

200500 – MECHANICAL GENERAL REQUIREMENTS

- A. REFERENCES: MECHANICAL AND PHYSICAL PROPERTIES OF ALL MATERIALS, AND THE DESIGN, PERFORMANCE CHARACTERISTICS, AND METHODS OF CONSTRUCTION OF ALL ITEMS OF EQUIPMENT, SHALL BE IN ACCORDANCE WITH THE LATEST ISSUE OF THE VARIOUS, APPLICABLE STANDARD SPECIFICATIONS.
 - B. PERFORMANCE REQUIREMENTS: SYSTEMS COMPONENTS PRESSURE AND TEMPERATURE RATINGS: NOT LESS THAN INDICATED AND AS REQUIRED FOR SYSTEM PRESSURES AND TEMPERATURES.
 - C. QUALITY ASSURANCE:
 - 1. SCOPE OF WORK: FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TECHNICAL SUPERVISION, AND INCIDENTAL SERVICES REQUIRED TO COMPLETE, TEST AND LEAVE READY FOR OPERATION THE MECHANICAL SYSTEMS AS SPECIFIED AND AS INDICATED IN DRAWINGS.
 - 2. ORDINANCES AND CODES: PERFORM ALL WORK IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL ORDINANCES AND REGULATIONS, THE RULES AND REGULATIONS OF ASHRAE, NFPA, SMACNA AND UL, UNLESS OTHERWISE INDICATED.
 - 3. SOURCE LIMITATIONS: EQUIPMENT OF THE SAME OR SIMILAR SYSTEMS SHALL BE BY THE SAME MANUFACTURER.
 - 4. TESTS AND INSPECTIONS: PERFORM ALL TESTS REQUIRED BY STATE, CITY, COUNTY AND/OR OTHER AGENCIES HAVING JURISDICTION. PROVIDE ALL MATERIALS, EQUIPMENT, ETC., AND LABOR REQUIRED FOR TESTS.
 - 5. SEQUENCE AND SCHEDULE: WORK SO AS TO AVOID INTERFERENCE WITH THE WORK OF OTHER TRADES. BE RESPONSIBLE FOR REMOVING AND RELOCATING ANY WORK WHICH IN THE OPINION OF THE OWNER'S REPRESENTATIVES CAUSES INTERFERENCE.
 - 6. LABELING REQUIREMENT FOR PACKAGED EQUIPMENT: ELECTRICAL PANELS ON PACKAGED MECHANICAL EQUIPMENT SHALL BEAR UL LABEL OR LABEL OF OTHER NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) (ITSNA, CSA, ETC.).
 - 7. ELECTRICAL COMPONENTS DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 - D. CODES, PERMITS AND FEES:
 - 1. UNLESS OTHERWISE INDICATED, ALL REQUIRED PERMITS, LICENSES, INSPECTIONS, APPROVALS AND FEES FOR MECHANICAL WORK SHALL BE SECURED AND PAID FOR BY THE CONTRACTOR. ALL WORK SHALL CONFORM TO ALL APPLICABLE CODES, RULES AND REGULATIONS.
 - 2. WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE RULES AND REGULATIONS SET FORTH IN LOCAL AND STATE CODES. PREPARE ANY DETAILED DRAWINGS OR DIAGRAMS WHICH MAY BE REQUIRED BY THE GOVERNING AUTHORITIES. WHERE THE DRAWINGS AND SPECIFICATIONS INDICATE MATERIALS OR CONSTRUCTION IN EXCESS OF CODE REQUIREMENTS, THE DRAWINGS AND SPECIFICATIONS SHALL GOVERN.
