This addendum forms a part of the Contract Documents and modifies the original Documents dated **May 5, 2025,** as noted below. Acknowledge receipt of this addendum in the space provided on the Official Bid Form. Failure to do so may subject the Bidder to disqualification.

REVISION TO SECTION 00 0110 — TABLE OF CONTENTS

*Disregard **original** Section 00 0110 TABLE OF CONTECTS* and replace with the **enclosed Section 00 0110 TABLE OF CONTECTS** *in its entirety.*

ENCLOSED 23 08 00 – COMMISSIONING OF HVAC – PROVIDED BY SYSTEMS WEST

Enclosed 23 08 00 – **COMMISSIONING OF HVAC,** *in its entirety.*

ENCLOSED 26 08 00 – COMMISSIONING OF ELECTICAL – PROVIDED BY SYSTEMS WEST

Enclosed 26 08 00 – **COMMISSIONING OF ELECTRICAL,** *in its entirety.*

SUBSTITUTION REQUESTS

All material or products supplied by the contractor must meet or exceed the quality and performance of the material or product originally specified. It is the contractor's responsibility to ensure that substituted equipment matches the exterior dimensions, weight, and configuration of the equipment that was specified.

APPROVED

1. Section: Hydronic Piping, Valves and Specialties
   Product: Air Separator
   Paragraph: Mechanical Sheets

   Proposed Substitution

   Manufacturer: Thrush Air Separator, TBSF-050-X
   Description: Coalescing Air / Dirt Separator

APPROVED

1. Section: M0.3
   Product: Plate and Frame Heat Exchanger HX-1
   Paragraph: Heat Exchanger Schedule

   Proposed Substitution

   Manufacturer: Paul Mueller Heat Exchanger
   Description: Plate and Frame Exchanger

REVISION TO TECHNICAL DRAWINGS BY MORRISON-MAIERLE

MECHANICAL:
DRAWINGS –
M0.2 – Mechanical Specifications

- REVISED Specification to include test and balance scope under commissioning contractor's scope

M0.3 – Mechanical Schedules

- REVISED Air-Cooled Chiller Schedule
- REVISED Ductless Mini-Split System Schedule

- REVISED Pump Schedule to add CHP-1
- REVISED MEP Coordination Schedule
- REVISED Chilled Water Coil Schedule
- ADDED Existing VRF System general note
- ADDED Commissioning Note

M0.4 – Mechanical Details
- REVISED AHU Heating/Cooling Coil Piping Detail
- REVISED Chilled Water Diagram
- ADDED Refrigerant Piping Roof Penetration Hood Detail

M0.5 – Mechanical Controls
- REVISED General Control Notes
- REVISED Chilled Water Coil Control Detail
- REVISED Chilled Water Plant Control Detail

M5.0 – Enlarged Mechanical Plans
- REVISED Enlarged Mechanical room piping plan to include separate pump for the chiller, removed wall penetration on courtyard wall, revised pipe sizing

M5.1 – Enlarged Mechanical Plans
- REVISED Enlarged Mechanical Plan – Electrical Room A125 to show refrigerant piping routing and thermostat and temperature sensor
- REVISED Enlarged Mechanical Plan – Control Room G128 to show refrigerant piping routing and thermostat and temperature sensor
- REVISED Enlarged Mechanical Plan – Dimmer Room G218 to show refrigerant piping routing and thermostat and temperature sensor
- REVISED Keynotes

M5.2 – Enlarged Mechanical Plans
- REVISED Enlarged Roof Mechanical Plan – Electrical Room A125 to show refrigerant piping routing
- REVISED Enlarged Roof Mechanical Plan – Control Room G128 to show refrigerant piping routing
- REVISED Enlarged Mechanical Plan – Dimmer Room G218 to show refrigerant piping routing
- REVISED Keynotes

ELECTRICAL:
DRAWINGS –
E0.3 – ELECTRICAL SCHEDULES AND DETAILS
- Revised MEP coordination schedule to reflect mechanical equipment revisions
- Revised chiller MCA on electrical one-line diagram
- Refer to the revised sheet, included in addendum

