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NEWS ALERT

ISO 9001 • ISO 14001
ISO/IEC 17025

Cooling Tower Seasonal Layup

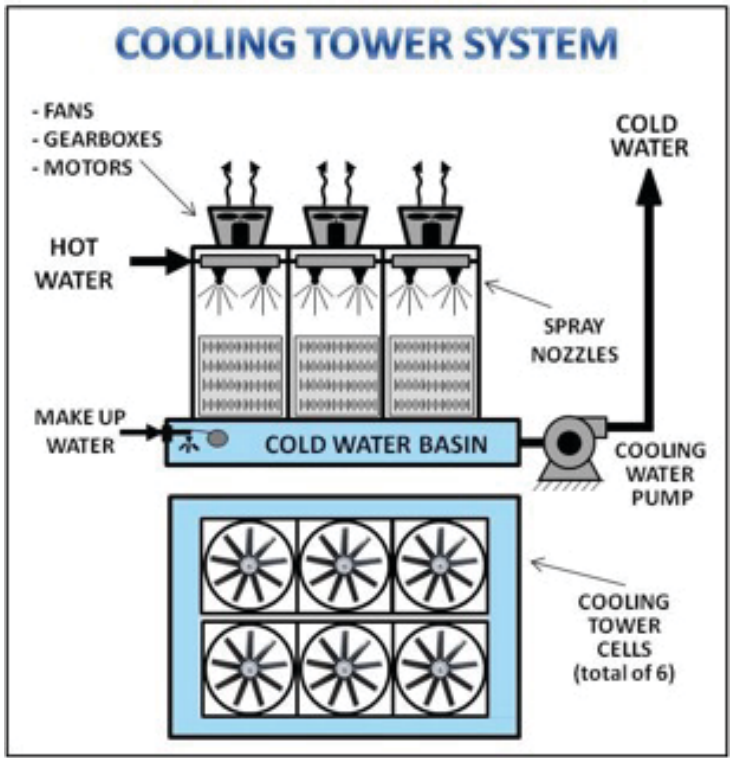

Figure 1 - Cooling Tower System

Cooling towers are an integral part of any cooling system and must work within the design specification for the system to properly function. A cooling tower operating outside its specifications will increase the overall costs of operations due to higher energy and water usage. When it comes time to lay the system up, much thought and consideration is given to protecting the water side of the system (i.e., piping, pumps, valves, heat exchangers, and other associated equipment). However, little attention is paid to exterior surfaces of the equipment, associated control panels, and the cooling tower structure. Excess corrosion on any of these surfaces over time can lead to system failure and expensive non-budgeted repairs or equipment replacement.

This guide outlines strategies to provide an integrated approach to protect the entire system, not just water side components.

The cooling tower structure consists of the following components:

1. Fan Blades – Fiberglass reinforced polyester (FRP), aluminum, galvanized steel
2. Rotating Shaft – Steel
3. Motors
4. Louvers – Typically FPR but can be galvanized steel or stainless steel
5. Fill – Plastic sheet
6. Structure – Normally galvanized steel, but can be stainless steel or fiberglass reinforced polyester (FRP)

