Summary of Major Changes for

Fresh Water Colling Towers (FWCT) Scheme Brochure (2023 Edition) and

Code of Practice for Fresh Water Cooling Towers (2023 Edition)

Part A: FWCT Scheme Brochure

2016 Edition	2023 Edition	Major Changes in FWCT Scheme Brochure
Section 1.5	Section 1.5	To update the name of task force member The Chartered Institution of Building Services Engineers (Hong Kong Branch) (CIBSE-HKB) to The Chartered Institution of Building Services Engineers (Hong Kong Region) (CIBSE-HKR).
N/A	Section 1.7	To add the background of updates of the publications in 2023 edition. *"As the "Code of Practice for Fresh Water Cooling Towers: Parts 1, 2 & 3" has been established for more than 6 years…"*
Section 3.1	Section 3.1	To add "*Water Quality Objectives of Saltwater for Flushing Supply*" as the statutory requirements.
Section 5.1(b)	Section 5.1(b)	To update the requirement of drift eliminator drift emission to not exceeding ***0.002%*** of maximum design water circulation rate
Section 9	Section 9	To incorporate the Building (Minor Works) (Amendment) Regulation 2020 to relative sub-sections. *Section 9.1: "There are certain building works designated as minor works under the Building (Minor Works) Regulation which can be referred to sub-section 9.3 below."* *Section 9.3: "Simplified requirements under the MWCS may be adopted under certain circumstances…"*
Section 19	Section 19	To update the telephone number of EMSD, address and website of Buildings Department

Part B: Code of Practice for Fresh Water Cooling Towers (Part 1)

2016 Edition	2023 Edition	Major Changes in Code of Practice for Fresh Water Cooling Towers (Part 1)
Definition	Definition	To extend the definition of "Outdoor air intake". *"Vent pipe of water tanks are considered as outdoor air intake since it draws air from outdoor to the tank during discharge of water."*
Section 1.3.1	Section 1.3.1	To clarify the application of Code of Practice to alteration and improvement works.
Section 2.3.1	Section 2.3.1	To recommend Internet of Things (IOT) water treatment controller to be integrated with cloud-based water treatment management software or central server based Central Control and Monitoring System (CCMS)/ Building Management System (BMS).
Section 2.3.5	Section 2.3.5	To modify the clause as below: *"Water treatment systems are essential for a cooling tower system…"*
N/A	Section 2.3.11	To recommend the adoption of intelligent control system for cooling tower on/off and speed control. Please refer to the section for more details.
Section 3.5.2	Section 3.5.2	To recommend the use of basin sweeping system. *"Basin sweeping system with nozzles installed around the bottom of basin could be considered to further prevent accumulation of suspended solids and building up of sludge. The basin sweeping system could be integrated with the side stream filtration system."*
Section 3.6.5	Section 3.6.5	To update the requirement of drift eliminator drift emission to not exceeding ***0.002%*** of maximum design water circulation rate through the cooling tower.
Section 3.12	Section 3.12	To modify the recommended plume abatement measures. *(iii) For cooling towers with fan speed control, optimizing the cooling tower fan speed control to meet plume abatement with energy efficient strategy during partial-load condition;* *(iv) Introducing by-pass air (heated or non-heated ambient air) to the cooling tower before discharge to the atmosphere, etc.; or*

Section 3.17	Section 3.17	To clarify that the supporting frame of cooling towers and similar installations are building works subject to the control of the Building Ordinance and subsidiary Regulations. Authorized Person should be appointed to obtain the prior approval of plans and consent for commencement of works from the Building Authority (BA). Simplified requirements under the Minor Works Control System (MWCS) may be adopted under certain circumstances. Please refer to the section, the Building Ordinance, and subsidiary regulations for more details.
N/A	Section 3.18	To include new section "High Productivity Construction Method", as pre-fabrication cooling tower and water pipework modules could reduce on-site installation time and material waste. Please refer to the section for more details.
Section 4.1.4	Section 4.1.4	To classify vent pipe of drainage system and generator flue gases as critical exhaust air outlet as they might spread airborne viruses or pollutants, and can contaminate the cooling water or pollute the cooling air.
Section 4.1.5	Section 4.1.5	To classify public accessible green roof as public accessible area. *"Public accessible green roof is considered as public accessible area, same separation requirements are applied."*
Appendix 1A	Appendix 1A	To update according to Section 2.3.1.
Appendix 1B	Appendix 1B	To add "public accessible green roof" to Figure B2 in B2.1.
Appendix 1D	Appendix 1D	To add "public accessible green roof" to the major risks check list.

Part C: Code of Practice For Fresh Water Cooling Towers (Part 2)

<table>
<tr><th>2016 Edition</th><th>2023 Edition</th><th>Major Changes in Code of Practice for Fresh Water Cooling Towers (Part 2)</th></tr>
<tr><td>Definition</td><td>Definition</td><td>To extend the definition of “Outdoor air intake”.

