management
RA	Risk assessment
RCA	Root cause analysis
RO	Reverse osmosis
SMF	Site master file
SOP	Standard operating procedure
URS	User requirements specifications
UV	Ultraviolet-visible spectrophotometer

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

1. Quality management

The quality unit was comprised of quality assurance and quality control and was independent of the production activities. The site quality manual was prepared per the quality manual SOP for preparing quality manuals for all Tianish sites. The manufacturing site was using the following software applications for quality management:

S. No.	System	Used for
1	e1 SAP	Material Management, Batch Release, Manufacturing Process Equipment Logbook, Equipment Preventive Maintenance
2	TrackWise	QMS Elements (Incidents, Change Controls, Investigations, Complaints and CAPA)
3	LIMS	Laboratory Sample and Data Management

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4	Empower3	Chromatography (HPLC, GC)
5	Documentum D2	Master Batch Production Record (MBPRs) and Standard Operating Procedure (SOPs)
6	MyUniversity	Training

Product quality review

The SOP for APQR was reviewed. It was a corporate procedure applied to all APIs and intermediates manufactured at all Tianish sites. The procedure stated that based on the follow-up action, it would be concluded if it is a Level I, II, or III classification of PQR. The PQR was performed for the batches manufactured during the previous calendar year and should be completed by the end of February. The procedure stated that trend analysis would be performed when 12 or more than 12 batches were manufactured. Where fewer than 12 batches are manufactured, graphs and control charts would be prepared for guidance. The PQR included reviews of packaging materials, change controls, out-of-specifications (OOS), API starting materials, critical quality parameters, intermediate manufacturing review, critical process parameters, in-process controls, incidents, process validation, reprocessing, reworking, rejection, recovered solvents, and final API review, complaints, returned goods, product recall, stability study data, retention samples etc. The process capability (Ppk) was performed using Minitab, and 25 batches were required. The Ppk of 1.33 or more (4sigma level) is considered favorable, whereas between 1.00 and 1.33 (3 to 4 sigma) was also acceptable. If Ppk was reported below 1.0, an investigation would be performed, and appropriate action would be initiated. In general, the procedure was found adequate.

The Quality risk management procedure was reviewed which guided how to perform a risk assessment. It was a corporate procedure applied at all Tianish sites. The company uses FMEA and RPN to calculate risk (high, medium, and low).

The SOP for the management review (MR) was discussed, and it was noted that MR was conducted once every two months. The QA prepared a schedule with tentative meeting dates before the start of the new year. The items for the MR were identified and discussed at the meeting, and minutes were recorded. The attendance sheet was available for the meeting held in November 2023. The meeting was chaired by the Site Head and or his deputy in his absence. The follow-up actions from this meeting were discussed at the site level and communicated to the corporate quality assurance (CQA) through email. The critical quality issues were escalated by the site QA to the CQA's attention as a critical quality notification (CQN). The SOP for notification of critical quality events was divided into Tier I, II, and III based on a risk assessment. The procedure provided a critical quality notification workflow to guide users to escalate critical events and take appropriate actions timely. The example of Esomeprazole Magnesium Trihydrate was reviewed, and it was reported to have high water content during the stability study testing at 48 months. Based on the investigation, the root cause was identified and corrected. The matter was escalated to regional, vertical, and global teams, and learning from this event was shared with other sites. The CQN was managed through TrackWise.

The SOP for handling and investigation of incidents /deviations was reviewed. It was a corporate procedure applicable to all Tianish API sites. The SOP applied to deviations related to manufacturing activities. A separate SOP was available for handling laboratory and data errors. Incident reporting was

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handled through TrackWise software and recorded on the respective page in BMR. An impact assessment was done for each incident report, and closure of the report was done if the root cause and CAPA were fully documented and no impact on product quality was foreseen. Incident reports could be elevated to investigation reports based on different set criteria. There were two types of incident categories: 1. Manufacturing incidents relevant to OOT/OOS are relevant to product non-compliance, and 2. The operational incident was relevant to all other manufacturing incidents. A product impact assessment was performed, categorizing impact into severe, major, medium, minor, and negligible. Incident reports were classified based on risk into critical, major and minor. Minor operational deviations should be closed within 12 days, and all other deviations should be elevated to the investigation report and closed within 45 days. The incident report filling in the TrackWise system was reviewed.

The SOP for CAPA with effectiveness check was in place. It was a corporate procedure applicable to all Tianish API sites. CAPA was managed by TrackWise software.

