PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

FAILURE MODE EFFECT ANALYSIS FOR SAMPLING & CLEANING STATION

PREPARED BY		
NAME	**DESIGNATION**	**SIGNATURE /DATE**

CHECKED BY		
NAME	**DESIGNATION**	**SIGNATURE /DATE**

APPROVED BY		
NAME	**DESIGNATION**	**SIGNATURE /DATE**

FAILURE MODE EFFECT ANALYSIS FOR SAMPLING & CLEANING STATION

S.No.	Document Title	Document Number
1.	Validation master plan	
2.	Project validation plan	

Name (block letters)	Function	Signature

FAILURE MODE EFFECT ANALYSIS FOR SAMPLING & CLEANING STATION

Level	Descriptor	Example detail description
1	Minor	• No impact on the product quality or outcome of the equipment. • Features required for easing equipment operation.
2	Moderate	• No direct impact on product quality/ outcome of equipment. however may indirectly affect the product quality. • Minor effect on personnel health • ~~Used in the initial stage of operation, however it may affect the final output~~ but those are not used for final release of output. • Effect on environment such as clean room.
3	Major	• Features having direct impact on product quality/ outcome of equipment like contact parts MOC, Surface finish, Control system, Process air quality etc. • Failure could lead to regulatory non-compliance. • Loss/ damage to equipment or its critical sub-components • Critical instruments not calibrated or not of desired range or accuracy. • ~~Proper supporting documentation not provided.~~ • Major effect on personnel health

Likelihood	Consequences/ Impact		
	1 – Minor	2 – Moderate	3 – Major
1 (Unlikely)	Low	Medium	High
2 (Possible)	Low	Medium	High
3 (Likely)	Medium	High	High

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								Mitigation Method	Residual risk level	Verification
Charging										
1.	Blended material in IBC is docked to Sampling & cleaning station	Docking not gas tight	No	Does not have any impact on product quality	EH S	Contamination of air with high potent drug posing a risk to operator's health	High	• Split valves are used as interface between IBC and sampling & cleaning station. • Supplier to ensure the gastight closure split valves.	Acceptable	IQ / O Q
2.	Size of sampling & cleaning station and IBC attachment	Docking cannot be done due to mismatched aperture diameter between sampling & cleaning station and IBC.	Yes	Basic requirement	EH S	Contamination of external/ room with high potent drug	High	Aperture on sampling & cleaning station, IBC and split valve will be kept same for correct interfacing.	Acceptable	IQ
Discharging										
3.	Removal of sampled material from sampling & cleaning station	Removing of sampled material in closed condition not possible.	No	Does not have any impact on product quality	EHS	Contamination of air with high potent drug posing a risk to operator's health.	High	• Trash in and trash out sleeve shall be provided for removing of sampled material in bags.	Acceptable	IQ
Process										

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4.	Sampling	Sampling is not possible from the IBC	Yes	Sampling is required for validation study and routine assessment sample.	No	NA	High	▪ Provision for glove ports should be provided to assist sampling. ▪ Sampling rod is to be provided inside the isolator.	Acceptable	IQ / OQ
5.	Inlet/ Exhaust air	Air is not filtered / contaminated	Yes	Cross contamination possible , product may get contaminated	Yes	Unfiltered exhaust air may cause product exposure to the environment	High	In the supply and exhaust air, HEPA shall be provisioned to ensure pure air	Acceptable	IQ / OQ
6.	Coarse filter	Inlet air not filtered from coarse particle	No	Final air quality shall be maintained by HEPA filter	Operational	HEPA get checked frequently	High	Coarse filter shall be installed before the HEPA filter	Acceptable	IQ / OQ

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7.	Exhaust air	Exhaust air contaminate	No	Does not have any impact on product quality	EHS	Product exposure	Low	A dust extraction port shall be provided inside the isolator. HEPA filter with wet scrubber line connection shall be provided at the dust extraction line.	Acceptable	IQ
8.	Height of isolator	Isolator height is not suitable to dock the IBC.	Yes	Design inadequate	No	NA	Medium	▪ Working height is considered to accommodate a vessel of specified height beneath isolator. ▪ Jacking hoist shall be provided to support easy lifting of IBC.	Acceptable	IQ/ OQ
9.	Height of Glove port	Glove port height is not suitable for operation	Yes	Design inadequate	No	NA	medium	▪ The glove port height shall be approx. 1350 ± 50 mm from the floor level to ensure smooth operation.	Acceptable	IQ
10.	Chamber space of isolator	Isolator chamber space is not suitable to keep the material container.	Yes	Design adequacy	No	NA	Medium	Design considered with all operational requirements.	Acceptable	IQ

