nne pharmaplan®	User Requirement Specifications				
	Equipment/System	Buffer Preparation Tank			
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01	
	Effective Date	2014-10-17	**Revision**	10	

User Requirement Specifications
Buffer Preparation Tank

Process Code	Area	Equipment code	Qty(Nos)	Capacity (W.V)
D	Diphtheria	D-BPT 01	1	200 L
P	Pertussis	P-BPT 01	1	80 L
F	Formulation	F-BPT 01	1	250 L
T	Tetanus	T-BPT 01	1	200 L

nne pharmaplan®	User Requirement Specifications				
	Equipment/System	Buffer Preparation Tank			
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01	
	Effective Date	2014-10-17	**Revision**	10	

URS Annexure List

URS Annex No.	Detail
1	A) Layout showing location of the Buffer Preparation Tank in the Diphtheria block
	B) Layout showing location of the Buffer Preparation Tank in the Pertussis block
	C) Layout showing location of the Buffer Preparation Tank in the Formulation block
	D) Layout showing location of the Buffer Preparation Tank in the Tetanus block
2	P&ID as separate URS annexure
3	List of preferred MAKE of components

Table of Contents

nne pharmaplan®	User Requirement Specifications				
	Equipment/System	Buffer Preparation Tank			
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01	
	Effective Date	2014-10-17	**Revision**	10	

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 **Assistant Manager- 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 “BUFFER PREPARATION TANK”. The tank shall be suitable to take water for injection (WFI) of 85°C for CIP and plant steam of 121°C for SIP and other pre-weighed materials.

Design, function and control of the unit have to be cGMP compliant. The general design must be hygienic, with no dead legs and no air pockets. The buffer preparation system must be fully drainable. The vessel shall be mobile type, which is mounted on legs with anti-static lockable caster wheels.

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

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

S. No.	Description	Purpose	MOC
1.	Shell	Cylindrical for buffer solution preparation and transfer	SS316L
2.	Top closure	Torispherical dish	SS316L
3.	Bottom closure	Torispherical dish	SS316L
4.	Jacket	For temperature maintenance	SS304
5.	Insulation	To avoid heat loss	Mineral wool
6.	Cladding	To cover the jacket	SS304
7.	GMP Mixer (bottom mounted)	For mixing the buffer solution and maintain homogeneity	SS316L
8.	Height/Diameter Ratio	1.2:1	-

2.0.2. Vessel specifications

Sl.NO	Area	Geometric volume	Maximum working volume	Quantity
1.	Diphtheria	Vendor to specify	200 L	1 no
2.	Pertussis	Vendor to specify	80 L	1 no
3.	Tetanus	Vendor to specify	200 L	1 no
4.	Formulation	Vendor to specify	250 L	1 no

2.0.3. General vessel specification are as under :

Sl.NO	Description	Specification
1.	Min mixing volume	*Vendor to specify*

2.	Working temperature range	20-134^{o}C
3.	Temperature control deviation	±0.5 °C
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. This vessel must be on anti-static castor wheels.

Following are the general requirements for a vessel:

a. **Addition of buffer salts:** The buffer salts shall be added into the vessel through the hopper/hand hole[Approx. ~ 2.5"dia]

b. **Spray ball:** The port with fixed type spray ball covering the entire area with 360^{0} shall be provided on the top dish.

c. **Inlet/Exhaust line:** The vent /exhaust line shall be provided with

- A single sterile inlet and exhaust filter (0.2/0.22 micron) with SS housing.
- Compressed air inlet for vent filter
- Air PRV (with filter)

d. **Rupture disc:** It should be mounted on top of the buffer preparation vessel to relieve excess pressure during operations.

e. **Temperature Control:** The temperature during buffer preparation shall be controlled via circulation of utilities (pure steam, cooling water, chilled water, etc) in the jacket. Temperature control during buffer preparation (tolerance limit: ±2.0°C) & during sterilization (SIP)(tolerance limit: 122 °C ± 1°C)

- Safety relief valve for jacket
- Bourdon type pressure gauge for jacket utility
- Pneumatically operated valves for steam and cooling water/ chilled water

f. **Pressure:** Pressure of the buffer preparation vessel during process and SIP shall be monitored by the following :

- Diaphragm pressure gauge

g. **Mixer:** The vessel shall be designed with bottom mounted GMP mixer as per process requirement.