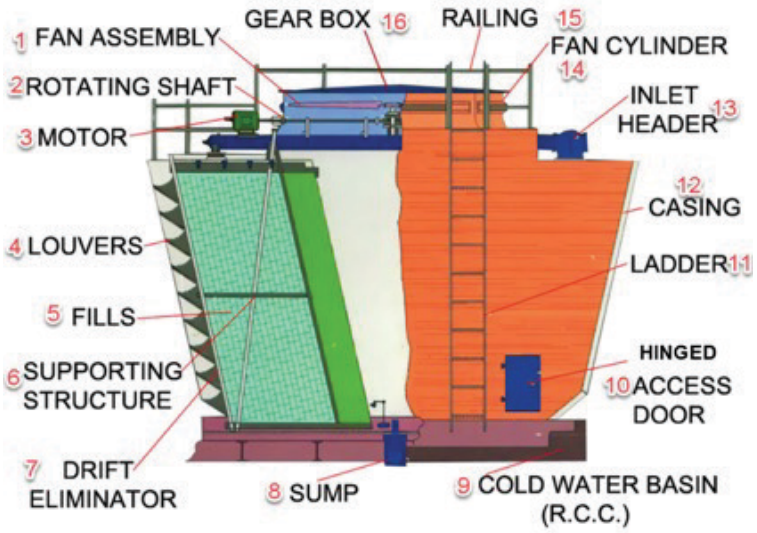

Figure 2 - Cooling Tower Major Components

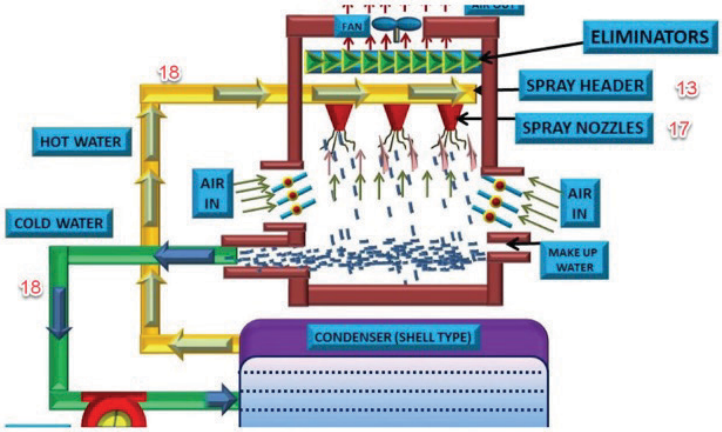

Figure 3 - Flow Through Cooling Tower

7. Drift Eliminator – Polypropylene material filled with carbon black
8. Cold Water Basin – Concrete, galvanized, FRP, or stainless steel
9. Sump – Same material as cold-water basin; receives water from the basin
10. Hinged Access Door – Steel
11. Walkways and Ladders – Galvanized steel
12. Casing – Fiberglass
13. Inlet Header
14. Fan Cylinder – Fiberglass reinforced plastic (FRP)
15. Railing – Galvanized steel
16. Gearboxes
17. Spray Nozzles – Plastic feed by steel pipe
18. Piping – Painted and/or insulated
19. Control Panels
20. Hot Water Basin (Crossflow Towers) – Galvanized steel, FRP, or stainless steel

Other components of a cooling water system:

- Chemical Injection Skid
- Pumps
- Piping
- Controls
- Valves
- Heat Load

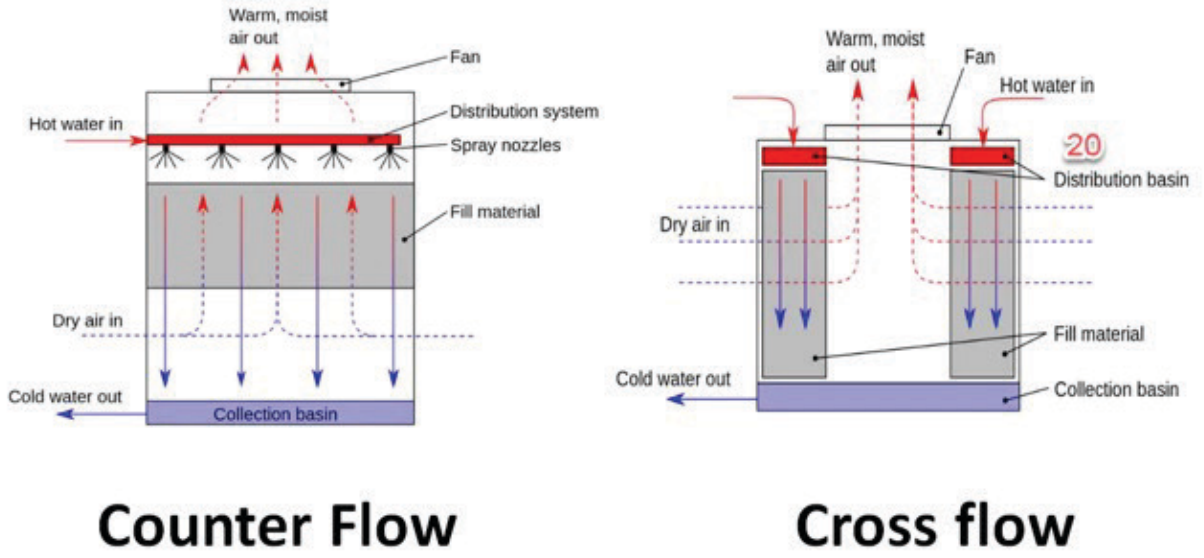

Figure 4 - Comparison of Counter Flow and Cross Flow Cooling Towers

SEASONAL LAYUP (3-6 Months)		
COMPONENT	PRODUCT	COMMENTS
Structure	VpCI®-373 VpCI®-396	Prime galvanized and stainless with VpCI®-373 prior to topcoat of VpCI®-396
Louvers	VpCI®-373 VpCI®-396	Prime galvanized and stainless with VpCI®-373 prior to topcoat of VpCI®-396
Piping	VpCI®-396 VpCI®-658	• Coat exposed steel pipe surfaces with VpCI®-396 • Inject VpCI®-658 into pipe insulation
Fan Blades	VpCI®-373 VpCI®-396	Prime galvanized and aluminum with VpCI®-373 prior to topcoat of VpCI®-396

Motors	VpCI®-391
	VpCI® Emitters
		• Coat exposed machined surfaces with VpCI®-391
		• Install appropriate size emitter into junction box.
		  • VpCI®-101 – 1 ft^3 (28 L)
		  • VpCI®-105 – 5 ft^3 (0.14 m^3)
		  • VpCI®-111 – 11 ft^3 (0.31 m^3)

Gearbox	M-531
	VpCI®-391
		• Wet layup:
		  • Add to oil at 2.5% by volume to existing oil and circulate prior to shutdown
		  • Drain and fill with fresh oil prior to startup
		• Dry layup:
		  • Fog into gearbox at 0.3-0.5 oz/ft^3 (0.3-0.5 L/m^3)
		  • Coat exposed machined surfaces with VpCI®-391

Control Panels	ElectriCorr™ VpCI®-239
	VpCI® Emitters
	VpCI®-308 Pouch
		• Lightly spray all exposed metal surfaces (contacts) with ElectriCorr™ VpCI®-239.
		• Install appropriate size emitter into panel.
		  • VpCI®-101 – 1 ft^3 (28 L)
		  • VpCI®-105 – 5 ft^3 (0.14 m^3)
		  • VpCI®-111 – 11 ft^3 (0.31 m^3)
		  • VpCI®-308 Pouch – 35 ft^3 (1 m^3)

Walkways, Railings, and Ladders	VpCI®-373 VpCI®-396	Prime galvanized with VpCI®-373 prior to topcoat of VpCI®-396
Hot Water Basin	VpCI®-373 VpCI®-396	Prime galvanized and stainless with VpCI®-373 prior to topcoat of VpCI®-396

Cold Water Basin	VpCI®-395 VpCI®-2026 VpCI®-373 VpCI®-396	• Apply either VpCI®-395 or VpCI®-2026 to concrete • Prime galvanized with VpCI®-373 prior to topcoat of VpCI®-396
Other components of a cooling water system: • Chemical Injection Skid • Pumps • Piping • Controls • Valves • Heat Load • Exposed Shafting • Hinged Access Door	VpCI®-391 VpCI®-369 D ElectriCorr™ VpCI®-239 VpCI®-126 HP UV Shrink Film	• External machined surfaces should be coated with VpCI®-391 • Valves stems and bushings should be coated with VpCI®-369 D • Finned sections of heat load can be sprayed with ElectriCorr™ VpCI®-239 and wrapped with VpCI®-126 HP UV Shrink Film

