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Prequalification Unit Inspection services
WHO PUBLIC INSPECTION REPORT
WHOPIR
Active Pharmaceutical Ingredient Manufacturer

Part 1	**General information**
Manufacturers details	
Name of manufacturer	Shanghai Desano Chemical Pharmaceutical Co., Ltd.
Corporate address of manufacturer	No. 417 Binhai Road, Laogang Town, Pudong New Area, Shanghai, China, 201302
Inspected site	
Name & Address of inspected manufacturing site if different from that given above	Same as above GPS: Latitude 31.01309 Longitude 121.885005 D-U-N-S 421274357
Synthetic Unit /Block/ Workshop	A16, B14, B15, B16, B19, C16, C18, C20, K13, K15, K16-2, K17, K18, L17, L18
Inspection details	
Dates of inspection	3 – 7 July 2023
Type of inspection	Routine inspection
Introduction	
Brief description of the manufacturing activities	Manufacturing, quality control and release of active pharmaceutical ingredients and intermediates.
General information about the company and site	Shanghai Desano Chemical Pharmaceutical Co. Ltd. (Desano) was established in 2002. The company supplied its APIs mostly in China, India, South Africa, Brazil, Russia, and Thailand while exploring US, EU and Australian markets. The total area of the Shanghai site is about195000m^2.
History	The site has been regularly inspected by WHO since 2007. The last WHO on-site inspection was performed in January 2019. The site received the remote audit performed by TGA in July 2022 with positive outcome.
Brief report of inspection activities undertaken – Scope and limitations	
Areas inspected	• Quality management system • Production Block: See Part 2. • Warehouses for starting materials and finished API products • Quality Control laboratory for Physical & chemical • Contract microbiology laboratory • Water system • Nitrogen system
Restrictions	The inspection was restricted to the products listed in the inspection scope. It was noted that the company provides micronized APIs to some markets. If the micronization was not a process declared in its API dossier for WHO PQ, it was not covered by the inspection.
Out of scope	APIs which are not under the scope of prequalification

Abbreviations	Meaning
AHU	Air handling unit
ALCOA	Attributable, legible, contemporaneous, original and accurate
API	Active pharmaceutical ingredient
APR	Annual product review
BER	Batch Analysis Record
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
LAF	Laminar air flow
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
QP	Qualified person
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
WFI	Water for injection

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

1. Quality management

A system for managing quality that involves the participation of management and appropriate manufacturing personnel was in place. Quality-related activities were defined and documented. The Quality department was independent of the production department. Persons authorized to release intermediates and APIs were specified. Quality-related activities were recorded at the time they were performed. Deviations from established procedures were documented and explained. Regular internal audits were performed in accordance with an approved schedule.

Product Quality Review

Regular quality reviews of APIs were conducted, reviews were evaluated, and an assessment was made of whether corrective actions or revalidation should be undertaken.

The SOP "Product Quality Review procedure" was checked. QA had the responsibility for ensuring that these reviews were completed according to agreed timelines. PQRs were approved and released by the QP. PQRs included a review of equipment, facilities, utilities, critical control parameters, deviations, changes, raw materials and supplier status, validation status of equipment and utilities, complaints, recalls, returns, rejected batches, OOS, OOT and stability studies. Graphical representation of analytical results and CpK were used for process capability evaluation. Cpk was calculated using MiniTab.

A number of PQRs were checked.

Management review (MR)

Corporate SOP "Quality Management review (QMR)" was checked. According to the SOP QMR should be held at least once every year by all Desano sites to review QS operations of previous year. Standard agenda specified items to be covered by the QMR.

QMR protocol, report and summary of QMR for 2022 were presented to the inspector and checked. Document "Annual Quality Target" protocol 2022 and "Annual Quality Target" reports were checked.

QMR Protocol for 2023 meeting was available and approved 2023.