- Variable speed 40-500 rpm motor with magnetic drive. 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 pH 1-14, Temp 134°C.
- On/ off switch shall be provided

h. **Sampling valve:** It should be flush welded zero dead lag valve without steaming provision.

i. **pH:** The vessel shall be provided with a sterilizable pH probe with transmitter

j. **Tank bottom valve:** It is Zero Dead Leg type valve. It shall be directly welded to vessel bottom centrally, having a PTFE diaphragm

k. **CIP (Cleaning – In – Place)**: The vessel shall be cleaned by using a mobile CIP trolley.

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

l. **SIP (Sterilization – In – Place)**:

The buffer preparation vessel should be designed for inbuilt SIP

The following principles will be applied for SIP of the system:

- The exhaust air filters to be sterilized along with the vessel.
- The sensors should be reusable and sterilizable type.

m. **Controller:** - Relay based controller shall be provided.

2.0.5. Nozzle schedule:

1. Top dish

The buffer preparation vessel top dish will have:

- Light / Sight glass
- Hand hole - 1no
- Port for pressure gauge-1 no
- Rupture disc-1 no
- Spray ball port - 1 no
- Spare port – 1 no (TC Connection)
- Inlet and Exhaust port with sterile vent filter-1 no

2. Upper wall side

- Vertical view glass(with level marking) - 1 no
- Jacket outlet-1 no

3. Lower wall side

- Port for temperature sensor/transmitter-1 no
- Jacket inlet-1 no
- Port for sampling- 1 no
- pH probe – 1 no

4. Bottom dish

- Port for Tank bottom valve- 1 no
- Port for magnetic mixer-1 no

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 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/110831/EQP/IRS01
12.	Refer tender document NPI/110831/EQP/TED/07

nne pharmaplan®	User Requirement Specifications				
	Equipment/System	Buffer Preparation Tank			
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01	
	Effective Date	2014-10-17	**Revision**	10	

Specifications	Remarks
3.0 PROCESS DESCRIPTION	
3.1 Input & Charging method	
3.1.1 The buffer salts shall be charged in to the vessel through the hopper/hand hole	
3.1.2 WFI of 80-85°C is added into the vessel	
3.2 Brief Process Steps	
The tanks have to be designed to prepare and store buffer solution respectively in sufficient quantity and quality.	
3.2.1 After dissolving the ingredients, the solution is cooled down to required temperature by using chilled/cooling water circulation in the tank jacket.	
3.2.2 Samples can be drawn through sampling valve.	
3.3 Output & Discharging method	
3.3.1 The buffer solution is transferred to the next process	
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	
6.0 GMP REQUIREMENTS	
6.1 Process control	
The equipment must operate and control the following process parameters.	
6.1.1 Temperature of product during the buffer preparation	

Specifications	Remarks
6.1.2 Speed of the mixer during buffer preparation	
6.1.3 CIP/SIP process parameters	
6.2 Failure mode detection	
Equipment shall be capable to detect the following failure, notify the operator with alarm and shutdown the process: (if it exceeds by 0-10% (i.e. tolerance limit) of the set point value):	
6.2.1. Mixing speed is out of set range	
6.2.2. Abrupt change in temperature in a particular time	
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:	

Parameter	Purpose	Type of control and Instrumentation
Temperature of the vessel	To monitor, indicate and control the vessel temperature	Temperature sensor
Pressure	To monitor the pressure during process/SIP	Diaphragm pressure gauge
Speed	To control magnetic mixer speed	Variable frequency drive with indicator
pH	To monitor the pH of the solution	pH probe with display

6.5 Batch data display and record printing	
Batch data to be printed by using real time printer and trends to be printed in strip chart recorder	
6.6 GMP requirements (Others)	
6.6.1 The vent filter housings in the vessel shall be provided with sterilizing grade hydrophobic filter.	
6.6.2 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. All nozzle connection should comply with dead leg requirement.	
6.6.3 All nozzles shall be flushed to the wall on closure.	
6.6.4 Nozzle length shall be minimized (less than 2D) to avoid cold spot during steam	