E0.4 – ELECTRICAL PANEL SCHEDULES
- Revised Existing Branch Panel A4MA to reflect mechanical equipment revisions
- Refer to the revised sheet, included in addendum

E5.1 – ENLARGED ELECTRICAL PLAN – LOWER LEVEL
- Revised pump layout to reflect mechanical equipment changes. Added pump CHP-1
- Refer to the revised sheet, included in addendum

END OF ADDENDUM 3

TABLE OF CONTENTS

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes Commissioning activities required for work of Division 23 Sections including but not limited to construction checks, equipment start-up, functional testing, and operator training.
   1. Comply with Section 01 91 13 – General Commissioning Requirements for Commissioning activities for Division 23 work.

1.02 SEQUENCING

A. Provide written notification to Commissioning Provider (CxP) in advance of significant project dates as directed and as listed below.
   1. Two weeks prior to start-up of air handling units, air-conditioning units, exhaust fans, chillers and pumps
   2. Four weeks prior to installation of lay-in ceiling tiles or other partial concealment of equipment to be commissioned
   3. Four weeks prior to any system ready for balancing

1.03 SUBMITTALS

A. Provide control system custom software, hardware, and technical manuals as necessary for development of Commissioning activities. Control system submittals include but are not limited to operating sequences, point database, workstation remote access, on-site custom programming/editing software, and programming and operations manual as necessary for development of Commissioning activities. Submit a minimum of 12 weeks prior to equipment start-up.

B. Provide submittals of systems being commissioned to Owner's Authorized Representative as required by Section 01 91 13.

C. Provide electronic copies (or hard copies where appropriate) of control system final configuration parameters, programs, databases, files, and electrical data as necessary to reconfigure and/or replace control components upon device failure.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide all necessary control hardware, software, and temporary licenses to enable Commissioning Provider to conduct activities and to fully access any electronic control systems furnished for this project. Commissioning Provider's laptop computer may be used for access if software and hardware systems provided are compatible with existing computer configuration, otherwise furnish laptop computer where required for duration of project.

B. Provide minimum of two HVAC control operator interface sites for both on-site and remote access as described below:
   1. Commissioning Provider Access Functions: Review and modification of control programming, monitoring of control system operations, review and modification of software database, setup, and monitoring trend data in tabular and graphical formats.

2. Remote Access: Remote access using Internet and shall include all functions described above.
3. Provide credentials for Commissioning Provider. Security access level shall be suitable to perform necessary commissioning functions.
4. Provide labor required to install hardware and software on personal computers at Commissioning Provider's office. Software will be manufacturer's most recent version and will be compatible with the CxP's personal computers. Provide Commissioning Provider with two hours training after fully functional remote access is established.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's Representative to execute Construction Checklists and perform operational training as specified in Division 23 including the following systems:
1. Chiller
2. Packaged air handlers
3. Pumps
4. Fan coils
5. Variable frequency drives
6. Building Automation System

3.02 CONSTRUCTION CHECKLISTS

A. Contractor shall execute as required by Section 01 91 13. Construction Checklists for each system commissioned will be prepared by Commissioning Provider during construction.

3.03 CONTROL VERIFICATION REPORTS

A. Building Automation System: BAS control contractor shall perform verification of the function and performance of control hardware and software. Provide verification report demonstrating proper system installation and operation. Verification report shall include the following:
1. Network Communication: Verify that all network devices properly communicate on network. Verify communication speed and reliability is acceptable.
2. Input and Output Verification:
   a. Verify that all input and output points are indicating properly. Verification tests shall be "end-to-end," meaning field measurement to workstation graphic display value.
   b. Calibrate all analog inputs. Acceptance accuracy shall be as specified for product accuracy. Repair or replace all devices that do not conform to specified accuracy.
   c. Operate all analog outputs from 0% to 100% of operating range. Verify that controlled device operates over the entire output range and that maximum and minimum operating conditions are achieved.
   d. Valves and dampers shall close fully and provide tight shutoff. Leakage rates shall not exceed specified values.
   e. Verify that all digital outputs operate controlled devices.
3. Sequence of Operation Verification: Systematically verify automatic control sequence of operation functions in field after installation is complete. Verification shall include:
   a. Time scheduling.
   b. Operating modes.
   c. Tune and adjust control loops and control sequences to optimize efficiency and performance. Control loops shall be stable and maintain desired setpoints.