 - E. THE DRAWINGS SHOW LOCATION AND GENERAL ARRANGEMENT OF EQUIPMENT, PIPING AND RELATED ITEMS. FOLLOW DRAWINGS AS CLOSELY AS ELEMENTS OF THE CONSTRUCTION PERMIT.
 - F. MATERIAL AND EQUIPMENT MANUFACTURERS:
 - 1. EQUIPMENT: ALL ITEMS OF EQUIPMENT SHALL BE FURNISHED COMPLETE WITH ALL ACCESSORIES NORMALLY SUPPLIED WITH THE CATALOG ITEMS LISTED AND ALL OTHER ACCESSORIES NECESSARY FOR COMPLETE AND SATISFACTORY OPERATING SYSTEM. EQUIPMENT AND MATERIALS SHALL BE NEW AND SHALL BE STANDARD PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN THE PRODUCTION OF FIRE PROTECTION, PLUMBING, HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT; AND SHALL BE MANUFACTURER'S LATEST DESIGN.
 - 2. PACKAGE UNIT EQUIPMENT AND SKID MOUNTED MECHANICAL COMPONENTS THAT ARE FACTORY ASSEMBLED SHALL MEET, IN DETAIL, PRODUCTS NAMED AND SPECIFIED IN EACH SECTION OF MECHANICAL AND ELECTRICAL SPECIFICATIONS.
 - 3. WHERE EQUIPMENT CHANGES ARE MADE THAT INVOLVE ADDITIONAL ELECTRICAL WORK (LARGER SIZE MOTOR, ADDITIONAL WIRING OF EQUIPMENT, ETC.) THE MECHANICAL TRADES INVOLVED SHALL COMPENSATE THE ELECTRICAL TRADES FOR THE COST OF THE ADDITIONAL WORK REQUIRED.
 - G. INSPECTION OF SITE: VISIT SITE, EXAMINE AND VERIFY CONDITIONS UNDER WHICH WORK MUST BE CONDUCTED BEFORE SUBMITTING PROPOSAL. SUBMITTING OF PROPOSAL IMPLIES THAT CONTRACTOR HAS VISITED SITE AND UNDERSTANDS CONDITIONS UNDER WHICH WORK MUST BE CONDUCTED. NO ADDITIONAL CHARGES WILL BE ALLOWED BECAUSE OF FAILURE TO MAKE THIS EXAMINATION OR TO INCLUDE ALL MATERIALS AND LABOR TO COMPLETE WORK.
 - H. SUBMITTALS: SUBMIT PROJECT SPECIFIC SUBMITTALS FOR REVIEW.
 - I. DELIVERY, STORAGE, AND HANDLING: STORAGE AND PROTECTION: PROVIDE ADEQUATE WEATHER PROTECTED STORAGE SPACE FOR ALL MECHANICAL EQUIPMENT AND MATERIALS DELIVERED TO THE JOB SITE. STORAGE LOCATIONS WILL BE DESIGNATED BY THE OWNER'S REPRESENTATIVE. EQUIPMENT STORED IN UNPROTECTED AREAS MUST BE PROVIDED WITH TEMPORARY PROTECTION.
 - J. INSTRUCTION OF OWNER PERSONNEL: BEFORE FINAL INSPECTION, INSTRUCT OWNER'S DESIGNATED PERSONNEL IN OPERATION, ADJUSTMENT, AND MAINTENANCE OF MECHANICAL EQUIPMENT AND SYSTEMS AT AGREED UPON TIMES. A MINIMUM OF 24 HOURS OF FORMAL INSTRUCTION TO OWNER'S PERSONNEL SHALL BE PROVIDED FOR EACH BUILDING. ADDITIONAL HOURS ARE SPECIFIED IN INDIVIDUAL SPECIFICATION SECTIONS.
