User Requirement Specifications
Mixing vessel

Process Code	Area	Equipment code	Qty(Nos)	Capacity
F	Formulation (Component Mixing)	F-MIV 01	1	100 L (W.V)
F	Formulation (Component Mixing)	F-MIV 02	1	100 L (W.V)
F	Formulation	F-MIV 03	1	400 L (W.V)
F	Formulation	F-MIV 04	1	400 L (W.V)
F	Formulation (Saline Mixing)	F-MIV 05	1	200 L (W.V)
F	Formulation (Saline Mixing)	F-MIV 06	1	200 L (W.V)

URS Annexure List

URS Annex No.	Detail
1	Layout showing location of the Mixing vessel in the Formulation block
2	P&ID as separate URS annexure
3	List of preferred MAKE of components

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nne pharmaplan	User Requirement Specifications			
	Equipment/System	Mixing vessel		
	Identification	-	**Document**	URS/MIV 01
	Effective Date	2014-10-16	**Revision**	07

1.0 APPROVAL SIGNATURE

This document is prepared by the Process, Validation and GMP Compliance team of “NNE Pharmaplan India" for the project “Revival of DPT Vaccines 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 be approved by the QA team of Pasteur Institute of India, and authorized by the appropriate Project Authority.

Prepared by		
Name/ Designation	**Signature**	**Date**
Ms. Shilpa Rao **Sr. Project Engineer-Biotech** **NNE Pharmaplan India Ltd.**		

Checked by		
Name/ Designation	**Signature**	**Date**
Ms. Bincy Joseph **Sr. Project Engineer-Biotech** **NNE Pharmaplan India Ltd.**		

Approved by		
Name/ Designation	**Signature**	**Date**
Mr. Vikas Katial **GM and Head-COC Vaccines** **NNE Pharmaplan India Ltd.**		
HLL Lifecare Limited		
Pasteur Institute Of India		

Authorized by		
Name/ Designation	**Signature**	**Date**
Project Authority **Pasteur Institute Of India**		

2.0 EQUIPMENT DESCRIPTION

The equipment described by this URS is a “Mixing vessel”. The Vessel shall be suitable to take water for injection (WFI) of 30°/85°C. The vessel shall be used to mix the raw materials.

The vessel shall be cylindrical having Torispherical top and bottom dish and shall be provided with vessel bottom valve for discharge. .

The mixing vessel shall be CIP able using Mobile CIP system.

The Equipment shall be made SS316L for product contact parts including vessel, inlet and out let nozzles, valves, piping interconnection.

Design, function and control of the unit have to be GMP compliant.

2.0.1. TABLE 1

The equipment should consist of following parts in order to run operation smoothly.

S. No.	Description	Purpose	MOC
1	Shell	To hold the material for mixing	SS316L
2	Top closure	Torispherical dish	SS316L
3	Bottom closure	Torispherical dish	SS316L
4	Insulation	To avoid heat loss	Mineral wool
5	Cladding	To avoid the heat dissipation	SS304
6	Mixer(bottom mounted)	To mix up the contents ((F-MIV 03 and F-MIV 04)	SS316L
7	Impeller (bottom mounted) with two number common motor	To mix up the contents (F-MIV 01, F-MIV 02, F-MIV 05 and F-MIV 06)	SS316L
8	Height/Diameter Ratio	1.2:1	-
9	Height/Diameter Ratio	1.5:1 (F-MIV 05 and F-MIV 06)	-

2.0.2. Design specifications

SI.NO	Identification	Geometric volume	Maximum working volume	Quantity
1.	F-MIV 01	150 L	100 L	1 no
2.	F-MIV 02	150 L	100 L	1 no
3.	F-MIV 03	500 L	400 L	1 no
4.	F-MIV 04	500 L	400 L	1 no
5.	F-MIV 05	250 L	200 L	1 no
6.	F-MIV 06	250 L	200 L	1 no

2.0.3. General vessel specification are as under :

SI.NO	Description	Specification
1.	Min mixing volume	*Vendor to specify*
2.	Working temperature range	20-134^{o}C