4. Trending: Confirm trending utilities storage of operating data as required to verify operation and performance of control modes, sequence, and loops. Meet with Owner and CxP to review configuration, parameter interval, and duration prior to trend setup.
5. Operator Interface: Review function of operator interface. Confirm that graphic operator interface accurately depicts as-constructed system configuration and that all required content is displayed and functions as intended.
6. Alarms: Confirm alarm utilities are configured as required, alarm conditions are displaying in alarm logs and on graphic displays, and provide annunciation and reporting as required. Meet with Owner and CxP to review configuration parameters prior to alarm utility setup.
7. Coordination: Assist balancing contractor with development of control setpoints and parameters as specifically indicated or otherwise required to provide Sequence of Operation. Setpoints would include but would not be limited to actuator positions required to provide minimum ventilation rates, supply air pressure setpoints for variable air volume air distribution systems, and terminal unit calibration parameters.
8. Controls Verification Report: After system operation is completely verified, provide written certification to Owner that systems have been fully tested, are operating according to specifications, and ready for functional testing. Include documentation to the Commissioning Provider detailing verification results. Report shall include:
    a. Updated control construction drawings and equipment data that incorporates all changes made during construction.
    b. Printed as-built control code.
    c. Printed point data base.
    d. Input/Output Verification Log: Submit point verification log including point identification, control system readout value, verification measurement, and required calibration offset where applied.
    e. Sequence of Operation Verification: Submit verification test report listing complete text of control sequence and test results. Verify all specified control sequences.
    f. Trend Logs: Submit printed trend reports for the following:
        1) Time schedules. Seven-day log demonstrating that equipment operates according to programmed time schedules.
        2) Automatic control sequences. Trends shall be set-up as follows:
            a) Analog Control: Points that modulate over time shall be sampled at appropriate intervals and durations to demonstrate proper operating sequences. For example, a discharge temperature control loop would require trending during the morning warm-up mode and normal daytime operation mode. Each trend shall include all measured variables, control output signal, actual output signal, and controlled variable.
            b) Digital Control: Dual-state control or monitoring points shall be recorded as COV (+) or change of value meaning that the changed parameter only needs to be recorded after the value changes from its previous state. A minimum of one week of samples shall be provided to properly demonstrate equipment cycles, modes, and schedules.
    g. Include trend graphs as described below:
        1) Lines shall be labeled and shall be distinguishable from each other by using either different line types, or different line colors.
        2) Indicate engineering units of the y-axis values; e.g., degrees F., inches w.g., Btu/lb, percent wide open, etc.
        3) The y-axis scale shall be chosen so that all trended values are in a readable range. Do not mix trended values on one graph if their unit ranges are incompatible.
        4) All points trended for one HVAC subsystem; e.g., air handling unit, chilled water system, etc. shall be trended during the same trend period.
        5) Each graph shall be clearly labeled with HVAC subsystem title, date, and times.
    h. List of incomplete work.
9. Demonstration: Demonstrate operation of control system to Engineer, Commissioning Provider, and Owner including:

a. Menu functions.
b. Point overrides.
c. Control loop response after point modification.
d. Alarm response time.

