OPERATIONAL QUALIFICATION FOR LYOPHILIZER

OPERATIONAL QUALIFICATION (OQ)

Type of Equipment	Lyophilizer
Customer	…….
Model	…….
Revision	…….
Department	Quality Assurance
Page	41

REVISION HISTORY			
Revision	**Date**	**Name**	**Description**

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

DOCUMENTREVIEW/APPROVAL

Meaning of Signatures	Document Reviewers: Will have technical expertise to critically assess the content and accuracy of the document. Review and acceptance by signing will signify that the document is complete and technically accurate. Document Approvers: Their approvals signify that the document meets specified requirements.

…….	**DEPARTMENT**	**SIGNATURE & DATE**
DOCUMENT AUTHOR AND REVIEW		
Author	Quality Assurance	
Reviewed By	Quality Assurance	
Approved By	Technology Department	
CLIENT'S NAME	**DEPARTMENT**	**SIGNATURE & DATE**
DOCUMENT APPROVAL		
Reviewed By		
Approved By		

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1. SCOPE:

This Operational Qualification (OQ) study will be performed on the Lyophilizer System, located in ……..

This protocol describes the equipment, test procedures, specifications, documents used to establish that the Lyophilizer System operates in accordance with the manufacturer's design specifications, and those of …….

This documentation package has been prepared by ……. personnel. This document will provide for the delineation of responsibilities of ……and ……..., appropriate approval signatures, support documentation, and other factors that are normally included in a protocol package. All supporting data and documentation will be attached to this validation protocol when completed.

2. PURPOSE:

OQ is a checklist activity that ensures the installation performed by, meets the operation specifications.

OQ document proves operation of Lyophilizer comply with customer's URS and technology specification. There are three parts as shown below.

3. BACKGROUND:

The Lyophilizer System is a new system purchased specifically for use at ……

This Operational Qualification (OQ) protocol is specific for the Lyophilizer System located in ……

Operational checks will be performed to verify and document that the system is operating in accordance with the manufacturer's specifications, and …….. requirements. The operational checks will verify proper operation of the Lyophilizer System.

4. SYSTEM DESCRIPTION:

The Lyophilizer System, Model No. …… is produced by ……... The Lyophilizer system has several components: a Chamber, a Condenser, a Vacuum System, a Refrigeration and Heat Transfer System Hydraulic System, Pneumatic System, Control Systems, CIP System, SIP System, and other Associated Valves and Instruments.

The Chamber internal surface is constructed of 316L stainless steel and is rated for full vacuum. The chamber is insulated with polymer foam and exterior is 304 Stainless Steel. The chamber has 11units (available) + 1 (thermal balance) shelf of 316 L stainless steel shelves with a total surface area of 29.7 square meters for product. The shelves provide a temperature range of –55°C to +70°C. The front access door constructed of stainless steel provides visibility into the chamber through an observation window. The chamber is equipped with ball sprays and nozzles for a Clean In Place system utilizing WFI.

The Condenser is 600 kg capacity unit, horizontal type circle bucket in shape. It is designed for an unloaded ultimate low temperature of –75ºC (no-load). The Condenser is constructed of 316L stainless steel with a condensing surface comprised of 8 units independent stainless steel coils. It is rated for full vacuum. The condenser is insulated with aluminum silicate polyisocyanurate foam and exterior is stainless steel. A mushroom valve connects the condenser with the chamber. Two water/steam ball sprays are mounted in the condenser for cleaning, sterilization and defrost ice.

The Vacuum System utilizes two vacuum pumps and a booster pump to achieve vacuum. The system is connected to the condenser with stainless steel piping. A pneumatically activated butterfly valve is located close to the condenser to isolate the vacuum system from the Lyophilizer.

The Refrigeration System consists of four 25 P two-stage, semi-hermetic reciprocating compressors utilizing R404A fluid as the refrigerant. Four refrigeration circuits are designed to service the shelves or condenser during various stages of the process.

5. TESTINGPROCEDURES:

The operational qualification will be performed using the protocol attachments. All pertinent information will be recorded on these forms. Copies of the forms may be made as necessary. Document results and data concurrently with the execution of this protocol. Mark through any unused spaces with a single line and initial and date. Mark spaces that do not apply to the system being qualified with Not Applicable (N/A) and provide an explanation where appropriate. Document any deviations or abnormalities observed during the execution of the protocol.