PHARMA DEVILS

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11.	Size of sleeve	Sleeve port size is not suitable to transfer minimum 5 kg powder materials and waste material.	Yes	Design adequacy	No	NA	Medium	Design considered a size of minimum 200 mm sleeve port.	Acceptable	IQ
12.	Pressure of chamber	Pressure of chamber cannot be measured	Yes	GMP requirement	No	NA	Medium	▪ Magnehelic gauge shall be installed to monitor the pressure of chamber.	Acceptable	IQ / OQ
13.	Hand gloves	Uncomforted operation with hand gloves, chances of material spillage.	No	No impact on weighed quantity	Operational	Loss of material	High	▪ SOP: Sampling of active ingredient in Isolator (Sampling & cleaning Station). ▪ Training of operators for the operations in isolator	Acceptable	SOP
Cleaning and material of construction										

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14.	Cleaning	Difficulty in cleaning	Yes	Accumulation of particles, contamination of clean room possible.	No	NA	High	▪ The design shall ensure adequate clean ability (smooth, SS surface). ▪ Parts which are required for cleaning should be provided with quick fixing arrangement. ▪ Spray guns with flexible piping should be provided for cleaning of chamber. ▪ Spray ball with cover plate shall be provided for cleaning of IBC bin.	Acceptable	IQ

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15.	Cleaning	Improper cleaning	Yes	Accumulation of particles leading to contamination of product during sampling	No	NA	High	▪ Proper cleaning method has to be provisioned for sampling & cleaning station and IBC, so as to minimize the contamination risk. ▪ All gaskets provided to avoid leakage should be amenable for easy removed & re- fixing for cleaning. ▪ All bolts, nuts on the exterior part of the equipment will be with cap head or cap nut.	Acceptable	IQ/ OQ
16.	Drain	Water is not completely drained	Yes	Water stagnation leads to micro burden.	No	NA	High	▪ Water drainage to be considered to ensure complete drainage. ▪ A suitable slope towards drain port is considered.	Acceptable	IQ

PHARMA DEVILS

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17.	Material of Construction	▪ Surface and construction of the machine is not compatible to product. ▪ Material reacts with cleaning media like PW, IPA etc.	Yes	It will lead to product contamination due to corrosion	No	NA	High	▪ All product contact metallic surfaces should be of SS 316 or better with a surface finish of ≤ 0.4 Ra. ▪ All welds and joints shall be ground finish; metallic surface will have no crevices. ▪ Non Contact surfaces should be SS304 with external surface matt finish. ▪ The isolator surface should preferably be made of polyurethane. ▪ Hand Gloves should preferably be made of nitrile rubber or delron and should be compatible to product and decontaminating agents.	Acceptable	IQ

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18.	Isolator surface	Isolator surface is not dried	Yes	Require dryness for operation. Chances of microbial growth if surface is not dried	No	NA	High	Isolator should be suitable to connect with compressed air	Acceptable	IQ
19.	Connection of utility to sampling & cleaning station	Chamber cannot be connected with clean media (potable water, purified water, compressed air) for cleaning & drying.	Yes	Contamination	No	NA	Medium	Suitable sanitary end connections shall be provided to connect utilities.	Acceptable	IQ
20.	Welding	Welding quality not sufficient	Yes	GMP requirement; Cleaning problems, surface conditions out of specification in case of bad welding quality.	No	NA	High	▪ Standard welding technique: Orbital welding. ▪ Welding verification reports shall be available.	Acceptable	IQ
21.	Gaskets, seals and O rings MOC	Gasket MOC not compatible	Yes	▪ Product contamination possible	No	NA	High	▪ MOC should be of food grade (Silicon/PTFE). ▪ Should be compatible with decontaminating agents.	Acceptable	IQ

PHARMA DEVILS

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22.	Surface Finishing	Surface Finishing of Internal & external surface insufficient	Yes	▪ GMP requirement; cleaning problems. ▪ Micro-organisms may accumulate on metallic surfaces	No	NA	High	▪ Surface roughness, Ra ≤ 0.4 µm, proven by certificates for internal surface. ▪ Crevice free smooth, rounded corners & smooth surface.	Acceptable	IQ
23.	Labelling	Labelling of components inappropriate	Yes	Prerequisite for qualification	No	NA	High	▪ Unique identity No. / flow direction must be on components / pipelines, operator panel, etc. (e.g. according to P&ID) ▪ All labelling in English language and according to project standard.	Acceptable	IQ
Maintenance										