3.04 FUNCTIONAL TESTING

A. Contractor shall assist Commissioning Provider with functional testing as required by Section 01 91 13. Functional Test Plans for each system being commissioned will be prepared by Commissioning Provider during construction and will generally include a rigorous verification of instrument calibration, equipment performance, packaged equipment control system operations, automatic control sequence of operations, fire and life safety sequences, and operator interface functions. Commissioning Provider will supervise and document functional testing. Contractor shall provide qualified technicians to assist Commissioning Provider during on-site testing and perform the following functions.
1. Operate equipment and systems as necessary to conduct testing.
2. Manipulate control parameters to simulate test conditions as detailed in Functional Test Plans.
3. Access control programming and database as required to verify control configuration or to correct observed deficiencies.
4. Create graphic displays and/or trend report as required to document test results.
5. Provide proprietary hardware and software as needed to interface with manufacturer’s packaged control systems.

B. Labor required for retesting due to failure of equipment, or systems not performing in accordance with Contract Documents shall be provided at no additional cost to Owner.

3.05 OPERATIONS AND MAINTENANCE TRAINING

A. The Contractor shall provide operation and maintenance instruction to Owner's personnel as required by Division 01 and 23.

3.06 SCHEDULE OF SYSTEMS BEING COMMISSIONED

A. Commission systems and equipment listed below, including associated equipment, piping, ductwork, and control systems.

B. HVAC Systems:

a. Air handling units and cooling coils
b. Air cooled chiller
c. Split-system air conditioning units
d. Chilled water system and pumps
e. Building automation control system
f. Packaged control systems
g. Variable frequency drives

END OF SECTION

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes Commissioning activities required for work of Division 26 Sections including but not limited to construction checks, equipment start-up, functional testing, and operator training.
   1. Comply with Section 01 91 13 – General Commissioning Requirements for Commissioning activities for Division 26 work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION CHECKLISTS

A. Contractor shall perform electrical checks as required by Section 01 91 13. Construction checklists for each system being commissioned will be prepared by Commissioning Provider during construction.
   1. Execute electrical Construction Checklists.
   2. Execute electrical connections section of the Construction Checklists for mechanical equipment as required in Section 23 08 00.

3.06 SCHEDULE OF SYSTEMS BEING COMMISSIONED

A. Commission systems and equipment listed below including associated equipment and control systems.
   1. Air cooled chiller
   2. Split-system air conditioning units
   3. Chilled water system and pumps
   4. Building automation control system
   5. Variable frequency drives

END OF SECTION

SUBSTITUTION REQUEST: DATE SUBMITTED 05/21/25

1.01 SUBMIT TO: Darek Olson,Senior Project Manager, at darek.olson@hmkco.org

1.02 PROJECT: Ridgeview High School

1.03 SPECIFIED ITEM:

A. SECTION NAME AND NUMBER: Hydronic Piping, Valves and Specialties

B. PRODUCT TYPE AND NAME AND MODEL: Air Separator

C. PARAGRAPH AND PRODUCT DESCRIPTION: Mechanical Sheets

1.04 PROPOSED SUBSTITUTION:

A. MANUFACTURER AND MODEL NUMBER(S): Thrush Air Separator, TBSF-050-X

B. PRODUCT DESCRIPTION: Coalescing Air / Dirt Separator

C. Attached data includes product description, specifications, drawings, photographs, performance, test data and **point by point comparative matrix** adequate for evaluation of request including identification of applicable data portions. Attached data also includes description of changes to Contract Documents the proposed substitution requires for proper installation.

D. It is the responsibility of the requestee to assemble a comparative matrix outlining key elements of proposed substitution.

1.05 UNDERSIGNED CERTIFIES FOLLOWING ITEMS, UNLESS MODIFIED BY ATTACHMENTS, ARE CORRECT:

A. Proposed substitution does not affect dimensions shown on the drawings.

B. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.

C. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.

D. Maintenance and service parts are available locally or readily obtainable for proposed substitution.

1.06 UNDERSIGNED FURTHER CERTIFIES FUNCTION, APPEARANCE, AND QUALITY OF PROPOSED SUBSTITUTION ARE EQUIVALENT OR SUPERIOR TO SPECIFIED ITEM.

1.07 UNDERSIGNED FURTHER CERTIFIES THAT THE MANUFACTURER OF THE PROPOSED SUBSTITUTION IS AWARE OF THIS SUBSTITUTION REQUEST AND AGREES TO THE STATEMENTS NOTED ABOVE.

