DATA SHEET-A

Sl no.	Description	Parameters
1.0	**SULPHURIC ACID STORAGE TANK**	
1.1	Numbers	Two(2)
1.2	Type	Horizontal cylindrical with dished ends.
1.3	Type of fluid to be handled	98 % Sulphuric Acid.
1.4	Effective capacity, in m3	23 m3 (each)
1.5	Minimum Free Board	300 mm
1.6	Material of Construction	
1.6.1	Shell	Mild steel as per IS 2062 or ASTM A 516 Gr.70.
1.6.2	Dished Ends	Mild steel as per IS 2002 or ASTM A 516 Gr.70.
1.7	Design Temerature	80 Deg.C
1.7	Dimensions (diameter, length & thickness)	ASME SEC VIII DIV I /IS 2825. Thickness of each acid storage tank will be 10 mm.
1.8	Instruments	As per P& ID and system requirement.
1.9	Accessories for each tank	Fume absorbers, breather, manhole (2 nos), vent, drain, sample connection, level transmitter, operating platform, ladders etc.
1.10	Manhole	2 Nos in each tank each of 600 mm dia.
2.0	**SULPHURIC ACID UNLOADING PUMPS**	
2.1	Number	Two (2) [1W+1S].
2.2	Location	Outdoor.
2.3	Fluid to be handled	98% w/w Commercial Sulphuric Acid.
2.4	Service	To unload Concentrated Sulphuric Acid from Tanker to Sulphuric Acid Storage Tank.
2.5	Type of Pump	Horizontal Centrifugal Non Clog type
2.6	Design standard	As per IS-5659 /IS-5120/ or equivalent.
2.7	Rated Capacity, in m3/hr	10 m3/hr
2.8	Range of operation	20 % - 120 %.
2.9	Head to be developed at rated capacity	10 mlc min or as per system requirement.
2.10	Accessories	As per tender specification, P&ID and system requirement.
2.11	Design standard and design temp	As per IS-5659 & IS-5120 and 80 Deg C.
2.12	**Material of construction**	
2.12.1	Casing	Alloy-20.
2.12.2	Impeller	Alloy-20.
2.12.3	Shaft	EN-8 to BS-970.
2.12.4	Mechanical Seal	Alloy-20.
2.12.5	Common Base plate	Fabricated Steel as per IS 2062.
2.12.6	Nuts and bolts	Alloy-20.
2.13	Type of drive	Electrical Motor
2.14	Criteria of selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
2.15	Rated speed (RPM)	1500 (Sync.) max
2.16	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase,50 HZ (+10 to –10%).
2.17	Type of coupling between Pump & Motor	Flexible Spacer.
2.18	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
2.19	HDPE Hose	Two (2) numbers, each min 80 NB and 20 m long type-2 HDPE hose as per IS-7654/1989 with isolation hose.
2.20	Accessories required for each pump	Coupling guard, drain plug, vent valve, suction hoses, isolation valves, Y- type strainers, pressure gauges, pulsation dampener.
2.21	Suction strainer	PVDF (2X100 %, 50 BS).
2.22	Tests and Inspection	
2.23	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
2.24	b) Hydro-test	Shall be provided as per Tender Specification
2.25	c) Dynamic Balancing Test	Shall be provided
2.26	Performance Test	Shall be provided as per Tender Specification
3.0	**SULPHURIC ACID DOSING PUMPS**	