“Vent pipe of water tanks are considered as outdoor air intake since it draws air from outdoor to the tank during discharge of water.”</td></tr>
<tr><td>N/A</td><td>Section 2.3.3 – 2.3.6</td><td>To include new requirements on pre-closure and re-operation procedures for each shut-down scenario.

<u>Section 2.3.3:</u> “The shut-down procedures for 2.3.1 a), closing without draining…”

<u>Section 2.3.4:</u> “Procedures before system re-operation for 2.3.1 a), closing without draining…”

<u>Section 2.3.5:</u> “Systems fully drained might have pocket of water remained, which poses a risk of microorganism growth…”

<u>Section 2.3.6:</u> “If cooling tower(s) are shut down for more than four (4) months…”</td></tr>
<tr><td>Section 2.5.3.1</td><td>Section 2.5.3.1</td><td>To update the indicative cooling water quality criteria of fresh water cooling tower as below:

<table>
<tr><th>Parameters</th><th>Cooling Water Quality Criteria</th></tr>
<tr><td>Calcium hardness</td><td>Less than 500 ppm <u>as $CaCO_3$</u></td></tr>
<tr><td>Total alkalinity</td><td>80 – 500 ppm <u>as $CaCO_3$</u></td></tr>
<tr><td><u>Free</u> Residual Cl<u>*</u></td><td><u>0.5 – 1.0 mg/L</u></td></tr>
</table>
<u>* Operators could decide the suitable concentration with due consideration of existing pipe conditions.</u></td></tr>
</table>

<table>
<tr>
<td>Section 2.5.4.2</td>
<td>Section 2.5.4.2</td>
<td>To update four parameters of the bleed-off water quality criteria according to Water Supplies Department’s Water Quality Objective of Saltwater for Flushing Supply.

<table>
<tr><th>Parameters</th><th>Water Quality Objectives
Chemical values expressed in mg/L
(parts per million), unless otherwise specified</th></tr>
<tr><td>Colour (H.U.)</td><td><u>< 40</u></td></tr>
<tr><td>Turbidity (N.T.U.)</td><td><u>< 20</u></td></tr>
<tr><td>Suspended Solids</td><td><u>< 20</u></td></tr>
<tr><td><u>5-Day</u> Biochemical Oxygen Demand</td><td>< 10</td></tr>
<tr><td>E. coli (<u>cfu</u>/100mL)</td><td><u>< 5 000</u></td></tr>
</table>
</td>
</tr>
<tr>
<td>Appendix 2B</td>
<td>Appendix 2B</td>
<td>To update recommended routine inspection checklist.

<table>
<tr><th></th><th><u>Procedures</u></th><th><u>Inspection Frequency</u></th></tr>
<tr><td>8.</td><td><u>Check water treatment system, including water treatment dosing equipment, controller, conductivity sensors, and other sensors, etc.</u></td><td>Weekly</td></tr>
<tr><td><u>18.</u></td><td><u>Calibrate sensors</u></td><td><u>As recommended by equipment manufacturer or annually whichever is shorter</u></td></tr>
</table>
</td>
</tr>
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Part D: Code of Practice For Fresh Water Cooling Towers (Part 3)

2016 Edition	2023 Edition	Major Changes in Code of Practice for Fresh Water Cooling Towers (Part 3)
Definition	Definition	To extend the definition of "Outdoor air intake". *"Vent pipe of water tanks are considered as outdoor air intake since it draws air from outdoor to the tank during discharge of water."*
Section 3.4.4 Section 4.3.3	Section 3.4.4 Section 4.3.3	To update the clause to cover different types of products available in the market. *"This method involves the exposure of recirculating water under magnetic field."*
Section 3.4.5 Section 4.3.4	Section 3.4.5 Section 4.3.4	To update the clause to cover different types of products available in the market. *"Electromagnetic technology produces a time-varying electromagnetic field, which induces electric field in water."*
Section 5.3	Section 5.3	To rename "Central Monitoring and Control" as "Integrated Control and Monitoring System". To recommend integrated control and monitoring strategies and add advantages of such strategies in sub-clauses. *"It is recommended to integrate the water treatment system to:* *a) IoT Water treatment controller with cloud-based water treatment management software*; and/or* *b) Central server based Central Control and Monitoring System (CCMS) or Building Management System (BMS) of the building.* **Attention should be paid to assure cyber security of cloud-based control system."*

Part E: O&M Guideline

2016 Edition	2023 Edition	O&M Guideline
N/A	Section 3.6	It is recommended to integrate the water treatment system to IOT water treatment controller with cloud-based water treatment management software or central server based Central Control and Monitoring System (CCMS)/ Building Management System (BMS). Refer to Code of Practice for Fresh Water Cooling Towers (Part 1) Section 2.3.1 for details.
Section 4.2 (iv)	Section 4.2 (iv)	To add checking of water treatment system, including the smart controller, sensors to the recommended weekly inspection routine.
Section 8	Section 8	To update telephone number of EMSD.