1.08 UNDERSIGNED AGREES THAT THE TERMS AND CONDITIONS FOR SUBSTITUTIONS FOUND IN BIDDING DOCUMENTS APPLY TO THIS PROPOSED SUBSTITUTION.

1.09 SUBMITTED BY:

A. PRINT NAME: Rich Rowell

SIGNATURE: Rich Rowell

B. FIRM NAME: Proctor Sales Inc

C. FULL MAILING ADDRESS: 27180 SW 95th Ave, Suite 3370

City: Wilsonville State: OR Zip: 97070

D. PHONE: 503-278-6712 E-MAIL: rrowell@gopsi.com

1.10 FOR USE BY ARCHITECT OR ENGINEER

A. APPROVED OR APPROVED AS NOTED BY: Eric Weber, Morrison-Maierle

B. NOT APPROVED BY: _____

C. RECEIVED TOO LATE: _____

D. REMARKS: _____

E. DATE OF RESPONSE: May 22, 2025

END OF SECTION

SUBMITTAL DATA

Aar-O-Vent®

AIR ELIMINATOR & DIRT SEPARATOR

STANDARD VELOCITY WITH REMOVABLE or FIXED COVER

2" - 24" Flanged Connections

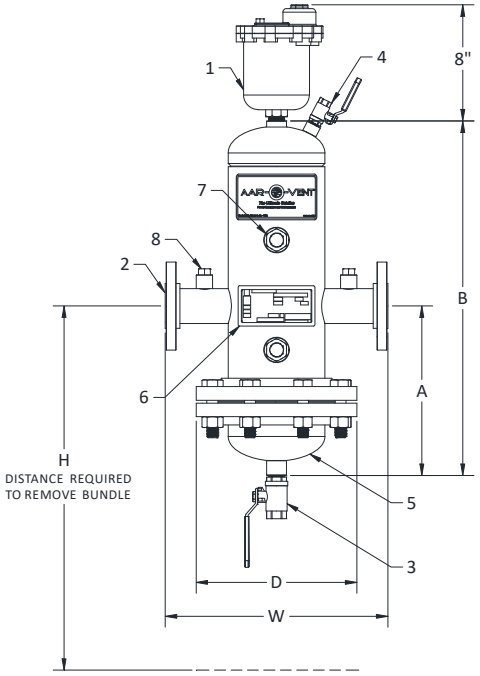
AAR-O-VENT®

Standard Features

1. Air Vent
2. Flanged Connections
3. Blow Down Valve
4. Skim Valve
5. Removable or Fixed Head
6. ASME Nameplate
7. Sight Glass (4)*
8. Gauge Tap (2)*

***Less Options:**

Minus Sight Glass x4
Minus Gauge Tap x2



MATERIALS OF CONSTRUCTION

Coalescing Media	Stainless Steel
Shell	Carbon Steel
Blow Down Valve	Bronze
Skim Valve	Bronze
Air Vent	Thrush Model 720

NOTE: IF REQUIRED, THE LOWER HEAD AND COALESCING MEDIA ARE REMOVABLE FOR CLEANING ON THE 'R' TYPE HEAD.

MAXIMUM OPERATING CONDITIONS

Maximum Working Pressure (2"-12")	175 PSIG
Maximum Working Pressure (14"-24")	150 PSIG
Maximum Working Temperature	375° F

Model Designation

T	B	S	F	-	050	-	X

Thrush

Separation Type
A=Air Only
D=Dirt Only
B=Both Air and Dirt
4=Hydraulic Separator

Velocity
S=Standard Velocity
H=High Velocity

Head Type
R=Removable
F=Fixed

Connection Size
example: 025 = 2.5"
or 100 = 10.0"

