

**Design, Build and Commissioning of 7 MLD
Common Effluent Treatment Plant (CETP) and
0.5 MLD Package Sewage Treatment Plant (STP)
at DPIA on EPC basis with 4 years Operation and
Maintenance - Package B**

VOLUME 4

PART 3 SCHEDULE OF GUARANTEES

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Acronyms and Abbreviation

DPIA	Dighi Port Industrial Area
DMIC	Delhi Mumbai Industrial Corridor
DMICDC	Delhi Mumbai Industrial Corridor Development Corporation
MIDC	Maharashtra Industrial Development Corporation
STP	Sewage Treatment Plant
CETP	Common Effluent Treatment Plant
MLD	Million Litres per day

1. PERFORMANCE GUARANTEES FOR CETP

1.1 General

Compliance with the Performance Guarantees will be measured during the Tests on Completion and verified during the Tests after Completion, in accordance with the procedures described in the Contract. These Performance Guarantees shall be binding.

Non-performance damages will be calculated based on the measurements taken during the Tests after Completion.

1.2 Influent Parameters

The CETP influent characteristics concentrations are as listed in Table 1-1 Influent Characteristics to new CETP.

Table 1-1 Influent Characteristics to new CETP

Parameters	Values*	Unit
Biochemical Oxygen Demand (BOD ₅)	600.0	mg/l
Chemical Oxygen Demand (COD)	1200.0	mg/l
Total Dissolved Solids	≤ 2100	mg/l
Total Suspended Solids (TSS)	600.0	mg/l
Total Kjeldahl Nitrogen (TKN)	100.0	mg/l
Total Phosphorus	10.0	mg/l
pH	6.5-9.0	
Oil & Grease (Free oil)	50	mg/l
Total Coliform	10 ⁶ to 10 ⁸	MPN/100 ml
Wastewater Temperature (Min)	20	Deg C
Wastewater Temperature (Max)	40	Deg C
Chloride	< 600	mg/l
Sulphate	< 1000	mg/l
Phenolic compounds	< 5	mg/l
Iron	< 5	mg/l
Arsenic	<0.2	mg/l
Cadmium	<1	mg/l
Lead	<1	mg/l
Copper	<3	mg/l
Zinc	<1	mg/l
Nickel	<3	mg/l
Mercury	<0.01	mg/l
Selenium	<0.05	mg/l
Total Chromium	<1	mg/l
Hexavalent Chromium	<0.1	mg/l
Cyanide	< 2	mg/l
Flouride	< 2	mg/l
Boron	< 2	mg/l

1.3 Testing and Performance

The testing of the Works to show that they achieve the Performance Guarantees shall be:

- Measured during the 15-day performance test part of the Tests On Completion; and
- Evaluated for compliance during the Tests after Completion as indicated in the Contract Document.

All process performance parameters shall comply with Employer's Requirements (Volume 2 Part 2 Process Specification). All plant and equipment shall be operated strictly in accordance with the operations and maintenance manual submitted by the contractor (for example, bowl speeds) and, where relevant, the performance testing of related items/equipment shall be carried out concurrently (for example, polymer usage and power consumption of centrifuges shall be monitored during the same period).

Daily monitoring is required during all testing periods. Non-performance damages calculations shall be based on the average consumption values calculated over the 30-day testing period.

1.4 Influent Quality

The Performance Guarantees shall be based upon, and shall only apply for Influent which does not exceed the quality criteria as detailed in the Employer's Requirements.

If the Influent parameters are not in conformity with the values in the Employer's Requirements, then the power and chemical consumption shall continue to be monitored, but the consumption levels for those particular days shall not be used when calculating the average consumption value for the measurement over the performance tests period.

1.5 Effluent Quality

The effluent shall be treated to achieve a quality that will satisfy the end user requirements for Industrial reuse as described in the Table 1-2 CETP Treated Effluent Characteristics.

Table 1-2 CETP Treated Effluent Characteristics

Parameters	Discharge Limit	Unit
Biochemical Oxygen Demand (BOD ₅)	≤ 5.0	mg/l
Chemical Oxygen Demand (COD)	≤ 80.0	mg/l
Total Suspended Solids (TSS)	≤ 1.0	mg/l
Turbidity	≤ 0.5	NTU
Total Nitrogen (TN)	≤ 10.0	mg/l
Ammonical Nitrogen	≤ 2.0	mg/l
Total Kjeldal nitrogen	≤ 5.0	mg/l
Total Phosphorus	≤ 1.0	mg/l
pH	6.5-9.0	
Oil and Grease	≤ 10.0	mg/l
Total Dissolved Solids	≤ 2100.0	mg/l
Chloride	< 600	mg/l
Sulphate	< 1000	mg/l
Bacteria	≥ Log 5 Reduction	
Viruses	≥ Log 5 Reduction	

Protozoa	≥ Log 5 Reduction	
Phenolic compounds	< 1	mg/l
Iron	< 0.5	mg/l
Arsenic	< 0.05	mg/l
Cadmium	< 0.5	mg/l
Lead	< 0.1	mg/l
Copper	< 0.5	mg/l
Zinc	< 0.5	mg/l
Nickel	< 0.5	mg/l
Mercury	< 0.01	mg/l
Selenium	< 0.05	mg/l
Total Chromium	< 1	mg/l
Hexavalent Chromium	< 0.1	mg/l
Cyanide	< 0.2	mg/l
Fluoride	< 2	mg/l
Boron	< 2	mg/l

Note:

The above parameters shall be guaranteed as follows:

1. 24-hour composite samples with 95 % plus compliance.
2. The Conformity is based on a 30-day rolling month with a maximum of two failures allowed per month for composite samples, and at no time does a grab sample exceed the limits as specified above.

