User Requirement Specifications
Mobile CIP_SIP system

Process Code	Area	Equipment code	Qty(Nos)
D	Diphtheria	D-CIP_SIP01 and D-CIP_SIP 02	2
T	Tetanus	T-CIP/SIP01 and T-CIP_SIP 02	2

nne pharmaplan	User Requirement Specifications			
	Equipment/System	Mobile CIP/ SIP system		
	Identification #	-	**Document No:**	URS/CIP/SIP01
	Effective Date	2014-10-15	**Revision#**	02

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URS Annexure List

URS Annex No.	Detail
1	P&ID as separate URS annexure
2	List of preferred MAKE of components

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1.0 APPROVAL SIGNATURES

This document is prepared by the Validation and GMP compliance team of "NNE Pharmaplan India for the project "Revival of DPT Vaccine Manufacturing Facility" (project number:-110831) of Pasteur Institute of India, Coonoor under the authority of their Project Manager. Hence, this document before being effective shall b;e approved by the QA team and authorized by the appropriate Project Authority.

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2.0 EQUIPMENT DESCRIPTION

Mobile CIP/ SIP system is used for cleaning solution preparation, recirculation and cleaning of the process equipment/vessel. The scope of the Mobile CIP/ SIP system which includes the preparation of cleaning solution, transfer the CIP solution with the required flow rate & velocity, Re-circulating the CIP solution to the vessel and draining of the CIP solution at the end of the sequence. The system shall also be used for performing the SIP of the subjected vessel.

Design, function and control of the unit should be cGMP compliant. The Equipment should be designed considering easy accessibility and maintenance. All piping should be designed to achieve 100% drainability as per the guidelines of ASME BPE 2012.

The Skid mounted Mobile CIP/ SIP system with integrated pump, anti-static lockable castor wheels, Heat exchanger, Process vessel, HMI, valves, instrumentation and control panel with following features:

Description	Remarks
The vessel should be equipped with the following requirements: Sterile vent filter should be provided for venting and pressurizing the vessel. The filter should be of sterilization grade filter cartridge with code 7 type. The filter housing should be constructed of 316L stainless steel with necessary assembly.	
Air Pressure regulator should be provided in the air line for regulating the air pressure.	
Spray ball should be provided in the top dish of the vessel for WFI supply.	
Acid/ Alkali dosing bottles with necessary accessories like level switch, Non-Return valve, and metering/ stroke pumps should be provided for acid & alkali solutions.	
Differential pressure sensor (Hydrostatic Type) should be provided for measurement and control of liquid level in the vessel.	
Port for recirculation line should be provided on the top dish. The recirculation line should be provided with Suitable heat exchanger for heating CIP solution, centrifugal pump for recirculation and transfer of CIP solution.	
Two numbers of metering/ stroke pumps for addition of acid and alkali, all necessary automation and instrumentation should be provided for fully automatic functionality of the system.	

Description	Remarks
Centrifugal pump with Suitable flow rate should be provided for re circulation and transfer of the CIP solution, all necessary automation and instrumentation should be provided for functionality of the system. Pump should be provided with a drain line.	
A flow switch should be provided to prevent the centrifugal pump from dry running.	
Conductivity sensor (0.04to 500 mS/cm) should be provided on the recirculation line and drain line for the measurement and control during CIP solution preparation & CIP cycle.	
Temperature sensor duplex Pt 100 should be provided on the discharge line of the centrifugal pump for the measurement and control of CIP solution temperature during heating.	
All the condensate drain lines should be provided with necessary steam traps.	
Manifold for pure steam supply	
Manifold for drain line to remove condensate with necessary steam.	
Temperature sensor shall be provided above the stream traps. Note: It shall be provided with interlock which prevents starting of sequence if the air pressure is below 6 barg in the instrument airline.	

