



**PROJECT TITLE : ONE (1) YEAR PROVISION FOR CHEMICAL WATER TREATMENT OF THE CCP COOLING TOWERS (SY 2020-2021)**

**LOCATION : Cultural Center of the Philippines, CCP main Building  
CCP Complex, Roxas Blvd., Pasay City**

## **TERMS OF REFERENCE**

### **I. PURPOSE:**

To establish and maintain the quality of water to be used for the Cooling System of the CCP Main Building conforming to the technical specifications and operating parameters of the Cooling Towers.

### **II. SCOPE OF THE PROJECT:**

2.1 The CONTRACTOR shall furnish labor, tools, equipment (chemical metering pump), chemicals, consumables, and technical/general supervision for the comprehensive chemical water treatment program of the open system of Multi-Cell Cooling Tower at the CCP Main building. This is through the application of the specified and approved chemicals to control and prevent the formation of scales, corrosions, algae, and slimes thus, avoiding operational interruption and undue deterioration of CCP interconnected equipment of the cooling towers.

The CONTRACTOR must submit Certified True Copy of Material Safety Data Sheet of each chemical with its Chemical Formulae and a Certificate of Safety. The CONTRACTOR shall also submit Certification or licenses or approval of the offered chemicals from DENR or DTI or from any regulating agencies having jurisdiction, that the chemicals are not prohibited by law, before the application;

2.2 The CONTRACTOR shall maintain the cooling tower at 10°F (5.6°C) range and 7°F (3.9°C) approach, and chiller condenser approach of 32°F-39.2°F (0 °C-4 °C);

2.3 The CONTRACTOR shall conduct Water Analysis on weekly basis, supervise initial application of chemicals in standard dosage, equipment check-up, cleaning, and prepare technical reports and recommendation in accordance with the results of analysis.

### **III. PERSONNEL AND TYPE OF COVERAGE:**

3.1 The CONTRACTOR shall perform all services using technical personnel who are specialist in HVAC Water Treatment of Cooling System and chemical application services and other related maintenance services.

3.2 The CONTRACTOR shall assign technical service personnel to the CCP who shall conduct weekly water analysis, troubleshoot, and recommend appropriate actions in the event that target parameters of the Cooling Water Treatment Program are not met. The service shall be within 8:30am to 5:00pm, every

Monday (as and when the needs may require). Temperature readings shall be made during operation hours in order to take actual data. Additional inspections will be performed in accordance with service detailed herein, as determined necessary by CONTRACTOR, based on equipment usage;

- 3.3 The CONTRACTOR shall assign at least two (2) personnel who will regularly (weekly during Mondays) monitor the water treatment, bleed off frequency, water treatment chemical feeding rate and other matters relative to the cooling tower water treatment program.
- 3.4 The CONTRACTOR shall submit the following personnel requirement before awarding of the Contract:
  - A. Approved Organizational Chart for the project.
  - B. Curriculum Vitae properly arranged and prepared of all personnel to be involved in the project indicating their qualification and competencies subject for CCP approval.
  - C. Sworn Statement that they are the assigned personnel of the project.

Any personnel not included in the original list will not be permitted to undertake the works under the Agreement. In case of resignation and changes of personnel, curriculum vitae of the replacement personnel shall be submitted subject to CCP approval prior to the actual assignment.

#### IV. TECHNICAL SPECIFICATION:

##### 4.1 MULTI CELL FIBERGLAS REINFORCED POLYESTER (FRP) COOLING TOWER:

The Cooling Tower is KUKEN Brand. Factory manufactured, square type, mechanically induced draft rectangular cross flow, six (6) cells, open type, low noise, internally piped cooling tower, light weight and high strength structure design. Manufactured with upper basin cover, handrails and ladder with cage for safety protection. The Cooling Tower is constructed to withstand severe vibration, high wind velocity/loads, and can resist corrosion. Also, it is constructed with complete inhibitors, cylindrically formed with bolted sections and hot-dipped steel support, complete with fan surface sections, drift eliminators and motor, and internally piped water inlet.

Its modular design having internal piping must permit quick and easy site installations and must comply with all parameters and specifications set herein. The Cooling Tower is approved standard by Japan Cooling Tower Institute (JCI).

##### 4.2 DESIGN & OPERATING CONDITIONS :

Heat Rejection	: 4,063kW
Inlet Water Temp.	: 95 <sup>0</sup> F (35 <sup>0</sup> C)
Outlet water Temp.	: 85 <sup>0</sup> F (29.4 <sup>0</sup> C)
Ambient wet bulb Temp.	: 80.6 <sup>0</sup> F (27 <sup>0</sup> C)
Water Flow rate	: 10,400 lpm / 2,747 gpm (minimum)
Pressure Loss	: 38.5 kPa

Seismic Load (H/V)	: 9.81 / 4.9 m/s <sup>2</sup>
Evaporation loss	: 0.93 max
Drift loss	: 0.05% (against water flow)
Noise Level (2m away)	: 73.0 dB(A) max, 2m away louver
Width (max)	: 3,630 mm
Length (max)	: 13,420 mm
Body Height (max)	: 2,930 mm
Total Height (max)	: 4,030 mm