	Specifications	Remarks
	sterilization	
6.6.5	Steam traps shall be provided wherever required.	
6.6.6	All valves in the sterile part of the equipment should be of sanitary diaphragm valves	
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 comply with ASME BPE compliant.	
6.7.3	Total motor drive assembly with SS304 cover	
6.7.4	Vendor shall provide FRL (Filters, regulators, lubricators)	
6.7.5	Design Parameters: 6.7.5.1 Shell working pressure- FV to 2.5 bar(g) 6.7.5.2 Shell working temperature- 20-134°C 6.7.5.3 Shell sterilization temperature- 121°C 6.7.5.4 Shell design pressure- Vendor to specify 6.7.5.5 Shell design temperature- Vendor to specify 6.7.5.6 Jacket working pressure- FV to 4 bar(g) 6.7.5.7 Jacket working temperature- 135°C 6.7.5.8 Jacket design pressure- Vendor to specify 6.7.5.9 Jacket design temperature-Vendor to specify	
6.7.6	From user point to the equipment, food grade SIPable flexible hose (4 m, 4 Nos) with TC end to be provided.	
6.7.7	From the equipment to the drain, food grade SIPable flexible hose with TC end of minimum 5 m length to be provided- 2 nos	
6.7.8	Non sterile flexible hoses for black utility to be part of equipment supply	
6.7.9	The equipment shall be easily accessible for cleaning the product non-contact part at maintenance side of the equipment.	
6.7.10	**Performance criteria during FAT/SAT:** a. Spray ball coverage test during FAT b. Thermal mapping c. All FAT/SAT IQ,OQ as per IRS	

Specifications	Remarks
7.0 CONSTRAINTS	
7.1 Equipment location and available space	

a) This equipment will be installed in the **Diphtheria block** of Revival of DPT vaccine manufacturing facility at PII, Coonoor as follows:

Floor: Ground floor Diphtheria bulk
Room dimension : 4.9 m x 3.61 m, 2.0 x 2.9 m
False ceiling height: 4 m

Physical condition of the room:

1. Class: EU Class “C”
2. Differential Pressure:25 Pa
3. Temperature maintained: 22±2 °C
4. Relative Humidity: < 55% RH

b) This equipment will be installed in the **Pertussis bulk** of DPT Vaccine manufacturing facility at PII, Coonoor as follows:

Floor: Ground**; Room No: B1G028**
Room dimension : L x W: 4.7 m x 3.61, 1.8 m x 2.9 m
False ceiling height: 4.0 m

Physical condition of the room:

1. Class: EU Class “C”
2. Differential Pressure:25 Pa
3. Temperature maintained: 22±2 °C
4. Relative Humidity: < 55%RH

c) This equipment will be installed in **Formulation block** of the Revival of DPT vaccine manufacturing facility at PII, Coonoor, as follows:

Floor: Ground floor –Formulation
Room dimension : 11m^2
False ceiling height: 3 m

Physical condition of the room:

1. Class: EU Class “C”
2. Differential Pressure:15 Pa
3. Temperature maintained: 22±2 °C
4. Relative Humidity: < 55% RH

nne pharmaplan®	User Requirement Specifications			
	Equipment/System	Buffer Preparation Tank		
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01
	Effective Date	2014-10-17	**Revision**	10

Specifications	Remarks
d) This equipment will be installed in **Tetanus block** of the Revival of DPT vaccine manufacturing facility at PII, Coonoor, as follows: **Floor:** Ground; Room No:B2G033 **Room dimension :** L x W : 5.3 m x 2.98 m **False ceiling height:** 4.0 m **Physical condition of the room:** 1. Class: EU Class "C" 2. Differential Pressure:15 Pa 3. Temperature maintained: 22±2 °C 4. Relative Humidity: < 55% RH The equipment location is indicated in the relevant block of the layout enclosed as **URS Annex 1.**	
7.2 Available Utility	
7.2.1 Cooling Water@ 3 bar _____ (Report requirement)	
7.2.2 Chilled Water @ 3bar _____ (Report requirement)	
7.2.3 Compressed Air@ 8 bar _____ (Report requirement)	
7.2.4 WFI (Hot loop) @ 2 bar _____ (Report requirement)	
7.2.5 Plant Steam@ 3-8 bar _____ (Report requirement)	
7.2.6 Pure steam @ 2.5 bar _____ (Report requirement)	
7.2.7 Electricity : 1.5 kW (Report requirement)	