Options
W=with options
*X=less options**

DIMENSIONS

MODEL	CONNECTION SIZE**	(INCHES) A	B	D	W	H	IDEAL FLOW (GPM)	WEIGHT (LBS.) TBSR	WEIGHT (LBS.) TBSF
TBS*-020-*	2"	12.00	24.50	11.00	15.25	26.50	63	150	120
TBS*-025-*	2.5"	12.00	24.50	11.00	15.75	26.50	90	150	120
TBS*-030-*	3"	12.00	24.50	11.00	20.25	26.50	138	150	120
TBS*-040-*	4"	15.00	29.00	13.50	20.63	33.00	238	250	200
TBS*-050-*	5"	19.00	39.00	16.00	27.75	44.00	374	310	240
TBS*-060-*	6"	19.00	41.00	19.00	27.75	44.00	573	375	265
TBS*-080-*	8"	24.25	49.50	23.50	33.63	54.50	998	700	530
TBS*-100-*	10"	33.00	63.00	27.50	37.50	75.00	1544	1000	730
TBS*-120-*	12"	38.00	78.00	32.00	42.50	90.00	2205	1500	1110
TBS*-140-*	14"	43.00	94.00	35.00	45.00	104.00	2678	1950	1670
TBS*-160-*	16"	56.00	118.00	35.00	50.00	141.00	3530	2325	2045
TBS*-180-*	18"	55.00	121.00	41.62	56.00	138.00	4499	3250	2800
TBS*-200-*	20"	68.00	145.00	41.62	61.50	175.00	5586	4575	4125
TBS*-240-*	24"	73.00	150.00	55.00	72.00	175.00	7942	7250	6370

**ANSI B16.5 150 PSI FLANGE

DESIGNED AND CONSTRUCTED PER ASME SECTION VIII, DIV. 1

Job Name _____

Location _____

Engineer _____

Architect _____

Sales Rep. _____

Contractor _____

Model Number _____

Temperature _____

Capacity _____

Liquid _____

Notes _____

AAR-O-VENT®

High Performance Air & Dirt Separators

Thrush Co.Inc.

“The Ultimate Solution” for Air

Air Elimination Performance

Air removal and elimination rates can vary with various system temperatures, pressures, flow rates, and pipe velocities. They can also vary with the type of air elimination equipment used. Some equipment can only remove free air from the system. This type of air removal is usually referred to as venting or purging. Other types of equipment can remove some of the entrained air in the system water, but only to a certain level. Only a high performance air elimination device with a superior coalescing medium design, such as the Aar-O-Vent®, can remove and eliminate air down to a level that can actually absorb and remove air trapped in pockets and high points in the system.

Third party testing by an independent laboratory concluded that the Aar-O-Vent® can consistently remove greater than 99.7% of the dissolved oxygen content in a closed piping system. Removal percentages approaching 100.0% will be achieved after sufficient time is allowed. In all tests, up to 50% of the dissolved oxygen was removed from the test system in less than 1 hour. Some tests showed 50% dissolved oxygen removal in as little as 15 minutes. With sufficient time, the dissolved oxygen content can drop to 0.07%. Since air is 20% oxygen, this equates to only 0.35% air, or 99.65% air free.

This level of air elimination performance will absorb and remove air trapped in pockets and high points in the system, virtually stopping corrosion in piping systems. It also eliminates heat transfer problems and numerous pumping problems associated with trapped or entrained air in piping systems.

Dirt Separation Performance

Air is not the only contaminant that affects systems performance and component life. Dirt particles can erode pump impellers, seals, valve seats and mechanisms and other system components as well as the piping itself. By using an Aar-O-Vent ® combination air and dirt separator or a dirt only unit, dirt such as sand, metal shavings, iron oxide, and other harmful materials can be separated out of the circulating fluid.

The Aar-O-Vent ® dirt separator is unlike a filter or strainer. As the Aar-O-Vent® removes dirt from the system, the particles drop to the bottom sediment collection area of the vessel and out of the flow path. This results in zero change in pressure drop as the particles are collected, which requires less pumping energy than filter or strainer equipped systems. Particles are easily removed by opening the blow down valve in the bottom of the vessel.