NOTE: Any exclusion to this protocol must be fully investigated and documented. This OQ can be considered acceptable with exclusion data only if the cause of the exclusion has been determined or an assignable cause can be attributed to it and it can be proven that such data will not invalidate the protocol studies. Quality Assurance is responsible for determining the acceptability of any exclusion data.

6. ACCEPTANCE CRITERIA:

- All data forms required for execution of the protocol must be completely, accurately, and properly filled out.
- All criteria specified on the data sheets must be met.
- All validation tests outlined in the protocol attachments must be successfully executed with the results

noted on the appropriate pages. All verifications must be answered “yes” or a protocol deviation must be documented. Re-testing must be described and justified.

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Attachment 1- Chamber door & pizza door motion qualification

1. Chamber door & pizza door

S.No.	Check item	Check method	Judge Criteria	Check	Remark
1.	Door open	Open the door by hand	Door There is no strange voice	Yes ( ) No ( )	
2.	Pizza door open	Open the pizza door by automatic	Pizza door open there is no Strange voice	Yes ( ) No ( )	
3.	Pizza door close	Close the pizza door by automatic	Pizza door close, there is no strange voice	Yes ( ) No ( )	

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 2-Hydraulic System Qualification

1、Shelf up/down:

S.No.	Check item	Check method	Criteria	Check Confirmation	Remark
1.	Shelf up	Rise shelf	Shelf rise stability and fluency	Yes ( ) No ( )	
2.	Shelf down	Down shelf	Shelf down stability and fluency	Yes ( ) No ( )	
3.	The whole shelf up	Rise whole shelf	The whole shelf stability and fluency	Yes ( ) No ( )	
4.	The whole shelf down	Down whole shelf	The whole shelf down stability and fluency	Yes ( ) No ( )	

2、Mushroom valve Open/Close:

S.No.	Check item	Check method	Criteria	Check confirmation	Remark
1.	Mushroom valve open	Mushroom valve open	Mushroom valve open stability and fluency.	Yes ( ) No ( )	
2.	Mushroom valve close	Mushroom valve close	Mushroom valve close stability and fluency.	Yes ( ) No ( )	

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3、Hydraulic System:

S.No.	Check item	Check method	Criteria	Check Confirmation	Remark
1.	Big hydraulic oil pipe no leakage	Inspect visually	No oil mark in connection	Yes ( ) No ( )	
2.	Small hydraulic oil	Inspect visually	No oil mark in	Yes ( ) No ( )	
	Pipe connection no leakage		connection		
3	Hydraulic unit oil connection no oil	Inspect visually	No oil mark in connection	Yes ( ) No ( )	

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Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
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Attachment 3- Shelves orientation stop accuracy qualification

1. **Test method:** To ensure the shelves in level, rise the shelves and stopped in the required place, take a basis position, measure each the distance of the position with central head and basis position, each shelf up and down check twice.

2. **Test criteria:** The position error of each shelf should be controlled under ±2 mm

S.No.	Up		Check Confirmation	Down		Check Confirmation
	First time	Second time		First time	Second time	
	Central of Shelf	Central of Shelf		Central of Shelf	Central of Shelf	
Shelf 1			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 2			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 3			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 4			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 5			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 6			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 7			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 8			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 9			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 10			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 11			Yes ( ) No ( )			Yes ( ) No ( )
Shelf 12			Yes ( ) No ( )			Yes ( ) No ( )
Average						
Maximum						
Minimum						
Deviation						
Remark						

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Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
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CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 4 – Shelf temperature uniformity confirmation

1、Test method:

.1.1 Before check, connect thermocouple to validate temperature equipment. Prepare at least 10 thermo couple (TC), to supply the data logger.

Identify and label each thermocouple with number

Prepare the data loggers for use. Indicate the Protocol number and the unit designation in the setup. Set the print interval and file recording interval for 20 seconds during the time of holding set point and others for 60 seconds. Logged data will include the time, temperature and channel number labels of each thermocouple during each minute print interval. Synchronize clocks on all equipment used in this test.

