State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

# Request for Quotation

| RFQ NUMBER | PAGE |
|---|---|
| GSD126419 | 1 |

ADDRESS CORRESPONDENCE TO ATTENTION OF:
KRISTA FERRELL
304-558-2596

VENDOR
*709043406 304-346-0549
CASTO TECHNICAL SERVICES INC
540 LEON SULLIVAN WAY
PO BOX 627
CHARLESTON WV 25322

SHIP TO
DEPARTMENT OF ADMINISTRATION
GENERAL SERVICES DIVISION
BUILDING 11 CHILLER PLANT
218 CALIFORNIA AVENUE
CHARLESTON, WV
25305 304-558-2317

| DATE PRINTED | TERMS OF SALE | SHIP VIA | F.O.B. | FREIGHT TERMS |
|---|---|---|---|---|
| 11/23/2011 | | | | |

BID OPENING DATE: 12/20/2011 BID OPENING TIME 01:30PM

| LINE | QUANTITY | UOP | CAT. NO. | ITEM NUMBER | UNIT PRICE | AMOUNT |
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| 0001 | 1 | EA | | 031-13 | | |

CLEANING/MAINTENANCE OF CHILLERS AND TOWERS BLDG 11

REQUEST FOR QUOTATION
(RFQ)
CONSTRUCTION

THE WEST VIRGINIA STATE PURCHASING DIVISION FOR THE AGENCY, THE WEST VIRGINIA DIVISION OF GENERAL SERVICES, IS SOLICITING BIDS TO PROVIDE THE AGENCY WITH ANNUAL CLEANING AND MAINTENANCE FOR THE HEATING, VENTILATION, AND AIR CONDITIONING SYSTEM IN BUILDING 11 (CHILLER PLANT) LOCATED ON THE WEST VIRGINIA STATE CAPITOL COMPLEX IN CHARLESTON, WEST VIRGINIA PER THE ATTACHED SPECIFICATIONS.

A MANDATORY PRE-BID WILL BE HELD ON 12/06/11 AT 10:00 AM AT THE AGENCY'S LOCATION AT THE 218 CALIFORNIA AVENUE IN CHARLESTON, WEST VIRGINIA. ALLL INTERESTED PARTIES ARE REQUIRED TO ATTEND THIS MEETING. FAILURE TO ATTEND THE MANDATORY PRE-BID SHALL RESULT IN DISQUALIFICATION OF THE BID. NO ONE PERSON MAY REPRESENT MORE THAN ONE BIDDER.

AN ATTENDANCE SHEET WILL BE MADE AVAILABLE FOR ALL POTENTIAL BIDDERS TO COMPLETE. THIS WILL SERVE AS THE OFFICIAL DOCUMENT VERIFYING ATTENDANCE AT THE MANDATORY PRE-BID. FAILURE TO PROVIDE YOUR COMPANY AND REPRESENTATIVE NAME ON THE ATTENDANCE SHEET WILL RESULT IN DISQUALIFICATION OF THE BID. THE STATE WILL NOT ACCEPT ANY OTHER DOCUMENTATION TO VERIFY ATTENDANCE.

RECEIVED
2011 DEC 20 P 12:25
PURCHASING DIVISION
STATE OF WV

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

| SIGNATURE | TELEPHONE | DATE |
|---|---|---|
| TODD WATSON | 304-346-0549 | 12-19-2011 |

| TITLE | FEIN | ADDRESS CHANGES TO BE NOTED ABOVE |
|---|---|---|
| PROJECT MANAGER | 55 0539186 | |

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

# GENERAL TERMS & CONDITIONS
# REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

**1.** Awards will be made in the best interest of the State of West Virginia.

**2.** The State may accept or reject in part, or in whole, any bid.

**3.** Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required $125 fee.

**4.** All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.

**5.** Payment may only be made after the delivery and acceptance of goods or services.

**6.** Interest may be paid for late payment in accordance with the ***West Virginia Code***.

**7.** Vendor preference will be granted upon written request in accordance with the ***West Virginia Code***.

**8.** The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

**9.** The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.

**10.** The laws of the State of West Virginia and the ***Legislative Rules*** of the Purchasing Division shall govern the purchasing process.

**11.** Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.

**12. BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.

**13. HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at **www.state.wv.us/admin/purchase/vrc/hipaa.html** and is hereby made part of the agreement provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

**14. CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf.

**15. LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

**16. ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or Fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

## INSTRUCTIONS TO BIDDERS

**1.** Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.

**2.** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.

**3.** Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.

**4.** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130

**5.** Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).

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NO CONTACT BETWEEN THE VENDOR AND THE AGENCY IS PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF THE STATE BUYER. VIOLATION MAY RESULT IN REJECTION OF THE BID. THE STATE BUYER LISTED ABOVE IS THE SOLE CONTACT FOR ANY AND ALL INQUIRIES AFTER THIS RFQ HAS BEEN RELEASED.

EXHIBIT 5

WEST VIRGINIA CODE 21-1D-5 PROVIDES THAT: ANY SOLICITATION FOR A PUBLIC IMPROVEMENT CONSTRUCTION CONTRACT REQUIRES EACH VENDOR THAT SUBMITS A BID FOR THE WORK T SUBMIT AT THE SAME TIME AN AFFIDAVIT OF COMPLIANCE WITH THE BID. THE ENCLOSED DRUG-FREE WORKPLACE AFFIDAVIT MUST BE SIGNED AND SUBMITTED WITH THE BID AS EVIDENCE OF THE VENDOR'S COMPLIANCE WITH THE PROVISIONS OF ARTICLE 1D, CHAPTER 21 OF THE WEST VIRGINIA CODE. FAILURE TO SUBMIT THE SIGNED DRUG-FREE WORKPLACE AFFIDAVIT WIT THE BID SHALL RESULT IN DISQUALIFICATION OF SUCH BID.

NOTICE TO PROCEED: THIS CONTRACT IS TO BE PERFORMED WITHIN (30) CALENDAR DAYS AFTER THE NOTICE TO PROCEED IS RECEIVED. THE AGENCY WILL ISSUE A WRITTEN NOTICE TO PROCEED TO THE SUCCESSFUL VENDORS.

CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE MATERIALS OR WORKMANSHIP SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM WITH THE SPECIFICATIONS OF THE BID AND CONTRACT HERE IN.

WAGE RATES: THE CONTRACTOR OR SUBCONTRACTOR SHALL PAY THE HIGHER OF THE U.S. DEPARTMENT OF LABOR MINIMUM WAGE RATES AS ESTABLISHED FOR KANAWHA COUNTY, PURSUANT TO WEST VIRGINIA CODE 21-5A, ET, SEQ. (PREVAILING

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THE BIDDER IS RESPONSIBLE FOR ENSURING THEY HAVE COMPLETED THE INFORMATION REQUIRED ON THE ATTENDANCE SHEET. THE PURCHASING DIVISION AND THE STATE AGENCY WILL NOT ASSUME ANY RESPONSIBILITY FOR A BIDDER-S FAILURE TO COMPLETE THE PRE-BID ATTENDANCE SHEET. IN ADDITION, WE REQUEST THAT ALL POTENTIAL BIDDERS INCLUD THEIR E-MAIL ADDRESS AND FAX NUMBER.

ALL POTENTIAL BIDDERS ARE REQUESTED TO ARRIVE PRIOR TO THE STARTING TIME FOR THE PRE-BID. BIDDERS WHO ARRIVE LATE, BUT PRIOR TO THE DISMISSAL OF THE TECHNICAL PORTION OF THE PRE-BID WILL BE PERMITTED TO SIGN IN. BIDDERS WHO ARRIVE AFTER CONCLUSION OF THE TECHNICAL PORTION OF THE PRE-BID, BUT DURING ANY SUBSEQUENT PART OF THE PRE-BID WILL NOT BE PERMITTED TO SIGN THE ATTENDANCE SHEET.

TECHNICAL QUESTIONS CONCERNING THIS SOLICITATION MUST BE SUBMITTED IN WRITING TO KRISTA FERRELL IN THE WEST VIRGINIA STATE PURCHASING DIVISION VIA FAX AT 304-558-4115 OR VIA EMAIL AT KRISTA.S.FERRELL@WV.GOV.

DEADLINE FOR ALL TECHNICAL QUESTIONS IS 12/09/2011 AT THE CLOSE OF BUSINESS.

ANY TECHNICAL QUESTIONS RECEIVED WILL BE ANSWERED BY FORMAL WRITTEN ADDENDUM TO BE ISSUED BY THE PURCHASING DIVISION AFTER THE DEADLINE HAS LAPSED.

VERBAL COMMUNICATION: ANY VERBAL COMMUNICATION BETWEE THE VENDOR AND ANY STATE PERSONNEL IS NOT BINDING, INCLUDING THAT MADE AT THE MANDATORY PRE-BID MEETING. ONLY INFORMATION ISSUED IN WRITING AND ADDED TO THE RFQ SPECIFICATIONS BY AN OFFICIAL WRITTEN ADDENDUM BY PURCHASING IS BINDING.

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WAGE RATES APPLY TO THIS PROJECT)

ARBITRATION: ANY REFERENCES MADE TO ARBITRATION OR INTEREST FOR PAYMENTS DUE (EXCEPT FOR ANY INTEREST REQUIRED BY STATE LAW) CONTAINED IN THIS CONTRACT OR IN ANY AMERICAN INSTITUTE OF ARCHITECTS DOCUMENTS PERTAINING TO THIS CONTRACT ARE HEREBY DELETED.

WORKERS' COMPENSATION: VENDOR IS REQUIRED TO PROVIDE A CERTIFICATE FROM WORKERS' COMPENSATION IF SUCCESSFUL.

ALL OF THE ITEMS CHECKED BELOW WILL BE A REQUIREMENT OF THIS CONTRACT:

(XX) INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF COMMERCIAL GENERAL LIABILITY INSURANCE PRIOR TO ISSUANCE OF CONTRACT. UNLESS OTHERWISE SPECIFIED IN THE BID DOCUMENTS, THE MINIMUM AMOUNT OF INSURANCE COVERAGE REQUIRED IS $1,000,000.00.

( ) BUILDERS RISK INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF BUILDERS RISK - ALL RISK INSURANCE IN AN AMOUNT EQUAL TO 100% OF THE AMOUNT OF THE CONTRACT.

(XX) BONDS: FIVE PERCENT (5%) OF THE TOTAL AMOUNT OF THE BID PAYABLE TO THE STATE OF WEST VIRGINIA, SHALL BE SUBMITTED WITH EACH BID AS A BID BOND. THE SUCCESSFUL BIDDER SHALL ALSO FURNISH A PERFORMANCE BOND AND LABOR/ MATERIAL BOND FOR 100% OF THE AMOUNT OF THE CONTRACT. BONDS MAY BE PROVIDED IN THE FORM OF A CERTIFIED CHECK IRREVOCABLE LETTER OF CREDIT, OR BOND FURNISHED BY A SOLVENT SURETY COMPANY AUTHORIZED TO DO BUSINESS IN THE STATE OF WEST VIRGINIA. A LETTER OF CREDIT SUBMITTED IN LIEU OF A BOND WILL ONLY BE ALLOWED FOR PROJECTS UNDER $100,000. PERSONAL OR BUSINESS CHECKS ARE NOT ACCECPTABLE IN LIEU OF THE 5% BID BOND, PERFORMANCE

2.5%

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BOND, OR LABOR AND MATERIAL BOND.

( ) MAINTENANCE BOND: A TWO (2) YEAR MAINTENANCE BOND COVERING THE ROOFING SYSTEM WILL BE A REQUIREMENT OF THE SUCCESSFUL VENDOR.

REV. 11/00

EXHIBIT 7

DOMESTIC ALUMINUM, GLASS & STEEL IN PUBLIC WORKS PROJECTS

IN ACCORDANCE WITH WEST VIRGINIA CODE 5-19-1 ET., SEQ., EVERY CONTRACT FOR CONSTRUCTION, RECONSTRUCTION, ALTERATION, REPAIR, IMPROVEMENT OR MAINTENANCE OF PUBLIC WORKS, WHERE THE COST IS MORE THAN $50,000 AND, IN THE CASE OF STEEL ONLY, WHERE THE COST OF STEEL IS MORE THAN $50,000 OR WHERE MORE THAN 10,000 POUNDS OF STEEL ARE REQUIRED, THE STATE WILL ACCEPT ONLY ALUMINUM GLASS, OR STEEL PRODUCTS PRODUCED IN THE UNITED STATES. IN ADDITION, ITEMS OF MACHINERY OR EQUIPMENT PURCHASED FOR USE AT THE SITE OF PUBLIC WORKS SHALL BE MADE OF DOMESTIC ALUMINUM, GLASS OR STEEL, UNLESS THE COST OF THE PRODUCT IS LESS THAN $50,000 OR LESS THAN 10,000 POUNDS OF STEEL ARE USED IN PUBLIC WORKS PROJECTS.

FOREIGN MADE ALUMINUM, GLASS OR STEEL PRODUCTS MAY BE ACCEPTED ONLY IF THE COST OF DOMESTIC PRODUCTS IS FOUN TO BE UNREASONABLE. SUCH COST IS UNREASONABLE IF IT IS 20% OR MORE HIGHER THAN THE BID PRICE FOR FOREIGN MADE PRODUCTS. IF THE DOMESTIC ALUMINUM, GLASS OR STEEL PRODUCTS TO BE SUPPLIED OR PRODUCED IN A "SUBSTANTIAL LABOR SURPLUS AREA", AS DEFINED BY THE UNITED STATES DEPARTMENT OF LABOR, FOREIGN PRODUCTS MAY BE SUPPLIED

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ONLY IF DOMESTIC PRODUCTS ARE 30% OR MORE HIGHER IN PRICE THAN THE FOREIGN MADE PRODUCTS.

IF, PRIOR TO THE AWARD OF A CONTRACT UNDER THE ABOVE PROVISIONS, THE SPENDING OFFICER OF THE SPENDING UNIT DETERMINES THAT THERE EXISTS A BID FOR LIKE FOREIGN ALUMINUM, GLASS OR STEEL THAT IS REASONABLE AND LOWER THAN THE LOWEST BID DOMESTIC PRODUCTS, THE SPENDING OFFICE MAY REQUEST, IN WRITING, A REEVALUATION AND REDUCTION IN THE LOWEST BID FOR SUCH DOMESTIC PRODUCTS. ALL VENDORS MUST INDICATE IN THEIR BID IF THEY ARE SUPPLYING FOREIGN ALUMINUM, GLASS OR STEEL.

REV. 3/88

EXHIBIT 9

NOTICE FOR ISSUANCE & ACKNOWLEDGEMENT OF CONSTRUCTION PROJECT ADDENDA

THE ARCHITECT/ENGINEER AND/OR AGENCY SHALL BE REQUIRED TO ABIDE BY THE FOLLOWING SCHEDULE IN ISSUING CONSTRUCTION PROJECT ADDENDA FOR STATE AGENCIES:

(1) THE ARCHITECT/ENGINEER SHALL PREPARE THE ADDENDUM AND A LIST OF ALL PARTIES THAT HAVE PROCURED DRAWINGS AND SPECIFICATIONS FOR THE PROJECT. THE ADDENDUM AND LIST SHALL BE FORWARDED TO THE BUYER IN THE STATE PURCHASING DIVISION. THE ARCHITECT/ENGINEER SHALL ALS SEND A COPY OF THE ADDENDUM TO THE STATE AGENCY FOR WHICH THE CONTRACT IS ISSUED.