8.0 ABBREVIATION

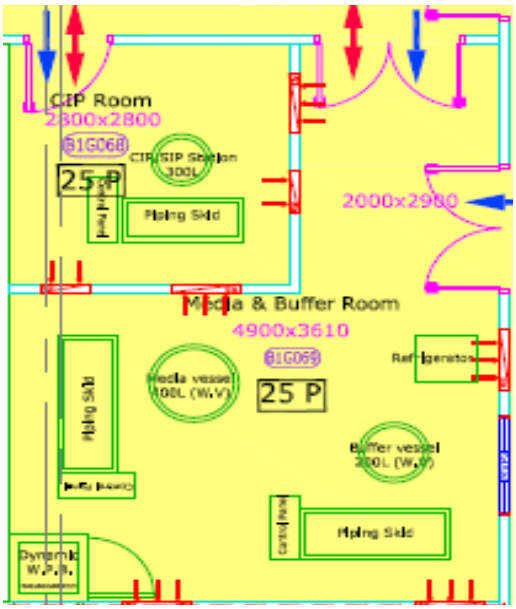
Abbreviation	Definition
PII	Pasteur Institute Of India
BPT	Buffer Preparation tank
CIP	Clean In Place
SIP	Sterilization In Place
ESIP	Empty Sterilization In Place
GMP	Good Manufacturing Practices
HLL	HLL Life care Limited
NPI	NNE Pharmaplan India Ltd

nne pharmaplan	User Requirement Specifications				
	Equipment/System	Buffer Preparation Tank			
	Identification	D-BPT 01 P-BPT 01 F-BPT 01 T-BPT 01	**Document**	URS/BPT 01	
	Effective Date	2014-10-17	**Revision**	10	

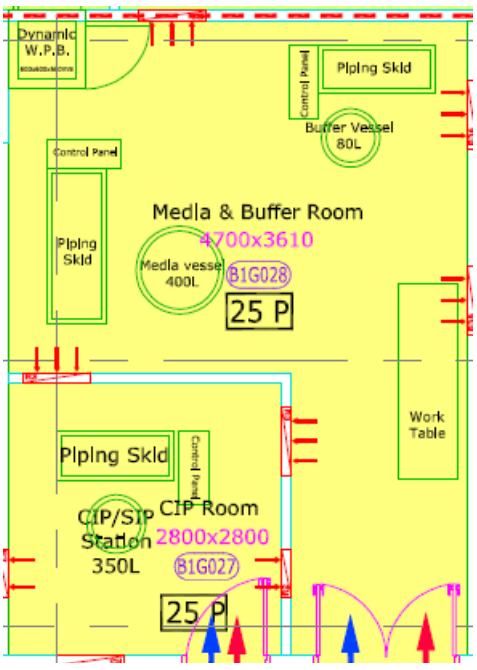
REVISION INDEX

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	2013-06-27	As per the discussion with HLL/PIIC on 2013-05-28 and 2013-05-29 and Internal review
03	2013-09-23	As per the discussion with HLL on Video Con on 2013-09-11 ,2013-09-12 and comments received on 2013-09-20
04	2013-10-28	Revised as per comments received on URS by email on 2013-10-23
05	2013-11-20	Revised as per comments received on URS by email on 2013-11-12 and Telecon on 2013-11-15
06	2014-01-02	Revised as per the discussion with HLL on Video Con on 2014-01-02
07	2014-01-20	Revised as per comments received on URS by email on 2014-01-20
08	2014-01-28	URS's Consolidated as per telephonic confirmation between NNE and HLL
09	2014-06-24	Revised as per the discussion with HLL on 2014-06-19 and 2014-06-20
10	2014-10-17	Revised as per the discussion with PIIC and HLL on 2014-10-16

