DOC NUMBER: **569-DB7B-PRO-500-004**	CLIENT NUMBER: **PRD-MEC-MDE-009**
CLIENT: **TAKEDA**	
PROJECT **BURITI EPCMV**	

BULK DRUG SUBSTANCE
COOLING WATER SYSTEM
DESCRIPTION REPORT

1	25MAY2022	ISSUED FOR CONSTRUCTION AS PER N+1 UPDATE	PTC	MPA	MSS
0	30JUL2021	ISSUED FOR CONSTRUCTION	JRM	LFF	MSS
A	23JUN2021	90% DD ISSUE	JRM	CCO	MSS
RE	DATE	DESCRIPTION	EXEC	CHECK	APPROV

1. REVISION HISTORY

Rev	Reason For Change
A	90% DD ISSUE
0	ANSWERING TAKEDA COMMENTS – SUBMITAL 324.0 UPDATED ACCORDING TO CALCULATION REPORT, REVISION 0
1	AS PER N+1 UPDATE

2. PURPOSE

This document is intended to describe the process characteristics for the Cooling Water System, building 7B – Bulk Drug Substance – FDP, intended to Takeda unit - Buriti Project, located at Hermobrás site in Goiania – Pernambuco state, Brazil.

3. REFERENCE

The following documents were used as reference:

Item	Number	Title
01	7B-M-0-5-42	COOLING WATER SYSTEM
02	PRD-MEC-CLC-010	COOLING WATER SYSTEM CALCULATION
03	7B-M-0-5-44	CHILLED GLYCOL GENERATION SYSTEM
04	7B-M-0-5-81	COMPRESSED AIR GENERATION SYSTEM
06	7B-Z-0-2-76	BIO-KILL SYSTEM, BKS-7501

4. PROCESS DESCRIPTION

The Cooling Water System was sized to feed the 1 Process Chiller (1 operating), 1 Bio-Kill Outlet Cooler and 1 Air Compressor based on the following conditions:

- DESIGN CONDITION – Sizing Criterion for Cooling Towers - 100% of the capacity of equipment and an oversizing of 20%. – 1 Cooling Tower operating.
- MAXIMUM OPERATING CONDITION – 100% of the capacity of equipment operating – 1 Cooling Tower operating (higher pressure drop of the system).
- MINIMUM OPERATING CONDITION – 100% of the capacity of equipment operating – 1 Cooling Tower operating (minimum pressure drop of the system).

It is a closed system, with the equipment shown below:

- 1 Cooling Tower CT-7B-1 (1 cooling tower operating). The cooling tower was sized for the capacity 1,428,505 kcal/hr.
- 1 Pump P-C-7B-2 (1 pump operating). The pump was sized for the flow rate of 260.00 m³/hr and the HEAD of 31 mlc.
- 1 Chemical Dosing system.

4.1 COOLING TOWER

The Cooling Tower (CT-7B-1) is located on the Second Floor on the building 7B, where is operating a total thermal load of 1,428,505 kcal/hr and a total flow rate of 260.00 m³/hr.

The Cooling Tower reduce the cooling water temperature from 37.0°C to 31.5°C and, after that, it is distributed for consumers.

The Cooling Tower has the following instruments:

EQUIPMENT	INSTRUMENT	FUNCTION
CT-7B-1	XV-940031	Timed Solenoid valve for Cooling Tower Blowdown
	SC-940001	Cooling Tower Fan Speed Control – to keep the supply temperature at 31.5°C with the Temperature Transmitter (TIT-940009).
	LCV-940037	Level Control Valve
	BV-940012	Static Balancing Valve

The Cooling Tower is interconnected in cooling water basin, not requiring an external line for equalization. Shall be in an elevation of 1.5 m above the floor to protect the pump.

At the return line are installed a Pressure Transmitter (PIT-940010) and a Temperature Transmitter (TIT-940010) to check the cooling water operating conditions. There are alarms for High Pressure (PAH-940010), Low Pressure (PAL-940010) and High Temperature (TAH-940010).