3.	Temperature control deviation	±0.5 ºC
4.	Surface Finish	Internally Electro polished up to Ra ≤0. 8 µm (mirror finish) (For valves- Mechanically polished up to Ra ≤0.8 µm)
		Internal finish of the interconnecting piping: Ra < 0.8 µm
		Externally Mechanically polished up to Ra ≤1.2 µm (matt finish)

2.0.4. The general design must be hygienic, with no dead legs and no air pockets. The mixing vessel must be fully drainable. This Vessel must be a floor-standing type with mounting legs on caster wheels (F-MIV 01 and F-MIV 02) and F-MIV 03, F-MIV 04, F-MIV 05 and F-MIV 06 are fixed vessels. Following are the general requirements for a vessel**:**

a) **Port for Addition of raw materials:**

Component Mixing Vessels (F1-MIV 01 and F1-MIV 02)

- F1-MIV 01: Alum solution will be added manually into the mixing vessel through the port with TC end.
- F1-MIV 02: Aluminium phosphate solution will be added manually into the mixing vessel through the port with TC end.

Mixing Vessel (F1-MIV 03 and F1-MIV 04)

- F1-MIV 03-04**:** Alum solution/Aluminium phosphate gel is added into the mixing vessel through the port with TC end.

Saline Mixing Vessel (F1-MIV 05 and F1-MIV 06)

- F1-MIV 05**:** Saline solution is added into the mixing vessel through the port with TC end.
- F1-MIV 06: Saline solution and the supernatant of the Aluminium phosphate gel is added into the mixing vessel through the port with TC end.

b) **Port for Acid/Alkali:** Acid/Alkali will be added manually through a non-sterile addition port.

c) **Spray ball:** The port with fixed type spray ball covering the entire area with 360^0 shall be provided on the top dish for the addition of WFI and CIP solution from CIP system.

d) **Pressure :** Pressure of the vessel during process shall be monitored by the following:

- Diaphragm Pressure gauge for vessel
- Manual diaphragm valve in the exhaust line

e) Mixer: The vessel shall be designed with bottom mounted magnetic mixer (For F-MIV 04 and F-MIV 05) and only impeller (For F-MIV 01, F-MIV 02, F-MIV 05 and F-MIV 06) shall be provided and two number separate trolleys with VFD controlled motor shall be provided as per process requirement.

- Variable speed 40-500 rpm motor with magnetic drive and VFD. Open end of the motor shaft have a flange fitted with a circular magnet.
- Bottom mounted, magnetically coupled.
- Magnetic mixer, suitable for liquids up to Temp 134°C
- It shall be fixed type (For F-MIV 04 and F-MIV 05)
- On/ off switch shall be provided

f) **Inlet/Exhaust Line:** The inlet/exhaust line shall be provided with

- Compressed air inlet for vent filter

- Air pressure reducing valve (PRV) (with filter).
- A single sterile filter (0.2/0.22 µm) with SS housing for both inlet and exhaust.

g) **Sampling valve:** Zero dead lag type with no provision for steam sterilization.

- Sampling port shall be placed at one third of volume of vessel (For F-MIV 04 and F-MIV 05)
- Placed at normal position (For F-MIV 01, F-MIV 02, F-MIV 05 and F-MIV 06)

h) **CIP (Cleaning– In – Place)**: The vessel should have a provision CIP using mobile CIP system.

- SS 316L spray ball shall be provided for the cleaning of the interior of the vessel and all the nozzles on the top dish and nozzles, ports on the vessel.

i) **Tank bottom valve:** Zero dead lag type.- 2 way diaphragm valve.

j) **Dip tube:** Adjustable/Removable type Dip tube shall be provided (For F-MIV 03, F-MIV 04, F-MIV 05 and F-MIV 06)

2.0.5. Nozzle schedule

1. **Top dish:**
   - Light/sight glass-1 No
   - Hand hole-1 No
   - Spray ball-1 No
   - Pressure gauge-1 No
   - Spare part-1 No
   - Exhaust port with sterile vent filter(1 R 6" 0.2µm PTFE))-1 no
   - Dip tube- 1 No