Quality risk management

Quality risk management and risk assessment were handled and performed according to the written procedure. Various approaches to risk assessment were allowed, but the focus was on utilization of the FMEA model with descriptions of levels for probability, severity and detectability, and RPN was calculated. The acceptance criteria were specified in the procedure.

Internal audit

The SOP "Internal audit and Self inspection management" was checked. Internal audit was performed at least annually and should cover six (6) systems:

- Quality system
- Laboratory system
- Production
- Equipment and facility
- Materials
- Packaging and labelling

System based check lists were used to perform internal audit. The internal audit team consisted of trained auditors. The audit report was approved by the QA manager or the QP. CAPAs were proposed by audited departments and approved by QA or the QP.

Deviations
Deviations were managed according to the SOP "Deviation investigation and handling procedure". SOP was applicable, but not limited to:

- Operations
- Equipment
- Utilities
- Instruments
- Facility
- Material quality
- Documents
- Records
- Method of analysis
- Environmental factors
- Processed

were classified as:

- Minor
- Major

Review of deviations was performed quarterly and annually.

A number of deviations was checked.

CAPA
The SOP "CAPA management procedure" was checked. The SOP was applicable but not limited to:

- Self-inspection/customer audits
- Official inspection
- Training
- Complaints
- Returns
- Recalls
- QM review
- Deviations
- Daily monitoring
- Rejected materials
- Risk assessment
- PQR
- OOS/OOT
- Laboratory incident reports

A number of CAPAs was checked.

Root cause analysis (RCA)
The SOP "Root cause analysis" 2 was checked. The SOP was applicable but not limited to:
- Audit issues
- Customer complaints
- OOS/OOT
- Major deviations
- Rejected batches
- Critical and major deficiencies
- Data integrity issues

The following tools were used for RCA investigations:
- Brain storming
- Mapping
- 5 Whys
- Fish bone diagram
- FMEA
- Flow chart
- Fault tree analysis

Logbooks for CC, deviation and CAPA were available for review.

Product release
The SOP "Product release procedure" was checked. Upon analysis request, raw material and API sampling were performed by QC, and intermediate in the process was sampled by the production personnel and delivered to QC. After analysis, analytical raw data (BAR), BMR, BPR and internal CoA were reviewed by QA. Final release was done by the QA manager or the QP. The product release of Nirmatrelvir API was checked and discussed.

The SOP "Certificate of analysis template" was checked. CoAs were issued for each batch of intermediate or API. Final CoAs sent to the clients were dated and signed by the QA manager or the QP.

2. Personnel
The company had an organizational chart that showed that there was a clear separation between the responsibilities and reporting of the quality and production units. Key personnel responsibilities were required to be defined in job descriptions.

There was an adequate number of personnel suitably qualified by education and training to perform and supervise the manufacture of APIs. The personnel met during the inspection appeared to be knowledgeable in GMP.

Currently, the company was using one consultant. The consultant's CV and consultation agreement were available.

Training
The SOP "Quality Training Management procedure" was checked. The SOP was applicable to all employees. The following training modules were used:
- Introduction

- On job related training
- Periodic training

Training records were maintained by Human Resources (HR). HR were responsible for collecting topics for training and creating an annual matrix plan based on job profiles. QA was responsible for review and approval of the training plan. Training assessment was done by multiple choice questions and open questions. The training plan for 2023 was spot checked.

Hygiene
Personnel were trained to practice good sanitation and health habits. Direct contact with intermediates or APIs was avoided. Personnel with an infectious disease or who have open lesions on the exposed surface of the body were not engaged in activities that could result in compromising the quality of APIs.

Measures were taken to prevent unauthorized people from entering production and QC.

3. Buildings and facilities
Buildings and facilities used in the manufacture of intermediates and APIs were located, designed, and constructed to facilitate cleaning, maintenance and operations as appropriate to the type and stage of manufacture. Facilities were designed to minimize potential contamination.