(2) THE BUYER SHALL SEND THE ADDENDUM TO ALL INTERESTED PARTIES AND, IF NECESSARY, EXTEND THE BID OPENING DATE. ANY ADDENDUM SHOULD BE RECEIVED BY THE

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BUYER WITHIN FOURTEEN (14) DAYS PRIOR TO THE BID OPENING DATE.

(3) ALL ADDENDA SHOULD BE FORMALLY ACKNOWLEDGED BY ALL BIDDERS AND SUBMITTED TO THE STATE PURCHASING DIVISION. THE SAME RULES AND REGULATIONS THAT APPLY TO THE ORIGINAL BIDDING DOCUMENT SHALL ALSO APPLY TO AN ADDENDUM DOCUMENT. THE ONLY EXCEPTION MAY BE FOR AN ADDENDUM THAT IS ISSUED FOR THE SOLE PURPOSE OF CHANGING A BID OPENING TIME AND/OR DATE.

REV. 11/96

EXHIBIT 10

ADDENDUM ACKNOWLEDGEMENT

I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.

ADDENDUM NOS.:

NO. 1 ..... TW

NO. 2 ..... TW

NO. 3 ..... TW

NO. 4 ..... TW

NO. 5 ..... TW

I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF TH

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ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF THE BIDS.

VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.

.....SIGNATURE

CASTO TECHNICAL SERVICES.....COMPANY

12-19-2011.....DATE

REV. 11/96

CONTRACTORS LICENSE

WEST VIRGINIA STATE CODE 21-11-2 REQUIRES THAT ALL PERSONS DESIRING TO PERFORM CONTRACTING WORK IN THIS STATE MUST BE LICENSED. THE WEST VIRGINIA CONTRACTORS LICENSING BOARD IS EMPOWERED TO ISSUE THE CONTRACTORS LICENSE. APPLICATIONS FOR A CONTRACTORS LICENSE MAY BE MADE BY CONTACTING THE WEST VIRGINIA DIVISION OF LABOR CAPITOL COMPLEX, BUILDING 3, ROOM 319, CHARLESTON, WV 25305. TELEPHONE: (304) 558-7890.

WEST VIRGINIA STATE CODE 21-11-11 REQUIRES ANY PROSPECTIVE BIDDER TO INCLUDE THE CONTRACTORS LICENSE NUMBER ON THEIR BID.

BIDDER TO COMPLETE:

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

| SIGNATURE | TELEPHONE | DATE |
|---|---|---|
| TITLE | FEIN | ADDRESS CHANGES TO BE NOTED ABOVE |

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

# Request for Quotation

| RFQ NUMBER | PAGE |
|---|---|
| GSD126419 | 9 |

ADDRESS CORRESPONDENCE TO ATTENTION OF:
KRISTA FERRELL
304-558-2596

VENDOR
*709043406 304-346-0549
CASTO TECHNICAL SERVICES INC
540 LEON SULLIVAN WAY
PO BOX 627
CHARLESTON WV 25322

SHIP TO
DEPARTMENT OF ADMINISTRATION
GENERAL SERVICES DIVISION
BUILDING 11 CHILLER PLANT
218 CALIFORNIA AVENUE
CHARLESTON, WV
25305 304-558-2317

| DATE PRINTED | TERMS OF SALE | SHIP VIA | F.O.B. | FREIGHT TERMS |
|---|---|---|---|---|
| 11/23/2011 | | | | |

BID OPENING DATE: 12/20/2011 BID OPENING TIME 01:30PM

| LINE | QUANTITY | UOP | CAT. NO. | ITEM NUMBER | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|

CONTRACTORS NAME: CASTO TECHNICAL SERVICES

CONTRACTORS LICENSE NO.: WV001241

THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH A COPY OF THEIR CONTRACTORS LICENSE PRIOR TO ISSUANCE OF A PURCHASE ORDER/CONTRACT

APPLICABLE LAW

THE WEST VIRGINIA STATE CODE, PURCHASING DIVISION RULES AND REGULATIONS, AND THE INFORMATION PROVIDED IN THE "REQUEST FOR QUOTATION" ISSUED BY THE PURCHASING DIVISION IS THE SOLE AUTHORITY GOVERNING THIS PROCUREMENT.

ANY INFORMATION PROVIDED IN SPECIFICATION MANUALS, OR ANY OTHER SOURCE, VERBAL OR WRITTEN, WHICH CONTRADICTS OR ALTERS THE INFORMATION PROVIDED FROM THE SOURCES AS DESCRIBED IN THE ABOVE PARAGRAPH IS VOID AND OF NO EFFECT.

BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THE STATE MAY DEEM THE CONTRACT NULL AND VOID, AND TERMINATE SUCH CONTRACT WITHOUT FURTHER ORDER.

REV. 5/2009

NOTICE

A SIGNED BID MUST BE SUBMITTED TO:

DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

| SIGNATURE | TELEPHONE | DATE |
|---|---|---|
| | | |

| TITLE | FEIN | ADDRESS CHANGES TO BE NOTED ABOVE |
|---|---|---|
| | | |

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

# Request for Quotation

| RFQ NUMBER | PAGE |
|---|---|
| GSD126419 | 10 |

ADDRESS CORRESPONDENCE TO ATTENTION OF:
KRISTA FERRELL
304-558-2596

VENDOR
*709043406 304-346-0549
CASTO TECHNICAL SERVICES INC
540 LEON SULLIVAN WAY
PO BOX 627
CHARLESTON WV 25322

SHIP TO
DEPARTMENT OF ADMINISTRATION
GENERAL SERVICES DIVISION
BUILDING 11 CHILLER PLANT
218 CALIFORNIA AVENUE
CHARLESTON, WV
25305 304-558-2317

| DATE PRINTED | TERMS OF SALE | SHIP VIA | F.O.B. | FREIGHT TERMS |
|---|---|---|---|---|
| 11/23/2011 | | | | |

BID OPENING DATE: 12/20/2011 BID OPENING TIME 01:30PM

| LINE | QUANTITY | UOP | CAT. NO. | ITEM NUMBER | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|

BUILDING 15
2019 WASHINGTON STREET, EAST
CHARLESTON, WV 25305-0130

THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:

SEALED BID

BUYER: KRISTA FERRELL-FILE 21

REQ. NO.: GSD126420

BID OPENING DATE: 12/20/2011

BID OPENING TIME: 1:30 PM

PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:

304-346-8920

PLEASE PRINT OR TYPE NAME OF PERSON TO CONTACT CONCERNING THIS QUOTE:

TIM VANDERBORNE

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

| SIGNATURE | TELEPHONE | DATE |
|---|---|---|
| | | |

| TITLE | FEIN | ADDRESS CHANGES TO BE NOTED ABOVE |
|---|---|---|
| | | |

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

# REQUEST FOR QUOTATIONS

## Bldg 11 HVAC Maintenance Service

**Charleston, West Virginia**

Location: West Virginia State Office Building
218 California Ave
Charleston, West Virginia 25301

For: State of West Virginia
General Services Division
1900 Kanawha Blvd; East
Charleston, West Virginia 25305

All inquiries for specification clarification shall be addressed to:

Krista Ferrell, Buyer Supervisor
Purchasing Division
P. O. Box 50130
Charleston, West Virginia 25305-0130
Telephone: (304) 558-2596
Fax: (304) 558-4115
Krista.S.Ferrell@wv.gov

The Acquisition and Contract Administration Section of the Purchasing Division "State" for the West Virginia General Services Division is soliciting quotations to provide HVAC Maintenance Service as specified in the attached documents in Building 11 located at 218 California Ave. in Charleston, West Virginia. This document is intended to supplement information provided in the standard "Request for Quotation" and "General Terms and Conditions" issued by the Purchasing Division for this project. Vendors should carefully review all documents.

**Mandatory Pre-Bid Meeting**

A mandatory pre-bid conference will be held on 12/06/2011, at 10:00 am. Contractors attending the meeting shall assemble in the conference room of Building 11. No parking is provided for attendees by the Agency. See Purchasing Division Request for Quotation for additional information.

**Scope of Work**:

The work consists of providing annual maintenance and cleaning of the chillers and towers in Building 11 as specified by OEM service schedules and manufacturer's recommendations. The Contractor shall also conduct testing to ensure the units are returned fully operational. There are 5 Trane Chillers and 5 Marley Towers.

| Chiller Serial Number | Model Number |
|---|---|
| 1. L99A00273 | CVHF770 |
| 2. L99A00282 | CVHF770 |
| 3. L99A00287 | CVHF128 |
| 4. L99A00279 | CVHF128 |
| 5. L99A00288 | CVHF128 |

Work shall be conducted as a single project. Seventy-two (72) hours after award of the Contract, the Contractor shall submit a schedule showing the commencement and completion dates for each proposed area or subsystem. The schedule shall be reviewed and approved by the Agency Project Manager prior to commencement of the work. The Contractor shall coordinate the schedule around the Agency's work requirements.

Contractor shall furnish all materials, labor, and equipment necessary to complete all work as indicated by these specifications. The intent is that the completed work consists of the complete maintenance and cleaning of HVAC chillers and towers and units are brought back to full operation in Building 11. Contractor shall furnish any incidental work, materials, labor and equipment that are necessary to complete the work, even if such incidental work is not explicitly included in the contract documents.

Any equipment or material contracted for prior to receipt of the signed purchase order and written Notice to Proceed letter shall be at the Bidder's risk.

**Documents**:

This Request for Quotations also incorporates the attached documents:

1. The WV Purchasing Division "Request for Quotation" and "General Terms and Conditions".
2. Attachment A: Trane Manual
3. Attachment B: Marley Manual
4. Attachment C: Bid Form

**Contract Period**:

The Contract shall be substantially completed within **Thirty (30)** calendar days from the issuance of the written Notice to Proceed. In accordance with the West Virginia State Code 5A-3-4(8), vendor agrees that liquidated damages shall be imposed at the rate of $250.00 per day for failure to complete the project within the contract period. This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other additional remedy to which the State or Agency may have legal cause for action including further damages against the vendor.

**Reference Requirement**:

Bidders shall supply, with their bid, at least three references indicating their capabilities to perform such work. References shall include the name, location, and HVAC system used in the building in addition to the name, address and telephone number of a contact person with the building's owner familiar with the work.

**Qualifications:**

The Contractor shall have the minimum qualifications outlined below to perform the services specified under this Contract. The Contractor shall provide the Agency all documentation of the qualifications in line 1 prior to award (see Bid Form and Section labeled "Reference Requirement" above).

1. The Contractor must provide letters of reference for at least three (3) distinct contracts documenting the successful completion of repair and warranty services to pumps and chillers of the type currently serving Building 11 equipment.

Work under this Contract may only be performed by a mechanic who has first provided documentation of certifications and or licensure for the following:

1. Electricians- WV Master Electricians License
2. Plumbers- WV Master Plumbers License
3. HVAC- EPA 608 Certification and Apprentice Certification or Completion of HVAC Vocational Program prior to January 1, 2006

**Definitions**:

A. The "Agency" shall be defined as The Department of Administration, General Services Division, State Capitol Complex, Building 1, Room MB-60,Charleston, West Virginia 25305.

B. "Contractor" shall be defined as the successful bidder or vendor.

C. The "Contract" shall be defined as the binding agreement that is entered into between the State of West Virginia and the Contractor to provide the services as herein specified.

D. "Agency Representative" shall be defined as the person designated by the Director of the General Services Division as having authority to act on behalf of the General Services Division.

E. "Maintenance Service" shall be defined as the scheduled inspections and the replacement of parts, components, and materials on HVAC equipment prior to the failure or wear-out period of the parts, components or materials. The planned inspections and replacements shall be in accordance with the equipment manufacturer's specifications and recommendations.

F. "Holidays" shall be defined as days designated by W.Va. Code §2-2-1 as legal holidays (i.e. new Year's Day, Martin Luther King's Birthday, President's Day, Memorial Day, West Virginia Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, Lincoln's Day, Election Days, and Christmas Day).

G. "Testing" shall be defined as a function test upon the completion of ordered services to ensure equipment is returned to normal operating mode or to determine if additional repairs are required.

**Payment**:

Invoices shall be submitted for payment (in arrears) and must include the following information:

1. Invoice must include invoice date, service dates, FEIN number, complete address of vendor and Master Contract number.

2. Invoices shall be mailed to the following address:

General Services Division
1900 Kanawha Blvd. E.
Building 1, Room MB-68
Attn: Business Manager
Charleston, WV 25305

All work shall be inspected and approved prior to payment.

**Supplementary General Conditions:**

A. The qualified Contractor shall satisfactorily perform all specified work outlined in the Scope of Work and further described in the drawings, specifications or other attachments. Authorization to perform the work described herein must be approved in writing by issuance of the Notice to Proceed and signed by the Agency Representative.

B. The Contractor shall procure all necessary permits and licenses to comply with all applicable laws, Federal, State, or municipal, along with all regulations, and ordinances of any regulating body.

C. The relationship of the Contractor to the Owner shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by the parties to this Contract. The Contractor as an independent contractor is solely liable for the acts and omissions of its employees and agents. The Contractor will be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this contract. Neither the Contractor nor any employees or sub-contractors of the Contractor will be deemed to be employees for the State for any purposes whatsoever. The wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension or other deferred obligations, and

licensing fees, etc., and the filing of all necessary documents, forms and returns pertinent to all of the foregoing are the Contractor's responsibility.

D. The Contractor will hold harmless the State, and must provide the State and Agency with a defense against any and all claims including but not limited to the foregoing payments, withholdings, contributions, taxes, social security taxes and employer income tax returns. The Contractor will not assign, convey, transfer, sub-contract, or delegate any of its responsibilities and obligations under this contract to any person, corporation, partnership, association or entity without expressed written consent of the Agency.

E. Indemnification: The Contractor agrees to indemnify, defend, and hold harmless the State and the Owner, their officers, and employees from and against (1) Any claims or losses for services rendered by any subcontractor, person or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Contractor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; (3) Any failure of the Contractor, its officers, employees or sub-contractors to observe State and Federal laws, including but not limited to labor and wage laws.

F. This contract will be governed by the laws of the State of West Virginia. The Contractor further agrees to comply with the Civil Rights Act of 1964 and all other applicable Federal, State, and local Government regulations.

H. The Contractor will pay any applicable sales, use, or personal property taxes arising out of this contract and the transactions contemplated thereby. Any other taxes levied upon this Contract, the transaction, or the equipment, or services delivered pursuant hereto shall be borne by the Contractor. It is clearly understood that the State of West Virginia is exempt from any taxes regarding performance of the scope of work of this Contract.