 - K. WARRANTIES: CONTRACTOR SHALL WARRANT THAT MECHANICAL INSTALLATION IS FREE FROM DEFECTS AND AGREES TO REPLACE OR REPAIR, TO OWNER'S SATISFACTION, ANY PART OF THIS MECHANICAL INSTALLATION WHICH BECOMES DEFECTIVE WITHIN A PERIOD OF ONE YEAR (UNLESS SPECIFIED OTHERWISE) FROM THE DATE OF SUBSTANTIAL COMPLETION FOLLOWING FINAL ACCEPTANCE, PROVIDED THAT SUCH FAILURE IS DUE TO DEFECTS IN EQUIPMENT, MATERIAL, WORKMANSHIP OR FAILURE TO FOLLOW CONTRACT DOCUMENTS. FILE WITH OWNER ANY AND ALL WARRANTIES FROM EQUIPMENT MANUFACTURERS INCLUDING OPERATING CONDITIONS AND PERFORMANCE CAPACITIES THEY ARE BASED ON.
 - L. MECHANICAL DEMOLITION WORK: DEMOLITION OF EXISTING MECHANICAL EQUIPMENT AND MATERIALS SHALL BE DONE BY THE CONTRACTOR UNLESS OTHERWISE INDICATED. INCLUDE ALL ITEMS SUCH AS, BUT NOT LIMITED TO, EXISTING PIPING, PUMPS, DUCTWORK, SUPPORTS AND EQUIPMENT WHERE SUCH ITEMS ARE NOT REQUIRED FOR PROPER OPERATION OF MODIFIED SYSTEM. IN GENERAL, DEMOLITION WORK IS INDICATED ON DRAWINGS. HOWEVER, THE CONTRACTOR SHALL VISIT JOB SITE TO DETERMINE FULL EXTENT AND CHARACTER OF THIS WORK.
 - M. WORK IN EXISTING BUILDINGS:
 - 1. OWNER WILL PROVIDE ACCESS TO EXISTING BUILDINGS AS REQUIRED. ACCESS REQUIREMENTS TO OCCUPIED BUILDINGS SHALL BE IDENTIFIED ON THE PROJECT SCHEDULE. CONTRACTOR, ONCE WORK IS STARTED IN EXISTING BUILDING, SHALL COMPLETE SAME WITHOUT INTERRUPTION IN ORDER TO RETURN WORK AREAS AS SOON AS POSSIBLE TO OWNER.
 - 2. ADEQUATELY PROTECT AND PRESERVE ALL EXISTING AND NEWLY INSTALLED WORK. PROMPTLY REPAIR ANY DAMAGE TO SAME AT CONTRACTOR'S EXPENSE.
 - 3. CONSULT WITH OWNER'S REPRESENTATIVE AS TO METHODS OF CARRYING ON WORK SO AS NOT TO INTERFERE WITH OWNER'S OPERATION ANY MORE THAN ABSOLUTELY NECESSARY. ACCORDINGLY, ALL SERVICE LINES SHALL BE KEPT IN OPERATION AS LONG AS POSSIBLE AND THE SERVICES SHALL ONLY BE INTERRUPTED AT SUCH TIME AS WILL BE DESIGNATED BY THE OWNER'S REPRESENTATIVE.
 - 4. PRIOR TO STARTING WORK IN ANY AREA, OBTAIN APPROVAL FOR DOING SO FROM A QUALIFIED REPRESENTATIVE OF THE OWNER WHO IS DESIGNATED AND AUTHORIZED BY THE OWNER TO PERFORM TESTING AND ABATEMENT, IF NECESSARY, OF ALL HAZARDOUS MATERIALS INCLUDING BUT NOT LIMITED TO, ASBESTOS. CONTRACTOR SHALL NOT PERFORM ANY INSPECTION, TESTING, CONTAINMENT, REMOVAL OR OTHER WORK THAT IS RELATED IN ANY WAY WHATSOEVER TO HAZARDOUS MATERIALS UNDER THE CONTRACT.
 - N. TEMPORARY SERVICES: THE EXISTING BUILDING WILL BE OCCUPIED DURING CONSTRUCTION. MAINTAIN MECHANICAL SERVICES AND PROVIDE NECESSARY TEMPORARY CONNECTIONS AND THEIR REMOVAL AT NO ADDITIONAL EXPENSE.