Buildings and facilities had adequate space for the orderly placement of equipment and materials to prevent mix-ups and contamination.

The flow of materials and personnel through the building or facilities was designed to prevent mix-ups and contamination.

Buildings used in the manufacture of intermediates and APIs were properly maintained and repaired and kept in a clean condition. Written procedures were established assigning responsibility for sanitation and describing the cleaning schedules, methods, equipment and materials to be used in cleaning buildings and facilities.

Workshop C16-A/B/C was visited during the inspection.

During the inspection, the API manufacturing process was ongoing. Filtered air to the workshop clean rooms was provided by a dedicated AHU. Air was re-circulated and afterwards filtered G4→F7→HEPA (installed in the rooms). Pressure differentials were controlled and recorded. Fresh G4 and F7 filters were replaced when required. Fresh air filtered via F7 filter was provided to the synthetic production rooms.

Recovery of solvents was carried out in dedicated recovery area. The synthetic process was carried out in synthesis area. Separate purification and clean area was used for final processing steps. Raw materials were dispensed in material warehouse.

The following workshops were visited:
L17B: Chemical synthesis area
K17-1: Intermediate drying area
K17-2C: Intermediate drying area
K-15: The block was renovated in year 2020 with a synthesis and multifunctional area
K16-2: Grade D clean area

Permanently installed pipework was appropriately identified. Water used in the manufacture of APIs was suitable for its intended use. Adequate lighting was provided to facilitate cleaning, maintenance and proper operations.

Laboratory areas and operations were separated from production areas.

4. Process equipment

Equipment used in the manufacture of intermediates and APIs was of appropriate design and adequate size, and suitably located for its intended use, cleaning, sanitization and maintenance. Equipment was constructed so that surfaces that contact raw materials, intermediates or APIs did not alter the quality of the intermediates. Permanently installed processing lines were appropriately identified. A set of current drawings was maintained for equipment.

Written procedures were established for cleaning of equipment and its subsequent release for use in the manufacture of intermediates and APIs. Equipment and utensils were cleaned, stored and sanitized to prevent contamination or carry-over of a material that would alter the quality of the intermediate or API. Equipment was identified as to its contents and its cleanliness status.

Equipment cleaning

Equipment cleaning was classified into three levels including the class I cleaning for product change over, class II periodic cleaning for the same product and class III for the new equipment before use and existing equipment after maintenance. The equipment dirty holding time and clean holding time were defined. A number of equipment cleaning procedures were checked.

Computerized systems

Computerized systems were not used for production control and material management. A computerized system was used in the QC lab for HPLC and GC networking which was validated. The requirements for data backup and data restoration were described in the relevant procedures. The chromatogram access level including user groups and name list with authorised privileges and access control were checked during the visit to QC laboratory. The following procedures were reviewed and discussed.

- SOP “Data reliance management”
- SOP “QC electronic data backup management”
- SOP “QC record review and verification”

Calibration

Control, weighing, measuring, monitoring and test equipment was calibrated according to written procedures and an established schedule. Equipment calibrations were performed using standards traceable to certified standards. Calibration/maintenance schedules for laboratory equipment/instruments and production equipment/instruments were available and presented to the inspectors. Spot checks showed that schedules were followed. Follow-up of calibration status was carried out monthly.

Preventive maintenance (PM)

PM of equipment was performed in accordance with the check list specifying items to be checked and how to do checks. A number of PM and IQ/OQ protocols/reports were checked.

5. Documentation and records

Documents related to the manufacture of intermediates or APIs were prepared, reviewed, approved and distributed according to written procedures. The issuance, revision, superseding and withdrawal of all documents was controlled with maintenance of revision histories.

Procedure was established for retaining documents, retention periods for documents were specified.
Records of major equipment use, cleaning, sanitization and maintenance showed the date, time, product and batch number of each batch processed in the equipment, and the person who performed the cleaning and maintenance.