1.6 Performance Levels

The Performance Guarantees shall be guaranteed against the Performance Levels for treated effluent, sludge and odour as outlined in the Employer Requirements. (Volume 2 Part 2 Process specification). If the Performance Levels are not met during the Performance Tests, the Works shall be deemed to have failed.

2. CETP ENERGY CONSUMPTION GUARANTEE

2.1 Guaranteed Energy Consumption - Liquid Treatment

The Contractor hereby guarantees that the energy consumption of the treatment plant per m³ of Influent treated shall be less than or equal to the values stated in Table 42-1. This shall include all energy used during the treatment, including pumps, blowers, backwashing, and all major electromechanical equipment and instruments, but shall exclude building services (lighting, heating, and ventilation). Table 42-1 shall contain the guaranteed power consumption for the plant per m³ of Influent and should be based on the worst-case operational parameters as detailed in the Employer's Requirements.

Table 42-1 Power Consumption in kWh/m³

Item/Parameter	Unit	Contractors Guaranteed value kWh/m ³ of Influent treated
Biological treatment only*	kWh/m ³ of Influent treated	
Reverse Osmosis System	kWh/m ³ of output water	
Evaporation Including Brine Concentration	kWh/m ³ of Influent treated	
Others	kWh/m ³ of Influent treated	
Total - Whole of works	kWh/m ³ of Influent treated	

Note: *Contractor shall list the processes that are included in the biological process, but as a minimum shall include Anaerobic tank mixers, Anoxic tank mixers, Aeration Blowers, RAS pumps, Internal Recirculation pumps, Post-Anoxic tank mixers (if applicable), MBR Blowers, MBR permeate cum backwash pumps, CIP System and related equipment and other bioreactor-related electromechanical equipment.

2.1.1 Non-performance damages

The Non-performance damages (cNPDs) for liquid treatment shall be paid in the event that the sum of total damages calculated using the equation below provides a positive value. However, under no circumstances shall the Contract Price be increased as a result of the performance exceeding the Performance Guarantees.

The non-performance damages shall be calculated as the net present value of the additional chemical cost at a discount rate of 8% over 4 years' period using the equation below:

$$pNPD_L = (kWh_{(actual.)} - kWh_{(guarantee.)}) \times 365 \times Q \times \text{cost of power}_{(current)} \times 9.56$$

Where

kW h_(guarantee) = guaranteed power consumption as stated in **Error! Reference source not found.**

kW h_(actual) = actual power consumption as measured during the Performance Test divided by the totalized flow during the same period.

Cost of power (current) = INR 6.39 per unit rate (kWh). (for the purpose of evaluation)

Signature

(a person or persons authorised to sign on behalf of the Tenderers)

Date.....

2.2 Guaranteed Energy Consumption - Sludge Treatment

The Contractor hereby guarantees that the energy consumption of the new sludge plant in kWh/ tDS of sludge treated shall be less than or equal to the values declared in Table 2-2. This shall include all energy used during the sludge treatment process, including, but not limited to, pumps, mixers, thickeners, centrifuges, and instrumentation, but shall exclude building services (lighting, heating, and ventilation).

Table 2-2 shall contain the guaranteed power consumption for the sludge plant per ton of DS of sludge treated, and should be based on the worst-case operational parameters as detailed in the Employer Requirements.

Table 2-2 Power consumption in kWh/tDS

Item/Parameter	Unit	Contractor's Guaranteed value kWh/m ³ of Influent treated
Sludge Treatment	kWh/Ton Dry solids of sludge treated	
ZLD Treatment	kWh/Ton Dry solids of brine treated	

2.2.1 Non-performance damages

The non-performance damages to be paid, in the event that the average power consumption value determined during the Test after Completion, exceeds the guaranteed values detailed in Table 4-2 shall be calculated on a total sludge treatment process basis. The non-performance damages shall be calculated as the net present value of the additional chemical cost at a discount rate of 8% over a 4-year period following Completion as follows.

pNPD_{SLUDGE} = (kWh/tDS_(actual.) – kWh/tDS_(guarantee.)) X 365 x tDS x cost of power_(current) X 9.56 Where

kWhrs_(guarantee) = guaranteed daily power consumption as stated for thickening (or dewatering)

kWhrs _(actual) = actual daily power consumption for thickening and dewatering as measured during the Performance Test period

Cost of power _(current) = INR 6.39 per unit rate (kWh). (for the purpose of evaluation)

Signature

(a person or persons authorised to sign on behalf of the Tenderers)

Date.....