I. Contractor will be responsible for parts and materials as follows:

1) The Contractor will supply all tools, tool accessories, personal safety equipment, and supplies necessary to execute the responsibilities of this Contract. Contractor will be responsible for the removal and disposal of all waste and debris from Owner's property as a result of performing this contract.

2) Contractor will be responsible for all mileage and travel costs, including travel time, associated with the performance of this contract.

3) Unless greater warranties are specified elsewhere in this RFQ, the submittal of this bid you shall include a minimum one (1) year labor and materials warranty on all work performed.

J. Any work to be performed to successfully execute the terms of this Contract by a third party or sub-contractor must be pre-approved by the Owner or their Representative or Designee. All such work, after Owners approval, will remain the sole responsibility of the

successful bidder/Contractor with regard to all labor, materials, fees associated with the sub-contracting and any/all associated responsibilities. Under no circumstances will the Contractor transfer responsibility for any work as described herein by a third party or sub-contractor.

**Bonds and Insurance**:

Refer to Purchasing Division's 'Request for Quotation' for requirements on bonding; insurance; wage rates; "Foreign made aluminum, glass and steel in Public Works Projects", and other project requirements.

**General Requirements:**

**Submittals**: N/A

**Project Closeout**:

1. Final cleanup shall be completed prior to final acceptance.
2. Submit warranty documents to Agency Project Manager.
3. Perform final inspection with the Agency Project Manager.

**Final Inspection**:

The Final Inspection will be conducted by a Project Manager from the Agency. Work found to be in accordance with the Contract Documents will be accepted as complete for final acceptance. Unacceptable work, or work not in accordance with the Contract Documents shall be removed, replaced, changed or cleaned as required to meet requirements of Contract Documents prior to final acceptance. Final Acceptance does not waive or release Contractor to conform to the Contract Documents.

Final payment shall not be made until all work is finally accepted.

**Limits of Work:**

Work areas will be limited to those spaces required for access to the building.

Some interior space may be utilized for temporary (overnight) storage of equipment and tools. Coordinate storage needs with the Agency Project Manager.

Agency facilities shall remain in use during this contract. Contractor shall work with the Building Manager and Protective Services to coordinate the temporary access to work areas and otherwise provide for the Contractor needs to complete work. Contractor shall minimize disruption to building work areas and loading dock access.

**Use of Facilities:**

Contractor shall be permitted reasonable use of building utilities including power, water and sanitary sewage disposal as required for conducting the work. Contractor shall

coordinate the location of service connections or use of receptacles with the Building Manager to avoid overloading existing circuits.

**Contractor Schedule**:

The Contractor shall provide the Agency Project Manager with an overall project schedule within seventy-two (72) hours of Award of the Contract. The proposed project schedule shall indicate areas to be worked. Where coordination or disruption of office workspaces or occupants may be required, provide at least one week's advance notice prior to conducting work in those areas. Contractor shall adhere to schedule provided and coordinate through the Agency Project Manager.

**Waste Removal:**

The Contractor shall be required to leave the work area clean upon completion of work daily. Contractor shall make arrangements for the collection and disposal of Contractor's waste and construction related debris. Debris shall be removed on a daily basis.

**Contractor Visitor Badges:**

The Building 11 is a secure facility. Contractor shall provide a list of all personnel working on this project within the Building. This list shall include a copy of a valid driver's license or other legal identification and include date of birth and cell phone number. All proposed workers may be subjected to a criminal history / driver's license background check prior to being permitted to work in state buildings. Workers shall carry valid Contractor Photo ID Badges to be worn when working in the building. Under no circumstances shall a worker be assigned to this project without the validation first being submitted to the General Services Division and approval given.

**Work Restrictions:**

Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except state recognized holidays. Weekends may be permitted when pre-arranged with the Agency Project Manager.

This is a non-smoking building. Smoking is not permitted within the building or near entrances, operable windows or outdoor air intakes.

**Parking:**

No parking is available on the project site. Parking in non-designated areas is not permitted. Parking is the responsibility of the contractor. With prior approval, contractor's vehicles may be brought on-site for loading & unloading or to provide equipment necessary for conducting the work.

Use of loading dock areas or sidewalk areas for parking is strictly prohibited.

**Building Access:**

The building is available from 7:00 a.m. to 5:00 p.m. Extended work hours or schedules may be arranged if acceptable and approved by the agency. This building is a secure location. Access to the building shall be coordinated with the Owner. Contractor shall not leave open doors unattended and shall close doors when not in use.

**Codes**:

All work is to be performed in compliance with applicable Federal and State codes including but not limited to the International Building Code, International Mechanical Code, Life Safety Code, NEC, OSHA,UL, ANSI, ASME and related standards.

**Safety:**

All applicable local safety and OSHA rules and guidelines shall be met by the Contractor. Work shall be subject to verification and inspection by GSD Safety representatives. Such verification shall not relieve the Contractor from meeting all applicable safety regulations and inspection by other agencies.

Notify Owner if suspected hazardous materials are encountered. Any areas requiring abatement will be provided by the GSD under separate contract.

**Hot Work Permit**:

Contractor shall obtain Owner's permission prior to performing any work that requires an open flame, creates sparks, use's equipment that creates combustible temperatures, or performs any work that could result in a fire hazard. Owner will review work area and issue a 'Hot Work Permit' prior to Contractor commencing work. Note that the Contractor must take proper precautions and may be required to provide a Fire Watch as a condition of the permit.

**Workmanship**:

Contractor shall complete all work in a neat and workmanlike manner. All work shall be done using new materials in a manner that meets commercial quality standards. Work shall be neat, true, plumb and square, as applicable. Contractor shall verify all dimensions.

**Warranty**:

A one year warranty on labor and materials or the manufacturer's warranty, whichever is greater, are required.

TRANE

# Periodic Maintenance

## Overview

This section describes the basic chiller preventive maintenance procedures, and recommends the intervals at which these procedures should be performed. Use of a periodic maintenance program is important to ensure the best possible performance and efficiency from a CenTraVac® chiller.

Recommended purge maintenance procedures for the Purifier Purge unit are covered by PRGD-SVU01A-EN or the latest revision which can be obtained at the nearest Trane office.

## Record Keeping Forms

An important aspect of the chiller maintenance program is the regular completion of records. Provided at the end of this manual are copies of the "Annual Inspection Check List and Report", "CenTraVac with UCP Commissioning Checklist and "Start-Up Test Log", a "Start-Up Test Log for Water Cooled CenTraVacs with UCP Control Panels" and "UCP "Settings Group" Menu Record". When filled out accurately by the machine operator, the completed logs can be reviewed to identify any developing trends in the chiller's operating conditions.

For example, if the machine operator notices a gradual increase in condensing pressure during a month's time, he can systematically check, then correct the possible cause(s) of this condition (fouled condenser tubes, noncondensable in the system, etcetera)

## Daily Maintenance and Checks

[ ] Check the chiller's evaporator and condenser pressures, oil tank pressure, differential oil pressure and discharge oil pressure. Compare the readings with the values provided in the Normal Chiller Operating Characteristics table.

**IMPORTANT:** IT IS HIGHLY RECOMMENDED THAT THE OPERATING LOG BE COMPLETED ON A DAILY BASIS.

## CAUTION

## Moisture Contamination!

**IF FREQUENT PURGING IS REQUIRED, MONITOR PURGE PUMPOUT RATE, IDENTIFY AND CORRECT SOURCE OF AIR OR WATER LEAK AS SOON AS POSSIBLE. Failure to do so can shorten chiller life expectancy, due to moisture contamination caused by leakage.**

[ ] Check the oil level in the chiller oil sump using the two sight glasses provided in the oil sump head. When the unit is operating, the oil level should be visible in the lower sight glass.

TRANE

# Periodic Maintenance

## ⚠ WARNING

### Hazardous Voltage w/ Capacitors!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.**

**Note: For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN or PROD-SVB06A-FR**

### Weekly Maintenance

[ ] Complete all recommended daily maintenance procedures and checks. Complete logs on a daily basis.

### Every 3 Months

[ ] Complete all recommended weekly maintenance procedures. Refer to the previous sections for details.

[ ] Clean all water strainers in the CenTraVac water piping system.

### Every 6 Months

*Normal Chiller Operating Characteristics*

| Operating Characteristic | Normal Reading |
|---|---|
| Approx. Evaporator Pressure | (6 to 9 PSIA) (-9 to -6 PSIG) |
| Approx. Condenser Pressure | (17 TO 27 PSIA) 2 to 12 PSIG (Standard Condensers) |
| Oil Sump Temperature: | |
| Unit Not Running | 140°F to 145°F (60°C to 63°C) |
| Unit Running | 80°F to 162°F (26.6°C to 72°C) |
| Differential Oil Pressure | 18 to 22 psid |

Notes:
1. Condenser pressure is dependent on condenser water temperature, and should equal the saturation pressure of HCFC-123 at a temperature above that of leaving condenser water at full load.
2. Normal pressure readings for ASME condensers exceed 12 PSIG.
3. Oil Tank Pressure 12" to 18" HG Discharge Oil Pressure 7 to 15 PSIG.

TRANE

# Periodic Maintenance

[ ] Complete all recommended quarterly maintenance procedures.

[ ] Lubricate the vane control linkage bearings, ball joints, and pivot points; as needed a few drops of light machine oil (SAE-20) is sufficient.

[ ] Lubricate vane operator tang o-rings as described in the maintenance section.

[ ] Lubricate the oil filter shutoff valve o-rings by removing the pipe plug and adding several drops of Trane OIL00022. Replace plug.

[ ] Drain the contents of the rupture disc and purge discharge ventline drip-leg, into an evacuated waste container minimally and more often if the purge is operated excessively.

Also, apply one or two drops of oil on the vane operator shaft and spread it into a very light film; this will protect the shaft from moisture and rust.

## Off-Season Maintenance

During those periods of time when the chiller is not operated, be sure the control panel is energized. This is to keep the purge operational, the oil heater warm and will also keep air out of the machine.

## Annual Maintenance

Shut down the chiller once each year to check the items listed ; a more detailed inspection checklist is provided on the "Model CVHE, CVHF and CVHG CenTraVac Annual Inspection Checklist and Report" illustrated in this manual.

[ ] Perform the annual maintenance procedures referred to in the Maintenance Section of the purge manual.

[ ] Use an ice water bath to verify that the accuracy of the evaporator refrigerant temperature sensor (4R10) is still within tolerance (+ or - 2.0° at 32°F (1° at 0°C)). If the evaporator refrigerant temperature displayed on the UCP's read-out is outside this 4-degree tolerance range, replace the sensor.

**Note:** If the sensor is exposed to temperature extremes outside its normal operating range (0°F to 90°F) (-18°C to 32°C), check its accuracy at six-month intervals.

TRANE

# Oil Maintenance

## Compressor Oil Change on CVHE, CVHF, CVHG

Recommendations are to subscribe to an annual oil analysis program rather than automatically change the oil as part of scheduled maintenance. Change the oil only if indicated by the oil analysis. Use of an oil analysis program will reduce the chillers overall lifetime waste oil generation and minimize refrigerant emissions. The oil analysis should be performed by a qualified laboratory that is experienced in refrigerant and oil chemistry and in the servicing of Trane centrifugal chillers.

In conjunction with other diagnostics performed by a qualified service technician, oil analyses can provide valuable information on the performance of the chiller to help minimize operating and maintenance costs and maximize it's operating life. A drain fitting is installed in the oil filter top, after the oil filter, for obtaining oil samples.

**Note:** Use only Trane OIL00022. A full oil change is 9 gallons of OIL00022.

### Oil Change Procedure

When oil analysis indicates the need to change compressor oil, use the following procedure for removing oil.

### CAUTION

### Heater Damage!

**The oil sump heater must be deenergized before draining the sump. Failure to do so could possibly burn out the oil sump heater.**

[ ] Draw the oil from the chiller through the oil charging valve on the chiller oil sump into an approved, evacuated tank; or,

[ ] Pump the oil from the chiller through the oil charging valve into an airtight resealable container, using a magnetically-driven auxiliary pump.

Forcing the oil from the oil sump by pressurizing the chiller (by raising chiller temperature or adding nitrogen) is not recommended.

Refrigerant dissolved in the oil can be removed and returned to the chiller by using an appropriate deep-vacuum recovery unit and heating and agitating the oil container. Follow all Federal, State and Local regulations with regard to disposal of waste oil.

TRANE

# Oil Maintenance

## Replacing Oil Filter

Replace oil filter: (1) annually, (2) at each oil change, (3) or if erratic oil pressure is experienced during chiller operation.

### Oil Filter Replacement

Use the following procedure to service the oil filter. Refer to Figure 34.

1. Run the oil pump for two to three minutes to insure that the oil filter is warmed up to the oil sump temperature.
2. Turn the oil pump motor off.
3. Pull the "D" handle on the rotary valve locking pin out of its detent and rotate the valve to the "DRAIN" position. An offset pointer is located on top of the valve with wrench flats to allow turning. The spring force on the locking pin should allow the pin to drop into a detent at this position.
4. Allow at least 15 minutes for the oil to drain from the filter back into the oil sump.
5. Pull the "D" handle to unlock the pin and rotate the valve to the "Change Filter" position. This isolates the filter from the unit. The locking pin should drop into a detent in this position.
6. Remove and replace the filter as quickly as possible. Tighten filter 2/3 to 3/4 turn per instructions written on the filter. Place the used filter in a reusable container. Follow all local, state and federal regulations to dispose of the filter. Pull the "D" handle to unlock the pin and rotate the valve to the "RUN" position. The locking pin should drop into a detent in this position. The chiller is now ready for operation.
7. Purge unit.
8. Check oil pressure 18-27 psi.

TRANE

# Maintenance

### Other Maintenance Requirements

Compressors using new seal technology will not use O-rings. The O-ring has been replaced by Loctite 515 applied at a minimum film thickness of .010 applied across the width of the flange. The current jack bolt holes remain for disassembly.

## CAUTION

### Oil Supply System Problems!

**Plugging of oil supply system could lead to bearing failure. Failure to use care could result in Loctite getting into the chiller which may cause problems with the Oil supply system and eductor system.**

[ ] Inspect the condenser tubes for fouling; clean if necessary.

## ⚠ WARNING

### Hazardous Voltage w/ Capacitors!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Note: For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN or PROD-SVB06A-FR**

[ ] Measure the compressor motor winding resistance to ground; a qualified service technician should conduct this check to ensure that the findings are properly interpreted.

Contact a qualified service organization to leak-test the chiller; this procedure is especially important if the system requires frequent purging.

[ ] Use a nondestructive tube test to inspect the condenser and evaporator tubes at 3-year intervals.

**Note:** It may be desirable to perform tube tests on these components at more frequent intervals, depending upon chiller application. This is especially true of critical process equipment.

[ ] Depending on chiller duty, contact a qualified service organization to determine when to conduct a complete examination of the unit to discern the condition of the compressor and internal components.

**Note:** (a) Chronic air leaks, which can cause acidic conditions in the compressor oil and result in premature bearing wear; and, (b) Evaporator or condenser water tube leaks. Water mixed with the compressor oil can result in bearing pitting, corrosion, or excessive wear.