3.1	Number	Two (2) [1W+1S].
3.2	Fluid to be handled	98% w/w sulphuric acid.
3.3	Service	To inject concentrated sulphuric acid into CW Fore bay.
3.4	Duty	Continuous and to be suitable for parallel Operation.
3.5	Type of Pump	Positive displacement, constant speed, variable stroke and plunger operated reciprocating type.
3.6	Rated Capacity, in LPH	250 LPH each.
3.7	Facility for Capacity Adjustment	Local manual through Micrometer Dial and remote manual from Control Room (DDCMIS).
3.8	Range of Capacity Adjustment	0 % - 100 %.
3.9	Head to be developed at rated capacity	As per system requirement. However it shall not be less than 15 mlc
3.10	Y- type strainers for each pump	PVDF (2X100 %, 50 BS).
3.11	Accessories	As per tender specification, P&ID and system requirement.
3.12	**Material of construction**	
3.1	Housing	Alloy-20.
3.1	Pump head	Alloy-20.
3.1	Plunger	Alloy-20.
3.12.4	Worm	Manganese Bronze / Cast Iron.
3.12.5	Worm Wheel	Manganese Bronze / Cast Iron.
3.12.6	Shafts (worm)	Hardened Steel (EN 19 / ASTM A 276 Gr.410).
3.12.7	Base plate	MS.
3.12.8	Foundation bolts	Alloy-20.
	Type of drive	Electrical Motor
	Criteria of selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
	Rated speed (RPM)	1500 (Sync.) max.
	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase,50 HZ (+10 to –10%).
	Type of coupling between Pump & Motor	Flexible Spacer.
	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
	Tests and Inspection	
	a) Material Test	Required for Pump Head and Plunger.
	b) Hydro-Test	Test Pressure - 200% of pump operating pressure or 15 kg/cm2 (g) whichever is higher. Test Duration - Half an hour (minimum).
	c) Dynamic Balancing Test	Static Balancing for all rotating parts of pumps required.
3.20	Performance Test	
	a) Test Code	Hydraulic Institute Standard and API-675.
	b) Tests to be done for determination of	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	c) Test to be carried out	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	d) Test for satisfactory operation of pump at site	Shall be provided.
3.21	Design Temperature	80 Deg C.
3.22	Accessories	As per tender specification, P&ID and system requirement.
4.0	**SULFURIC ACID DAY TANK**	
4.1	Numbers To be provided	One (1) number
4.2	Type	Vertical cylindrical with dished ends.
4.4	Effective capacity, in m3	Total effective capacity of each tank shall be adequate to hold the quantity required for one-day operation of 1 x 800 MW Unit at full load but effective capacity of each of the tank shall not be less than 3.0 cum.
4.5	Type of fluid to be handled	98 % Sulphuric Acid.
4.6	Material of Construction	Carbon steel as per IS 2062 or ASTM A 515 Gr.70.
4.7	Thickness, in mm	Not less than 6.0

5.0	**SCALE INHIBITOR TANK**	
5.1	Numbers To be provided	Two (2) numbers
5.2	Type for each Tank	Vertical cylindrical with dished bottom.
5.3	Type of fluid to be handled	Commercial Scale Inhibitor Solution.
5.4	Effective capacity of each tank, m^3	Total effective capacity of each tank shall be adequate to hold the quantity required for one-day operation of 1 x 800 MW Unit at full load but effective capacity of each of the tank shall not be less than 3.0 cum.
5.5	Minimum Free Board, in mm	300
5.6	Material of Construction	SS-316
5.7	Thickness, in mm	Not less than 5
5.8	Accessories	Chemical charging platform with steps.
5.9	Manhole	One (1) on shell of minimum 600 mm NB.
6.0	**SCALE INHIBITOR DOSING PUMPS**	
6.1	Number	Two (2) [1W+1S]
6.2	Location	Indoor
6.3	Capacity	50 LPH (each).
6.4	Service	To inject Scale Inhibitor Solution into CW forebay.
6.5	Type of Pump	Positive displacement, constant speed, variable stroke and plunger operated reciprocating type.
6.6	Facility for Capacity Adjustment	Local manual through Micrometer Dial and remote manual from Control Room (DDCMIS).
6.7	Range of Capacity Adjustment	0 % - 100 %.
6.8	Suction Condition	Flooded.
6.9	Head to be developed at rated capacity	As per system requirement. However it shall not be less than 15 mlc
6.10	**Material of construction**	
6.10.1	Housing	SS-316.
6.10.2	Pump head	SS-316.
6.10.3	Plunger	SS-316.
6.10.4	Worm	Manganese Bronze / Cast Iron.
6.10.5	Worm Wheel	Manganese Bronze / Cast Iron.
6.10.6	Shafts (worm)	Hardened Steel (EN 19 / ASTM A 276 Gr.410).
6.10.7	Base plate	MS.
6.11	s and nuts	
6.12	Type of drive	Electrical Motor
6.13	Criteria of selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
6.14	Rated speed (RPM)	1500 (Sync.) maximum.
	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase,50 HZ (+10 to –10%).
	Type of coupling between Pump & Motor	Flexible Spacer.
	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
	Tests and Inspection	
	a) Material Test	Required for Pump Head and Plunger.
	b) Hydro-Test	Test Pressure - 200% of pump operating pressure or 15 kg/cm2 (g) whichever is higher. Test Duration - Half an hour (minimum).
	c) Dynamic Balancing Test	Static Balancing for all rotating parts of pumps required.
6.19	Performance Test	
	a) Test Code	Hydraulic Institute Standard and API-675.
	b) Tests to be done for determination of	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	c) Test to be carried out	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	d) Test for satisfactory operation of pump at site	Shall be provided.
6.20	Design Temperature	80 Deg C.
	Accessories	As per tender specification, P&ID and system requirement.