 - O. WORK INVOLVING OTHER TRADES: CERTAIN ITEMS OF EQUIPMENT OR MATERIALS SPECIFIED IN THE MECHANICAL DIVISION MAY HAVE TO BE INSTALLED BY OTHER TRADES DUE TO CODE REQUIREMENTS OR UNION JURISDICTIONAL REQUIREMENTS. IN SUCH INSTANCES, CONTRACTOR SHALL COMPLETE WORK THROUGH AN APPROVED, QUALIFIED SUBCONTRACTOR AND SHALL INCLUDE FULL COST FOR SAME IN PROPOSAL.
 - P. ACCEPTANCE PROCEDURE: UPON SUCCESSFUL COMPLETION OF START-UP AND RECALIBRATION, BUT PRIOR TO BUILDING ACCEPTANCE, SUBSTANTIAL COMPLETION AND COMMENCEMENT OF WARRANTIES, ARCHITECT/ENGINEER SHALL BE REQUESTED IN WRITING TO OBSERVE THE SATISFACTORY OPERATION OF ALL MECHANICAL SYSTEMS.
 - 1. CONTRACTOR SHALL DEMONSTRATE OPERATION OF EQUIPMENT AND CONTROL SYSTEMS, INCLUDING EACH INDIVIDUAL COMPONENT, TO OWNER AND ARCHITECT/ENGINEER.
 - 2. AFTER CORRECTING ALL ITEMS APPEARING ON THE PUNCH LIST, MAKE A SECOND WRITTEN REQUEST TO THE OWNER AND ARCHITECT/ENGINEER FOR OBSERVATION AND APPROVAL.
 - 3. AFTER ALL ITEMS ON PUNCH LIST ARE CORRECTED AND FORMAL APPROVAL OF MECHANICAL SYSTEMS IS PROVIDED BY ARCHITECT/ENGINEER, CONTRACTOR SHALL INDICATE TO THE OWNER IN WRITING THE COMMENCEMENT OF THE WARRANTY PERIOD.
- 232513 – WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS**
- A. FURNISH THE SERVICES OF A FIRM SPECIALIZING IN HYDRONIC PIPING SYSTEM WATER TREATMENT WORK. THIS FIRM SHALL FURNISH AND ADMINISTER GLYCOL FOR SYSTEMS USING GLYCOL/WATER MIX.
 - B. WATER QUALITY FOR HVAC SYSTEMS SHALL MINIMIZE CORROSION, SCALE BUILDUP, AND BIOLOGICAL GROWTH FOR OPTIMUM EFFICIENCY OF HVAC EQUIPMENT WITHOUT CREATING A HAZARD TO OPERATING PERSONNEL OR THE ENVIRONMENT.
 - C. BASE HVAC WATER TREATMENT ON QUALITY OF WATER AVAILABLE AT PROJECT SITE, HVAC SYSTEM EQUIPMENT MATERIAL CHARACTERISTICS AND FUNCTIONAL PERFORMANCE CHARACTERISTICS, OPERATING PERSONNEL CAPABILITIES, AND REQUIREMENTS AND GUIDELINES OF AUTHORITIES HAVING JURISDICTION.
 - D. BASE CHEMICAL QUANTITIES ON ESTIMATED SYSTEM SIZE.
 - E. CLOSED HYDRONIC SYSTEMS, INCLUDING HOT-WATER HEATING WITH NON-ALUMINUM BOILERS, SHALL HAVE THE FOLLOWING WATER QUALITIES:
 - 1. PH: MAINTAIN A VALUE WITHIN 9.0 TO 10.5.
 - 2. TP ALKALINITY: MAINTAIN A VALUE WITHIN 100 TO 500 PPM.
 - 3. BORON: MAINTAIN A VALUE WITHIN 100 TO 200 PPM.
 - 4. CHEMICAL OXYGEN DEMAND: MAINTAIN A MAXIMUM VALUE OF 100 PPM.