Third party testing by an independent laboratory concluded that the dirt separation portion of the Aar-O-Vent® can remove 89% of the dirt particles in the 17 to 65 micron size range in as few as 50 system cycles and with enough cycles can remove up to 99% of these particles. Larger particle sizes can be removed even more quickly and effectively. (See Chart 1)

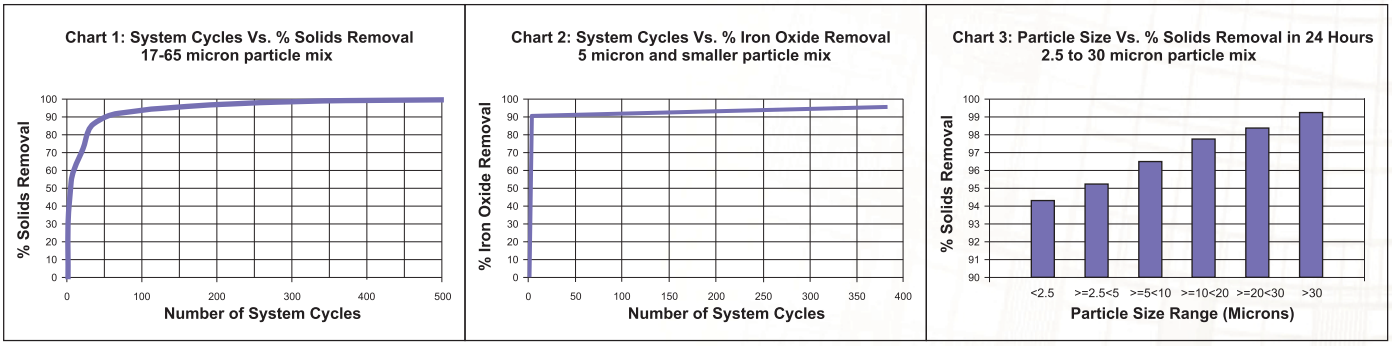


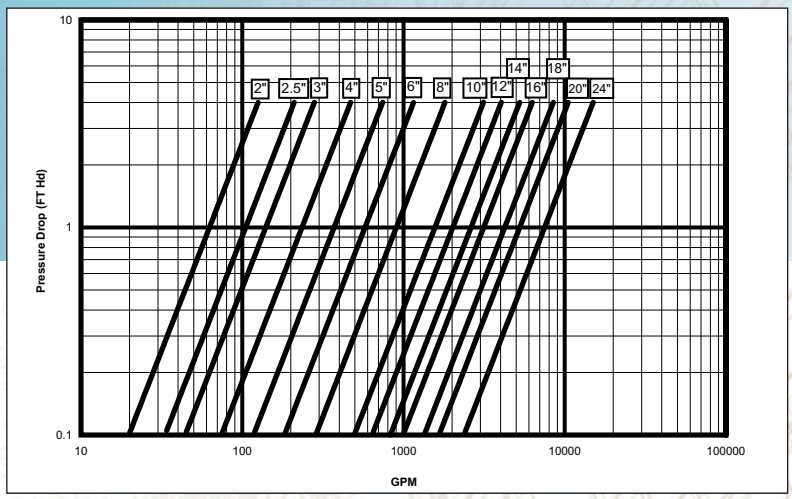
Chart 1: Testing shows that 99% of dirt particles 17 to 65 microns in size can be removed given enough system cycles.

Chart 2: Further testing shows that the Aar-O-Vent® is also effective in removing even smaller particles. In as few as 4 system cycles, up to 88% of iron oxide particles 5 microns and smaller are removed and with enough cycles up to 99% of these particle can be removed.

Chart 3: Other testing shows the percentage of removal effectiveness for a particle size range from 2.5 microns to 30 microns in 24 hours of operation.

Elimination & Dirt Separation...