[ ] Submit a sample of the compressor oil to a Trane qualified laboratory for comprehensive analysis on an annual basis; this analysis determines system moisture content, acid level and wear metal content of the oil, and can be used as a diagnostic tool.

### Lubrication

The only CVHE, CVHF and CVHG chiller component that requires periodic lubrication is the external vane linkage assembly and Rotary oil valve.

Lubricate the vane linkage shaft bearings and rod end bearings as needed with a few drops of light-weight machine oil.

The CenTraVac inlet guide vane tang operators should be serviced annually with R123 compatible grease. Use only Rheolube 734A, available from Trane as LUB00033 (16oz. standard grease gun cartridge) or LUB00063 (3oz. mini grease gun cartridge)

**To service the 1st stage tang operator of all units except CVHF extended capacity chillers with 1470 or 1720 compressors.**

1. The chiller must be off.
2. Carefully remove any insulation that may have been placed over the two lubrication ports of the tang operator base. This insulation will need to be replaced after the service is complete.
3. Note the position of the tang operator arm, note the placement of spacing washers etc., then disconnect the linkage rod from the tang operator arm. Manually move the tang operator arm and note the amount of effort required to operate the assembly.
4. Loosen but DO NOT REMOVE the 1/16" NPT lubrication port plug that is highest on the assembly.
5. Loosen and remove the remaining lower 1/16" NPT plug.
6. Using a grease gun with an appropriate fitting, insert ONLY Rheolube grease into the open port until clean grease is seen to appear around the threads of the plug in the opposite port.
7. Tighten the plug that was loosened in step 4. Tighten the plug to hand tight plus 1/4 to 1/2 turn.
8. Remove the grease fitting, if used.

TRANE

# Maintenance

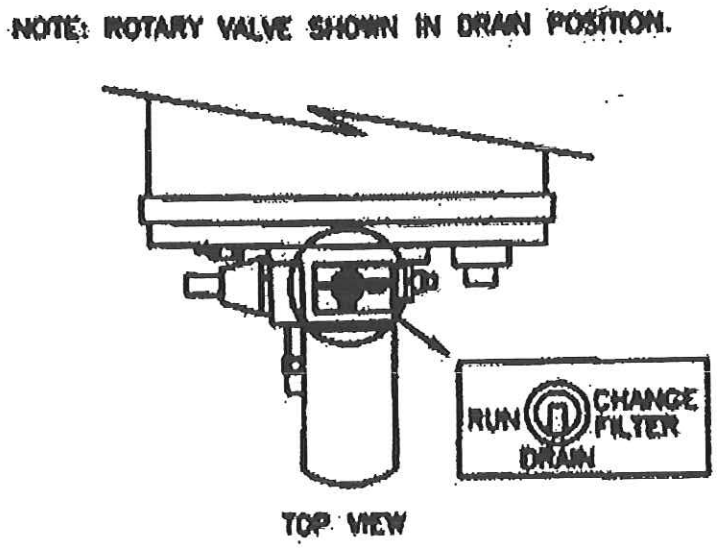
DO NOT LEAVE GREASE FITTINGS INSTALLED.
If grease fittings have been used for this procedure then they MUST BE REMOVED before returning the unit to service. Grease fittings are not vacuum-tight and will become a leak path.

9. Using a clean wooden dowel or other similar tool, remove excess grease from the remaining open lubrication port.
10. Clean and then lightly coat the threads of the plug with Rheolube grease and re-install it into the lubrication port. Tighten the plug to hand tight plus 1/4 to 1/2 turn.
11. Before reconnecting the vane linkage, grasp the tang operator arm and manually operate the vane assembly. If it is now difficult to move, then the tang operator may have become "hydraulically locked" because of excess grease in the assembly. This situation could cause damage to the o-rings of the assembly. If this occurs then remove one of the lubrication plugs, remove some of the grease, then re-install the plug.
12. Reconnect the linkage to the tang operator arm. Ensure the spacer washers between the linkage and the arm are properly placed and that the assembly does not bind. Re-install any insulation that was cut or removed. The unit may be restarted.

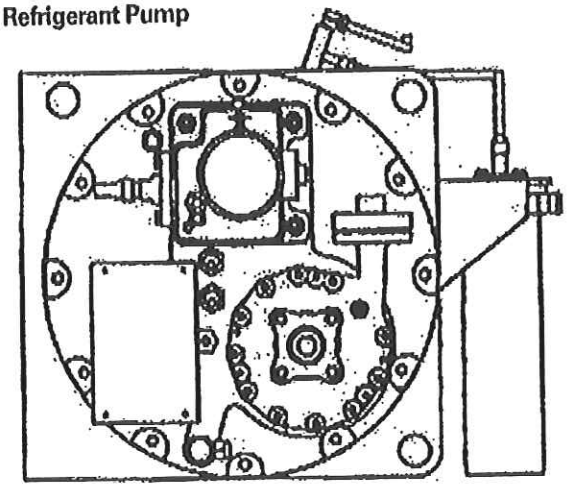
**To service the 1st and 2nd stage tang operators on CVHF and CDHF extended capacity chillers with 1470 or 1720 compressors.**
The 1st and 2nd stage rotary inlet guide vane tang operators of the extended capacity chillers also require periodic lubrication, at least annually, with R123 compatible Rheolube grease. These actuators have two 1/8" NPT plugs located 180 degrees apart, with one on the top and the other on the bottom of the operator base. Use the same procedure as described above, except that it will be necessary to temporarily disconnect the vane actuators from the tang operator arms in order to test for a "hydraulically locked" condition.

The oil valve block rotary valve uses dual O-Rings to seal to atmosphere. These should be manually lubricated by removing the pipe plug at the valve lubrication port and placing a few drops of Trane OIL00022 in the cavity. Be sure to reinstall the pipe plug when lubrication is completed.

*Figure 33. Rotary valve in drain position*




**Front View with Refrigerant Pump**



TRANE

# Maintenance

## Refrigerant Charge

### ⚠ WARNING

### Contains Refrigerant!

**System contains oil and refrigerant and may be under positive pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.**

**Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.**

The refrigerant charging procedure for Trane centrifugal chillers is:

1. If water is present in the tubes, break machine vacuum with refrigerant vapor, or circulate water, to avoid tube damage.
2. Always use refrigerant compatible hoses or copper-tubing with self-sealing connections or shut-off valves.
3. Transfer the refrigerant using one of the following (listed in order of preference):
   a. An approved Trane low-pressure refrigerant recovery and recycle unit.
   b. The available pressure differential.
   c. Gravity. (Use a return vent line to refrigerant drums to equalize pressure.)
5. Do not use dry nitrogen to push refrigerant into the chiller as was common practice in the past. This will contaminate the charge and require excessive purging, which will result in unnecessary release of refrigerant.
6. Weigh in the proper charge.
7. Use recovery and recyle unit or vacuum pump to evacuate hoses; discharge outdoors.
8. If refrigerant is supplied in new returnable cylinders, be sure and refer to General Service Bulletin CVHE-SB-48B for information on returning cylinders. This service bulletin is available at the nearest Trane office.

Depending on the chiller duty, contact a qualified service organization to determine when to conduct a complete examination of the unit to discern the condition of the compressor and internal components.

**Note:** If your chiller is covered by a Trane extended warranty, the terms of that warranty may require that the procedures listed in the Periodic Maintenance section of this manual be followed for your extended warranty to remain in force. The terms may also require that the chiller be inspected by a Trane authorized warranty agent every 4-years or 40,000 operating hours, whichever occurs first. This inspection will include, at a minimum, a review of the annual inspection checklists and the daily operating logs, as well as performance of a leak test and a general inspection of the chiller. The owner is then required to follow the recommendations made as a result of this inspection at the owners expense.

TRANE

# Maintenance

## Recovery and Recycle Connections

To facilitate refrigerant removal and replacement, newer-design CVHE, CVHF and CVHG units are provided with a 3/4-inch vapor fitting with shutoff valve on the chiller suction and with a 3/4-inch liquid connection with shutoff valve at the bottom of the evaporator shell. (Refer to Refrigerant Handling Guidelines.)

## Leak Testing

To leak-test a chiller containing full refrigerant charge, raise chiller pressure using a controlled hot water or electric-resistance system to a maximum of 8 psig. Do not use nitrogen, which will cause excessive refrigerant discharge by the purge system.

## Cleaning the Condenser

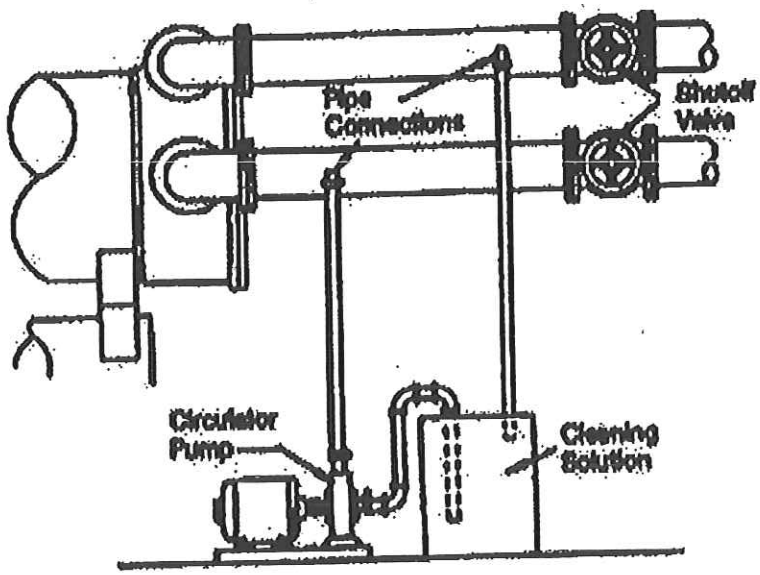
## CAUTION

## Proper Water Treatment!

**The use of untreated or improperly treated water in a CenTraVac may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.**

See Figure 34 which shows a Typical Chemical Cleaning Setup.

*Figure 34 - Typical Chemical Cleaning Setup*



TRANE

# Maintenance

Condenser tube fouling is indicated when the approach temperature (the difference between the condensing refrigerant temperature and the leaving condenser water temperature) is higher than predicted.

If the annual condenser tube inspection indicates that the tubes are fouled, two cleaning methods, mechanical and chemical, can be used to rid the tubes of contaminants.

Use the mechanical cleaning method to remove sludge and loose material from smooth-bore tubes.

To clean other types of tubes including internally-enhanced types, consult a qualified service organization for recommendations.

1. Remove the retaining nuts and bolts from the water box covers at each end of the condenser. Use a hoist to lift the covers off the water box. (A threaded connection is provided on each water box cover to allow insertion of an eyebolt).
2. Work a round nylon or brass bristled brush (attached to a rod) in and out of each of the condenser water tubes to loosen the sludge.
3. Thoroughly flush the condenser water tubes with clean water.

Scale deposits may be best removed by chemical means. Be sure to consult a qualified chemical house in the area (one familiar with the local water supply's chemical mineral content) for a recommended cleaning solution suitable for the job. Remember, a standard condenser water circuit is composed solely of copper, cast iron and steel.

## CAUTION

### Unit Corrosion Damage!

**Proper procedures must be followed when using corrosive chemicals to clean water side of unit. It is recommended that the services of a qualified chemical cleaning firm be used. Proper personal protective equipment as recommended by the chemical manufacturer should be used. Refer to the chemicals MSDS sheet for proper safety procedures. Failure to follow proper procedures could result in corrosion damage to the unit and tubes.**

**IMPORTANT:** ALL OF THE MATERIALS USED IN THE EXTERNAL CIRCULATION SYSTEM, THE QUANTITY OF THE SOLUTION, THE DURATION OF THE CLEANING PERIOD, AND ANY REQUIRED SAFETY PRECAUTIONS SHOULD BE APPROVED BY THE COMPANY FURNISHING THE MATERIALS OR PERFORMING THE CLEANING.

REMEMBER, HOWEVER, THAT WHENEVER THE CHEMICAL TUBE CLEANING METHOD IS USED, IT MUST BE FOLLOWED UP WITH MECHANICAL TUBE CLEANING, FLUSHING AND INSPECTION.

### Cleaning the Evaporator

Since the evaporator is typically part of a closed circuit, it does not accumulate appreciable amounts of scale or sludge. Normally, cleaning every 3 years is sufficient. However, on open CVHE, CVHF and CVHG systems, such as air washers, periodic inspection and cleaning is recommended.

### Control Settings and Adjustments

Time delays and safety control cutout settings need to be checked annually. For control calibration and check-out, contact a Trane qualified service organization.

TRANE

# Maintenance

## Purge System

Because some sections of the chiller's refrigeration system operate at less-than-atmospheric pressure, the possibility exists that air and moisture may leak into the system. If allowed to accumulate, these noncondensables become trapped in the condenser; this increases condensing pressure and compressor power requirements, and reduces the chiller's efficiency and cooling capacity.

The Trane EarthWise Purge is the only purge system available for the CVHE, CVHF and CVHG chiller. The purge is designed to remove noncondensable gases and water from the refrigeration system. EarthWise Purge unit operation, maintenance and trouble shooting is covered by a separate operation and maintenance manual, which may be obtained from the nearest Trane office.

## Overview

This section describes extended storage requirements for UCP installed CVHE, CVHF and CVHG chillers to be removed from service for an undetermined length of time.

## Unit Preparation

The following steps are necessary in order to properly prepare a unit for storage.

1. Remove all liquid refrigerant if the unit is charged.

### ⚠ WARNING

### Contains Refrigerant!

**System contains oil and refrigerant and may be under positive pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.**

**Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.**

2. After the liquid refrigerant is removed, using a recovery or recycle unit or vacuum pump, pull a vacuum to remove remaining refrigerant vapor from the unit.
3. After all traces of refrigerant are out of the unit, a positive nitrogen charge should be put into the unit (6 to 8 psig). This positive pressure must be checked monthly to insure no noncondensables get into the unit. Use a pressure gage on the evaporator shell to verify that the 6 to 8 psig dry nitrogen holding charge is still in the chiller. If this charge has escaped, contact a qualified service organization and the Trane sales engineer that handled the order.
4. The refrigerant charge should be stored in proper refrigerant containers. Due to possible leakage, do not store in used drums.
5. Maintain control power to the control panel. This will maintain oil temperature in the oil sump and the capability of the control panel to present report information. The Chiller Reports should be viewed once a week for normal readings. Any abnormal observation must be reported to the Trane Sales Engineer that handled the order.

TRANE

# Maintenance

## ⚠ WARNING

### Hazardous Voltage w/ Capacitors!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.**

**Note: For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN or PROD-SVB06A-FR**

6. Remove the factory installed jumper or the field installed wiring on terminals in the unit control panel. This will prevent unwanted chiller operation.
7. Set the purge operating mode to OFF on UCP chillers.
8. The oil can be left in the unit.
9. The water side should not cause a problem if shut down and drained. There may be slight scaling inside the tubes, but not enough to cause a problem. The customer should inspect and clean tubes before the unit is returned to service.

IMPORTANT: DO NOT USE UNTREATED OR IMPROPERLY TREATED WATER, OR EQUIPMENT DAMAGE MAY OCCUR.