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7.0	**CORROSION INHIBITOR TANKS**	
7.1	Numbers To be provided	Two (2) numbers
7.2	Type for each Tank	Vertical cylindrical with dished bottom.
7.3	Type of fluid to be handled	Commercial Scale Inhibitor Solution.
7.4	Effective capacity of each tank, m^3	Total effective capacity of each tank shall be adequate to hold the quantity required for one-day operation of 1 x 800 MW Unit at full load but effective capacity of each of the tank shall not be less than 3.0 cum.
7.5	Minimum Free Board, in mm	300
7.6	Material of Construction	SS-316
7.7	Thickness, in mm	Not less than 5
7.8	Manhole	One (1) on shell of minimum 600 mm NB.
8.0	**CORROSION INHIBITOR DOSING PUMPS**	
8.1	Number	Two (2) [1W+1S]
8.2	Location	Indoor
8.3	Capacity	50 LPH (each).
8.4	Service	To inject Scale Inhibitor Solution into CW forebay.
8.5	Type of Pump	Positive displacement, constant speed, variable stroke and plunger operated reciprocating type.
8.6	Facility for Capacity Adjustment	Local manual through Micrometer Dial and remote manual from Control Room (DDCMIS).
8.7	Range of Capacity Adjustment	0 % - 100 %.
8.8	Suction Condition	Flooded.
8.9	Head to be developed at rated capacity	As per system requirement. However it shall not be less than 15 mlc
8.10	**Material of construction**	
8.10.1	Housing	SS-316.
8.10.2	Pump head	SS-316.
8.10.3	Plunger	SS-316.
8.10.4	Worm	Manganese Bronze / Cast Iron.
8.10.5	Worm Wheel	Manganese Bronze / Cast Iron.
8.10.6	Shafts (worm)	Hardened Steel (EN 19 / ASTM A 276 Gr.410).
8.10.7	Base plate	MS.
8.11	s and nuts	
8.12	Type of drive	Electrical Motor
8.13	Criteria of selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
8.14	Rated speed (RPM)	1500 (Sync.) maximum.
	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase,50 HZ (+10 to –10%).
	Type of coupling between Pump & Motor	Flexible Spacer.
	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
	Tests and Inspection	
	a) Material Test	Required for Pump Head and Plunger.
	b) Hydro-Test	Test Pressure - 200% of pump operating pressure or 15 kg/cm2 (g) whichever is higher. Test Duration - Half an hour (minimum).
	c) Dynamic Balancing Test	Static Balancing for all rotating parts of pumps required.
8.19	Performance Test	
	a) Test Code	Hydraulic Institute Standard and API-675.
	b) Tests to be done for determination of	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	c) Test to be carried out	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	d) Test for satisfactory operation of pump at site	Shall be provided.