**V. SCOPE OF WORK (but not limited to):**

The following scope of services shall be performed by the CONTRACTOR as necessary and applicable to keep the Cooling System operates properly and with optimum energy efficiency:

5.1 Prior to the application of regular chemical treatment, undertake the following:

- A. Initial chemical de-scaling and mechanical swabbing of condenser coils of one (1) unit 500TR Dunham Bush Chiller and six (6) units 60TR Hitachi Chillers;
- B. Initial cleaning and de-contamination of cooling towers including the vicinity;
- C. Chemical shock dosing of the cooling towers;
- D. De-scaling of PVC Fillers;
- E. Install metering pump and chemical tank for chemical dosing.

5.2 Equipment check-up and inspection.

- A. Weekly visual inspection and cleaning of basins and vicinity;
- B. Weekly check of cooling tower range and approach and chiller approach (during operation days);
- C. Monthly equipment check-up and cleaning;
- D. Technical Report and Analysis.

5.3 Water Quality Analysis.

- A. Weekly water laboratory analysis and monitoring on the standard parameters indicating standard method of testing for the pH value, hardness, alkalinity, dissolved solids, conductivity, salinity, organisms, etc;
- B. Gathering of water samples during Mondays with the assistance of CCP In-house Operator. The operator will signify the water samples taken.

5.4 Disinfection of the cooling towers using approved chemicals.

5.5 Check-up and Monitor equipment performance.

5.6 Conduct Monthly Water Laboratory Analysis or test on make-up water with the same parameters of the cooling water.

5.7 Monitor make-up water and bleed off.

- 5.8 Carry out weekly monitoring/inspection of the application of chemicals and submit technical reports and recommendations based on the analysis.
- 5.9 Provide and use chemical dosing/metering pump and mixing tank for the water treatment.
- 5.10 Weekly removal of the deposited debris, silt, slime, algae or sludge in the cooling tower strainers and basins. Weekly activities such as cleaning, inspection, water sampling, check-up, and other works shall be done during Mondays (as and when the needs may require).
- 5.11 Repair and rectification minor water leaks.
- 5.12 Vacuum cleaning of basins to remove silt, dust and other foulants as needed.
- 5.13 Mechanical, chemical and high pressure scale removal as needed using pressure washers.
- 5.14 Conduct initial/shock chemical dosage of the cooling waters, cleaning and descaling of the cooling towers PVC fillers and basins.
- 5.15 Assist the CCP operator in the water balance of the cooling towers and adjust gate valves if necessary to ensure the desirable or exact flow and volume of water.
- 5.16 When the result of water treatment is failure, upon the written notice of CCP, the CONTRACTOR shall conduct descaling and mechanical swabbing of the shell and tube condensers of the one (1) unit 500TR Dunham Bush Chiller and six (6) units 60TR Hitachi Chillers.
- 5.17 Conduct quarterly cleaning of Cooling Towers and conduct pressurize washing of PVC fillers.
- 5.18 Recommend effective water concentration measures.
- 5.19 Provide separate logbook for the Water Treatment Program and record all the services rendered. The logbook should be safe kept at the CCP Engineering Office.
- 5.20 EXCLUSIONS:
  - A. Regular operation of the equipment mentioned.
  - B. Supply of parts, materials and consumables which are not included in the water treatment.
  - C. Rewinding and/or reconditioning of the motors.
  - D. Replacement and installation of bearings, gate valves, controllers and other parts or accessories.
  - E. Dismantling, installation, disassembly, re-assembly, aligning and re-installation of units, components or equipment.
  - F. Painting works.
  - G. Rewinding of electrical and/or electronic controls and accessories.

- H. Extensive water balancing.
- I. Retrofitting works.

**VI. CHEMICAL REQUIREMENTS AND APPLICATION, WATER ANALYSIS AND CONTROL LIMITS AND REPORT**

6.1 The CONTRACTOR shall provide the following chemicals for the water treatment or equivalent:

- A. A concentrated, water clear, alkaline liquid compound for controlling corrosion and scales in the cooling system. It is used for water softening, pH control, suspension, and dispersion of solids;
- B. A specially formulated compound designed to prevent and control slime formation, growth of algae, bacteria and other foul-odor producing microorganisms in Cooling tower, evaporative condenser and other water circulating systems. Also acts as sanitizer and germicide;
- C. A biocide complex formulated to effectively control growth of microorganisms in the circulating water system. It penetrates microbial slime and destroys enzyme promoting cell metabolism;
- D. Any cleaning germicidal/disinfectant for cooling tower.
- E. Preventive care and cleaning of the cooling system including cooling equipment of the cooling system.
- F. Reduces clogging of pipes and valves and reduce hardness of water.
- G. Maintain the low and acceptable "Approach Temperature" of the cooling towers and chillers.