Do six runs to test shelves temperature uniformity, place 5 TCs on each thermocouple, test the temperature uniformity of shelf temperature. Each cycle will under -40°C, 0°C,40°C. All the TCs sensor tips are to be placed in contact with shelf surfaces. Record thermocouple identification number on Location Diagram. (see thermocouple diagram 1)

Before start, ensure the temperature of thermocouple approach room temperature.

Activate the data logger and select to print one interval.

Start lyophylizer cycle, run at the point of -40°C. Keep on 40°C for 30 min then record half an hour.

Start drying circle, run at the point of 0°C. keep on 0°C for 30 min then record half an hour.

Start the freezing cycle with a set point of 40°C and keep on 30 min, record half an hour.

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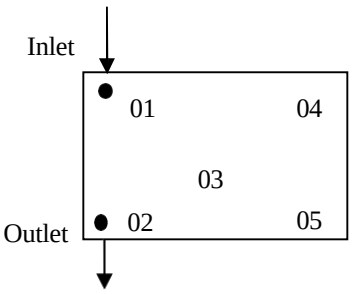
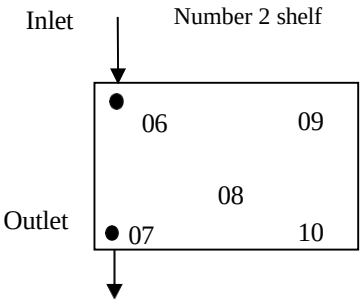
Thermo couple location 1

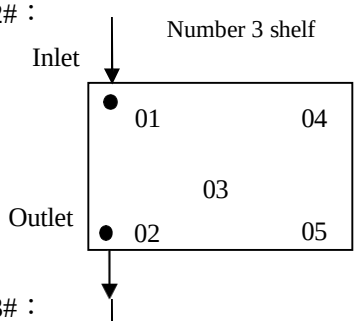
Run1# :

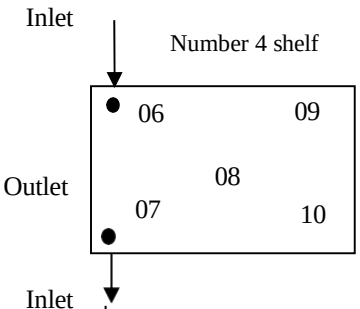
Number 1 shelf





Run2# :





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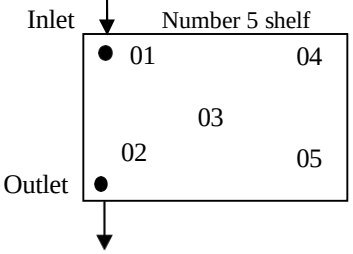

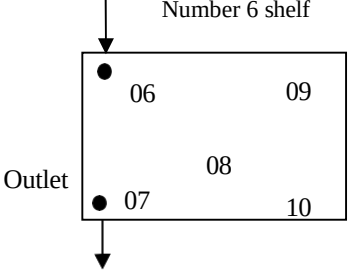

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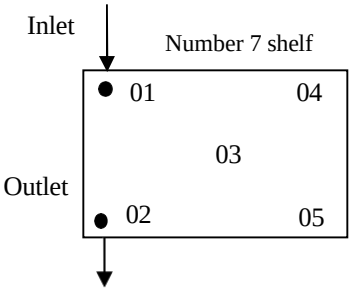
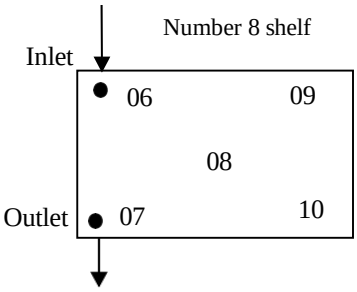
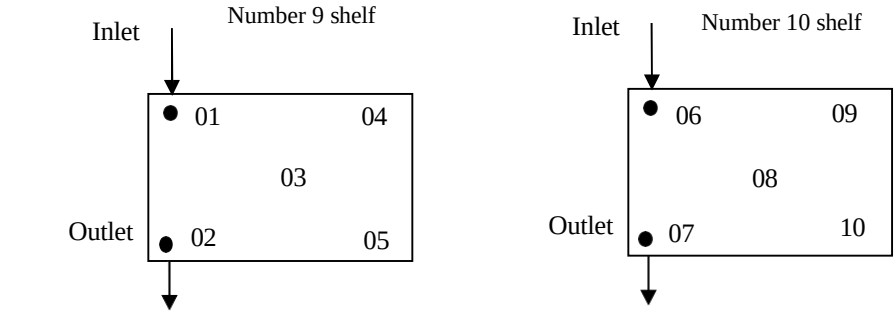