2. **Upper wall side:**
   - Port for raw material addition-1 No
   - Port for acid/ Alkali addition-1 No
   - Vertical view glass(with level marking)-1 No

3. **Lower Wall Side:**
   - Sampling valve-1 No
   - pH Sensor (for F-MIV 03 & F-MIV 04)

4. **Bottom dish:**
   - Tank bottom valve port - 1 No
   - Port for Magnetic mixer- 1 No

pH Sensor shall be provided for 400 L Mixing Vessels (F-MIV 03 & F-MIV 04)

Note: The following points which are there in the IRS (Installation Requirement Specifications) are NOT APPLICABLE for this equipment:

- 4.1.10, 4.1.11
- Sec 5.1
- SI.NO 5 CE Conformity,
- SI.NO 7 ANSI/NSF 49-2008, ISO 14664, ISO 8362
- SI.NO 8 ISO 14664
- SI.NO 9 ISO 8362

- Sec 5.4.1

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 any 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 become necessary the item must be clearly stated.
4.	In case that the requirement includes a question or request or an 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 vendor's 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 Specifications and Specific Instructions" with URS NPI/110729/PIIC/IRS 01
12.	Refer the tender document NPI/110831/EQP/TD/07

Specifications	Remarks
3.0 PROCESS DESCRIPTION	
3.1 Input & Charging method	
3.1.1 The WFI at 80^0C-85^0C shall be added into the vessel.	
3.1.2 The raw material shall be added respectively. **F1-MIV 01:** The known concentration of alum solution shall be added. **F1-MIV 02:** The known concentration of Tri -sodium Ortho Phosphate solution shall be added. **F1-MIV 03-04:** The Alum solution, Tri sodium Ortho-phosphate solution and Saline solution shall be added. **F1-MIV 05:** Known concentration of saline solution shall be added. **F1-MIV 06:** Supernatant aluminium phosphate gel solution and saline shall be added.	
3.2 Brief Process Steps	
3.2.1 The raw materials are mixed well with WFI	
3.2.2 After dissolution the solution is cooled to required temperature.	
3.2.3 Sample can be drawn from the sampling valve.	
3.3 Output & Discharging method	
3.3.1 The prepared solution shall be transferred through the bottom discharge valve to the next process vessels through the pressure.	
4.0 PRODUCTIVITY REQUIREMENT	
4.1 Desired/ suggested capacity	
See Table **2.0.2**	
4.2 Standard batch size	
See Table **2.0.2**	
4.3 Change Over Time	
Not Applicable	
4.4 Others(If any)	
Not Applicable	
5.0 CONTAINMENT	
Not Applicable	

Specifications	Remarks
6.0 GMP REQUIREMENTS	
6.1 Process control	
6.1.1 Pressure of the vessel during process	
6.1.2 pH of the solution (Offline)	
6.1.3 F-MIV 03 and F-MIV 04 (400 L vessels) – pH of the solution (online)-	
6.1.4 Speed of the magnetic mixer(VFD for control)	
6.2 Failure mode detection	
6.2.1. Mixing speed is out of set range	
6.3 In – Process control	
6.3.1 Should have provision for sampling of product solution	
6.4 Level of instrumentation	

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

Parameter	Purpose	Type of control and Instrumentation
Pressure	To monitor the Pressure during process	Diaphragm pressure gauge
RPM	To control the speed of bottom magnetic mixer	Variable frequency drive with indicator
Ph	To monitor the pH of the solution	pH Sensor (for F-MIV 03 and F-MIV 04)

6.5 Batch data display and record printing	
Refer IRS(Installation requirement Specification and Specific Instructions)	
6.6 GMP requirements (Others)	
6.6.1 All nozzle connection shall be sanitary type and special attention shall be given in shape and dimension of the nozzle and connection to realize efficient cleaning and steaming process.	
6.6.2 All nozzles shall be flushed to the wall on closure	
6.6.3 Nozzle length shall be minimized (less than 2D) to avoid cold spot during steam sterilization.	
6.6.4 Bottom discharge and sampling valve shall be zero dead leg type.	
6.6.5 Utility operation shall be preferably manual and valves shall be placed inside of aseptic	