Laboratory control records included complete data derived from all tests conducted to ensure compliance with established specifications and standards, including examinations and assays.

The following procedures were reviewed and discussed.
- SOP "Controlled records management"
- SOP "Product code and batch numbering system"
- SOP "Testing reports template management procedure"

6. Materials management

Written procedures describing the receipt, identification, quarantine, storage, handling, sampling, testing and approval or rejection of materials were available.

The SOP "Material primary checking procedure" was checked. The procedure was applicable to all incoming materials. Upon receipt and before acceptance materials were examined visually for correct labelling, damage to containers, broken seals and evidence of tampering or contamination. Materials were held under quarantine until they have been sampled, tested, and then released for use.

The SOP "Sampling of materials" was checked. Containers from which samples were withdrawn were identified with "sampled" labels. Packaging materials sampling plan was according to AQL.

Inspectors visited the finished products warehouse. Quarantine storage was clearly indicated, and finished goods were stored in mobile racks. Separate rooms were provided for returned and rejected products. During the inspection rejected or returned materials were not seen. Temperature requirements in this warehouse were specified. Recirculated, filtered air to the warehouse was provided by a dedicated AHU. API retention samples were also stored in the finished product warehouse. Retention samples were stored in containers that simulate the market container. Retention samples were kept one year after the re-test date or three years after dispatch. A separate room was provided for products to be stored at -20 ±5 °C. The company explained that T/RH mapping was carried out.

Inspectors visited the cold storage (2°C – 8°C) warehouse. Quarantine, release and rejected areas were clearly marked. T was controlled online. T was also recorded manually twice per day. Warehouse was equipped with a sound alarm and text message alarm system. T mapping of cold warehouse was spot-checked.

During inspection, Solvent tank farm was visited. Solvents from tankers were transferred to the storage tanks by dedicated hoses. For production, solvents from tanks were transferred to drums using dedicated pipelines. Samples from tankers were taken under the roof. Samples were identified, tested and released. After release, solvents were transferred to the storage tanks and mixed with existing stocks. Afterwards, samples of mixed solvents were taken. After analysis, solvents in tanks were released for production and a new batch number was assigned.

In case bulk deliveries were made in non-dedicated tankers cleaning certificate was requested. Storage containers, manifolds, filling and discharge lines were appropriately identified.

SOP "Liquid raw material charging, storage and discharging procedure" and SOP "Tank farm maintenance procedure" were checked.

During the inspection, visited warehouses and tank farm were seen to be clean and in good order.

Vendor management

System for evaluating the suppliers of critical materials was in place. Changing the source of supply of critical raw materials was done according to Change Control procedure.

Corporate SOP "Vendor management procedure" was checked. Procedure was applicable to raw materials, intermediate, packaging materials, chemical reagents that may potentially affect product quality.

The Corporate SOP "Vendor site audit procedure" was checked. Vendors on-site audits were performed by qualified auditors. The list of approved and qualified vendors as well as the vendor audit plan for 2023 were presented to the inspectors. Approved vendors list was available.

Water

During the inspection the water plant was visited. City water was used as the feed water and it was processed through a series of filters including three carbon columns, two RO membranes and two mixed bed ion exchange (one stand by). Purified water was stored in two tanks. Water was in continuous circulated by two loops at ambient temperature. Sanitization of storage tanks and distribution loop was done at specified time interval. Purified water (PW) monitoring program was in place: action and alert limits were specified.

Nitrogen

Nitrogen used in the production process and packaging was generated on site. SOP "Usage of nitrogen filter and its change procedure" was checked. Nitrogen specification and testing procedure were available for review.

7. Production and in-process controls

The production process for the API products in the inspection scope were reviewed. The production was in operation at the time of inspection. Several production workshops as well as warehouses for solid raw materials, including intermediates, warehouse and liquids warehouse were visited. The operation of API production an in-process control in the chemical and clean areas checked was found generally acceptable.