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24.	Maintenance	Malfunctions due to worn parts	Yes	Basic GMP requirement	No	NA	High	▪ Machine shall be easy to maintain. ▪ Preventive maintenance procedure should be available ▪ The unit must contain necessary protection devices to ensure that the equipment & the article remain in a safe condition.	Acceptable	IQ/SOP
Safety:										
25.	HEPA filters	During cleaning exhaust HEPA filter is not protected from water	No	This is a special requirement for protecting HEPA from water	Operational	HEPA filter performance is not compatible with water	High	▪ SOP: Precaution to be taken during cleaning ▪ Dome nut should be placed on the dust extraction port during cleaning.	Acceptable	OQ/SOP
26.	Wash water	Wash water pass through the plastic sleeve port	Yes	If not detected dispensed material may get wet	No	NA	High	▪ Trash out sleeve port should be removed after every Washing process. ▪ SOP: Cleaning of Sampling and Cleaning Station.	Acceptable	SOP

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27.	Hand gloves	Hand gloves are not replaceable	Yes	Contamination in case of damage	EHS	Product leakage	High	▪ Hand gloves should be replaceable. ▪ SOP: Preventive maintenance (for visual checking and replacement)	Acceptable	IQ
28.	Containment	Design does not prevent leakage of powder in the environment/ System does not work properly	Yes	Chances of cross contamination	EHS	Emission of powder	High	▪ The canopy installed must be leak proof and exhaust should be supported with HEPA filter. ▪ Sleeve ports for material in and out, should be provided with gas proof zips. ▪ Leak test should be conducted.	Acceptable	IQ, OQ
29.	Containment	System cannot maintain the negative pressure within the pan.	No	Does not have any impact on product quality	EHS	In case of overpressure chances of leakage into room	High	System to be designed so as to maintain negative pressure within the isolator and display of differential pressure with respect to room.	Acceptable	OQ

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30.	Waste water drainage	Rinse water drain in wrong drain	No	Does not have any impact on product quality	EHS	Will not be properly treated	Low	Isolator drain line will be directed towards the correct drain	Acceptable	Facility qualification
Measuring Instrument										
31.	Measuring Instrument	Measuring instrument is not of defined range & accuracy	Yes	Instrument is not suitable for use.	No	NA	High	Measuring instrument range & accuracy shall be defined	Acceptable	IQ / OQ
32.	Measuring Instrument	Measuring instrument could not be calibrated	Yes	Instrument is not suitable for use as it may produce false results	No	NA	High	• Must be calibrated and suitable for recalibration • Suitable calibration certificate shall be provided	Acceptable	IQ / OQ
Documentation:										
33.	Documentation	Critical surfaces are not tested for material of construction and test reports are not provided	Yes	Lack of documented evidence leads to question on the quality of MOC	No	NA	High	MOC description and certification of critical parts to be provided	Acceptable	IQ / OQ
34.	Documentation	Instrument is not provided with calibration certificate	Yes	Calibration cannot be assured due to lack of documented evidence	No	NA	High	Instrument shall be supported with calibration certificate.	Acceptable	IQ / OQ

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35.	Documentation	Equipment is not provided with design and functional specification	Yes	Design qualification is not possible	No	NA	High	Design and functional specification should be supplied as per URS	Acceptable	IQ / OQ
36.	Documentation	Equipment is not provided with Operation & maintenance manual	Yes	Correct operation is not ensured and Qualification requirement	No	NA	High	O & M manual should be supplied per URS	Acceptable	IQ / OQ
37.	Machine operation	Operator and staff is not trained	Yes	Untrained operators may not operate equipment properly	Yes	Chances of accidents	High	Proper training to be imparted with operator and staff by the vendor	Acceptable	OQ
38.	Standard Operating procedure	Standard operating procedures are not available.	Yes	Procedures critical operations cannot be carried out successfully resulting process failure.	Operational	Productivity will get decrease to unavailability of procedure.	High	SOPs for Operation, Cleaning and maintenance shall be prepared in line with operational and maintenance manual and finalized.	Acceptable	IQ / OQ

FAILURE MODE EFFECT ANALYSIS FOR SAMPLING & CLEANING STATION

Acronym	Definition
cGMP	Current Good Manufacturing Practice
db	Decibel
EU-GMP	European –Good Manufacturing Practice
GA	General Arrangement
GMP	Good Manufacturing Practices
HEPA	High efficiency particulate air
HMI	Human Machine Interface
IQ	Installation Qualification
MOC	Material Of Construction
OQ	Operational Qualification
O & M	Operation and Maintenance Manual
PQ	Performance Qualification
PLC	Programmable logic controller
RH	Relative humidity
SOP	Standard Operating Procedures
SS	Stainless steel
URS	User Requirement Specification
w.r.t.	With respect to