IMPORTANT: SCALE DEPOSITS ARE BEST REMOVED BY CHEMICAL MEANS. BE SURE TO CONSULT ANY QUALIFIED CHEMICAL HOUSE IN THE AREA (ONE FAMILIAR WITH THE LOCAL WATER SUPPLY'S CHEMICAL MINERAL CONTENT) FOR A RECOMMENDED CLEANING SOLUTION SUITABLE FOR THE JOB.

10. Motor bearings: If the motor sits for a long time the bearings could take a set and cause bearing problems or replacement later. Once every six months the chiller oil pump must be started and the compressor motor bump started to rotate the shaft. Contact a qualified service organization to perform this task. If the compressor motor cannot be bump started, then the shaft must be rotated manually by a qualified service organization.
11. Obtain an oil analysis initially after six months of storage, and once each succeeding year. If no oil breakdown is evident do not change the oil. If breakdown is evident, the oil must be replaced.
12. If the unit is stored for more than five years, and the storage is expected to be indefinite, the unit should be examined for leaks every five years from the initial storage date.
13. When the unit is to be returned to service, the services of a qualified service organization should be obtained to conduct all activities associated with the startup of a new chiller.

TRANE

## CenTraVac®
## Annual Inspection Check List and Report:

**Compressor Motor**

☐ Motor Continuity check
Good ☐ Open ☐

☐ Check and tighten motor terminals

☐ Meg Motor
Phase 1 ☐ Phase 2 ☐ Phase 3 ☐

☐ Check nameplate rating
Amps ☐

**Starter**

☐ Check condition of starter contacts
Good ☐ Fair ☐ Replace ☐

☐ Check, tighten if necessary all connections per manufactures specs

**Oil Sump**

☐ Change oil
If oil analysis, refer to program procedure

☐ Gallons (9) required

☐ Refrigerant/Oil pump motor ground check
Good ☐ Open ☐

☐ Check motor terminal

☐ Change oil filter

**Condenser**

☐ Visually inspect for scaling in tubes; not findings and make recommendations

**Control Circuits**

☐ Low refrigerant temperature sensor check
___°F set point ___°F trip point (ice water)

☐ Leaving Evaporator water temperature sensor check-out
___°F set point ___°F trip point (ice water)

☐ Condenser High Pressure Switch check-out
___psig set point
___psig trip point

☐ Check Net Oil Pressure

☐ Check adjustment and operation of inlet guide vane actuator stepper motor
(Note: each machine is unique and must have the full open position number of steps input.)

**Leak Test Chiller**

☐ Refrigerant and oil analysis for acid content

☐ Sample refrigerant and oil for laboratory analysis (attach a copy of analysis to next monthly inspection report)

**Purge Unit**

☐ Review the purge operation maintenance manual and follow maintenance and/or inspection items identified.

Comments: _____

_____

_____

_____

Recommendations: _____

_____

_____

_____

# User Manual

Manual 02-1237

Marley
Cooling Technologies

# Contents

△ Note

***This manual contains vital information for the proper installation and operation of your cooling tower. Carefully read the manual before installation or operation of the tower and follow all instructions. Save this manual for future reference.***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The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

△ Warning

***Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.***

△ Caution

***Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.***

△ Note

***Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.***

# Preparation

The Marley NC cooling tower purchased for this installation represents the current state of the art in crossflow, induced draft cooling tower design. Thermally and operationally, it is the most efficient cooling tower of its class.

These instructions—as well as those offered separately on motors, fans, Geareducer®, couplings, drive shafts, fan shafts, float valves, etc.—are intended to assure that the tower serves you properly for the maximum possible time. Since product warrantability may well depend upon your actions, please read these instructions thoroughly prior to operation.

If you have questions about the operation and/or maintenance of this tower, and you don't find the answers in this manual, please contact your Marley sales representative. *When writing for information, or when ordering parts, please mention tower serial number shown on the nameplate located on the access door.*

## Safety First

The location and orientation of the cooling tower can affect the safety of those responsible for installing, operating or maintaining the tower. However, since Marley does not determine the location or orientation of the tower, we cannot be responsible for addressing those safety issues that are affected by the tower's location or orientation.

△ Warning

***The following safety issues should be considered by those responsible for designing the tower installation.***

- ***access to hot water basins***
- ***access to and from maintenance access doors***
- ***the possible need for ladders (either portable or permanent) to gain access to the hot water basins or maintenance access doors***
- ***the possible need for external access platforms***
- ***potential access problems due to obstructions surrounding the tower***
- ***lockout of mechanical equipment***
- ***the possible need for safety cages around ladders***
- ***the need to avoid exposing maintenance personnel to the potentially unsafe environment inside the tower.***

# Preparation

***Those are only some of the safety issues that may arise in the design process. Marley strongly recommends that you consult a safety engineer to be sure that all safety considerations have been addressed.***

Several options are available that may assist you in addressing some of these personnel safety concerns, including:

— distribution basin access platforms with ladder and handrail

— ladder extensions (used where the base of the tower is elevated)

— safety cages for fan deck ladders

— external lube lines

— fan cylinder extensions

— access door platform

— motor located outside the tower

— external motor access platform

## Tower Location

Space available around the tower should be as generous as possible to promote ease of maintenance—and to permit freedom of airflow into and through the tower. If you have questions about the adequacy of the available space and the intended configuration of the tower, please contact your Marley sales representative for guidance.

Prepare a stable, *level* support foundation for the tower, utilizing weight, wind load, and dimensional information appearing on appropriate Marley submittal drawings. *Supports must be level to insure proper operation of the tower.*

**△ Warning**

***The cooling tower must be located at such distance and direction to avoid the possibility of contaminated tower discharge air being drawn into building fresh air intake ducts. The purchaser should obtain the services of a Licensed Professional Engineer or Registered Architect to certify that the location of the tower is in compliance with applicable air pollution, fire, and clean air codes.***

# Receiving and Hoisting

## Tower Shipment

Unless otherwise specified, NC towers ship by truck (on flat bed trailers), which lets you receive, hoist, and install the tower in one continuous operation. Most single-cell towers ship on one truck. Large modular towers may ship one cell on two trucks. Multicell towers, depending on their size, may require more than one truck.

Responsibility for the condition of the tower upon its arrival belongs to the trucker—as does the coordination of multiple shipments, if required.

## Receiving Tower

Prior to unloading the tower from the delivering carrier, inspect the shipment for evidence of damage in transit. If damage is apparent, note the freight bill accordingly. This will support your future recovery claim.

Find and remove the installation instruction drawings and bills of material located in a plastic bag in the cold water basin. This information should be kept for future reference and maintenance purposes.

## Hoisting Tower

NC80110, NC80111, and NC80112 models consist of two modules per cell. The upper module includes hoisting clips at the bottom of the module. The hoisting clips on the lower module are also located near the bottom on the sides of the cold water basin. All other models ship in a single module and include hoisting clips located near the bottom of the tower on the cold water basin sides. A ***Hoisting-Installation*** label which has hoisting dimensional information is located on the side casing near the tower centerline. Remove tower from the carrier and hoist into place according to the instructions on the label.

**△ Warning**

***Hoisting clips are provided for ease of unloading and positioning tower. For overhead lifts or where additional safety is required, safety slings should also be placed under the tower. Under no circumstances should you combine the top and bottom modules of modular models and attempt to hoist them at the same time by utilizing the hoisting clips alone!***

# Installation

## Tower Installation

△ Note

***These installation instructions are intended to help you prepare before your tower arrives. If discrepancies exist between these instructions and those shipped with the tower, the instructions shipped with the tower will govern.***

1. Prior to placement of the tower, confirm that the supporting platform is level, and that the anchor bolt holes are correctly located in accordance with Marley drawings.
2. Place tower (or bottom module of NC80110, NC0111 and NC50112 models) on your prepared supports, aligning anchor bolt holes with those in your supporting steel. Make sure that the orientation agrees with your intended piping arrangement. Attach tower to supporting steel with four 3/4" (19 mm) diameter bolts and flat washers (by others).
3. **NC80110, NC80111, and NC80112 models only.** Before setting top module in place on bottom module, clean any debris from the underside of the top module fill, skid and beams and from the top of the bottom module and remove shipping cover from bottom of top module—replace fasteners at side of module to prevent leaks. Place top module on the top peripheral bearing surface (factory-installed gasket) of bottom module, aligning mating holes as it is set in place. Make sure that the orientation of the top module agrees with your intended piping arrangement. Sections are 180° reversible with respect to each other. Attach top module to bottom module with fasteners provided, according to **"NC Field Installation Manual"** *Assembly Instructions*.

*If tower purchased is one fan cell only, ignore steps 4 through 8.*

4. If collection basins are to be equalized by the use of Marley standard flumes, unbolt the coverplate from the basin of the cell just installed. The coverplate is located in the center of the basin side.
5. Unbolt temporary coverplate from the basin of the second cell and set second cell (or bottom module of second cell) in place. Align anchor bolt holes and flume openings in basin sides.
6. Install flume according to *Field Installation Manual* instructions.

△ Note

***It is important that the cells be firmly anchored before the flume is attached to the second cell.***

# Installation

7. Repeat steps 2 and 3 for second top section on NC80110, NC80111, and NC80112 models.
8. Repeat steps 4 through 7 for any remaining cells.
9. Attach your cold water supply piping to the cold water basin outlet connection in accordance with drawing instructions, and utilizing gaskets provided by Marley.

△ Caution

***Do not support your pipe from the tower or outlet connection—support it externally.***

Normally, one of the following three outlet arrangements is provided:

**Side suction connection:** This is a factory-installed, galvanized pipe nipple, extending horizontally from the side of the cold water basin. It is both beveled for welding—and grooved for a mechanical coupling. If a weld connection is used, it is recommended that the weld area be protected against corrosion. Cold galvanizing is suggested, applied according to the manufacturer's instructions.

**Bottom outlet connection:** This is a factory-installed, circular opening in the cold water basin floor of one or more cells. An appropriately-sized circular opening has been drilled to accept a 125# ANSI B16.1 flat-face flange connection.

**Side outlet sump connection:** Unless otherwise specified, sumps are manufactured of galvanized or stainless steel construction. Because of their size, they are attached upside down in the basin to prevent damage in shipment. They must be inserted into the square opening prepared in the floor of the cold water basin of one or more cells—sealed against leakage, and attached by machine bolts, according to the installation drawing included. An appropriately-sized circular opening in the vertical face of the sump has been drilled to accept a 125# ANSI B16.1 flat-face flange connection.

10. Attach makeup water supply piping to appropriately-sized float valve connection located in cold water basin side wall. Install the drain and overflow according to the **"NC Field Installation Manual"** *Assembly Instructions*. If you wish to pipe overflow and drain water to a remote discharge point, make those connections at this time also.
11. Install your warm water piping at the inlet location on the tower.

# Installation

△ Note

***Fasteners and components provided by others that are to be attached to the tower must be compatible with the cooling tower materials—i.e. fasteners in a stainless steel cold water basin must be stainless steel.***

△ Caution

***Except for the horizontal components of top-mounted piping, and as prescribed on Marley drawings, do not support your pipe from the tower or inlet connection—support it externally.***

Normally, one of the following inlet arrangements is provided:

**Standard distribution basin connections:** These are circular hot-water inlet openings in the top deck of the tower. On NC80101, NC80103 and NC80104 models a single location is located near the centerline of the tower near the casing side. All other models have two inlet locations on the casing side. Piping inserts vertically into the opening.

**Bottom inlet connection (option):** An appropriately sized hole and bolt circle–one per cell–is provided in the floor of the cold water basin. Bolt circle is designed to accept a standard 125# flat-face flange.

12. Wire motor in accordance with wiring diagram.

13. Install distribution basin access port covers.

△ Warning

***For maintenance/safety purposes, Marley recommends a lockout type disconnect switch for all mechanical equipment.***
***In addition to a disconnect switch, the motor should be wired to main power supply through short circuit protection, and a magnetic starter with overload protection.***

# Operation

## Tower Start-Up

△ Warning

***Among other sources, outbreaks of Legionnaires' Disease have reportedly been traced to cooling towers. Maintenance and water treatment procedures that prevent amplification and dissemination of Legionella and other airborne bacteria should be formulated and implemented BEFORE systems are operated and continued regularly thereafter to avoid the risk of sickness or death.***

### Water System:

1. New installations should be cleaned and treated with biocides by a water treatment expert before startup.
2. Remove any and all accumulated debris from tower. Pay particular attention to inside areas of cold water basin, hot water basins, louvers and drift eliminators. Make sure that cold water suction screens are clear and properly installed.
3. For models NC80101, NC80102 and NC80103, fill the water system to an approximate depth of 7" (178 mm) in the depressed area of the cold water basin at the center of the tower. For all other models, fill the water system to an approximate depth of 8" (203 mm). This is the recommended operating water level. Adjust the float valve so that it is 75% open at that level. Continue filling the system until the water reaches a level approximately 1/8" (3 mm) below the lip of the overflow.

△ Note

***If tower is equipped with a standard side-suction connection, vent accumulated air from the top of the suction hood by removing one or both tap screws provided at that location. Replace these tap screws when venting is complete. (On certain models, the top of the suction hood for 14" (356 mm) diameter side suctions is 1 1/4" (32 mm) above the top of the overflow. In those situations, it is necessary to block the overflow and continue filling the basin to the level where the aforementioned tap screws are submerged before venting.)***

4. Start pump(s) and observe system operation. Since the water system external to the tower will have been filled only to the level achieved in the cold water basin, a certain amount of "pump-down" of the basin water level will occur before water completes the circuit and begins to

# Operation

fall from the fill. The amount of initial pump-down may be insufficient to cause the float valve to open. However, you can check its operation by pressing down on the operating lever to which the stem of the float valve is attached.

Some trial and error adjustment of the float valve may be required to balance the makeup water with tower operation. Ideally, the float valve setting will be such that no water is wasted through the overflow at pump shutdown. However, the water level after pump start-up must be deep enough to assure positive pump suction.

5. Check the water level with the UniBasin top deck. Uniform distribution basin depth of 3" to 5 1/2" (76 mm to 140 mm) is essential to efficient tower operation. Contact your Marley sales engineer if you are considering a permanent change in circulating water flow rate that would prevent operation within these limits.
6. Continue pump operation for about 15 minutes, after which it is recommended that the water system be drained, flushed, and refilled.
7. While operating the condensing water pump(s) and prior to operating the cooling tower fan, execute one of the two alternative biocidal treatment programs described in the following:
   - Resume treatment with the biocide which had been used prior to shutdown. Utilize the services of the water treatment supplier. Maintain the maximum recommended biocide residual (for the specific biocide) for a sufficient period of time (residual and time will vary with the biocide) to bring the system under good biological control

     ***or***
   - Treat the system with sodium hypochlorite to a level of 4 to 5 mg/L (ppm) free chlorine residual at a pH of 7.0 to 7.6. The chlorine residual must be held at 4 to 5 mg/L (ppm) for six hours, measurable with standard commercial water test kits.