Run5#：



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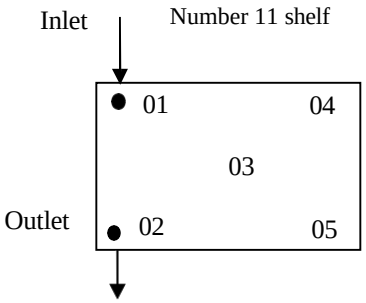

3. Test criteria:

Under six runs: The temperature of the same shelf and the same point of three shelves is within ± 1.0°C during stabile hold. All shelf inlet and outlet TCs are within ±1.0°C of the set point of temperature during stabile hold.

3. Test data & analysis:

DISTRIBUTION STUDY RESULTS SUMMARY	
Run1#	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____

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Maximum temperature in the chamber and location during hold (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of –40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Underrun1#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run1#	
Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 1#: The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run1#	
Minimum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes ( ) No ( )

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Underrun1#:The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )

DISTRIBUTION STUDY RESULTS SUMMARY	
Run2#	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of–40± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 2#: The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )
Run2#	
Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 2#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )

Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run2#	
Minimum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 2#:The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )

DISTRIBUTION STUDY RESULTS SUMMARY	
Run3#	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect to ectromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold -40°C(exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of– 40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 3#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run3#	

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 3#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )
Run3#	
Minimum temperature in the chamber and location during hold 40°C(exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 3#: The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )

DISTRIBUTION STUDY RESULTS SUMMARY	
Run 4#	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold -40°C (exclude the effect to feel ectromagnetic disturbance):	_____°C, TC# _____

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Did all the thermocouples fall within the specified temperature range of –40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 4#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run4#	
Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 4#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run4#	
Minimum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 4#:The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes ( ) No ( )

All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )

DISTRIBUTION STUDY RESULTS SUMMARY	
Run5#	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold -40°C(exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of –40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Underrun5#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run5#	
Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 5#: The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run5#	

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

Minimum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 5#: The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )

DISTRIBUTION STUDY RESULTS SUMMARY	
Run 6	
Minimum temperature in the chamber and location during hold -40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold -40°C (exclude the effect to feel ectromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of –40± 1.0°C during the stabile hold.	Yes ( ) No ( )
Under run 6#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes ( ) No ( )
All the TCs Passed Pre-cal	Yes ( ) No ( )
Did shelf temperature uniformity pass the test	Yes ( ) No ( )
Run 6#	
Minimum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 0°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____

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Did all the thermocouples fall within the specified temperature range of 0± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 6#:The temperature of the same shelf and the same point of the shelves is within ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )
Run 6#	
Minimum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Maximum temperature in the chamber and location during hold 40°C (exclude the effect of electromagnetic disturbance):	_____°C, TC# _____
Did all the thermocouples fall within the specified temperature range of 40± 1.0°C during the stabile hold.	Yes( ) No( )
Under run 6#:The temperature of the same shelf and the same point of the shelves is within40 ± 1.0°C	Yes( ) No( )
All the TCs Passed Pre-cal	Yes( ) No( )
Did shelf temperature uniformity pass the test	Yes( ) No( )

Summary

Under run 6,analyse the data:

1、During hold at – 40°C, maximum temperature and minimum temperature

2、During hold at 0°C, maximum temperature and minimum Temperature 0°C

3、During hold at 40°C, maximum temperature and minimum Temperature 40°C

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 5-Shelf Stoppering test qualification

1. Test method

Choose1shelf by random, load it with 5400 batch vials (Φ22), do stoppering test.

After stoppering, check wheather all the stoppers are on the position, takeout the fault vials, aclculate the Proportion of the fault vials in the whole numbers

Repeat 3 times

2. Test standard

The proportion of the fault vials should be less than 2% in each stoppering test.