Upon receipt and before acceptance, each container or grouping of containers of materials were examined visually using check list for correct labelling, damage to containers, broken seals and evidence of tampering or contamination. Materials were held under quarantine until they have been sampled, tested as appropriate, and then released for use.

Warehouses had separate quarantine and released products areas. For rejected materials separate locked room was provided. Sampling of solid raw materials was carried out in dedicated sampling rooms. Sampling was performed by QC personnel. Dispensing of raw materials was carried out in dedicated dispensing rooms. Dispensing was carried out by warehouse personnel. Dispensing was also witnessed by workshop personnel. Relevant SOPs and photos of entry procedure were on display. Before transportation, dispensed materials were checked by warehouse and production personnel. Materials to production blocks were transported in closed plastic containers. Worst case (summer) T mapping were performed for solid raw materials warehouse.

Only TLC and pH in-process analysis were performed in production blocks. In case HPLC or UV analysis were required for in-process control, samples were analysed in QC laboratory.

SOP "Management procedure for the materials during production" was checked and discussed. In-process controls and their acceptance criteria were defined.

SOP "Blending, micronizing and packaging" was checked.

8. Packaging and identification labelling of APIs and intermediates

Written procedures describing the receipt, identification, quarantine, sampling, examination and/or testing and release and handling of packaging and labelling materials were available.

Containers provided adequate protection against deterioration or contamination of the intermediate or API that may occur during transportation and recommended storage.

SOP "Label management procedure" and SOP "Product packaging and labeling procedure" were checked. Labels were printed by logistic personnel and checked by QA. Printed labels issued for a batch were examined for proper identity and conformity to specifications in the master production record. Labels used on containers of intermediates or APIs indicate the name, batch number of the product, manufacturing date, retest/expiry date, manufacturer and the storage conditions.

Line clearance was performed before and after labelling/packaging procedures. During the inspection no packaging/labelling was carried out.

9. Storage and distribution

Facilities were available for the storage of materials under appropriate conditions. Records were maintained of these conditions. Separate storage areas were provided for quarantine, rejected, returned or recalled materials.

APIs and intermediates were released for distribution to third parties after they have been released by the quality unit and transported in a manner that did not adversely affect their quality.

A system was in place by which the distribution of each batch of intermediate and/or API can be readily determined to permit its recall.

10. Laboratory controls

Physical and Chemical Laboratory and Microbiological laboratory were visited. The procedures that were reviewed and discussed during the inspection were generally of an acceptable standard, however, in some cases, improvements were sought.

Adequate quality control facilities were provided. Procedures were in pace describing sampling, testing, approval or rejection of materials and recording and storage of laboratory data. Specifications, sampling plans and test procedures were available.

Laboratory controls were followed and documented at the time of performance. Any departures from procedures were documented and explained. OOS results obtained were investigated and documented according to a procedure.

Batch Analytical Records (BARs) were issued and controlled by QA. BARs had unique identification numbers; pages were numbered. Traceability to equipment/standards used was ensured. BARs were reviewed using check lists. Separate check list was used to review UV and IR equipment audit trails. BARs were reviewed by qualified reviewer from QC and approved by QA.

Reagents and standard solutions were prepared and labelled following written procedures. All purchased reagents had expiry date or retest date. After receipt, laboratory assigned their own internal expiry dates. After opening expiry dates were also specified.

Reagents prepared in laboratory were appropriate labelled, expiry dates were defined for all reagents and were based on stability studies.

Primary reference standards were available. Records were maintained for each primary reference standard's storage and use. Working reference standards (WS) were appropriately prepared, identified, tested, approved and stored. WS were stored at 2 – 8 °C, ambient Temperature and -20 °C. T was recorded on–line and manually checked and recorded twice per day. Print outs were taken monthly.

Laboratory tests were performed for each batch of intermediate and API.