 - 5. SOLUBLE COPPER: MAINTAIN A MAXIMUM VALUE OF 0.20 PPM.
 - 6. TDS: MAINTAIN A MAXIMUM VALUE OF 5000 MGD.
 - 7. FREE CAUSTIC ALKALINITY: MAINTAIN A MAXIMUM VALUE OF 20 PPM.
 - 8. SCALE CONTROL: PROVIDE SUFFICIENT SCALE INHIBITORS TO PREVENT FORMATION OF SCALE AND MAINTAIN ALL SCALE-FORMING MATERIAL IN SOLUTION.
 - 9. MICROBIOLOGICAL LIMITS:
 - a. TOTAL AEROBIC PLATE COUNT: MAINTAIN A MAXIMUM VALUE OF 1000 ORGANISMS/ML.
 - b. TOTAL ANAEROBIC PLATE COUNT: MAINTAIN A MAXIMUM VALUE OF 100 ORGANISMS/ML.
 - c. AMMONIA: MAINTAIN A MAXIMUM VALUE OF 20 PPM.
 - d. NITRATE REDUCERS: MAINTAIN A MAXIMUM VALUE OF 100 ORGANISMS/ML.
 - e. SULFATE REDUCERS: MAINTAIN A MAXIMUM VALUE OF 0 ORGANISMS/ML.
 - f. IRON BACTERIA: MAINTAIN A MAXIMUM VALUE OF 0 ORGANISMS/ML.
 - F. SUBMITTALS SHALL INCLUDE WATER TREATMENT PROGRAM, INCLUDING A STEP-BY-STEP PROCEDURE TO BE FOLLOWED BY THE CONTRACTOR DURING FLUSHING, PURGING, DISINFECTING, DRAINING, DISPOSAL, PRETREATMENT AND TREATMENT OPERATIONS.
 - G. CLOSEOUTS SHALL INCLUDE FIELD QUALITY CONTROL REPORTS INCLUDING FINAL WATER QUALITY TEST REPORTS. BOILER WATER SAMPLES TAKEN AT ONE-WEEK INTERVALS AFTER INITIAL STARTUP FOR A PERIOD OF FIVE WEEKS. SAMPLES SHALL BE TAKEN ON A WEEK INTERVALS FOLLOWING SUBSTANTIAL COMPLETION ON HYDRONIC SYSTEMS TO SHOW SYSTEMS ARE MAINTAINING WATER QUALITY.
 - H. GLYCOL MANUFACTURER SHALL PROVIDE TESTING SERVICES EVERY SIX MONTHS OF SAMPLES SUBMITTED BY OWNER. FLUID SHALL BE TESTED AT NO CHARGE.
 - I. INHIBITED PROPYLENE GLYCOL: SINGLE NATIONALLY MARKETED BRAND OF PROPYLENE GLYCOL, INHIBITED FOR INDUSTRIAL APPLICATIONS. PREMIX INHIBITED GLYCOL SOLUTION AND DEIONIZED WATER TO SPECIFIC CONCENTRATION.
 - 1. MANUFACTURERS: DOW CHEMICAL, ELDON, INTERSTATE, NALCO
 - J. MANUFACTURERS/SUPPLIERS: H-O-H CHEMICALS/H.V. BURTON.
 - K. GLYCOL INSTALLATION: CLEAN AND FLUSH GLYCOL SYSTEM BEFORE ADDING PREMIXED GLYCOL SOLUTION. FILL HOT WATER HEATING SYSTEM WITH MINIMUM 25% PROPYLENE GLYCOL. PERFORM TESTS DETERMINING STRENGTH OF GLYCOL SOLUTION AND SUBMIT WRITTEN TEST RESULTS.

REVISION

REVISION



PROJECT TITLE

MARYSVILLE PUBLIC SCHOOLS
MARYSVILLE HIGH SCHOOL
GLYCOL REPLACEMENT
495 Huron Blvd., Marysville, MI 48040

Not for Construction

SHEET TITLE

MECHANICAL SPECIFICATIONS

DATE

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ISSUE

CONSTRUCTION DOCUMENTS

SHEET No.

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