The internal quality audit SOP was reviewed. It was a corporate procedure applicable to all Tianish API sites. The internal audit plan was prepared by the QAD within 30 days of the beginning of the year. At least 2 internal audits should be conducted every year for each department. CAPA should be submitted within 15 Working days. Inspection checklists were used for each department.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

2. Personnel

Knowledgeable and qualified staff were available. The staff job description (JD) was in place. The list of authorized personnel to release the dispatched batches was approved on 6/4/2023, including 13 persons assigned by the site quality head. The JD of 2 QA assistant managers responsible for the release of API and intermediates with experience of more than 8 years was reviewed. Also, their training records from the Myuniversity application were reviewed.

Training

The SOP training of employees was reviewed**.** It was a corporate procedure applicable to all Tianish API sites. The training calendar was prepared annually. The annual training schedule for 2023 and its implementation were reviewed. The annual training schedule included job-specific training JST-1 & 2 [specific jobs and cross-functional procedures] as well as GMP training and data integrity training which should be done by all employees annually. The training was managed through a Learning management system application. The training of some QAD managers was verified within the schedule for ICH GMP for API and data integrity. The annual training schedule was prepared for the year 2024.

3. Buildings and facilities

Unit 10 is spread over 27.09 Acres and consists of 4 Manufacturing Blocks (MB) and 2 solvent recovery plants (SRP). In addition, Unit-10 was equipped with one quality control laboratory, a process development lab, one purified water plant, one finished goods warehouse, three raw material warehouses (liquid and solid) and utilities. It was noted that Unit-10 manufactures 17 products, including intermediates and finished APIs. Each manufacturing block consists of a pharma area classified as a D

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area and an intermediate synthesis area separated from the pharma area. Solvent storage tanks were kept outside adjacent to manufacturing buildings and dispensed to buildings through the auto solvent dispensing system. Inspectors visited production MB-3 and MB-4 (Bay 1 & 2) intermediate synthesis and pharma areas, solvent recovery plant SRP-2 (recently established), PW plant, FG warehouse and RM warehouse 2. In general, production premises were located, designed, constructed, adapted, and maintained to suit the operations to be carried out. A pest control program was found in place. Temperature and humidity were not monitored in all intermediate manufacturing areas.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

4. Process equipment

Unit-10 was equipped with various process equipment such as stainless-steel reactors, glass-lined reactors, centrifuges, vacuum tray dryers, rotary cone vacuum driers, multi-mill, sifters, agitated nustche filter dryer, candy filters, leaf filters, nustche filters, micron filter and more. In general, non-dedicated equipment were used with some exceptions. Cleaning validation was performed for shared equipment following the health-based exposure limit requirement. Reactors were cleaned after 15 batches from the same API and on changeover between different APIs. Centrifuges were cleaned every 15 batches and bags were replaced every 30 batches. Evidence and records of cleaning were reviewed. A closed piping system for reagents and solvents was in place. An automated powder transfer system/PTS for some raw materials was used. Manual addition was also performed through the main hole of the reactors. The cross-contamination record was kept in the BMR and filled out to ensure adequate controls were in place during the manual handling of materials. All manufacturing equipment had a QR code, which opened to an E-log for equipment on scanning by the RIF gun, where manufacturing & cleaning activities were recorded. Reactors were found to have equipment data cards displaying all data relevant to qualification, calibration, and maintenance.

The SOP for preventive maintenance of equipment/systems/instruments and preparation of maintenance schedules was reviewed. The equipment PM schedule date and qualification date were found to be recorded on the equipment data card. PM activities conducted were recorded on the equipment's PM record. The PM plan was planned once yearly. The PM schedule for 2024 and 2023 were available.

The SOP for calibrating and handling instruments was reviewed. The procedure's scope was limited to process equipment and did not cover QC lab equipment. Process equipment was classified as critical, non-critical, and indicative. A classification list of equipment was prepared. Critical equipment was stated to be calibrated every six months, while non-critical equipment should be calibrated every year.

Calibration schedule plans for 2023 and 2024 were available. The temperature indicator in MB 3-bay 1 was categorized as critical equipment and its calibration was performed on 13/3/2023 as scheduled.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

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5. Documentation and records

The SOP preparation, review, approval, distribution, retrieval, and revision was reviewed. The SOPs and Master Batch Production Records (MBPR) were prepared using the Documentum D2 system. Once SOPs were issued, users could view SOPs through CARA software. Also, a system for manual distribution and retrieval of SOP was in place. Another SOP for issues, archival, and control of quality records was in place to control logbooks and formats. A document archival room -1 was placed on the second floor of the QA building.