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	Design Temperature	80 Deg C.
	Accessories	As per tender specification, P&ID and system requirement.
9.0	**BIOCIDE TANKS**	
9.1	Numbers To be provided	Two (2) [1W+1S]
9.2	Type for each Tank	Vertical cylindrical with dished bottom.
9.2	Type of fluid to be handled	Commercial Biocide Solution.
9.3	Effective capacity of each tank, m^3	Total effective capacity of each tank shall be adequate to hold the quantity required for one-day operation of 1 x 800 MW Unit at full load but effective capacity of each of the tank shall not be less than 3.0 cum.
9.4	Minimum Free Board, in mm	300
9.5	Material of Construction	SS-316
9.6	Thickness, in mm	Not less than 5
9.7	Manhole	One (1) on shell of minimum 600 mm NB.
9.0	**BIOCIDE INJECTION PUMPS**	
9.1	Number	Two (2) [1W+1S]
9.2	Location	Indoor
9.3	Capacity	500 LPH (each).
9.4	Service	Commercial Biocide Solution.
9.5	Type of Pump	Positive displacement, constant speed, variable stroke and plunger operated reciprocating type.
9.6	Facility for Capacity adjustment	Local manual through Micrometer Dial and remote manual from Control Room (DDCMIS).
9.7	Range of Capacity adjustment	0 % - 100 %.
9.8	Suction Condition	Flooded.
9.9	Head to be developed at rated capacity	As per system requirement. However it shall not be less than 15 mlc
9.10	**Material of construction**	
9.10.1	Housing	SS-316.
9.10.2	Pump head	SS-316.
9.10.3	Plunger	SS-316.
9.10.4	Worm	Manganese Bronze / Cast Iron.
9.10.5	Worm Wheel	Manganese Bronze / Cast Iron.
9.10.6	Shafts (worm)	Hardened Steel (EN 19 / ASTM A 276 Gr.410).
9.10.7	Base plate	MS.
9.11	Foundation bolts and nuts	
9.12	Type of drive	Electrical Motor
9.13	Criteria of selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
9.14	Rated speed (RPM)	1500 (Sync.) maximum.
	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase,50 HZ (+10 to –10%).
	Type of coupling between Pump & Motor	Flexible Spacer.
	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
	Tests and Inspection	
	a) Material Test	Required for Pump Head and Plunger.
	b) Hydro-Test	Test Pressure - 200% of pump operating pressure or 15 kg/cm2 (g) whichever is higher. Test Duration - Half an hour (minimum).
	c) Dynamic Balancing Test	Static Balancing for all rotating parts of pumps required.
9.19	Performance Test	
	a) Test Code	Hydraulic Institute Standard and API-675.
	b) Tests to be done for determination of	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.

	c) Test to be carried out	Capacity, Volumetric Accuracy, Volumetric Efficiency and Power Consumption.
	d) Test for satisfactory operation of pump at site	Shall be provided. 1
	Design Temperature	80 Deg C.
	Accessories	As per tender specification, P&ID and system requirement.
10.0	**NEUTRALIZATION PIT (CIVIL WORK BY BHEL CIVIL)**	
10.1	Quantity	One number.
10.2	Capacity	40 CuM.
10.3	MOC	RCC with acid alkali protection.
10.4	Accessories	As per tender specification, P&ID and system requirement.
11.0	**NUTRALIZATION PIT DEWATERING PUMP**	
11.1	Quantity	Two (2) nos. (1W+1S).
11.2	Capacity & Head	2 Cum/Hr & 1 Kg/cm2 (g).
11.3	Type	Horizontal Centrifugal.
11.4	Motor rating	Vendor Design specific.
11.5	Material of Construction	Casing/Cover – PP. Pump shaft– EN8. Impeller – PP. Base Plate-MS-FRP. Fastener- SS 316L.
11.6	Accessories	As per tender specification, P&ID and system requirement.
12.0	**PIPE, VALVES, STRAINER AND DIFFUSER**	
10.1	Pipe MOC 1	For 98% H2SO4 application-Seamless Carbon Steel pipe to ASTM A53 Gr. B /IS: 1239 Part- I, Heavy grade. For Scale & Corrosion Inhibitor and Biocide application-Stainless Steel to ASTM 312 Type 316 welded, schedule-40.
10.2	Valves	For 98% H2SO4 application-PVDF, PN10. For Scale & Corrosion Inhibitor and Biocide application-SS 316 PN10.
10.3	Strainer 1	For 98% H2SO4 application-PVDF (50 BS). For Scale & Corrosion Inhibitor and Biocide application- Stainless Steel to ASTM 312 Type 316 (50 BS).
10.4	Diffuser 1	SS-316 (except sulfuric acid, for sulfuric acid the MOC is PVDF).
11.0	Safety Equipment	Four sets of safety equipment comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided. A personnel water drench shower and eye bath shall be provided.

NOTES:

1. Noise level of all equipment shall be within 85 dbA and vibration level shall be within 30 µ.