4.2 PUMP

Pump (PC-7B-2) is sized for a capacity of 260.00 m³/hr and a Head of 31.0 meters for the pump, with frequency inverter. Although this pump has a frequency inverter and will operate with a speed fixed. At discharge of pump is installed a manometer (PI-940008 for P-C-7B-2).

For drainage of the pumping system goes to waste.

At the discharge of the pump there are the following instruments:

INSTRUMENT	LINE	FUNCTION
PIT-940009	8"-TWS-940009-CS1-NI	Pressure indication High Pressure Alarm Low Pressure Alarm
TIT-940009	8"-TWS-940009-CS1-NI	Temperature Indication Temperature Control High Temperature Alarm Low Temperature Alarm
FIT-940009	8"-TWS-940009-CS1-NI	Flow Indication Low Flow Alarm
FIT-940023	2"-TWS-940023-CS1-NI	Flow Indication Low Flow Alarm
FIT-940015	2"-TWS-9400015-CS1-NI	Flow Indication Low Flow Alarm

4.3 CHEMICAL FEEDING SYSTEM

The chemical feeding system it is efficient in the prevention of slime generation, scaling and corrosion and material removal already formed in the lines and refrigeration equipment circuit.

It was considered for this system one Chemical Dosing Pump (BM-7B-4), one Chemical Tank (TK-7B-4) and one Spill Containment Pallet (CN-7B-4).

Chemical feeding system capacity will be informed by the supplier and the chemical will be dosed in the tower's basin.

4.4 BALANCING VALVES

Along the Cooling Water System, balancing valves were considered, as bellow:

- Static balancing valves at the pump discharge.
- Static balancing valves at the cooling water return – inlet of Tower.
- Static balancing valves at the inlet or outlet of equipment

4.5 CONSUMERS

The Cooling Tower System feeds the following equipment:

EQUIPMENT	TAG	SIMULT. FLOWRATE		
		(m³/h)	(lpm)	(kg/h)
Process Chiller	P-CH-7B-1	202.2	3,370.0	201,251.0
Bio-Kill Outlet Cooler	TC-7501	12.3	205.0	12,242.3
Compressor	COMP-7B-1	7.2	120.0	7,166.2

Each equipment has the following instruments (cooling water side):

- Process Chillers

EQUIPMENT	INLET LINE		OUTLET LINE	
	INSTRUMENT	FUNCTION	INSTRUMENT	FUNCTION
PCH-7B-1	PIT-980013 *(1)*	Pressure indication	PIT-980014*(1)*	Pressure indication
			TIT-980014	Temperature indication High Temperature Alarm Low Temperature Alarm
	TIT-980013	Temperature indication High Temperature Alarm Low Temperature Alarm	FIT-980014	Flow rate indication Low flow shutdowns the chiller
			XV-980014	Automatic valve is closed when the chiller is out of operation
			XV-980016	Automatic valve is closed when the chiller is out of operation

Notes:

(1) If high differential pressure or low differential pressure, the PDS-9800253 shutdown the chiller.

- Air Compressor

EQUIPMENT	INLET LINE	
	INSTRUMENT	FUNCTION
COMP-7B-1	FSL-8400117	Low Flow Alarm

EQUIPMENT	INLET LINE	
	INSTRUMENT	FUNCTION
COMP-7B-1	PIT-840021	Pressure Indication

- Bill-Kill Outlet Cooler

EQUIPMENT	INLET LINE		OUTLET LINE	
	INSTRUMENT	FUNCTION	INSTRUMENT	FUNCTION
TC-7501	TE-750103	Temperature Indication	TE-750104	Temperature Indication
	PI-750101	Pressure Indication	PI-750104	Pressure Indication
	CBV	Static Balancing Valve	XV-750120	On Off Valve