

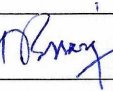
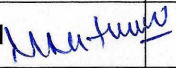
	TECHNICAL SPECIFICATION FOR DOSING SYSTEM & ACCESSORIES	SPEC. No.: ROS:6175
		REV: 00

**BHARAT HEAVY ELECTRICALS LIMITED,
RANIPET- 632406.**

TECHNICAL SPECIFICATION

For

DOSING SYSTEM & ACCESSORIES FOR KILWA PROJECT

00	05.07.17	DBN 	PPALANI 	MN 	Fresh issue
Rev. No	Date	Prepared	Checked	Approved	Remarks

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1. PROJECT INFORMATION

- 1.1 Owner : Kilwa Energy Company Ltd.,
Tanzania
- 1.2 Project Title : 1x371.2 MW natural gas
based combined power plant
- 1.3 Plant location : Kilwa Dist, Tanzania, Africa
Continent.
- 1.4 System : Plant water system / ETP
- 1.5 Vendor scope : Chennai / Mumbai Sea port

2. GENERAL

This technical specification should be read along with the General specification ROS: 9012/Rev.03 for Dosing system.

- a. Order of priority of this specification is as follows.
 - a. Technical specification.
 - b. General specification ROS: 9012/Rev.03.
 - c. E C&I specification ROS:4177/Rev.00
 - d. Dosing system drawing – P&ID: 1-WT-030-01052/ Rev.00
- b. Purchaser will provide required power supply at Pumps motor Terminal box – 415 V, 3 phase. Power cable is in BHEL scope.

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3.0 SCOPE OF SUPPLY

Sl. No.	Material Code	Description	Quantity
DOSING SKID AS PER P&ID (1-WT-030-01052/ Rev.00)			
1.	RWT705300001	Chlorination (NaOCl) Dosing System Assembly with Accessories (20 LPH)	1 Sets
2.	RWT705300002	Hydrochloric Acid Dosing System Assembly with Accessories (50 LPH)	1 Set
3.	RWT705300003	FeCl ₃ (Coagulant) Dosing system Assembly with Accessories (50 LPH)	1 Set
4.	RWT705300004	Coagulant aid Dosing system Assembly with Accessories (50 LPH)	1 Set
5.	RWT705300005	De- Chlorination Dosing Assembly with accessories- SBS (10 LPH)	1 Set
6.	RWT705300006	Antiscalant Dosing Assembly with accessories- SBS (10 LPH)	1 Set
7.	RWT705300007	Sodium Hydroxide (NaOH) Dosing System Assembly with Accessories (10 LPH)	1 Set
8.	RWT705300008	UF-CIP : Citric Acid Dosing System Assembly with Accessories (160 LPH) for PWTs & ETP	2 Set
9.	RWT705300009	UF-CIP : Chlorination (NaOCl) Dosing system with Accessories (160 LPH) for PWS & ETP.	2 Set
10.	RWT705300010	Hydrochloric Acid Dosing System Assembly with Accessories (50 LPH) for ETP	1 Set
11.	RWT7053000011	FeCl ₃ (Coagulant) Dosing system (50 LPH) for ETP clarifier	2 Set
12.	RWT7053000012	Coagulant aid Dosing system (50 LPH) for ETP	2 Set
13.	RWT7053000013	De- Chlorination Dosing System Assembly with Accessories (10 LPH) for ETP clarifier	1 Set
14.	RWT7053000014	Antiscalant Dosing Assembly with accessories- SBS (10 LPH)	1 Set
15.	RWT7053000015	Sodium Hydroxide (NaOH) Dosing System Assembly with Accessories (15	1 Set

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		LPH)	
16.	RWT7053000016	Chlorination (NaOCl) Dosing System Assembly with Accessories (15 LPH)	1 Set
17.	RWT7053000017	Commissioning spares for dosing system (refer clause. 3.2.1)	1 Set
18.	RWT7053000018	Mandatory spares for dosing system (refer clause. 3.2.2)	1 Set

Note:

All the sub-vendor must have supplied equipment for a similar duty and application with proven experience. These manufacturers / suppliers / sub-vendors should have received ISO 9000 qualification (certification of approval) from International Standard Organization, at least three (3) years old and such qualifications are currently valid. The vendor shall provide evidence to confirm this qualification when requested.