URS Annexure 1: LAYOUT A
DIPHTHERIA BLOCK

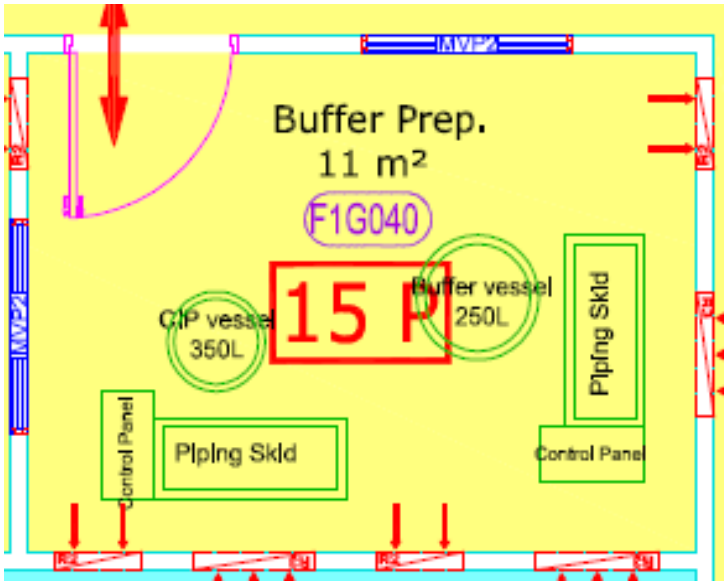


URS Annexure 1: LAYOUT B
PERTUSSIS BLOCK



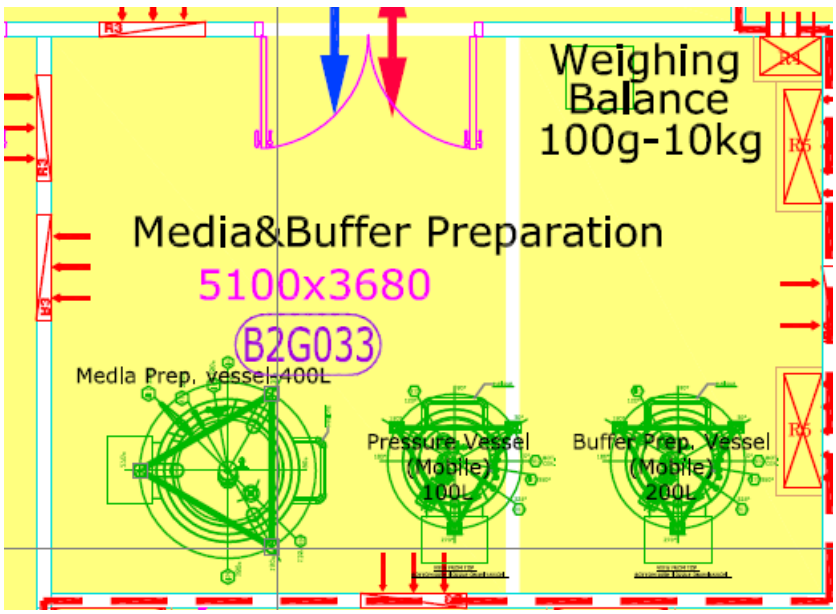
URS Annexure 1: LAYOUT C

FORMULATION BLOCK



URS Annexure 1: LAYOUT D

TETANUS BLOCK



URS Annexure 3: List of preferred make of components

SI.NO	COMPONENTS	MAKE
	INSTRUMENTATION	
1.	Temperature Sensor/transmitter	Radix/ NEGELE
2.	Steam trap	STERIFLOW/ITT/Spirax
	MECHANICAL	
3.	Pressure gauge	WIKA/Denver/Negele
4.	Air filter cartridge	Sartorius/PALL / Millipore
5.	Spray ball	HAKE
6.	Diaphragm valve	GEMU / ITT/SED/BURKERT/SAUNDERS
7.	Ball valve	Modentic/Saunders/Alfa laval
8.	Sampling valve	GEMU / ITT/SED/BURKERT/SAUNDERS
9.	Tank bottom valve	GEMU / ITT/SED/BURKERT/SAUNDERS
10.	Rupture disc	Zook/Elfab/fike
11.	Air-PRV	Festo
12.	GMP mixer	Alfa Laval/Novaseptic/ Roplan
13.	Flexible hose	AB Synthetic/ AMI Polymer/Venair
	PNEUMATIC	
14.	Diaphragm valve(Automatic)	GEMU / ITT/SED/BURKERT/SAUNDERS
15.	Angle seat valve(Automatic)	GEMU / ITT/SED/BURKERT/SAUNDERS
	ELECTRICAL	
16.	Lamp	PAPENMEIER