3. Stoppering data stat

Vials Times	Number of fault vials	Proportion of vials	Check	Remark
First time			Yes ( ) No ( )	
Second time			Yes ( ) No ( )	
Third time			Yes ( ) No ( )	

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	**Sign. & Date**
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

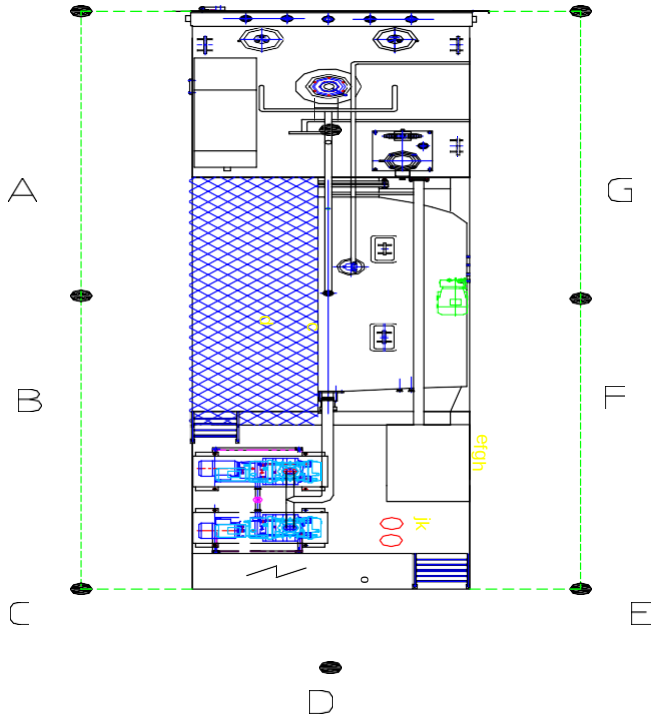
Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	**Sign. & Date**
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 6-machine noise confirmation

1.Test method

Choose 8 test points 1000 mm far away from machine uniformity, test with decibel meter, get 8 average value as the noise of the equipment. The test position are showed as follows



2. Acceptance criteria

The noise of the equipment should be less than 80 dB A）

3. Test data

Data	A	B	C	D	E	F	G	H	average

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

The machine of the noise_____dB （A）

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 7-Machine Empty Load Performance qualification

1. Shelf up rate and limited temperature qualification:

Test method

Into manual mode, set the oil inlet temperature at 20°C, freeze chamber, when oil the inlet temperature reach+20°C,record the time and oil inlet temperature, when the oil inlet temperature reach -40°C,record the time and oil inlet temperature. Keep on cooling the shelves, record the temperature and time when the Shelves temperature each -55°C..

Acceptance criteria:

Oil inlet temperature from 20°C to - 40°C should be ≤ 60 min
the final temperature of shelves ≤ -55˚C

Test criteria:

Shelf down rate

Item	Time	Silicon Oil Temperature	Remark
Shelves temperature down time			20°C or above
			- 40°C or below
Oil in let temperature from_____˚Cto _____˚C Time_____min Meets acceptance criteria Yes( ) No( )			

Shelf terminal temperature:

Time	Silicon oil inlet temperature
The lowest temperature ˚C, Meets acceptance criteria Yes ( ) No ( )	

Shelf down rate, shelf terminal temperature meets acceptance criteria

Yes ( ) No ( )

2. Condenser down temperature and terminal temperature qualification

Test method

Operate the lyophilizer according to standard operation procedure. Under manual module, record the time and temperature when begin to cooling down the condenser. Evaluate the condenser down temperature rate.

When the temperature lower than -45℃, start vacuum pump unites, when reach final vacuum continue to cooling the condenser till the temperature come to -75℃, record the condenser final temperature and time

Acceptance criteria:

Condenser cooling time ≤30 min (20℃ to -40℃)

Condenser final temperature ≤-75℃

Test result

Condenser temperature down rate

Test item	Time	Temperature (℃)	Remark
Condenser down rate			Environment temperature
			-40℃ below
Condenser temperature from_____℃ to_____℃ Time_____min Meets acceptance criteria Yes ( ) No ( )			

Condenser final temperature

Time	Condenser final temperature (℃)

Condenser final temperature_____ ℃ Meets acceptance criteria Yes ( ) No ( )	

Condenser low temperature, limit temperature:

Yes ( ) No ( )

3. Vacuum evacuation rate and final vacuum qualification:

Test method:

Ensure the inner of chamber and condenser are dry, in manual control method, the temperature of condenser reach -45°C, start vacuum pump, after 5 minutes, open pump-condenser isolation valve, open mushroom valve after 3 minutes, record the time of evacuating chamber from 1 to 10 Pa atmosphere. After the chamber under 10 Pa, it will heat the shelves and go on vacuum izingand reach the final Evacuation.