3.1 PERFORMANCE GUARANTEE

The system performance guarantees applicable are detailed in this section.

In addition to the guarantees mentioned in earlier clause, the requirements of specifications on all guarantees as elaborated under relevant clauses of Technical Specifications should be met.

The guarantee for the equipment shall start after 18 months from the date of supply (or) 12 months from the date of commissioning, whichever is earlier.

Any part which proves defective either in design, materials / and / or manufacture within the above guarantee period shall be replaced at free of cost to the owner at site and the provision of this clause shall apply to the portions of the plant so replaced or renewed until the expiration of the guarantee period or from the date of replacement whichever is later.

3.2 SPARES

3.2.1 Commissioning spares:

The bidder shall provide commissioning spares and the commissioning spares shall be delivered along with main supply. The commissioning spares list is indicated in this section. Over and above any additional requirements for trouble free commissioning of the equipment / system shall be included in the list. The price for the commissioning spares shall be included in the main supply and the list shall be provided along with the bid, this price will be included for bid evaluation.

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Sl. No.	Description	Unit
1.	Diaphragm for 10 LPH Pump	1 set
2.	Diaphragm for 15 LPH Pump	1 set
3.	Diaphragm for 20 LPH Pump	1 set
4.	Diaphragm for 50 LPH Pump	1 set
5.	Diaphragm for 160 LPH Pump	1 set
6.	Calibration Cylinder - 2 Liter Capacity	1No
7.	EPDM Flange Gasket -1"	10 Nos
8.	EPDM Flange Gasket – ½"	20 Nos
9.	'Y' type strainer	02 Nos
10.	Pressure Relief Valve	02 Nos
11.	Flexible hose	15 mtr
12.	Flexible hose & CPVC pipe connector	20 Nos
13.	Injection head for 10 LPH pump	1 set
14.	Injection head for 15 LPH pump	1 set
15.	Injection head for 20 LPH pump	1 set
16.	Injection head for 50 LPH pump	1 set
17.	Injection head for 160 LPH pump	1 set

Note : Over and above any additional requirements for trouble free commissioning of the equipment / system shall be included in the list.

3.2.2 Mandatory Spares

The price for the mandatory spares shall be given separately and shall not be included in the main supply. The list of the mandatory spares is as given below.
Mandatory spares shall be packed separately with detailed packing list (items should not be packed along with main supply items)

All spares supplied under this Contract shall be strictly interchangeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at site e.g small item shall be packed in sealed transparent plastic bags with desiccator packs as necessary.

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Each spare shall be clearly marked or labelled on the outside of the packing with its description. When more than one spare part is packaged in a single case, a general description of the contents shall be shown on the outside of such case and a detailed list should be enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.

Bidder to quote for the following mandatory spares.

(a). Mechanical :

1	NaOCl Dosing pump (20 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
2	HCl Dosing pump (50 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
3	FeCl₃ Dosing pump (50 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set

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g.	Solenoid Assembly	4 Sets
4	Coagulant aid Dosing pump (50 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
5	Antiscalant Dosing pump (10 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
6	De-chlorination Dosing pump (10 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
7	NaOH Dosing pump (10 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set

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d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
8	NaOCl Dosing pump (15 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
9	NaOCl/Citric Acid Dosing pump (160 LPH)	1 lot
a.	Bearings	1 Set
b.	Oils seals for gear box	1 Set
c.	Stuffing Box Packing	1 Set
d.	Diaphragm	10 Sets
e.	Pulser	4 Sets
f.	Nuts & Bolts for connecting rod	1 Set
g.	Solenoid Assembly	4 Sets
10	Gaskets (for each type/variant of GRP tank)	01 Set
11	Agitator bearing , coupling and oil seal (for each type/variant of agitator)	01 No
12	ELECTRICAL	
a.	Motor in each rating	2 Nos
b.	Bearing for motor in each rating	2 Nos
c.	Auto stroke controlled dosing pump motor assembly	2 Nos
d.	Agitator motor	2 Nos
12	CONTROL & INSTRUMENTATION	

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e.	Local gauges (pressure, level)	2 Nos
f.	Flow meters	2 Nos
g.	Field switches	2 Nos

3.3. Recommended Spares for 2 years O & M :

Bidder also provide the list of recommended spares for two years of normal operation of the plant over & above the mandatory spares. The bidder shall provide the list of recommended & to be filled as per **Annexure-1**

BHEL reserves the right to finalize the exact quantity of recommended spares parts and effect price adjustment on basis of unit rates quoted by the bidders.