Specifications	Remarks
area.	
6.7 Specific requirements	
In general the equipment has to be designed in a way to get easy and quick access to all necessary maintenance points.	
6.7.1 Nozzle shell shall be seamless.	
6.7.2 Nozzles, adaptors, instrument shall be ASME BPE compliant.	
6.7.3 Total motor drive assembly with SS304 cover	
6.7.4 **Design Parameters:** 6.7.4.1 Shell working Pressure- FV to 2.5 bar(g) 6.7.4.2 Shell working Temperature- 20-134°C 6.7.4.3 Shell sterilization Temperature- 121°C 6.7.4.4 Shell design Pressure- Vendor to specify 6.7.4.5 Shell design Temperature- Vendor to specify	
6.7.5 From user point to the equipment, food grade SIPable flexible hose (2m- 2 No's) with TC end to be provided.	
6.7.6 All black utility non-sterile hoses are considered in vendor's scope (2m – 2 No's)	
6.7.7 From the equipment to the drain, food grade SIPable flexible hose with TC end of minimum 3 m length to be provided -2 No's.	
6.7.8 The equipment shall be easily accessible for cleaning the non-product contact part at maintenance side of the equipment	
6.7.9 Vessel shall be on 3 legs MOC: SS 304 with double-roll lockable castor wheels for easy transportation. (for 100 L and 200L Vessels)	
7.0 CONSTRAINTS	
7.1 Equipments location and available space	
All equipment's will be installed in the Formulation block of the **Revival of the DPT vaccine manufacturing facility at PII, Coonoor** as follows: **Floor:** Ground floor-Formulation; **Room No**: F1G038 **Room size:** 31m^2 **False ceiling height:** 3 m **Physical condition of the room:** 1. Class: EU Class "C" 2. Differential Pressure:35 Pa 3. Temperature maintained: 22±2 ºC 4. Relative Humidity: NMT 55% RH The equipment location is indicated in the relevant block of the layout enclosed as **URS**	

Specifications	Remarks
Annex 1.	
7.2 Available Utility	
7.2.1 Chilled Water@ 2 bar _____ (Report requirement)	
7.2.2 Compressed Air@8 bar _____ (Report requirement)	
7.2.3 WFI@ 2bar_____(Report requirement)	
7.2.4 Pure Steam@2.5 bar _____(Report requirement)	
7.2.5 Plant Steam@3-8 bar _____(Report requirement)	
7.2.6 Electricity :1.5 kW (Report requirement)	