The equipment should consist of following parts for operation:

TABLE 1

S. No.	Description	Purpose	MOC	Remarks
1	Shell	Cylindrical	SS316L	
2	Top closure	Tori spherical dish	SS316L	
3	Bottom closure	Tori spherical dish	SS316L	
4	Insulation	To avoid heat loss	Mineral wool	
5	Cladding	Outer cover to Insulation	SS304	
6	Heat exchanger [Shell & Tube]	Maintain the CIP solution temperature	SS 316L	

TABLE 2

S. No.	Description	Diphtheria (D)	Tetanus (T)	Remarks
1	Equipment code	D-CIP/SIP 01 and 02	T-CIP/SIP 01 and 02	
2	No. of system	2	2	
3	Geometric Volume	VTS	VTS	
4	Min Operating Volume	VTS	VTS	
5	Acid dosage container	VTS	VTS	
6	Alkali dosage container	VTS	VTS	
7	H/D	VTS	VTS	

TABLE 3

Nozzle schedule:	Remarks
Top Dish:	
Light and sight port	
Port for Spray ball	
Spare port –TC end	
Acid addition port	
Alkali addition port	
Port for vent filter	
Bottom dish:	
Transfer line port/vessel outlet port	
Level indicator	

TABLE 4

System ID	Max Working Volume of System (WV) L	Subjected Vessel	Capacity (GV) L	Quantity nos.	Recirculation Pump flow rate m3/hr
D-CIP/SIP	200 L	Seed Fermentor	15 L	1	VTS

01		Fermentor	500 L	1	
		Sterile Filtration system	-	2	
		Pressure Vessel	750 L	2	
D-CIP/SIP 02	200 L	Pressure Vessel	250 L	1	VTS
		Precipitation Vessel	200 L	1	
		Sterile Filtration system (Grade B area)	-	1	
		Media Preparation Vessel	500 L	1	
		Buffer Preparation Vessel	250 L	1	
		Pressure Vessel	150 L	2	
T-CIP/SIP 01	200 L	Precipitation Vessel	200 L	1	VTS
		Pressure Vessel	150 L	1	
		Media Preparation Vessel	500 L	1	
		Pressure Vessel	150 L	1	
		Buffer Preparation Vessel	250 L	1	
T-CIP/SIP 02	200 L	Pressure Vessel	500 L	1	VTS
		Fermentor	500 L	2	
		Sterile Filtration system	-	1	

NOTE:

1.	This Technical Specification is the basis for an inquiry to a vendor and therefore the basis for the vendor's proposal.
2.	The vendor is asked to state in "REMARKS" column with "yes" if the described requirement will be completely fulfilled and with "no" in case the requirement will not or cannot be fulfilled with the proposed equipment. In case of an deviation a comment must be inserted or enclosed as a separate annexure by referring to the respective URS specification number.
3.	The vendor must clearly comment each item of the Technical Specification. The comments must be in English language. If extra cost for necessary options becomes necessary the item must be clearly stated.
4.	In case that the requirement includes a question or request or information from the vendor, the answer / information should be stated in the "REMARKS" column.
5.	The final version of this document including the vendor's comments will become basis of a potential purchase order or contract.
6.	The Technical Specification serves to define a summary of all vendors' requirements concerning scope of delivery and services.
7.	The vendor is responsible for technically unobjectionable function of the equipment. This TS is not intended to dictate a technical design to the vendor. If agreed upon with the vendor, the vendor can apply his practically proven design.
8.	Special Instruction a. If no comments against any specification shall be considered as "NO" and b. If there is no reply / comments against the complete URS by the vendor then it shall be treated as unresponsive / technically non-compliant and rejected.
9.	All the instruments and controls mentioned in the URS(s) are expected to be standard supply and part of your standard equipment model. In case of any deviation or redundancy or additional scope of supply is noticed, vendor is required to obtain clarification from HLL before submitting the quotes.
10.	The makes requested are standard international makes. In case of any deviation, vendor to seek clarification from HLL before submitting the offers.
11.	Refer document Installation Requirement Specification and Specific Instructions with URS; NPI_110831_IRS_PIIC_01
12.	Refer Tender document with URS; NPI/110831/EQP/TD/07