Documented, stability testing programme was in place. Test procedures used in stability testing were validated. Stability samples were stored in packaging that simulate the market container. At least one batch per year of API manufactured was added to the stability monitoring programme and tested. Stability samples were stored in locked stability chambers, calibrated for all stability conditions. Stability samples registers were available and presented. Spot check confirmed that stability schedule was flowed. T&RH was recorded on–line and manually checked and recorded twice per day. Print outs were taken monthly.

API expiry or retest date was based on an evaluation of data derived from stability studies.

Reserve samples of each batch of API were retained for one year after the expiry date, or for three years after distribution of the batch, whichever is the longer. For APIs with retest dates reserve samples were retained for three years after the batch has been completely distributed by the manufacturer. Sufficient quantities of reserve samples were stored in the same packaging system in which the API was stored.

The following SOPs and registers were checked:
- SOP "Out of specification." This SOP was applicable also for OOT and microbiological laboratory,
- SOP "Laboratory incidents."

A number of OOS were checked.

Laboratory equipment
All laboratory equipment had usage and calibration logbooks.

Calibration of the following equipment was checked:
- Analytical balances.
- HPLC
- HPLS columns
- UV
- IR
- Polarimeter
- Melting point
- Karl Fisher titrator

11.Validation
Validation master plan for 2023 was available and checked. Separate detailed validation plans were available for:

- Facilities
- Utilities
- Transpiration
- Equipment/instrument
- Process validation
- Cleaning validation
- Analytical method validation
- Computerized systems

Process validation
Process validation was performed according to the written procedure. Before validation activities were started appropriate qualification of critical equipment and ancillary systems was completed. Process validation protocols/reports for recently prequalified APIs were checked.

Cleaning validation
Cleaning validation was performed according to a written procedure. The company had introduced PDE based approach for setting allowable residue limits after cleaning. Cleaning validation for specific API was checked. While the validation was generally acceptable, currently not all PDE values of the APIs were available and documented.

Analytical method validation
The analytical method validation was checked and discussed for specific APIs.

12.Change control (CC)
A Change control system was established to evaluate changes that may affect the production and control of the intermediate or API. Potential impact of the proposed change on the quality of the intermediate or API was evaluated. Measures were taken to ensure that all documents affected by the changes are revised. After the change has been implemented an evaluation of the first batches produced or tested under the change was performed. Manufacturers of the current dosage form were notified of changes from established production and process control procedures that can impact the quality of the API.

The SOP "Change control procedure" and flow chart were checked. Change risk assessment was done and reviewed by QA. Timelines for implementation, closure and assessment of adequacy were established. After action plan was established, follow up was carried out. QA summarized all changes annually. Summary of changed for 2022 were presented.

A number of CCs were checked.

13.Rejection and re-use of materials
Intermediates or APIs were reprocessed or reworked. The final disposition of rejected materials were recorded.

SOP "Reprocessing and reworking" was checked. Intermediates and APIs failing to meet established specifications were identified and quarantined. In case reprocessing occurred, batch was assigned different batch number and batch was placed on stability studies. Before a decision was taken to rework batches that do not conform to established standards or specifications, an investigation into the reason for non-conformance was performed. Batches that have been reworked were evaluated and tested and put on stability studies.

SOP "Recovered solvents management procedure" was checked. Recovered solvents were tested and reused in the same processes. Use of recovered solvents, mother liquors and other recovered materials was documented.

SOP "Product return management procedure" was checked. Returned intermediates or APIs were identified and quarantined in returned goods room and checked by warehouse /QC personnel. Afterwards returned product were sampled and tested and risk assessment regarding storage/transportation was carried out. Records of returned intermediates or APIs were maintained.

14.Complaints and recalls

Quality-related complaints were recorded and investigated according to a written procedure. Records of complaints were retained.