Acceptance Criteria:

Vacuum evacuation rate: Chamber vacuum vacuumize the atmosphere from 1to10 Pa time ≤30 min.

final evacuation: Final evacuation ≤1Pa

Test results

Vacuum evacuation rate:

Evaluation start time	Pressure(atmosphere pressure) Pa	Record time	Pressure (10Pa or below)	Evacuate 10 Pa or below	Remark
	1×10^5 Pa				
The chamber evacuation from 1 to 10 Pa atmosphere time is_____min. Meets acceptance criteria Yes ( ) No ( )					

Final evacuation:

Record time	Final evacuation Pa）	Remark
Final evacuation Pa Meets accept criteria Yes ( ) No ( )		

Evacuation vacuumize rate, final evacuation meet the criterion.

Yes ( ) No ( )

4、Shelf temperature up rate and limit temperature qualification

Test method:

In manual operation mode, evacuation chamber under10Pa, when shelf temperature lower than-40°C, start electric heater, record current time and the temperature of the oil, heat the shelf until the temperature reaches 40°C or above, calculate the temperature up rate of shelves.

Keep on heating the shelf, until Its temperature come to70°C, record the inlet temperature and time.

Acceptance Criteria:

Shelf temperature more than 1˚C/min 1˚C/min.

Shelf temperature more than 70˚C

Test result

Shelf temperature up rate

Item	Time	Silicon Oil Temperature (°C)	Remark
Shelf temperature up rate			-40˚Cbelow
			40˚Cabove
Oil in let temperature from_____ ˚Cto_____ ˚C Time _____ min Temperature up rate_____ ˚C/min. Meets acceptance criteria Yes ( ) No ( )			

Shelf limit temperature

Time	Silicon oil inlet temperature (°C)
Shelf final temperature_____ ˚C Meets acceptance criteria Yes ( ) No ( )	

Shelf temperature up rate, shelf maximum ultimate meets acceptance criteria

Yes ( ) No ( )

5、Vacuum leakage qualification

Test method:

Under manual mode, ensure the inner of the chamber is dry, calculate the leakage of the chamber when the chamber come to final vacuum and the shelf more than 40°C. Chamber leakage formula: $Q=(P_2-P_1)\times V/t$ Pa.m^3/s
P1: Initial pressure,P2: Final temperature, V: Volume

Test chamber entire leakage, close the pump isolation valve, stop vacuum pump record P_1 and temperature, after 30min, record P_2 and time, calculate the leakage rate.

After calculate the system leakage, test chamber leakage rate, close mushroom valve, record P_1 and temperature, after 30 min, record P_2 and time, calculate the leakage rate.

Acceptance criteria:

Chamber whole leakage rate ≤0.003 Pa.m^3/s。

Chamber leakage rate ≤0.003Pa.m^3/s。

Test result:

Chamber whole leakage rate

Pressure test begin time:_____

Pressure test initial pressure _____Pa
Pressure test end time ：_____pressure
Test end pressure P_2：_____Pa
Chamber whole volume ：_____m^3
Pressure keep time ：_____min
Chamber whole leakage：_____Pa.m^3/s

Meets acceptance criteria: **Yes ( ) No ( )**

Chamber leakage
Pressure test begin time ：_____
pressure test initial pressure ：_____
Pa pressure test end time ：_____

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

Pressure test end pressure P_2：_____Pa chamber volume ：_____m^3
Pressure keep timet：_____min
Chamber leakage：_____$Pa.m^3/s$

Meets acceptance criteria **Yes ( ) No ( )**

Vacuum leakage meets acceptance criteria **Yes ( ) No ( )**

	Department	**Sign. & Date**
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Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

	Department	**Sign. &Date**
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Attachment 8- Machine Fully loaded Test Confirmation

1. Test method:

Under the automatic operating mode, make the machine full with 610 kg water, start up automatic operating curve, During the drying (about 30 h),If the test can catch the water clean or not.

2. Acceptance criteria:

One Drying period not less than 600 kg of water will be sublimed from trays and deposited on condenser.