   If the cooling tower has been in operation and then shut down for a duration of time and not drained, perform one of the two previous biocidal treatment programs directly to the cooling water storage vessel (cooling tower sump, drain down tank, etc.) without circulating stagnant water over the cooling tower fill or operating the cooling tower fan.

   After biocidal pretreatment has been successfully completed, cooling water may be circulated over the tower fill with the fan off.

# Operation

When biocidal treatment has been maintained at a satisfactory level for at least six hours, the fan may be turned on and the system returned to service. Resume the standard water treatment program, including biocidal treatment.

**Mechanical Equipment:**

△ **Warning**

***Always shut off electrical power to the tower fan motor prior to performing any maintenance on the tower. Any electrical switches should be locked out and tagged out to prevent others from turning the power back on.***

1. If equipped, check oil level in accordance with the *Geareducer User Manual* for the Geareducer. (Although the Geareducer was filled to the proper level at the factory, tipping during shipment and hoisting may have caused some loss of oil.) If oil is required, fill Geareducer to the proper level with approved lubricant. (See *Geareducer User Manual*) Check oil level at the Geareducer or dipstick (standpipe located on fan deck, if so equipped) to confirm that the proper level is indicated.
2. Install top fan ring and fan guard according to the installation drawing shipped with the tower. NC80101 and NC80102 models include a single-piece fan guard. All other models include a two-piece fan guard. Models with extended velocity-recovery cylinders do not have fan guards.

△ **Warning**

***Improper installation of the fan cylinder and fan guard will destroy the structural integrity of the fan guard. Failure of the fan guard could allow operating or maintenance personnel to fall into the rotating fan.***

3. Spin the fan manually to assure that all fan blades properly clear the inside of the fan cylinder. If equipped observe the action of the coupling (or drive shaft couplings) to be sure that the motor and Geareducer are properly aligned. If necessary, correct the alignment in accordance with the included manual.

   For Power Belt Drive equipped models observe the action of the sheaves and belts to be sure that the motor is properly aligned with the fan sheave. See Belt Tensioning and Sheave Alignment on page 20.

# Operation

△ Caution

***It is essential that the fan cylinder and fan guard be installed in accordance with the Field Installation Manual shipped with the tower. Do not force the fan cylinder out of round.***

4. Momentarily bump (energize) the motor and observe rotation of the fan. The fan should rotate in a counterclockwise direction when viewed from below. If rotation is backwards, shut off the fan and reverse two of the three primary leads supplying power to the motor.

△ Caution

***If tower is equipped with a two-speed motor, check for proper rotation at both speeds. Check also to see that starter is equipped with a 20 second time delay which prevents direct switching from high speed to low speed. If the fan is intended to be reversed for deicing purposes, make sure that the starter is equipped with a 2 minute time delay between changes of direction. These delays will prevent abnormal stress from being applied to the mechanical equipment and the electrical circuit components.***

5. Run the motor and observe the operation of the mechanical equipment. Operation should be stable, and if equipped, there should be no evidence of oil leakage from the Geareducer or oil lines.
6. If equipped with belt drive check the torque on the fan and motor sheave after 10 to 60 hours of operation. See Bushing Fastener Torque Values on page 21.

△ Note

***If the water supply system is not being operated—or if there is no heat load on the system—motor amps read at this time may indicate an apparent overload of as much as 10–20%. This is because of the increased density of unheated air flowing through the fan. Determination of an accurate motor load should await the application of the design heat load.***

# Operation

## Tower Operation

### General:

The cold water temperature obtained from an operating cooling tower will vary with the following influences:

1. **Heat load:** With the fan in full operation, if the heat load increases, the cold water temperature will rise. If the heat load reduces, the cold water temperature will reduce.

   Note that the number of degrees ("range") through which the tower cools the water is established by the system heat load and the amount of water being circulated, in accordance with the following formula:

$$\text{Range} - °F = \frac{\text{Heat Load (Btu/hr)}}{\text{GPM x 500}}$$

or — in SI units

$$\text{Range} - °C = \frac{\text{Heat Load (kilowatts)}}{\text{Liters/sec x 4.187}}$$

   The cooling tower establishes *only* the cold water temperature attainable under any operating circumstance.

2. **Air wet-bulb temperature:** Cold water temperature will also vary with the wet-bulb temperature of the air entering the louvered faces of the tower. Reduced wet-bulb temperatures will result in colder water temperatures. However, the cold water temperature will not vary to the same extent as the wet-bulb. For example, a 20°F (11 °C) reduction in wet-bulb may result in only a 15°F (8°C) reduction in cold water temperature.

3. **Water flow rate:** Increasing the water flow rate (GPM or L/s) will cause a slight elevation in cold water temperature, while reducing the water flow rate will cause the cold water temperature to decrease slightly. However, at a given heat load (see formula above), water flow reductions *also* cause an increase in the incoming hot water temperature. Use care to prevent the hot water from exceeding 125°F, (52°C) in order to prevent damage to the tower components.

# Operation

4. **Air flow rate:** Reducing air flow through the tower causes the cold water temperature to rise. *This is the approved method by which to control leaving water temperature.*

   If your tower is equipped with a single-speed motor, the motor may be shut off when the water temperature becomes too cold. This will cause the water temperature to rise. When the water temperature then becomes too warm for your process, the motor can be restarted.

△ **Caution**

***When operating in this mode care must be taken not to exceed a total acceleration time of 30 seconds per hour.***

**Fan cycling limits:** From a dead stop, determine the number of seconds it takes the fan to arrive at full speed. Divide this number into 30 to determine the allowable number of starts per hour. Considering the normal fan and motor sizes utilized on NC Class towers, anticipate that approximately 4 to 5 starts per hour are allowable.

If your tower is equipped with a two-speed motor, you will enjoy greater opportunity for temperature control. When the water temperature becomes too cold, switching the fan to half-speed will cause the cold water temperature to rise—*stabilizing* at a temperature a few degrees higher than before. With a further reduction in water temperature, the fan may be cycled alternately from half-speed to off—subject to the same constraint of *30 seconds of allowable acceleration time per hour* as outlined above.

If your tower consists of two or more cells, cycling of motors may be shared between cells, increasing your steps of operation accordingly.

Multicell towers equipped with two-speed motors will maximize energy savings and minimize sound levels if fans are staged so that all fans are brought up to low speed before any fan goes to high speed.

For greater insight on cold water temperature control, please read **"Cooling Tower Energy and its Management"**, *Technical Report #H-001-A*, available from your Marley sales representative.

# Operation

## Wintertime Operation:

The Marley fill system used in NC cooling towers has air entrance louvers that are molded as an integral part of the fill. This feature makes these towers very forgiving of cold weather operation, even at the low temperature and reduced load conditions encountered in free cooling and other low temperature applications. Nevertheless, during operation in subfreezing weather the opportunity exists for ice to form in the colder regions of the tower.

△ **Note**

***Slushy, transitory ice forms routinely in the colder regions of the fill of low temperature towers, and is visible through the tower louvers. Such ice normally has no adverse effect on tower operation, but its appearance should be a signal to the operator to undertake ice control procedures.***

***It is the operator's responsibility to prevent the formation of destructive (hard) ice on the cooling tower fill. Certain guidelines should be followed:***

1. *Do not allow the tower's leaving water temperature to drop below a minimum allowable level—say 36°F to 40°F (2°C to 4.5°C). If such low temperature operation is necessary or beneficial to your process, establish the minimum allowable level as follows:*

   During the coldest days of the first winter of operation, observe whether any ice is forming on the louver face, particularly near the bottom part of the louver face. If hard ice is present on the louvers, *you must increase the allowable cold water temperature.* If the coldest possible water is beneficial to your process, ice of a mushy consistency can be tolerated—but routine periodic observation is advisable.

△ **Caution**

***If the minimum allowable cold water temperature is established at or near maximum heat load, it should be safe for all operating conditions. However, if established at reduced load, increased heat loads may reintroduce the potential for icing.***

Having established the minimum allowable cold water temperature, maintaining that temperature can be accomplished by fan manipulation, as outlined in **Item 4** under **Tower Operation**. However, *in towers of*

# Operation

*more than one cell, where fans are manipulated sequentially, please realize that the water temperature will be significantly lower in the cell or cells operating at the highest fan speed than the net cold water temperature produced by the entire tower would indicate. Wintertime operation of multicell towers at low cold water temperature levels requires that the operator be especially watchful.*

2. As cold air enters the louvers, it causes the water flowing over the fill to be drawn inward toward the center of the tower. Thus, under fan operation, the louvers and lower periphery of the tower structure remain partly dry, seeing only random splashing from within the tower—plus normal atmospheric moisture from the entering air. Such lightly wetted areas are most subject to freezing.

   Therefore, if excessive ice forms on the louvers, stop the fan for a few minutes. With the fan off, the water flow will increase in the vicinity of the louvers and reduce the ice buildup.

3. Under extended extreme cold conditions, it may be necessary to operate the fan in reverse. This forces warm air out through the louvers, melting any accumulated ice—adequate heat load must be available. Reversal may be at either full or half speed; however, Marley recommends reversal at half speed. Reverse operation of the fan should be used sparingly and should only be used to control ice, **not** to prevent it. *Reverse fan operation should not need to exceed 1 or 2 minutes.* Monitoring is required to determine the time required to melt accumulated ice.

**△ Warning**

***Reverse operation of fans for prolonged periods during subfreezing weather can cause severe damage to fans and fan cylinders. Ice can accumulate inside fan cylinders at fan blade plane of rotation and fan blade tips will eventually strike this ring of ice, damaging the fan blades or cylinder. Ice can also accumulate on fan blades and be thrown off, damaging fan cylinder or blades. Allow a minimum of 10 minute delay between reverse operation and forward operation during subfreezing weather to permit ice to dissipate from fan blades and fan cylinders. See Fan Drive Caution note on page 12 for fan speed change and reversing precautions.***

# Operation

4. With no heat load on the circulating water, icing cannot be controlled effectively by air control during freezing weather. ***Towers must not be operated with reduced water rate and/or no heat load during freezing weather.*** If the circulating water system cannot be shut down, water returning from the process should be made to bypass the tower. If a bypass is used, all water must be bypassed without modulation. If the water bypass is directly into the tower's cold water basin, its design must be approved by Marley Engineers.

**Intermittent Wintertime Operation:**

If periods of shutdown (nights, weekends, etc.) occur during freezing weather, measures must be taken to prevent the water in the cold water basin—and all exposed pipework—from freezing. Several methods are used to combat this, including automatic basin heater systems available from Marley.

**△ Caution**

***Unless some means of freeze prevention is incorporated into your system, the tower basin and exposed pipework should be drained at the beginning of each wintertime shutdown period.***

It is recommended that you discuss your freeze prevention options with your local Marley sales representative.

# Maintenance

## Water Treatment and Blowdown

### Maintaining Water Quality:

The steel used in NC towers has been galvanized with a heavy zinc coating averaging 2.0 mils in thickness. NC towers are also available in stainless steel. Other materials used (polyethylene basins, PVC fill, drift eliminators, and louvers, aluminum fans and sheaves, cast iron Geareducer, etc.) are selected to offer maximum service life in a "normal" cooling tower environment, defined as follows:

- Circulating water with a pH between 6.5 and 8; a chloride content (as NaCl) below 500 ppm; a sulfate content ($SO_4$) below 250 ppm; total alkalinity (as $CaCO_3$) below 500 ppm; calcium hardness (as $CaCO_3$) above 50 ppm; a maximum inlet water temperature not to exceed 125°F (51.7°C); no significant contamination with unusual chemicals or foreign substances; and adequate water treatment to minimize scaling.
- Chlorine (if used) shall be added intermittently, with a free residual not to exceed 1 ppm—maintained for short periods. Excessive chlorine levels may deteriorate sealants and other materials of construction.
- An atmosphere surrounding the tower no worse than "moderate industrial", where rainfall and fog are no more than slightly acid, and they do not contain significant chlorides or hydrogen sulfide ($H_2S$).
- Many proprietary chemicals exist for control of scale, corrosion, and biological growth and should be used prudently. Also, combinations of chemicals may cause reactions which reduce treatment effectiveness, and certain chemicals such as surfactants, biodispersants and antifoams may increase drift rate.

For complete water treatment recommendations and services contact Marley Water Resources, toll free, at 877 800 0929 or contact our local Marley sales representative.

△ **Note**

***Unless you purchased the stainless steel structure, your NC tower consists primarily of galvanized steel, therefore your water treatment program must be compatible with zinc. In working with your water treatment supplier, it is important that you recognize the potential effects on zinc of the specific treatment program you choose.***

# Maintenance

### Cooling Tower Cleaning:

△ Warning

***Any evaporative-type cooling tower must be thoroughly cleaned on a regular basis to minimize the growth of bacteria, including Legionella Pneumophila, to avoid the risk of sickness or death. Service personnel must wear proper personal protective equipment during decontamination. Do NOT attempt any service unless the fan motor is locked out.***

Operators of evaporative cooling equipment, such as water cooling towers, should follow maintenance programs which will reduce to an absolute minimum the opportunity for bacteriological contamination. Public Health Service officials have recommended that "good housekeeping" procedures be followed, such as: regular inspections for concentrations of dirt, scale, and algae; periodic flushing and cleaning; and the following of a complete water treatment program including biocidal treatment.

The visual inspection should take place at least once a week during the operating season. The periodic flushing and cleaning should be done before and after each cooling season, but in any event at least twice a year. The louvers, drift eliminators, and easily accessible fill surfaces should be flushed by use of a moderate-pressure water nozzle, being careful not to cause physical damage. A reliable water treatment program should be installed and maintained. Filtration devices may be employed to reduce the suspended solids concentrations, thus increasing the effectiveness of the water treatment program. See Tower Startup instructions on page 9.

### Blowdown:

A cooling tower cools water by continuously causing a portion of it to evaporate. Although the water lost by evaporation is replenished by the makeup system, it exits the tower as pure water—leaving behind its burden of dissolved solids to concentrate in the remaining water. Given no means of control, this increasing concentration of contaminants can reach a very high level.

In order to achieve water quality which is acceptable to the cooling tower (as well as the remainder of your circulating water system), the selected water treatment company must work from a relatively constant level of concentrations. This stabilization of contaminant concentrations is usually accomplished by *blowdown*, which is the constant discharge of a portion of the circulating water to waste. As a rule, acceptable levels on which to base a treatment schedule will be in the range of 2-4 concentrations. The

# Maintenance

following table shows the minimum amount of blowdown (percent of flow) required to maintain different concentrations with various cooling ranges*:

| Cooling Range | Number of Concentrations | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1.5X | 2.0X | 2.5X | 3.0X | 4.0X | 5.0X | 6.0X |
| 5° F (2.78° C) | .76 | .38 | .25 | .18 | .11 | .08 | .06 |
| 10° F (5.56° C) | 1.58 | .76 | .51 | .38 | .25 | .18 | .14 |
| 15° F (8.33° C) | 2.38 | 1.18 | .78 | .58 | .38 | .28 | .22 |
| 20° F (11.11° C) | 3.18 | 1.58 | 1.05 | .78 | .51 | .38 | .30 |
| 25° F (13.89° C) | 3.98 | 1.98 | 1.32 | .98 | .64 | .48 | .38 |
| Multipliers are based on drift of 0.02% of the circulating water rate. | | | | | | | |

* Range = Difference between hot water temperature coming to tower and cold water temperature leaving tower.