SOP "Customer complaints procedure" was checked. Complaints could be initially received and registered by any department and reported to QA. QA was responsible for classifying the complaint and initiating root cause investigations.

If necessary, complaint investigation could lead to the product recall. According to the SOP, investigation should be performed to identify if neighbouring batched or other product batched should be investigated. Timeline for closing complaints was specified. Complaints were trended.

SOP "Handling of Product Recall" was checked. QA was responsible for making the recall decision and for coordinating all relevant actions. Reporting to the local authorities was done by QA. Recalls were classified as:

- Class I – recall within 1 day
- Class II within 3 days
- Class III within 7 days

Classification was according to health impact and urgency. Until the date of inspection, no recalls were executed. To evaluate efficacy of the SOP mock recall was performed beery 2 years.

In the event of a serious or potentially life-threatening situation, local, national and international authorities were informed.

15.Contract manufacturers (including laboratories)

Desano used one contractor for the manufacture of one API crude. The contract manufacturing quality agreement with contract acceptor was presented to inspectors.

Desano used five (5) contract laboratories. The quality agreement with specific lab was presented to the inspectors.

Both quality agreements were spot checked. Contracts permitted the contract giver to audit the contract acceptor's facilities for compliance with GMP. Subcontracting was not allowed. Contract acceptor and contract giver responsibilities were clearly defined.

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, ***Shanghai Desano*** located at ***417 Binhai Road, Laogang Town, Pudong New Area, Shanghai, 201 302, P. R. China*** 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 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 GMP for APIs*** or ***TRS No. 957, Annex 2***
   untitled (digicollections.net)

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 GMP Guidelines o*r *WHO TRS No. 986, Annex 2***
   https://digicollections.net/medicinedocs/documents/s21467en/s21467en.pdf

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://digicollections.net/medicinedocs/documents/s23457en/s23457en.pdf

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
   9789240020900-eng.pdf (who.int)

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://digicollections.net/medicinedocs/documents/s21440en/s21440en.pdf

6. 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://digicollections.net/medicinedocs/documents/s23455en/s23455en.pdf

7. 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
https://digicollections.net/medicinedocs/documents/s20108en/s20108en.pdf

8. 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. 961, 957), Annex 1
https://digicollections.net/medicinedocs/documents/s18681en/s18681en.pdf

9. 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://digicollections.net/medicinedocs/documents/s22358en/s22358en.pdf

10. 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
https://digicollections.net/medicinedocs/documents/s19959en/s19959en.pdf

11. 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
https://digicollections.net/medicinedocs/documents/s18677en/s18677en.pdf

12. 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://digicollections.net/medicinedocs/documents/s18683en/s18683en.pdf

13. 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://digicollections.net/medicinedocs/#d/s21438en

14. 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://digicollections.net/medicinedocs/documents/s18682en/s18682en.pdf

15. 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://digicollections.net/medicinedocs/#d/s20177en/

16. 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://digicollections.net/medicinedocs/#d/s20175en/

17. 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

18. 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://digicollections.net/medicinedocs/documents/s23697en/s23697en.pdf

19. 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

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***
Essential Medicines and Health Products Information Portal (digicollections.net)

21. 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***
9789240020900-eng.pdf (who.int)

22. 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
http://www.who.int/medicines/publications/pharmprep/WHO_TRS_996_annex10.pdf

23. WHO Recommendations for quality requirements when plant – derived artemisin is used as a starting material in the prosecution 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
http://www.who.int/medicines/areas/quality_safety/quality_assurance/expert_committee/WHO_TRS_992_web.pdf

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

25. Guidelines on heating, ventilation and air-conditioning systems for non-sterile pharmaceutical products. Part 2: Interpretation of Guidelines on heating, ventilation and air-conditionning 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://digicollections.net/medicinedocs/documents/s23699en/s23699en.pdf

26. 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**
9789240020900-eng.pdf (who.int)

27. 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**
9789240001824-eng.pdf (who.int)