Condenser temperature will remain below about –40°C during drying.

Chamber vacuum will be above 30 Pa during drying.

Machine automatic operating, and working stability and trustiness.

3. Test result:

STUDY RESULTS SUMMARY	
11 shelves are loaded with 610 kg of purified water	Yes( ) No( )
Freezing Start time / Date:	_____(hr/min) Date:_____
Minimum condenser temperature during drying:	_____°C
Maximum condenser temperature during drying:	_____°C
Minimum vacuum during drying:	_____Pa
Maximum vacuum during drying:	_____Pa
Freezing Finish time/Date:	_____(hr/min)Date:_____
Total water remaining in tray sat end of cycle	_____kg
During drying machine capacity	_____kg

OPERATIONAL QUALIFICATION FOR LYOPHILIZER

During drying machine capacity_____kg
Meet acceptance criteria Yes ( ) No ( )

Condenser temperature will remain below_____°C
Meet acceptance criteria Yes ( ) No ( )

Chamber vacuum will be above_____Pa during drying.
Meet acceptance criteria Yes ( ) No ( )

Machine automatic operating, and working stability and trustiness.
Meet acceptance criteria Yes( ) No( )

Machine fully loaded. Test Meet acceptance criteria

Yes ( ) No ( )

(Attachment: test data curve and report forms)

	Department	**Sign. & Date**
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

Meets Acceptance Criteria: **Yes ( )** **No ( )**

	Department	**Sign. & Date**
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 9- Clean in place (CIP) test confirmation

1. Test method:

In the every corner and shelf in the chamber, both sides spray the rougered about10% consistency. It assures that all the corners and shelves both sides all spray.

Automatic clean in place (CIP) program assures the cleaning water pressure up 0.4 M Pa, the cleaning water Utilizes running water and it is under the automatic mode.

After cleaning over, the program stop operating and open the chamber door for check, confirm it is no Seeper phenomenon.

2. Acceptance criteria:

Clean in place(CP) program can automatic operate and each valve motion and correlation motion can automatic open and close.

After cleaning over, in the chamber and shelves both sides should have no rougered, and it is clean in the chamber.

In the chamber drain is put in order and without seeper phenomenon.

3. Test result:

Automatic clean in place (CIP) program Meet acceptance criteria CIP） Yes ( ) No ( )
In the chamber and shelves both sides should have no rouge red, and it is clean in the chamber Meet acceptance criteria Yes ( ) No ( )
In the chamber drain is put inorder and without seeper phenomenon. Meet acceptance criteria Yes ( ) No ( )

Clean in place(CIP) test Meet acceptance criteria

Yes ( ) No ( )

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

Attachment 10-Sterilization in Place (SIP) test confirmation

1. **Test method:**

Under the automatic mode operating sterilization in place (SIP) program and confirm the stability of the sterilization program working.

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2. **Acceptance criteria:**

Sterilization in place (SIP) program working is stability and trustiness, record curve and report forms can reflect the process of sterilization exactly. In the chamber each sterilization temperature reach up 121˚C.

After sterilize in the chamber and condenser, it is good for dryness and without seeper phenomenon.

After sterilize in the chamber and condenser, cooling half an hour, in the chamber the temperature reach under 80˚C

3. **Test result:**

The Sterilization (SIP) automatic operating program, In the chamber each sterilization temperature reach up 121˚C. Meet Acceptance Criteria Yes ( ) No ( )
After sterilize in the chamber, it is good for dryness and without seeper phenomenon. Meet Acceptance Criteria Yes ( ) No ( )
After sterilize the condenser, it is good for dryness and without seeper phenomenon. Meet Acceptance Criteria Yes () No ()
It is good for sterilize, cooling half an hour, in the chamber the temperature each under 80˚C Meet Acceptance Criteria Yes ( ) No ( )

Sterilization in Place (SIP)

Meet Acceptance Criteria **Yes ( ) No ( )**

(Attachment: Sterilization in place (SIP) test curve and data report forms)

	Department	Sign. &Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	

CORRECTIVE ACTION:

Describe corrective action taken (attach additional sheets if necessary):	
Corrected By:	Date:

Meets Acceptance Criteria: **Yes ( ) No ( )**

	Department	Sign. & Date
Checked by	Quality Assurance	
Reviewed by	Quality Assurance	