Specifications	Remarks
3.0 PROCESS DESCRIPTION	
3.1 Input & Charging method	
3.1.1 The acid/ alkali solutions prepared in the mobile CIP/ SIP system shall be charged to the subjected vessel (vessel to be cleaned) through the system.	
3.1.2 Regulated pure steam through PRV shall be supplied through manifold to respective tanks.	
3.2 Brief Process Steps	
3.2.1 Mobile CIP/ SIP system will perform all the sequence i.e., Preparation, Transfer, Recirculation etc. from the system itself by taking the I/O from subjected Vessel PLC. The system should be capable of the following sequence of cleaning cycle: 1) Wash Phases: Once through with PW rinse- 55-60 °C 2) Alkali addition through metering/dosing pump: PW addition through electromagnetic set point flow meter Base wash- 55-60 °C 3) Intermediate wash: Once-through with PW 4) Acid addition through metering /Dosing pump: PW addition through electromagnetic set point flow meter Acid wash Once-through with PW 5) Rinse Phases: Recirculation/with WFI till conductivity is achieved 6) Drying in place: Air blow to the equipment	
3.2.2 For sterilization of subjected vessel, pure steam shall be supplied to the subjected vessel through CIP/ SIP system based on the temperature set point. 1. The Pure Steam line will be connected to the system using flexible hose. 2. The Compressed air line will be connected to the system using flexible hose. 3. The steam will be then purged inside the subjected vessel using the flexible hose connection between system manifold and Inlet of the vessel. 4. Air in the vessel will be removed through vent filter. 5. Vent valve will be closed. 6. Vessel will be held at 121 °C. 7. The temperature of the steam at the drain point will be monitored through	

Specifications	Remarks
the resistance temperature detector provided in system. 8. After sterilization cycle, the condensate from the vessel will be drained through the drain header provided on the system. 9. Compressed air shall be sent to pressurize the vessel.	
3.3 Output & Discharging method	
3.3.1 The prepared CIP solution will be transferred to the process vessel which will be recirculated with the help of Mobile CIP/ SIP system itself connected to the vessel by using flexible hoses.	
3.3.2 After achieving required conductivity the solution will be drained.	
3.3.3 The drain header of the system shall be connected to the room equipment drain to drain the drain condensate after SIP.	
4.0 PRODUCTIVITY REQUIREMENT	
4.1. Change Over Time	
Not Applicable	
4.2. Others (if any)	
Not Applicable	
5.0 CONTAINMENT	
Not Applicable	
6.0 GMP REQUIREMENTS	
6.1 Process control	
The equipment must operate and control the following process cycle:	
6.1.1 Duration of each cycle.	
6.1.2 Number of cycles.	
6.1.3 Quantities of wash liquid in each cycle.	
6.1.4 Temperature of washing liquid.	
6.1.5 Cycle sequence	
6.1.6 Conductivity (0.04 to 500 mS/ cm)	
6.1.7 pH(0-14)	

Specifications	Remarks
6.2 Failure mode detection	
6.2.1 Equipment should be capable to detect the following failure, notify the operator with alarm and shutdown the process:	
a) Emergency stop activated	
b) Power	
c) Temperature measurement failure	
d) Pump failure	
6.2.2 Following condition need only notification to operator for procedural control	
a) End of any/all process sequence.	
b) Low pressure of compressed air	
c) High/ Low conductivity	
d) High/ Low temperature	
6.3 In – Process control	
NA	
6.4 Level of instrumentation	

Sufficient and suitable instrumentation for the process, safety and productivity control as indicated in the following table:

Type of control	Purpose	Instrumentation
Temperature	To monitor , control and record the temperature	Temperature sensor and transmitter
DP Sensor (Hydrostatic Type)	To monitor , control and record the level in Vessel	DP sensor and transmitter
pH & Conductivity	To monitor , control and record the Conductivity	pH and Conductivity sensor and transmitter
Pressure	To monitor the pressure in the supply line	Pressure sensor
Flow	To check flow	Flow switch
Level Indicator	To monitor, control and record the level	Level sensor and transmitter
Speed	To control the speed of Pump	VFD

	Specifications	Remarks
6.5	**Batch data display and record printing**	
6.5.1	The system should be provided with all necessary automation and instrumentation for establishing interface (Handshake b/w the system) with other systems i.e., blending vessel, media prep. Vessel, Buffer Prep. Vessel etc.	
6.5.2	Controller: - PLC Based Controller (Non-editable data format to be obtainable) with minimum of 10" size HMI (Displaying data trends as Graphs, synoptic view of running parameters etc.)	
6.5.3	The HMI should be of touch screen type (Provision for manual operation to be provided). All settings should be user adjustable. HMI and Control Panel should be mounted on skid. • Human machine interface must be used to enter the process details, which should appear in the print out. • All critical alarms, Critical parameters and interlocks • All Recipes/ sequences • P&ID of the vessel along with instrumentation details • Login details • HMI screen showing simulation of valves	
6.6	**GMP requirements (Others)**	
6.6.1	All valve and joints should be sanitary type (preferably tri-clover connection).	
6.6.2	Equipment should be completely drainable.	
6.7	**Specific requirements**	
6.7.1	All attachments required for fixing nozzles, supply pipes and return pipes should be provided by vendor only.	
6.7.2	All the operations should be automatic through PLC, HMI and provision to be provided for manual interventions.	
6.7.3	All the flexible piping used for cleaning services should be of SS re-enforced and PTFE lined to withstand pressure, temperature and very high and low pH.	
6.7.4	Vendor should provide the following details in the quotes apart from these mentioned in the URS (a) Makes of pumps (Supply and return), Conductivity meter, Valves, PLC etc. (b) Schematics of the Mobile CIP/ SIP system (c) Vessel Capacity	
6.7.5	The Vendor should ensure maintenance parts availability for a minimum of 15 months from delivery.	
6.7.6	Cables, air tubes, etc. required from the point (single utility point) to equipment is in scope of vendor.	