PRODUCT NAME	PRODUCT DATA SHEET LINK
ElectriCorr™ VpCI®-239	https://www.cortecvci.com/Publications/PDS/ElectriCorr-VpCI-239.pdf
M-531	https://www.cortecvci.com/Publications/PDS/M-531.pdf
VpCI®-101	https://www.cortecvci.com/Publications/PDS/VpCI-101.pdf
VpCI®-105	https://www.cortecvci.com/Publications/PDS/105.pdf
VpCI®-111	https://www.cortecvci.com/Publications/PDS/VpCI-111.pdf
VpCI®-126 HP UV Shrink Film	https://www.cortecvci.com/Publications/PDS/VpCI-126_HP_UV_Shrink_Film.pdf
VpCI®-2026	https://www.cortecvci.com/Publications/PDS/VpCI-2026_Top_Coat.pdf
VpCI®-308 Pouch	https://www.cortecvci.com/Publications/PDS/VpCI-308_Pouch.pdf
VpCI®-369 D	https://www.cortecvci.com/Publications/PDS/VpCI-369_D.pdf
VpCI®-373	https://www.cortecvci.com/wp-content/uploads/VpCI-373NEW.pdf
VpCI®-391	https://www.cortecvci.com/wp-content/uploads/VpCI-391NEW.pdf
VpCI®-396	https://www.cortecvci.com/Publications/PDS/VpCI-396.pdf
VpCI®-658	https://www.cortecvci.com/Publications/PDS/VpCI-658.pdf

Cooling Water Layup

Product Line Guide

Product	Form	Open or Closed Loop	Layup Method	Dosage	< 3,000 Gallons	> 3,000 Gallons	Notes
Closed Loop Toad™	Water-soluble Bag	Closed	Wet-Dry	1 Bag per 250 Gallons	X		
Cooling Loop Gator®	Water-soluble Bag	Open	Wet-Dry	1 Bag per 250 Gallons	X		Molybdate-free version is available
Cooling Tower Frog®	Water-soluble Bag	Both	Dry	1 Bag per 500 Gallons	X	X	100% Vapor Phase Corrosion Inhibitor
S-69	Liquid	Both	Wet or Wet-Dry	0.3 – 1.5%		X	
VpCI®-649 (includes BD & BD MF)	Liquid	Both	Wet or Wet-Dry	0.3 – 1.5%		X	Contains stabilizer for hard water systems

Types of Layup	**Dry**	Preservation product is applied after the system has been shut down and drained.
	Wet	Preservation product is added and circulated throughout system. The system is then shut down and maintained at normal water level.
	Wet-Dry	Preservation product is added and circulated throughout system for 12-24 hours. The system is then shut down and is fully or partially drained.

Notes:

- All products listed provide multimetal protection.
- Multimetal protection refers to protection for ferrous metals, aluminum, stainless steel, copper and other yellow metals.
- Product dosage lists the volume of water or system volume treated by each product. Percentages correspond to weight percent.
- For dry layup of large cooling water systems, contact Cortec's Technical Services.

Cortec® Technical Service
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CORTEC CORPORATION
Environmentally Safe VpCI®/MCI® Technologies

References

- Figure 1: Netto, Adherbal Caminada, et al. "Petri Net Based Reliability Analysis of Thermoelectric Plant Cooling Tower System: Effects of Operational Strategies on System Reliability and Availability." White paper featured at ICVRAM ISUMA UNCERTAINTIES conference in Brazil, April 8-11, 2018. <https://www.researchgate.net/figure/Cooling-Tower-System_fig1_324531183>. All rights reserved.
- Figure 2: Courtesy of CASE GROUP. 1993. <https://www.casepl.com/coolingtowewooden_singleproduct_details.htm>. All Rights Reserved.
- Figure 3: Courtesy of YouTube. <https://i.ytimg.com/vi/G7Y3l16ywd0/maxresdefault.jpg>. All Rights Reserved.
- Figure 4: Courtesy of EnergyPurse. "Which is a better counter or crossflow cooling tower??" <https://www.energypurse.com/which-is-a-better-counter-or-cross-flow-cooling-tower/>. All Rights Reserved.

Keywords: Cooling tower, seasonal layup, cooling system, heat exchangers, corrosion, cooling system repairs, non-budgeted repairs, avoid system failure, cooling tower exterior protection, Cortec