The price of recommended spares **will not be considered for bid evaluation**.

The prices of recommended spares shall be consistent with those of the mandatory spares. The validity of prices for these spares shall be up to 2 years.

4.0 Inspection

Inspection by BHEL corporate Quality. Vendor shall submit the QAP for the Customer approval before start-up of the manufacturing.

Manufacturing quality plan shall detail out, for all the components and equipment, various tests/inspection to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by contractor's quality control organization, the relevant reference document and standards, acceptance norms and inspection documents raised etc. during all stages of material procurement, manufacture, assembly and final testing/performance testing.

No materials/equipment shall be dispatched from the manufacturer's works before the same is either accepted subsequent to pre-dispatch final inspection including verification of records of all previous tests/inspections by purchaser's Engineer /authorized representatives, or such pre-dispatch final inspection is waived by the purchaser and dispatch is authorized after review of test reports.

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5.0 VENDOR LIST

- | | | |
|-----------|--------------------------------|---|
| a. | Dosing pumps make | :Milton Roy ,Grundfos |
| b. | Mixers | :Milton Roy ,Grundfos ,Remi ,Bonfiglioli ,PSI Engineering system Pvt. Ltd. |
| c. | CPVC Pipes , fittings& Valves, | :Astral ,GF ,FIP
Industrial grade, PN 16 rating, DIN standard or schedule 80, UV resistance, chemically suitable and Grey in color Pipes as per ASTM F441(length – 5 mtr min), Fittings as per ASTM F439, Valves as per ASTM D1970 & Flange: ANSI B 16.5, Cl.150. |
| d. | CPVC Strainer, Schedule 80 | :Astral ,GF,FIP |
| e. | Motor | :Crompton Greaves, Bharat Bijilee , Kirloskar, Siemens ,ABB ,NGEF |
| f. | Level Switch | :Baumer, V.Automate & Instruments Pvt.Ltd
Pune Techtrol, Levcon, SBEM |
| g. | Pressure gauge | :A N Instruments Pvt Ltd, Premier Instruments & Controls, Manometer(India) Pvt Ltd , H.Guru Instruments (S.I) P.Ltd, Pyro Electric Instruemnts (Goa) Pvt. Ltd, Walchandnagar Industries Limited, Gauges Bourdon India Pvt Ltd, New Scientific Repairs & Trading Co, Goa Instruments Industries Pvt Ltd, Baumer Technologies India Pvt Ltd., |
| h. | Level gauge | : Baumer & Pune Techtrol |

6.0 PAINTING

All the Equipment and steel structures shall be protected against external and internal (if any) corrosion by providing suitable painting as described below unless otherwise specified elsewhere. However, the surfaces of stainless steel, Galvanised steel, Gunmetal, brass, bronze, UPVC pipes, HDPE pipes and non-metallic components shall not be applied with any painting.

All painting shall be carried out in conformity with the paint manufacturer's recommendation.

a. SCOPE

This section covers the painting requirements for skids, equipment & Accessories.

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b. CODES AND STANDARDS

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

IS: 5 : Colours for ready mixed paints and enamels
IS: 1303 : Glossary of terms relating to paints
IS: 9954 : Surface Preparation standard for painting of Steel surfaces.

c. PREPARATION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations where power tool cleaning cannot be carried out; sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the OWNER / ENGINEER.

d. PRIMER PAINT

After the surface is prepared, one coat of Zinc phosphate epoxy primer shall be applied. After this first coat is dried up completely, second coat shall be applied. Primer shall be applied by brushing to ensure a continuous film without 'holidays'. The total dry film thickness of shall be minimum 100 microns.

e. INTERMEDIATE COAT PAINT

After the primer coat, one intermediate coat of Micaceous Iron Oxide / Titanium dioxide shall be applied. The dry film thickness shall be minimum 150 microns.

f. FINISH PAINT

One layer of Polyester Urethane, shall be used for finish coat. The colour/shade shall be as approved by the OWNER. Dry film thickness of 50 microns.
The total system DFT after finish painting shall be minimum 300 microns.

g. SUGGESTED COLOUR CODES FOR PAINTING: IS-5, shade 631, Light Grey.