6.2 The CONTRACTOR shall maintain and monitor the following control limits through comprehensive chemical water treatment:

Parameters	Control Limits
Color	Clear/Blue
pH	6.5-9.0
P' Alkalinity (ppm CaCO <sub>3</sub> )	200 max
M' Alkalinity (ppm CaCO <sub>3</sub> )	400 max
Total Hardness (ppm CaCO <sub>3</sub> )	30-100 max
Iron Content (ppm)	3.0 max
Chloride (ppm of Cl)	250 max
Chloride (ppm of NaCl)	400 max
Silica (ppm SiO <sub>2</sub> )	150 max
Total Dissolved Solids (TDS)	1,000 max
Conductivity	2400 micromhos
Other standard parameters in water treatment of Cooling Tower: please specify	

**VII. REPORTS:**

The CONTRACTOR shall prepare and submit a detailed Technical Report of each inspection and result of analysis to the CCP authorized representative. This report shall include the condition of equipment, necessary repair/s, and recommendations in reducing energy consumption, where applicable.

## **VIII. OTHER PROVISION:**

- 7.1 The CONTRACTOR or prospective bidder shall submit the detailed costing of their bid in their proposal. The costing shall include the labor, materials, tools, supervision, government dues, taxes, profit margin and other necessary costs.
- 7.2 The CCP will provide free power and water supply.
- 7.3 Delivery of chemicals shall be checked by CCP representative before the application.
- 7.4 All services to be rendered shall be assisted by CCP in-house technicians.
- 7.5 Parts and labor required to replace defective parts found during the conduct of service shall be quoted separately.
- 7.6 Other works not stipulated in the scope of work shall also be quoted separately.
- 7.7 Notice to Proceed shall be issued upon perfection of the Contract.
- 7.8 The CONTRACTOR must submit the monthly service billing, inclusive of applicable Value Added Tax (VAT).
- 7.9 The terms of agreement shall be for a period of one year, from the receipt of Notice to Proceed.
- 7.10 Other valid provisions from the previous or existing Water Treatment Contract and the General and Special Conditions of the Contract per Philippine Bidding Documents are included.
- 7.11 Processing of payments shall be on a monthly basis upon submission of the following:
  - A. Service Invoice;
  - B. Letter Request of Payment;
  - C. Certificate of Completion;
  - D. Approved Service Report signed by the Contractor's qualified personnel and supervisor with their full name indicated and validated by the CCP in-house engineering Shift Engineer;
  - E. Weekly Laboratory Test Results for Cooling Water;
  - F. Monthly Laboratory Test Results for Make-up Water;
  - G. Photocopy of the Engineering Logbook;
  - H. Other required documents by the Contractor subject to government accounting and auditing rules and regulations.

## **8 ESTIMATED BUDGET COST:**

**THREE HUNDRED NINETY-ONE THOUSAND SIX HUNDRED NINETY-TWO PESOS ONLY (Php 391,692.00), VAT inclusive for, one (1) year.**

Prepared by:



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President

Within Budget:

*MA. BELMA R. BAGANG*  
**MA. BELMA R. BAGANG**

Officer-in-Charge, FSD

*50212990-01 (00) P 391,692.00*

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*7/26/20*



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(2020-2021)

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**BILL OF QUANTITIES**

Item No.	Description	Unit	Qty	Unit Price
<b>Part I</b>	<b>Materials</b>			
<b>1.0</b>	<b>Initial Dosage</b>			
1.1	Descaler	lits	11.28	
1.2	Biocide	lits	7.52	
1.3	Algaecide/Neutralizer	lits	3.76	
<b>2.0</b>	<b>Initial Chiller De-scaling</b>			
2.1	Descaler for Chiller	pail	2.50	
2.2	Neutralizer	gals	3.00	
<b>3.0</b>	<b>Monthly Treatment</b>			
3.1	Descaler (6lits/month)	lits	72.00	
3.2	Biocide (4lits/month)	lits	48.00	
3.3	Algaecide/Neutralizer (2lit/month)	lits	24.00	
3.4	Metering Pump	unit	1.00	
	<b>Sub-Total</b>		Plus 1.1 to 3.4	
<b>Part II</b>	<b>Labor</b>			
1.0	Initial Dosage	Man-hour	32.00	
2.0	Initial Descaling of Chillers	Man-hour	32.00	
3.0	Initial Cleaning of Cooling Towers	Man-hour	32.00	
4.0	Regular Chemical Treatment	Man-hour	768.00	
5.0	Water Treatment Supervision	LS	1.00	
6.0	Laboratory Analysis	LS	60.00	
	<b>Sub-Total</b>		Plus 1.0 to 6.0	
<b>Part III</b>	<b>Total Direct Cost (Material Cost + Labor Cost)</b>		Part I + Part II	
<b>Part IV</b>	<b>Total Indirect Cost</b>			
	<b>Contractor's Mark-ups</b>			
	(Overhead, Contingencies and Miscellaneous, and Profit)			
<b>Part V</b>	<b>Total Cost</b>		Part III + Part IV	
<b>Part VI</b>	<b>VAT 12%</b>		12% of Part V	
<b>TOTAL PROJECT COST</b>			Part V + Part VI	
	<b>OR</b>			

Prepared by:

Approved by: