

SCOPE

- I ↕ 1.1 This practice covers the design, fabrication, and inspection of mechanical draft cooling towers.
- I ↕ 1.2 **An asterisk (*)** indicates that a decision by the purchaser is required or that additional information is furnished by the purchaser.
- I ↕ 1.3 The following are synonymous: BP and IP.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices and standards which shall be used with this practice.
- I ↕ *2.2 **Table 2** lists the practices and standards which shall be used with this practice as specified by the purchaser or as required by **Table 3**.
- I *2.3 The vendor shall comply with any **local rules or regulations** specified by the purchaser.

TABLE 1

PRACTICES			
IP 2-1-1	Equipment Noise Level Data Requirements	IP 16-9-1	Low Voltage A-C Motors Up to 200 HP (150 kw)
IP 4-1-3	Design Loads for Structures	IP 20-1-1	Inspection of Equipment and Materials
IP 4-2-1	Auxiliary Structures for Operation and Maintenance		
STANDARDS			
ANSI Standards		CTI Standards (Cont)	
A 14.3	Safety Requirements for Fixed Ladders	STD-134	Plywood for Use in Cooling Towers
B 16.5	Pipe Flanges and Flanged Fittings	STD-136	Polyvinyl Chloride Materials Used for Film Fill, Splash Fill, Louvers and Drift Eliminators
CTI Standards		STD-137	Fiberglass Pultruded Structural Products for Use in Cooling Towers
STD-111	Gear Speed Reducers	ATC-105	Acceptance Test Code for Water Cooling Towers
STD-118	Inquiry and Bid Form		
STD-131	Fiberglass Reinforced Plastic Panels for Application on Industrial Water-Cooling Towers		

TABLE 2

PRACTICES			
IP 3-10-4	Plastic and Plastic-Lined Pipe	IP 10-11-1	Sizing of Drivers and Transmissions for Compressors, Fans, and Pumps
STANDARDS			
ASTM Standards		ASTM Standards (Cont)	
A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip	C 150	Portland Cement
A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware	E 84	Surface Burning Characteristics of Building Materials
A 536	Ductile Iron Castings	CTI Standards	
B 97	Copper-Silicon Alloy Plate, Sheet, Strip and Rolled Bar for General Purposes	STD-103	Redwood Lumber
B 98	Copper-Silicon Alloy Rod, Bar, and Shapes	STD-114	Douglas Fir Lumber
B 99	Copper-Silicon Alloy Wire for General Purposes	WMS-112	Pressure Preservative Treatment of Lumber
B 179	Aluminum Alloy in Ingot Form for Sand Castings, Permanent Mold Castings, and Die Castings	ANSI/VOL PROD. STD	
		PS 1	Construction and Industrial Plywood

IP 8-1-1		Cooling Towers	
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(This practice is appropriate for attachment to Inquiry or Purchase Document)

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DOCUMENTATION

PROPOSAL INFORMATION

- I 3.1 **Performance curves.** The vendor's proposal shall include three separate performance curve sheets, one each for 90%, 100%, and 110% design water quantity, showing tower temperatures versus ambient air wet bulb temperature. Curves shall cover cooling ranges corresponding to 60%, 80%, 100%, and 120% of design heat duty, at wet bulb temperatures ranging from 10°F (5.5°C) below to 3°F (1.6°C) above the specified ambient wet bulb temperature. Performance curves shall be based on constant fan power equal to the design power.
- I 3.2 Characteristic curve. The vendor's proposal shall include a tower characteristic curve showing KAV/L versus L/G.
- I 3.3 **Inquiry and bid form.** The vendor's proposal shall include a **data sheet** containing all applicable information listed in the Cooling Tower Institute **Inquiry and Bid Form CTI STD-118** and the following:
 - a. Percent recirculation (design).
 - b. Air temperature leaving tower, °F (°C).
 - c. Grade, dimensions, and other applicable specification for materials of construction.
 - d. Detailed description of deicing facilities, if required.
 - e. Cold water temperature when one cell is shutdown, and design duty and flow is distributed between remaining cells.
 - f. Description of vendors standard practice for incising of lumber (if incising is proposed).
 - g. Recommended spare parts based on 2 years' continuous operation.
- I ♦ 3.4 **Supplemental proposal data.** A supplemental data sheet shall be submitted with proposals to include the following additional information:

FAN DATA

1. Vendor shall provide curves for proposed fan; include fan efficiency (static and total).
2. State whether the fans are reversible and, if so, give qualifications for operating in the reverse direction.