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6.1 PACKING:

Being export Order Sea worthy packing shall be done to meet the requirement. For further details, please refer attached specification No. PE-TS-888-100-A001, Vol II B, section D.

7.0 ATTACHMENTS

- 1) Dosing System Drawing – P&ID and Skid Assembly: 1–WT–030-01052/R.00
- 2) General specification for Dosing system: ROS-9012/Rev.03
- 3) E C&I technical specification: ROS:4177/R.00
- 4). Sea worthy packing ref. No. PE-TS-888-100-A001, Vol II B, section D.



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Dosing skids for PWTs & ETP

ANNEXURE – A

Material Code		RWT70530 0001	RWT70530 0002	RWT70530 0003	RWT70530 0004	RWT70530 0005	RWT70530 0006	RWT70530 0007	RWT70530 0008
Dosing point	Unit	Filtered feed tank	DMF inlet	DMF inlet	DMF inlet	RO-1 inlet	RO-1 inlet	RO-2 inlet	UF-CIP
Dosing system Description		NaOCl dosing system (1 set)	HCL dosing system (1 set)	Ferric Chloride dosing system (1 set)	Coagulant aid dosing system (1 set)	De-chlorination dosing system (1 set)	Antiscalant dosing system (1 set)	NaoH Dosing system (1 set)	Citric Acid dosing system-CIP cleaning (1 set)
Skid Qty.	No.	01	01	01	01	01	01	01	02
Type		Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm
Stroke adjustment operation		Manual	Manual	Manual	Manual	Auto stroke	Auto stroke	Auto stroke	Manual
Medium Handled		Sodium hypo Chlorite	Hydro Chloric Acid	Ferric Chloride	Coagulant aid (poly electrolyte)	Sodium Bi Sulphite	Antiscalant	NaOH	Citric Acid
Chemical concentration & Sp. Gravity		6% & 1.1	30% & 1.1	40% & 1.4	100% & 1.1	20% & 1.1	20 % & 1.38	48% & 1.4	50% & 1.2
Dosing pumps & Acc	Set	2	2	2	2	3	3	3	2
Injection head	Nos.	1	1	1	1	1		1	1
Pump discharge design pressure required	Kg/c m2	10	10	10	10	10	10	10	10
Pump flow rate required	LPH	2 - 20	5 - 50	5 - 50	5 - 50	2 - 10	2 - 10	2 - 10	20 -160
Dosing to be done at the Line pressure pipe	Kg/c m2	5	5	5	5	5	5	5	5



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Pump Suction type		Flooded	Flooded	Flooded	Flooded	Flooded	Flooded	Flooded	Flooded
Material code		RWT70530 0001	RWT70530 0002	RWT70530 0003	RWT70530 0004	RWT70530 0005	RWT70530 0006	RWT70530 0007	RWT70530 0008
skid		NaoCl dosing system	HCL dosing	Ferric Chloride dosing system	Coagulant aid dosing system	De chlorination dosing system	Antiscalant dosing system	NaoH dosing system	UF-CIP Citric Acid system
Pump Head MOC – wetted parts		PP	PP	PP	PP	PP	PP	PP	PP
MOC of balls		ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	ceramic
Diaphragm (PTFE coated EPDM or Better)		Bidder decide to	Bidder decide to	Bidder decide to	Bidder decide to	Bidder decide to	Bidder decide to	Bidder decide to	Bidder to decide
PREPARATION CUM DAY TANK with LI D	Qty.	No	2	2	2	2	2	2	1
	capacity	Ltrs	200	500	1000	1000	200	200	100
	Mixer		Nil	Nil	Y	Y	Y	Y	Y
	Top cover segment opening		Y	N	Y	Y	Y	Y	Y
	Level Switch	No.	2	2	2	2	2	2	1
Tank MOC		FRP	FRP	FRP	FRP	FRP	FRP	FRP	FRP
Pulsating dampener	rating	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar
Preferred dia. of tank	Mtr.	Decided during detailed engineering							
Fume absorber		Not applicable	Applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable



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Dosing skids for PWTs & ETP

ANNEXURE – A

Material Code		RWT70530 0009	RWT70530 0010	RWT70530 0011	RWT70530 0012	RWT70530 0013	RWT70530 0014	RWT70530 0015	RWT70530 0016
System SI No.	Unit	UF-CIP1	CMB	DMF inlet	DMF inlet	RO inlet	RO inlet	CMB	DMF inlet
Dosing system Description		NaoCl dosing system (1 set)	HCL dosing system (1 set)	Ferric Chloride dosing system (1 set)	Coagulant aid dosing system (1 set)	Dechlorination dosing system (1 set)	Antiscalant dosing system (1 set)	NaoH Dosing system (1 set)	NaoCl dosing system (1 set)
Skid Qty.	No.	02	01	01	01	01	01	01	01
Type		Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm	Positive displacement, Mechanically actuated diaphragm
Stroke adjustment operation		Manual	Manual	Manual	Manual	Auto stroke	Auto stroke	Manual	Manual
Medium Handled		NaOCl	Hydro Chloric Acid	Ferric Chloride	Coagulant aid (poly electrolyte)	Sodium Bi Sulphite	Antiscalant	NaOH	Sodium hypo Chlorite
Dosing concentration & Sp. Gravity		6.0% & 1.2	30% & 1.1	40% & 1.4	100% & 1.1	20% & 1.1	20 % & 1.38	48% & 1.4	6% & 1.1
Dosing pumps & Acc	Set	2	2	2	2	3	3	3	2
Injection head	Nos.	1	2	1	1	1	1	1	1
Pump discharge design pressure required	Kg/c m2	10	10	10	10	10	10	10	10
Pump flow rate required	LPH	20 – 160	5 - 50	5 - 50	5 - 50	2 - 10	2 - 10	2 - 15	2 -15
Dosing to be done at the Line pressure pipe	Kg/c m2	5	5	5	5	5	5	5	5



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Pump Suction type		Flooded	Flooded	Flooded	Flooded	Flooded	Flooded	Flooded	Flooded
Material code		RWT70530 0009	RWT70530 0010	RWT70530 0011	RWT70530 0012	RWT70530 0013	RWT70530 0014	RWT70530 0015	RWT70530 0016
skid		NaoCl dosing system	HCL dosing	Ferric Chloride dosing system	Coagulant aid dosing system	De- chlorination dosing system	Antiscalant dosing system	NaOH dosing system	NaOCl dosing system
Pump Head MOC – wetted parts		PP	PP	PP	PP	PP	PP	PP	PP
MOC of balls		ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	ceramic
Diaphragm (PTFE coated EPDM or Better)		Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
PREPARATION CUM DAY TANK with LI D	Qty.	No.	1	2	2	2	2	2	2
	capacity	Ltr	100	500	1000	1000	200	200	200
	Mixer		Nil	Nil	Y	Y	Y	Y	Nil
	Top cover segment opening		Y	N	Y	Y	Y	Y	Y
	Level Switch	No.	1	2	2	2	2	2	2
Tank MOC		FRP	FRP	FRP	FRP	FRP	FRP	FRP	FRP
Pulsating dampener	rating	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar	10 Bar
Preferred dia of tank	Mtr.	Decided during detailed engineering							
Fume absorber	No	Not applicable	applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

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Note/Remarks : The dosing skid comprise of the following items

1. Skid frame for all dosing skids - 1 No/each
2. Inter connecting piping and valves - 1 set/each
3. Electrical Controls & Instruments - 1 set/skid (as per ROS:4177 and P&ID : 1-WT-030-01052)
4. Pressure relief valve - 1 set/each
8. Piping MOC & size : CPVC, industrial grade, PN 16 rating, DIN standard or ASTM standard schedule 80 class. All the ball valves shall be of union type only.
9. All the preparation tank & NaOH day tank shall be provided with inlet nozzle with UPVC Ball valves for utility water requirement.
10. Any other item for the efficient & safe working of the System-Bidder to specify.

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Annexure-1

List of **RECOMMENDED SPARES**

Sl. No.	Description of the equipment	Description of spares	Quantity	Price