**EXAMPLE:** 700 GPM (44.2 L/s) circulating rate, 18°F (10°C) cooling range. To maintain 4 concentrations, the required blowdown is 0.458% or .00458 times 700 GPM (44.2 L/s), which is 3.2 GPM (0.2 L/s).

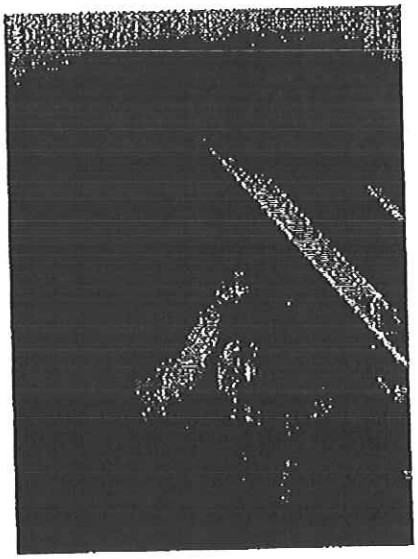
If tower is operated at 4 concentrations, circulating water will contain four times as much dissolved solid as the makeup water, assuming none of the solids form scale or are otherwise removed from the system.

△ Note

***When water treatment chemicals are added, they should not be introduced into the circulating water system via the cold water basin of the cooling tower. Water velocities are lowest at that point, which results in inadequate mixing.***

### Belt Tensioning

The belts are adjusted by turning the jacking screw at the motor support. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions. Check tension frequently during the first 24-48 hours of run-in operation. Overtensioning shortens belt and bearing life. Keep belts free from foreign material which may cause slip. Never apply belt dressing as this

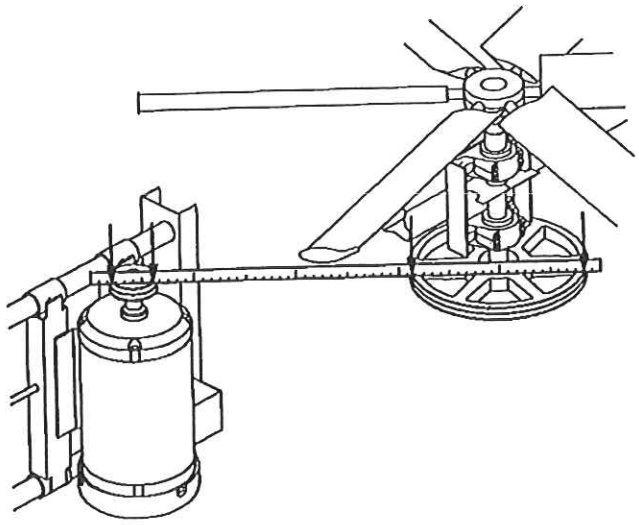


# Maintenance

will damage the belt and cause early failure. A Dodge® V-Belt Tension Tester is an alternate method for tensioning V-belts. Check with you local belt supplier.

### Sheave Alignment

- The motor sheave is to be positioned as close as possible to the motor in order to minimize torque on the motor bushings.
- The motor and fan sheaves may have grooves that are not used. The bottom surface of the motor and fan sheaves must be aligned within ⅛" of each other and level within ½° (⅛" In 12) in order to not adversely affect belt and sheave life.
- Alignment can be achieved by placing a straight edge across the top of the sheaves making sure that it is level and measuring down to the bottom surface of both sheaves at four points.
- The belt is to be located in the lowest set of grooves.



### Bushing Fastener Torque Values

| Bushing | Fastener Size | Torque | |
|---|---|---|---|
| | | ft· lb; | N· m |
| SH | ¼ - 20 | 6 | 8 |
| SDS | ¼ - 20 | 6 | 8 |
| SD | ¼ - 20 | 6 | 8 |
| SK | 5/16 - 18 | 13 | 18 |
| SF | ⅜ - 16 | 22 | 30 |
| E | ½ - 13 | 35 | 48 |
| F | 5/16 - 12 | 65 | 88 |

# Maintenance

### Schedule of Tower Maintenance

Some maintenance procedures may require maintenance personnel to enter the tower. Each cased face of the tower has a door for access to the interior of the tower.

△ Warning

***The purchaser or owner is responsible for providing a safe method for entering or exiting the access door.***

Included with this instruction packet are separate Manuals on each major operating component of the tower, and it is recommended that you read them thoroughly. *Where discrepancies may exist, the separate component User Manuals will take precedence.*

The following is recommended as a minimum routine of scheduled maintenance:

△ Warning

***Always shut off electrical power to the tower fan motor prior to performing any inspections that may involve physical contact with the mechanical or electrical equipment in or on the tower. Lock out and tag out any electrical switches to prevent others from turning the power back on. Service personnel must wear proper personal protective clothing and equipment.***

**Weekly:** Inspect for bacterial growth and general operation conditions. Bacterial growth should be reported to your water treatment expert for immediate attention.

**Monthly (Weekly at start up):** Observe, touch, and listen to the tower. Become accustomed to its normal appearance, sound, and level of vibration. Abnormal aspects relating to the rotating equipment should be considered reason to shut down the tower until the problem can be located and corrected. Observe the operation of the motor, drive train and fan. Become familiar with the normal operating temperature of the motor, as well as the sight and sound of all components as a whole.

If equipped, check for Geareducer oil leaks. Check the Geareducer as well as any optional oil lines to external oil dipstick/sight glass.

Inspect louvers, drift eliminators and basin trash screens and remove any debris or scale which may have accumulated. Replace any damaged or worn out components. Use of high-pressure water may damage the eliminator and louver material.

➡

# Maintenance

Observe operation of the float valve. Depress the operating lever to make sure that the valve is operating freely. Inspect the suction screen for plugging. Remove any debris that may have accumulated.

Check for any buildup of silt on the floor of the cold water basin. Make note of the amount, if any, so future inspections will enable you to determine the rate at which it is forming.

**Every 3 month:** If equipped, lubricate fan shaft bearings. While rotating equipment by hand, grease the bearings until a bead forms around the seals—a maximum charge of 0.55 ounces is recommended. Chevron SRI-2 grease is recommended

**Semi-Annually:** Relubricate motor according to the manufacturer's instructions. See instructions on this page for towers with the motor located outside the plenum option.

If equipped, check the belt tension and condition.

If equipped, check Geareducer oil level. Shut down the unit and allow 5 minutes for the oil level to stabilize. Add oil if required.

Check to see that all bolts are tight in the fan and mechanical equipment region, including the fan cylinder and fan guard. Refer to component User Manuals for torque values.

Clean and disinfect cooling tower with biocides. Systems with biofouling, high general bacterial counts, or positive cultures of legionella may require additional cleaning. Refer to **"Cooling Tower Cleaning"** section—page 20. Consult your water treatment expert as to prudent biological evaluation testing.

△ **Note**

***Geareducer models used on NC cooling towers are designed for 5-year oil change intervals. To maintain five-year change intervals, use only oil designed specifically for these Geareducers. If, after five years, turbine-type mineral oil is used, the oil must be changed semiannually. Refer to the Geareducer Manual for oil recommendations and further instructions.***

**Annually:** Inspect the tower thoroughly, making maximum use of instructions given in the separate service manuals. Check structural bolted connections and tighten as required. Make preventive maintenance repairs as necessary.

**Every 5 Years:** If equipped, change Geareducer oil. Refer to the *Geareducer User Manual* for instructions.

# Maintenance

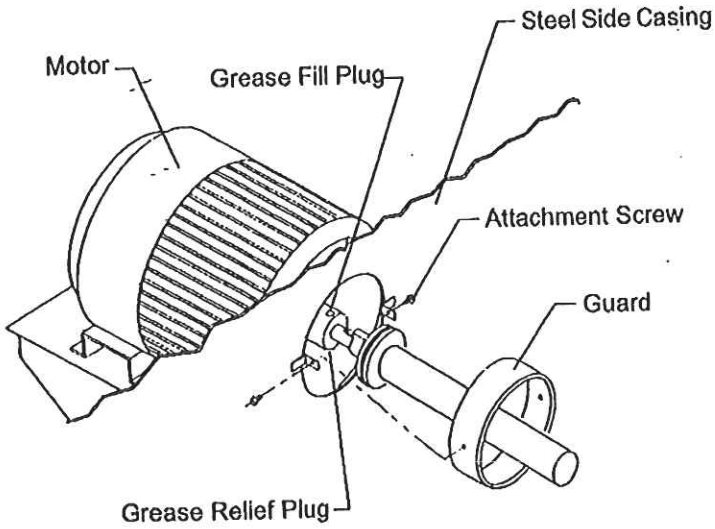
## Motor Relubrication Instructions

*Motor located outside plenum option*

△ Note

***Open and lock out disconnect switch to make certain motor cannot be started.***

1. Remove guard as shown on the next page. Opposite end motor bearing is accessible from outside the tower.




2. Remove grease fill and relief plugs at both shaft extension end and opposite end bearings and remove hardened grease, using clean wire.
3. Insert grease fittings in grease fill openings and add grease until grease is forced out through relief openings.
4. Replace fill plugs and operate mechanical equipment 30 minutes to one hour to purge excess grease at grease relief opening.
5. Reinstall grease relief plugs and reinstall guard.
6. Resume normal tower operation.

# Maintenance

### Seasonal Shutdown Instructions

When the system is to be shut down for an extended period of time, it is recommended that the entire system (cooling tower, system piping, heat exchangers, etc.) be drained. Leave the basin drains open.

During shutdown, clean the tower (see Warning, page 19) and make any necessary repairs. Pay particular attention to mechanical equipment supports and coupling (or drive shafts).

Following each year's shutdown and cleaning, inspect the tower's metal surfaces for evidence of the need to apply a protective coating. Do not misinterpret grime—and transient rust from the piping system—as a need to have the tower painted. If relatively bright metal can be exposed by cleaning, consider that the galvanizing has remained effective. Unless there is evidence of a generalized failure of the galvanizing, localized touch-up should be all that is required.

△ **Note**

***To the extent that the galvanizing (zinc coating) still exists, paint will not adhere to it readily. Contact the manufacturer of the coating you intend to use for instructions.***

**Tower framework:** Check structural bolted connections and tighten as required.

**Fans:** Check fan assembly bolting and tighten as required. Use torque values prescribed in the Fan User Manual.

**Fan shaft bearings:** If equipped, lubricate fan shaft bearings at close of each operating season—see page 23.

**Electric motors:** Clean and lubricate motor at close of each operating season (refer to motor manufacturer's recommendations.) Check motor anchor bolts and tighten as required. See Page 24 for towers with motor located outside the plenum option.

△ **Caution**

***Do not start motor before determining that there will be no interference with free rotation of the fan drive.***

The motor should be operated for three hours at least once a month. This serves to dry out windings and re-lubricate bearing surfaces (refer to Marley **"Electric Motor User Manual"** *Manual 92-1475*).

# Maintenance

At start of new operating season, make sure bearings are adequately lubricated before returning motor to service.

### Prolonged Shutdown

If shutdown period is longer than seasonal, contact your Marley sales engineer for additional information.

### Marley Services

Marley's interest in your NC cooling tower *does not* end with the sale. Having conceived, designed, and manufactured the most reliable and longest-lasting cooling tower of its class, we want to make sure that you gain the maximum possible benefit from its purchase.

Therefore, the following services are available which are intended to: assure the maximum possible service life under your operating conditions; tailor the operating characteristics to your specific needs; and maintain consistently optimum thermal performance capability. They are available by contacting your Marley sales representative.

**Replacement parts:** A complete stock of parts and components is maintained at one or more of the various Marley plants. In cases of emergency, they can normally be shipped within 24 hours—by air freight if necessary. However, you would obviously benefit from anticipating your need in advance, thus avoiding the cost of special handling.

Be sure to mention your tower serial number (from the tower nameplate) when ordering parts.

**Periodic maintenance:** You may wish to contract with Marley for regularly scheduled visits—for the purpose of inspecting and reporting your tower's condition—to make recommendations intended to prevent emergencies—and to perform maintenance considered outside the norm.

This service is not intended to replace the important function performed by your maintenance staff. Their attention assures the tower's routine operating performance, and is invaluable. However, Marley recognizes that the unusual manner in which a cooling tower performs its function—as well as the unique forces which act upon it—may be considerations which occasionally require the services of an expert technician.

# Additional Information

**Increased load requirements:** NC towers are designed so that cells of either equal or unequal capacity can be added in the future. This allows you to compensate for the load increases that normally occur with the replacement or addition of production equipment—and still retain continuity with respect to your cooling tower system.

**Tower rebuilding:** Marley routinely rebuilds and upgrades cooling towers of *all* materials and manufacture. If your tower ever reaches the limit of its service life, we recommend that you investigate the cost of rebuilding before you routinely order a new replacement tower.

Each NC tower includes a document package containing general orientation drawings, **"NC Field Installation Manual"** *Assembly Instructions*, and tower component manuals. ***These documents contain important information relating to safe installation and operation of the cooling tower.*** Field installation is always required for fan guards, piping inlets and piping outlets. Some optional accessories, such as valves, handrails, ladders and safety cages may also require field installation. If installation details are not covered in the **"NC Field Installation Manual"** a separate installation drawing or manual for each purchased option is included in the document package along with bills of material. If you have purchased an option and can't find the appropriate installation drawing, contact your local Marley office or representative before proceeding.

In addition to these specific documents, Marley publishes numerous technical reports including more detailed information on a variety of cooling tower operation and service topics. Your Marley office or representative will be happy to give you copies of these reports at no charge.

For complete parts and service assistance, contact the Marley sales or representative office in your area. If you need help locating the office nearest you, please phone 800 462 7539 or check the internet at www.marleyct.com.