Specifications	Remarks
6.7.7 Vendor to perform a criticality assessment to assess the applicability of the system to Part 11 regulation. Software, if used to generate, process, store the quality critical data must be validated and must comply 21 CFR Part 11 requirements	
6.7.8 Vendor should provide the FRL (Filter, regulator, lubricator), automatic valve assembly and air pressure switch for instrument air. Connections to automatic diaphragm valve should be in vendor scope.	

7.0 CONSTRAINTS

7.1 Equipment location and available space

NA	

7.2 Available Utility

7.2.1 Plant steam – 130 °C – 150°C at 3 – 3.5 bar (g) ----------(Report requirement)	
7.2.2 WFI (Hot loop) – 80-85°C ----------(Report requirement)	
7.2.3 Purified Water- 28 – 30°C ----------(Report requirement)	
7.2.4 Electricity – Vendor to specify----------(Report requirement)	
7.2.5 Compressed air- 6.0– 8.0 bar (g) ----------(Report requirement)	

Note: Utility consumption to be specified by the vendor, in case if there is a deviation in the values mentioned above.

8.0 ABBREVIATION

Abbreviation	Definition
ASME BPE	American Society of Mechanical Engineers Bioprocessing Equipment Standards
CIP	Clean In Place
Class EU	Class European Union
GMP	Good Manufacturing Practices
HLL	HLL Life Care Limited
HMI	Human Machine Interface
ISO	International Standards Organization
NMT	Not More Than
NPI	NNE Pharmaplan India Ltd
PIIC	Pasture Institute of India, Coonoor

Abbreviation	Definition
PLC	Programmable Logic Controller
PTFE	Polytetrafluoroethylene
RH	Relative Humidity
SCADA	Supervisory control and data acquisition system
SIP	Sterilization In Place
TBD	To be discussed
VTS	Vendor to Specify

9.0 REVISION INDEX

Revision	Date	Reason for Revision
00	2014-09-10	First Draft for Client's Review
01	2014-09-24	Updated as per HLL comments
02	2014-10-15	Updated as per meeting held on 16th October 2014

URS Annexure 2: List of Preferred Make of components

SL.NO	DESCRIPTION	MAKE
A	**INSTRUMENTATION**	
1	PLC	Allen Bradley/ Siemens
2	Operator Interface/HMI	Allen Bradley/ Siemens
3	Temperature transmitter	Radix/ Yokogawa/Emerson
4	Temperature sensor	Negele/ Radix/Negale
5	Conductivity sensor	Metler Toledo/E+H
6	DP transmitter	E+H/Negele
7	DP sensor	E+H/Rosemount /Emerson
8	Flow switch	Negele/ Danfoss/E+H
9	VFD	Allen Bradley/ Siemens /Danfoss
B	**MECHANICAL**	
10	Centrifugal pump	Alfa Laval/ Grundfos
11	Vent filter cartridge	Sartorius/Pall/ Millipore
12	Spray ball	Hake/Lechler/Alfa laval
13	Diaphragm valve(Manual)	GEMU/Burkert/ITT/SED/saunders
14	Ball valve(Manual)	Modentic/Saunders/Alfa laval
15	Flexible hose	AB Synthetic/ AMI Polymer / Venair
16	Dosing metering pump	Prominent/ Masterflex
17	Steam trap	Steriflow/spirax marshall
C	**PNEUMATIC**	
18	Diaphragm valve(Automatic)	GEMU/Burkert/ITT/SED/saunders
19	Angle seat valve(Automatic)	GEMU/Burkert/ITT/SED/saunders