Management of data integrity and data governance was discussed. It is a corporate procedure applicable for managing electronic and paper GxP data at all the API sites of Tianish, India. The procedure is also applied to data generated by third parties. The procedure refers to an obsolete WHO reference (TRS 996, Annex-5). The DI procedure was adequately prepared and based on the WHO recommendation.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

6. Materials management

The handling of all material and products, such as receipt, sampling, storage, labeling, dispensing, processing, packaging, and distribution, were carried out according to procedures and tracked on the SAP system. A smart source application is used to request purchase from the supply chain of Tianish sites for all materials. When a purchase request was initiated by staff in Tianish-10 through the smart source application, orders were further processed through procurement, and a purchase order was issued to the site. API & packaging materials were purchased from approved suppliers according to supplier qualification SOP. The global procurement team managed other material suppliers, e.g., QC laboratory materials, media, reagents, columns, and chemicals. No SOP for managing these vendors was found, and a list of approved vendors for lab purposes and materials existed within global procurement software.

The SOP for evaluation and approval of suppliers of API starting material, general RM, and packaging material was also applicable for API SM supplied from other Tianish sites. Purchasing from contract manufacturing units/CMU, Tianish would follow the management of CMU. Upon purchase from other Tianish sites, 3 batches were qualified by a lab in Unit-10, and a questionnaire would be sent to the supplier. The supplier was added to the SAP system, and the questionnaire would be updated every 3 years. The Qualification of Adenine [SM for TCF] supplier, from China, was revised. The revised questionnaire, along with all documents, was performed by Tianish on 3/1/2024. The last periodic audit was remotely performed on 29/3/2022.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

7. Production and in-process controls

The process flow chart of three APIs was reviewed. Tenofovir was manufactured in three stages in MB-1, 2, 3, and 4 according to process and batch size. Efavirenz was manufactured in one stage in MB-3. Abacavir was manufactured in three stages in MB 2, 3, and 4 according to process and batch size. It was noted that the MB-1 and MB-2 were used to manufacture small batch sizes, whereas bigger batch sizes

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were routinely manufactured in MB-3 and MB-4. Different Manufacturing batch records for small & and big size scales were present. Risk assessment for solvent recovery was in place. Recovered solvents were used only in the same API. All IPC testing was done in the QC lab. The final processing was carried out in the Grade D area.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

8. Packaging and identification labelling of APIs and intermediates

The packing area was equipped with one balance and a heat sealer. The QC performed the sampling using a portable balance. The finished API (TCF-III) was packed in an LDPE bag before being packed in a triple-laminated aluminium bag and sealed. The packing was carried out in the Grade D area.

9. Storage and distribution

Finished APIs were stored in the finished goods warehouse below 25°C, and temperature mapping of the FG warehouse was performed once every 3 years. Daily monitoring of temperature and humidity was in place. Finished APIs were stored within the recommended packaging material until being dispatched to the customer. Storage was managed through the SAP system.

10. Laboratory controls

The laboratory was located on the ground and first floor of the QA building. On the ground floor, there were instrumental labs, including 2 HPLC labs, 2 GC labs, and 2 wet labs, along with a chemical store. Stability chambers, microbiology labs, an incubator room with 5 incubators, and a retained samples room were located on the first floor. Equipment in labs was well maintained and calibrated; logbooks were kept in place, showing samples, calibration, and maintenance records. Intermediates and APIs were tested following the approved specification and test procedures. LIMS was used to manage samples and columns. Empower-3 chromatography data software was used for instruments like HPLC, GC and UPLC. The data were then transcribed from the analytical worksheet to LIMS and verified before a certificate of analysis was generated.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

11. Validation

A validation policy and validation master plan (VMP) were in place. The annual VMP schedule for the coming year was prepared in December of the current year. The VMP schedule was periodically reviewed quarterly to address major changes and updated requirements, regulations, and guidelines. The validation master plan was reviewed and found satisfactory. The cleaning validation, process validation, analytical method validation, and other validation activities were carried out as per the respective SOPs and protocols.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