PROPOSED SUBSTITUTES TO CTI MATERIALS (Refer to [Table 3](#))

1. A listing of comparative physical properties.
2. Grades of lumber to be used for the various tower parts.

- I,C 3.5 Polypropylene, polyethylene, or polyvinyl chloride fill shall be quoted as a base bid or as an alternative.

OPERATING AND MAINTENANCE MANUALS

- O,M 3.6 All manuals shall be written specifically for the equipment being furnished and shall contain (but not be limited to) the following information:
 - a. Mechanical data on fan, hub, coupling, and fan drivers, including shafts bore and keyway dimensions, design pitch for fan blades, type of lube oil recommended.
 - b. Sectional drawings of fan, hub coupling, fan drivers (including gears) showing location of parts, part numbers, and materials. Manufacturer's Standard Drawings are acceptable if corrected or supplemented as necessary to provide positive identification.
 - c. Instructions for installation, operation, and maintenance of the tower and mechanical equipment.
 - d. Instructions for fan hub and blade assembly, and recommended procedures for field dynamic balancing of the installed fan.

MATERIALS

- R ♦ 4.1 Acceptable materials of construction and applicable standards are listed in [Table 3](#). Vendor's proposed substitutes shall be submitted to purchaser for approval by Owner's Engineer.



Documents

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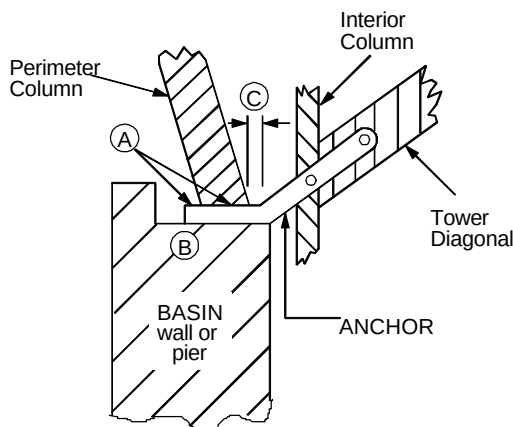
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- R,E ♦ *4.2 All lumber shall be given a **preservative treatment** per **CTI STD WMS-112** modified per the following:
- Treatment** shall be ACC (acid copper chromate), or CCA (chromated copper arsenate).
 - Moisture content** of lumber prior to treatment shall be 19% for air-dried material and 15% for kiln dried material.
 - * Deviations from the required penetration or retention, as determined from specimens representative of the condition and dimensions of the tower components to be treated, require approval of the Owner's Engineer.
 - If water borne salts are used, seasoning after treatment shall be continued for sufficient time to complete the chemical reaction within the wood.
 - The referenced standards of AWWA for Material, Treatment, Inspection and handling pressure treated wood shall be considered mandatory.
- R,C ♦ 4.3 Pipe for water distribution systems:
- Fresh water service.** Carbon steel pipe shall have a minimum corrosion allowance of 1/8 in. (3 mm).
 - * **Proposals to use plastic** pipe shall be submitted to purchaser for approval by the Owner's Engineer.
- S 4.4 **Plastic tower-fill, and plastic panels** used for casing, louvers, drift eliminators, and fan stack construction shall have a **flame spread classification** of not more than 25 per **ASTM E84**.

DESIGN

FRAMEWORK

- R 5.1 **Bolted construction** shall be used for tower framework. Nonframework members, such as fill, sheathing, and louvers shall not be called upon to furnish part of the structural strength of the tower.
- R 5.2 Structural support columns shall comply with the following:



Legend:

- Column base trimmed to seat flush on Anchor, no shims permitted. No overhang of Column base on Anchor permitted.
- Grout fill only. No shims permitted.
- Maintain about 1/2 in. (12 mm) clearance between Column base and Anchor-arm corner.

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CASING

- R ♦ 5.3 Glass fiber-reinforced polyester plastic panels used for tower sheathing shall be corrugated 12 oz/sq ft (3.7 kg/m²) minimum weight.
- R 5.4 **Leakage will not be permitted through the casing.** All seams shall be caulked with a nonhardening, oil- and water-proof compound.