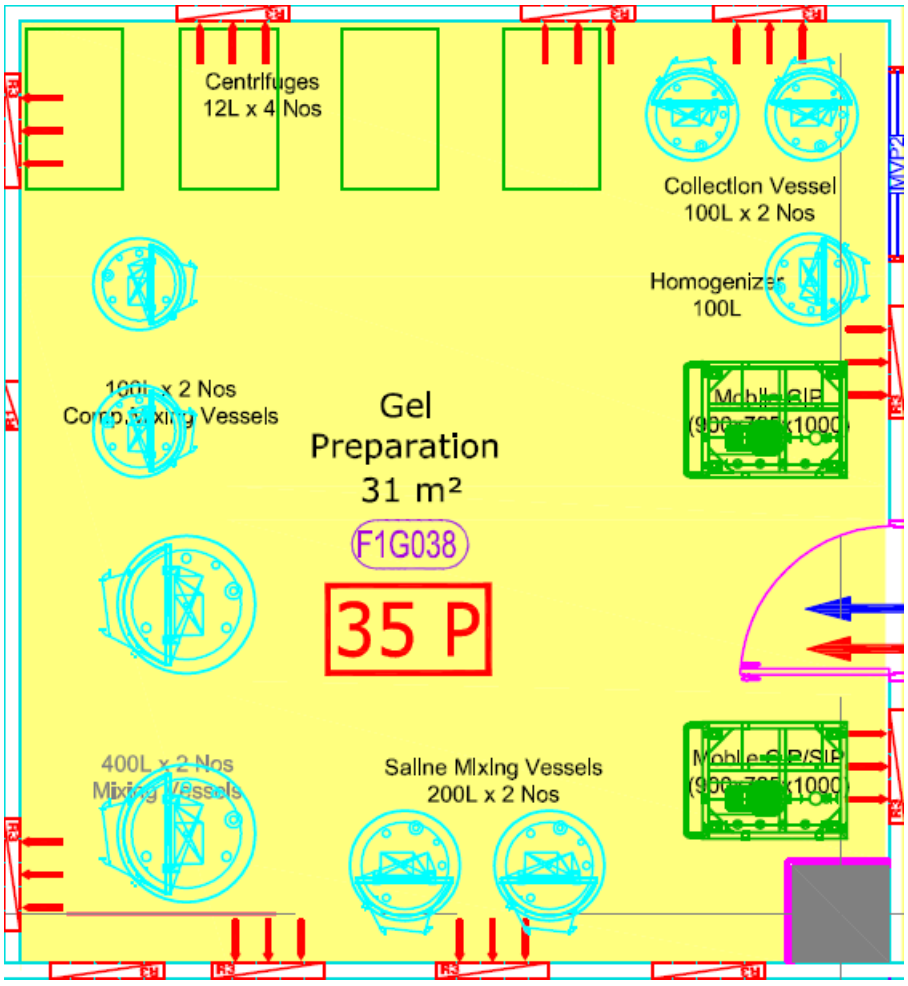
8.0 ABBREVIATION

Abbreviation	Definition
PII	Pasteur Institute Of India
MIV	Mixing Vessel
CIP	Clean In Place
SIP	Sterilization In Place
PII	Pasteur Institute Of India
cGMP	Current Good Manufacturing Practices
HLL	HLL Life care Limited
NPI	NNE Pharmaplan India Ltd
ISO	International Standards Organization
EUGMP	European Union Good Manufacturing Practices
NMT	Not more than

REVISION INDEX

Revision	Date	Reason for Revision
00	2012-06-01	First Draft for Client's Review
01	2012-12-10	Format changed as per HLL requirement
02	2013-06-26	As per MOM dated 2013-05-28 & 2013-05-29
03	2013-09-25	As per the discussion with HLL on Video Con on 2013-09-11 ,2013-09-12 and comments received on 2013-09-20
04	2014-01-20	Revised as per commented URS received on 2014-01-17
05	2014-01-28	URS's Consolidated as per telephonic confirmation between NNE and HLL
06	2014-07-14	Revised as per the discussion with HLL on 2014-06-19 and 2014-06-20
07	2014-10-16	Revised as per the discussion with HLL on 2014-10-16

URS Annexure 1: LAYOUT; Room No: F1G038



URS Annexure 3: List of preferred make of components

	MECHANICAL	
1.	Pressure gauges	WIKA/DENVER/NEGELE
2.	Filter cartridge	SARTORIUS/PALL / MILLIPORE
3.	Spray ball	HAKE
4.	Diaphragm valve	GEMU/ITT/Burkert/SED/Saunders
5.	Ball valve	MODENTIC/SAUNDERS/ALFA LAVAL
6.	Sampling valve	GEMU/ITT/Burkert/SED/Saunders
7.	Vessel bottom valve	GEMU/ITT/Burkert/SED/Saunders
8.	Flexible hose	AB SYNTHETIC/ AMI POLYMER/Veniar
9.	Magnetic Mixer	NOVASEPTIC/ALFA LAVAL/ROPLAN
10.	Air PRV	FESTO/SMC
	PNEUMATIC	
11.	Diaphragm valve(Automatic)	GEMU/ITT/Burkert/SED/Saunders
12.	Angle seat valve(Automatic)	GEMU/ITT/Burkert/SED/Saunders
	ELECTRICAL	
13.	Lamp	PAPENMEIER