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12. Change control

The SOP of the change management process was reviewed. A corporate SOP applied to all Tianish sites for all manufacturing activities. Another SOP for change management for the contract manufacturing unit was used for contract manufacturing change control. The change controls (CC) were classified as critical, major, and minor, with examples listed for critical CC, including but not limited to new product introduction to site/block. The CC was managed through a TrackWise software program, including electronic signature, sourced by Sparta system company. Types of CC were mentioned in SOP as permanent or temporary changes, where if temporary changes were repeated more than three times, they would be changed to permanent changes. The impact assessment was performed for all proposed CCs. Risk assessment was performed only for critical CC as per the form. Examples listed in the definition of major CC included changes in critical process parameters and source of starting materials etc. CC, which needs regulatory approvals, was finally authorized by global regulations. The CCs were trended per quarter. CC timeline of a maximum of 90 days from the plan's approval date; otherwise, an extension was made. Impact assessment, risk assessment forms, and CC periodic review and trending for CC were manually completed. Other forms were managed electronically.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

13. Rejection and re-use of materials

Materials were being rejected on the SAP system and stored in restricted access rooms in raw materials and finished goods warehouses. One batch of RM was found rejected after OOS and stored in the rejection room. Rejected intermediates were stored in their manufacturing buildings. After investigating OOS results that led to the rejection of intermediate or finished API, a reworking or reprocessing decision could be taken. Two API batches were found in the rejection room in the FG warehouse and banned on the SAP system, awaiting further investigation and decision.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

14. Complaints and recalls

The SOP for handling customer complaints was reviewed. Upon receipt of the complaint by the business development or corporate quality department, it was directed to the head of site quality within 3 business days, for further action. Complaints were classified as critical, major, or minor quality defects/complaints. Trending of complaints was performed on a quarterly basis. Complaints were managed through TrackWise. A risk assessment was done within 2 days of receiving the complaint. For critical complaints, further notification and actions should be performed within timelines. Investigation of critical complaints should be completed within 15 days; other complaints should be investigated within a 45-day timeline. Further to root cause identification, CAPAs were initiated.

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ inspections.

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15. Contract manufacturers (including laboratories)

Some key starting materials and intermediates were procured from outside Tianish sites (e.g. Efavirenz Stage 1 manufactured in Laurus Labs). In contrast, the final stages of three APIs were carried out on Tianish's Unit-10. Laurus Labs Ltd Unit-1 was audited by Tianish for PMPA for TCF and Amino Carbinol for Efavirenz. The report confirmed that these products were manufactured in Laurus Labs General Block with a cleaning limit of NMT 100ppm for intermediate and NMT 10ppm for finished product. The Laurus Labs was used for Units 10 and 8 for these intermediates. The cleaning limits were not established based on science and risk-based assessment (e.g. the use of PDE values).

The deficiencies raised in this section have been adequately addressed and will be verified during future PQ 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, ***Tianish Laboratories Private Limited***, located at ***Plot No. 86, Ramky Pharmacity (India) Ltd, SEZ, Jawaharlal Nehru Pharma City, Parawada (M), Anakapalli – 531019, Andhra Pradesh, India*** was considered to be operating at an acceptable level of compliance with WHO GMP Guidelines for APIs.

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 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/

2. 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***
   http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/trs_986/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. 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

5. 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/

6. 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/

7. WHO good manufacturing practices for sterile pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Sixth Report Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 1044), Annex 2.
Short name: WHO TRS No. 1044, Annex 2
TRS 1044 - Annex 2: WHO good manufacturing practices for sterile pharmaceutical products

8. WHO guidelines on transfer of technology in pharmaceutical manufacturing WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Sixth Report Geneva, World Health Organization, 2011 (WHO Technical Report Series, No. 1044), Annex 4.
Short name: WHO TRS No. 1044, Annex 4
TRS 1044 - Annex 4: WHO guidelines on technology transfer in pharmaceutical manufacturing

9. 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

10. 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

11. 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

12. 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/

13. 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/

14. 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

15. 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

16. 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

17. 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 Multisource guidance or ***WHO TRS No. 996, Annex 10***
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex10.pdf

18. 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/

19. Stability testing of active pharmaceutical ingredients and finished pharmaceutical products. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Second Report Geneva, World Health Organization, 2018 (WHO Technical Report Series, No. 1010), Annex 10.
Short name: WHO TRS No. 1010, Annex 10
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex10.pdf

20. Production of water for injection by means other than distillation. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Forth 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

21. Good chromatography practice. WHO Expert Committee on Specifications for Pharmaceutical Preparations. Fifty-Forth 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-detail/978-92-4-000182-4

22. 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-Forth 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-detail/978-92-4-000182-4

23. Points to consider when including Health-Based Exposure Limits (HBELs) 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 1033, Annex 2***
https://www.who.int/publications/i/item/55th-report-of-the-who-expert-committee-on-specifications-for-pharmaceutical-preparations¨

24. 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

25. 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