# Troubleshooting

| Trouble | Cause | Remedy |
|---|---|---|
| Motor Will Not Start | Power not available at motor terminals | • Check power at starter. Correct any bad connections between the control apparatus and the motor. |
| | | • Check starter contacts and control circuit. Reset overloads, close contacts, reset tripped switches or replace failed control switches. |
| | | • If power is not on all leads at starter, make sure overload and short circuit devices are in proper condition. |
| | Wrong connections | Check motor and control connections against wiring diagrams. |
| | Low voltage | Check nameplate voltage against power supply. Check voltage at motor terminals. |
| | Open circuit in motor winding | Check stator windings for open circuits. |
| | Motor or fan drive stuck | Disconnect motor from load and check motor and Geareducer for cause of problem. |
| | Rotor defective | Look for broken bars or rings. |
| Unusual Motor Noise | Motor running single-phase | Stop motor and attempt to start it. Motor will not start if single-phased. Check wiring, controls, and motor. |
| | Motor leads connected incorrectly | Check motor connections against wiring diagram on motor. |
| | Bad bearings | Check lubrication. Replace bad bearings. |
| | Electrical unbalance | Check voltages and currents of all three lines. Correct if required. |
| | Air gap not uniform | Check and correct bracket fits or bearing. |
| | Rotor unbalance | Rebalance. |
| | Cooling fan hitting end bell guard | Reinstall or replace fan. |
| Motor Runs Hot | Wrong voltage or unbalanced voltage | Check voltage and current of all three lines against nameplate values. |
| | Overload | Check fan blade pitch. See Fan Service Manual. Check for drag in fan drive train as from damaged bearings. |
| | Wrong motor RPM | Check nameplate against power supply. Check RPM of motor and gear ratio. |
| | Bearings overgreased | Remove grease reliefs. Run motor up to speed to purge excessive grease. |
| | Wrong lubricant in bearings | Change to proper lubricant. See motor manufacturer's instructions. |
| | One phase open | Stop motor and attempt to start it. Motor will not start if single-phased. Check wiring, controls, and motor. |
| | Poor ventilation | Clean motor and check ventilation openings. Allow ample ventilation around motor. |
| | Winding fault | Check with Ohmmeter. |
| | Bent motor shaft | Straighten or replace shaft. |
| | Insufficient grease | Remove plugs and regrease bearings. |
| | Too frequent starting or speed changes | Limit cumulative acceleration time to a total of 30 seconds/hr. Set on/off or speed change set points farther apart. Consider installing a Marley VFD drive for fine temperature control. |
| | Deterioration of grease, or foreign material in grease | Flush bearings and relubricate. |
| | Bearings damaged | Replace bearings. |
| Motor Does Not Come Up To Speed | Voltage too low at motor terminals because of line drop | Check transformer and setting of taps. Use higher voltage on transformer terminals or reduce loads. Increase wire size or reduce inertia. |
| | Broken Rotor bars | Look for cracks near the rings. A new rotor may be required. Have motor service person check motor. |
| Wrong Rotation (Motor) | Wrong sequence of phases | Switch any two of the three motor leads. |

# Troubleshooting

| Trouble | Cause | Remedy |
|---|---|---|
| Geareducer Noise | Geareducer bearings | If new, see if noise disappears after one week of operation. Drain, flush, and refill Geareducer. See Geareducer Service Manual. If still noisy, replace. |
| | Gears | Correct tooth engagement. Replace badly worn gears. Replace gears with broken or damaged teeth. |
| Unusual Fan Drive Vibration | Loose bolts and cap screws | Tighten all bolts and cap screws on all mechanical equipment and supports. |
| | Unbalanced drive shaft or worn couplings | Make sure motor and Geareducer shafts are in proper alignment and "match marks" properly matched. Repair or replace worn couplings. Rebalance drive shaft by adding or removing weights from balancing cap screws. See Drive Shaft Service Manual. |
| | Fan | Make certain all blades are as far from center of fan as safety devices permit. All blades must be pitched the same. See Fan Service Manual. Clean off deposit build-up on blades. |
| | Worn Geareducer bearings | Check fan and pinion shaft endplay. Replace bearings as necessary. |
| | Worn fan shaft bearings–belt drive | Check fan shaft endplay. Replace bealngs as necessary. |
| | Unbalanced motor | Disconnect load and operate motor. If motor still vibrates, rebalance rotor. |
| | Bent Geareducer shaft | Check fan and pinion shaft with dial indicator. Replace if necessary. |
| Fan Noise | Blade rubbing inside of fan cylinder | Adjust cylinder to provide blade tip clearance. |
| | Loose bolts in blade clamps | Check and tighten if necessary. |
| | Fan shaft bearings–belt drive | Grease bearings |
| Scale or foreign substance in circulating water system | Insufficient blowdown | See "Water Treatment" section of this manual |
| | Water treatment deficiency | Consult competent water treating specialist. See "Water Treatment" section of this manual |
| Cold Water Temperature Too Warm (See "Tower Operation") | Entering wet bulb temp. is above design | Check to see if local heat sources are affecting tower. See if surrounding structures are causing recirculation of tower discharge air. Discuss remedy with Marley representative. |
| | Design wet bulb temp. was too low | May have to increase tower size. Discuss remedy with Marley representative. |
| | Actual process load greater than design | May have to increase tower size. Discuss remedy with Marley representative. |
| | Overpumping | Reduce water flow rate over tower to design conditions. |
| | Tower starved for air | Check motor current and voltage to be sure of correct contract horsepower. Re-pitch fan blades if necessary. Clean louvers, fill and eliminators. Check to see if nearby structures or enclosing walls are obstructing normal airflow to tower. Discuss remedy with Marley representative. |
| Excessive Drift Exiting Tower | Distribution basins overflowing | Reduce water flow rate over tower to design conditions. Be sure hot water basin nozzles are in place and not plugged. |
| | Faulty drift elimination | Check to see that integral fill, louvers, and eliminators are clean, free of debris, and installed correctly. If drift eliminators are separate from fill, make sure they are correctly installed in place. Clean if necessary. Replace damaged or worn out components. |

# Maintenance Schedule

| Service | Monthly | Startup | Shutdown | Semi-annually |
|---|---|---|---|---|
| Inspect General Condition and Operation | x | x | | |
| **Observe Operation of:** | | | | |
| Motor, Coupling, Geareducer and Fan | x | x | | |
| Makeup Valve | x | x | | |
| **Inspect and Clean as Necessary:** | | | | |
| PVC Air Inlet Louvers | x | x | | |
| PVC Drift Eliminators | x | x | | |
| Cold Water Basin and Outlet | x | x | x | x |
| Hot Water Basins | x | x | | |
| Fan Motor Exterior | x | x | | |
| **Check:** | | | | |
| Cold Water Basin Level | x | x | | |
| Blowdown-adjust as required | x | x | | |
| **Check Geareducer for:** | | | | |
| Oil Leaks | x | x | | |
| Proper Oil Level | x | x | | |
| Loose Bolts or Oil Plug | | x | | x |
| Plugged Oil Lines or Vent | | x | | x |
| Change Geareducer Oil | | | 5-years | |
| Thoroughly Inspect Mechanical Couplings | | x | x | x |
| **Check Belt Drive System for:** | | | | |
| Belt Tension and Condition | | x | | x |
| Sheave Bushing Fastener Torque | | x | | x |
| Fan Shaft Beang Lubrication (every 3 mo) | | x | | x |
| **Check and Tighten as Required:** | | | | |
| Mechanical Equipment Bolts | | x | x | x |
| Motor Anchor Bolts | | x | x | x |
| Tower Framework Structural Bolts | | x | x | x |
| Fan Assembly Bolts | | | x | x |
| Inspect Metal Surfaces and Touchup | | | x | |
| Motor Operation Required (minimum) | | | 3 hrs/month | |


7401 W 129 Street • Overland Park, KS 66213 • 913 664 7400
www.marleyct.com • email: info@marleyct.com

# Maintenance Schedule

Use this schedule

| Service | Monthly | Startup | Shutdown | Semi-annually |
|---|---|---|---|---|
| Inspect General Condition and Operation | x | x | | |
| **Observe Operation of:** | | | | |
| Motor, Coupling, Geareducer and Fan | x | x | | |
| Makeup Valve | x | x | | |
| **Inspect and Clean as Necessary:** | | | | |
| PVC Air Inlet Louvers | x | x | | |
| PVC Drift Eliminators | x | x | | |
| Cold Water Basin and Outlet | x | x | x | x |
| Hot Water Basins | x | x | | |
| Fan Motor Exterior | x | x | | |
| **Check:** | | | | |
| Cold Water Basin Level | x | x | | |
| Blowdown-adjust as required | x | x | | |
| **Check Geareducer for:** | | | | |
| Oil Leaks | x | x | | |
| Proper Oil Level | x | x | | |
| Loose Bolts or Oil Plug | | x | | x |
| Plugged Oil Lines or Vent | | x | | x |
| Change Geareducer Oil | | | 5-years | |
| Thoroughly Inspect Mechanical Couplings | | x | x | x |
| **Check Belt Drive System for:** | | | | |
| Belt Tension and Condition | | x | | x |
| Sheave Bushing Fastener Torque | | x | | x |
| Fan Shaft Beang Lubrication (every 3 mo) | | x | | x |
| **Check and Tighten as Required:** | | | | |
| Mechanical Equipment Bolts | | x | x | x |
| Motor Anchor Bolts | | x | x | x |
| Tower Framework Structural Bolts | | x | x | x |
| Fan Assembly Bolts | | x | x | x |
| Inspect Metal Surfaces and Touchup | | x | x | |
| Motor Operation Required (minimum) | | x | 3 hrs/month | |

State of West Virginia
Department of Administration

General Services Division
GSD126419 Bldg 11 HVAC
Maintenance Service

## GSD126419 Attachment C: Bid Form

**Bidder's Company Name:** CASTO TECHNICAL SERVICES

**Bidder's Address:** 540 LEON SULLIVAN WAY
CHARLESTON, WV 25301

**Remittance Address:**
**(if different)**

**Phone Number:** 304-346-0549

**Fax Number:** 304-

**Email Address:** tvandeborne@castotech.com

**WV Contractor's License Number:** WV001241

We, the undersigned, having examined the site and being familiar with the local conditions affecting the cost of the work and also being familiar with the general conditions to bidders, drawings, and specifications, hereby propose to furnish all materials, equipment, and labor to complete all work in a workmanlike manner, as described in the Bidding Documents.

**TOTAL CONTRACT BID** (Total to be written in words and numbers)

FOURTY SEVEN THOUSAND DOLLARS & XX/

($ 47,000.00 )

State of West Virginia
Department of Administration

General Services Division
GSD126419 Bldg 11 HVAC
Maintenance Service

## References

Reference Name: Allen George
Position: Maintenance Supervisor
Address: 800 Pennsylvania Avenue Charleston WV 25302
Telephone Number: 304-388-2562
Project Name: CAMC W+C
Project Description: Cooling Tower Cleaning + Chiller Maintenance

Reference Name: Martin Best
Position: Facilities Manager
Address: 800 Garfield Avenue Parkersburg WV 26101
Telephone Number: 304-424-2323
Project Name: Camden Clark Hospital
Project Description: Cooling Tower Cleaning + Chiller Maintenance

Reference Name: Tim Lee
Position: Maintenance Director
Address: 4605 MacCorkle Avenue South Charleston WV 25309
Telephone Number: 304-746-3684
Project Name: Thomas Memorial Hospital
Project Description: Cooling Tower Cleaning + Chiller Maintenance

Agency PURCHASING
REQ.P.O#

# BID BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, Casto Technical Services, Inc.
of Charleston, WV, as Principal, and Western Surety Company
of Sioux Falls, SD, a corporation organized and existing under the laws of the State of
SD with its principal office in the City of Sioux Falls, as Surety, are held and firmly bound unto the State
of West Virginia, as Obligee, in the penal sum of Five Percent of Amount Bid ($ 5% ) for the payment of which,
well and truly to be made, we jointly and severally bind ourselves, our heirs, administrators, executors, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Purchasing Section of the Department of Administration a certain bid or proposal, attached hereto and made a part hereof, to enter into a contract in writing for
Cleaning the Chiller and Cooling Towers Building 11 - According to Plans & Specifications

NOW THEREFORE,

(a) If said bid shall be rejected, or
(b) If said bid shall be accepted and the Principal shall enter into a contract in accordance with the bid or proposal attached hereto and shall furnish any other bonds and insurance required by the bid or proposal, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be null and void, otherwise this obligation shall remain in full force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for the value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Obligee may accept such bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be affixed hereunto and these presents to be signed by their proper officers, this
20th day of December, 2011.

Principal Corporate Seal

Casto Technical Services, Inc.
(Name of Principal)

By _____
(Must be President or Vice President)

VP of Finance / CFO
(Title)

Surety Corporate Seal

Western Surety Company
(Name of Surety)

By: _____
Patricia A. Moye, WV Resident Agent Attorney-in-Fact

IMPORTANT – Surety executing bonds must be licensed in West Virginia to transact surety insurance. Corporate seals must be affixed, and a power of attorney must be attached.

# Western Surety Company

## POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

**Know All Men By These Presents,** That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

**Kimberly J Wilkinson, Larry D Kerr, Allan L Mc Vey, Gregory T Gordon, Patricia A Moye, Individually**

of Charleston, WV, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

**- In Unlimited Amounts -**

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

**In Witness Whereof,** WESTERN SURETY COMPANY has caused these presents to be signed by its Senior Vice President and its corporate seal to be hereto affixed on this 11th day of August, 2010.

WESTERN SURETY COMPANY

Paul T. Bruflat, Senior Vice President

State of South Dakota
County of Minnehaha } ss

On this 11th day of August, 2010, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Senior Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires
November 30, 2012

D. KRELL
NOTARY PUBLIC
SOUTH DAKOTA

D. Krell, Notary Public

**CERTIFICATE**

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 20th day of December, 2011.

WESTERN SURETY COMPANY

L. Nelson, Assistant Secretary

Form F4280-09-06

**Authorizing By-Law**

# ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.

**GSD126419**

**State of West Virginia**
**DRUG FREE WORKPLACE CONFORMANCE AFFIDAVIT**
***West Virginia Code* §21-1D-5**

**STATE OF** WEST VIRGINIA

**COUNTY OF** KANAWHA **, TO-WIT:**

I, TODD WATSON, after being first duly sworn, depose and state as follows:

1. I am an employee of CASTO TECHNICAL SERVICES, and,
(Company Name)

2. I do hereby attest that CASTO TECHNICAL SERVICES
(Company Name)

maintains a valid written drug free workplace policy and that such policy is in compliance with ***West Virginia Code*** §21-1D-5.

The above statements are sworn to under the penalty of perjury.

CASTO TECHNICAL SERVICES
**(Company Name)**

By: TODD WATSON

Title: PROJECT MANAGER

Date: 12-19-2011

Taken, subscribed and sworn to before me this 19th day of December, 2011

By Commission expires AUGUST 28, 2012

(Seal)

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
MICHELE WELLING
ROUTE 1, BOX 173C
GIVEN, WV 25245
My commission expires August 28, 2012

(Notary Public)

**THIS AFFIDAVIT MUST BE SUBMITTED WITH THE BID IN ORDER TO COMPLY WITH WV CODE PROVISIONS. FAILURE TO INCLUDE THE AFFIDAVIT WITH THE BID SHALL RESULT IN DISQUALIFICATION OF THE BID.**

Rev March 2009

**GSD126419**

RFQ No. _____

STATE OF WEST VIRGINIA
Purchasing Division

# PURCHASING AFFIDAVIT

**West Virginia Code §5A-3-10a states:** No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

**DEFINITIONS:**
"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

**EXCEPTION:** The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (***West Virginia Code*** §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

**WITNESS THE FOLLOWING SIGNATURE**

Vendor's Name: CASTO TECHNICAL SERVICES

Authorized Signature: _____ Date: 12-19-2011

State of WV

County of KANAWHA, to-wit:

Taken, subscribed, and sworn to before me this 19 day of DECEMBER, 2011.

My Commission expires August 28, 2012.

**AFFIX SEAL HERE**

**NOTARY PUBLIC** _____

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
MICHELE WELLING
ROUTE 1, BOX 173C
GIVEN, WV 25245
My commission expires August 28, 2012