Flow Rate vs. Pressure Drop Chart for All Models



Ideal Flow Rates

Connection Size	Standard Velocity Models Ideal Flow (GPM)	High Velocity Models Ideal Flow (GPM)
2”	63	105
2.5”	90	150
3”	138	230
4”	238	397
5”	374	623
6”	573	955
8”	998	1664
10”	1544	2573
12”	2205	3674
14”	2678	4463
16”	3530	5883
18”	4499	7499
20”	5586	9311
24”	7942	13236

Air Eliminator & Dirt Separator Operation Diagram

Large air bubbles quickly rise to the top of the vessel and into the vent. Micro bubbles coalesce and form larger bubbles. Entrained air is pulled out of solution and forms micro bubbles.

The Thrush Model 720 High Capacity Air Eliminator releases air as fast as it can be separated. The 720 will not allow air back into the system, even if a vacuum occurs.

Floating debris can be flushed out by opening the skim valve.

The system water contains air bubbles, entrained air, and dirt particles.

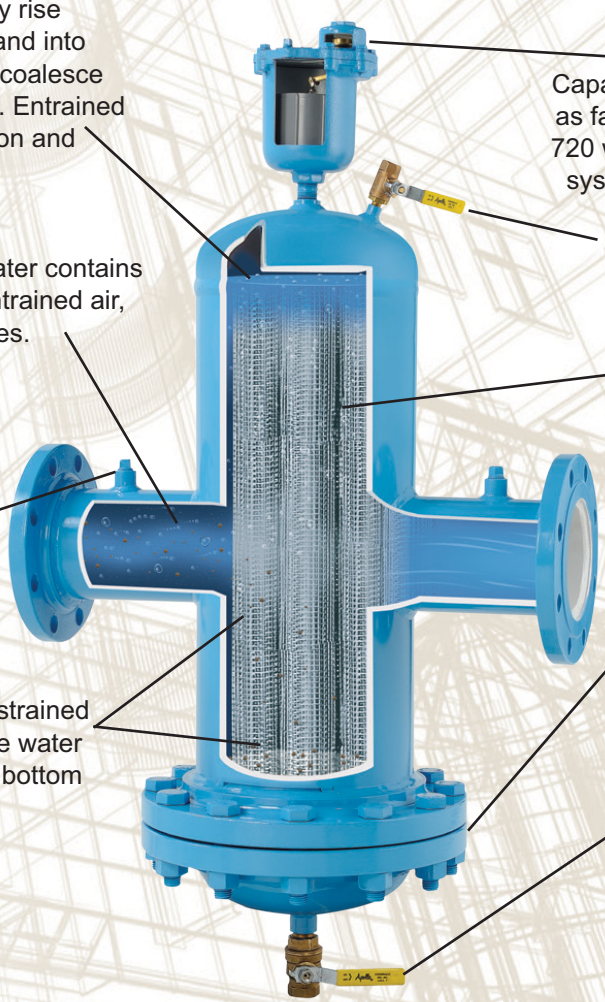
The coalescing medium separates the air and dirt from the water. Stainless steel construction provides durability and long life.

Gauge taps on both inlet and outlet connections.

Should the need to clean the coalescing medium arise, the standard removable bottom cover provides ease of removal and cleaning.

Dirt particles are strained or filtered from the water and collect in the bottom of the vessel.

Collected sediment can be flushed out through the blow down valve.



Thrush Co.Inc.

Advantages

Stainless steel coalescing medium provides superior corrosion resistance. Its non-soldered construction provides more durability and is not affected or damaged when installed in sweat fit systems.

Air elimination models utilize Thrush's unique and popular model 720 Air Eliminator, which will not allow air back into the system even if a vacuum occurs.

This design provides the highest air elimination performance and low to negligible head loss through the unit. On dirt separation models, pressure drop does not increase as the dirt collection area fills.

Standard Features

- Removable or Fixed Head
- Drain valve for blow-down of unit
- Skim valve for flushing of floating debris and
- rapid venting
- Standard pressure rating 175 PSI
- Standard temperature rating 375° F
- US Patent No. 8,177,975
- Manufactured to ASME Section VIII Division 1 standards

Options

- Front and rear sight glass for easy inspection
- Gauge tappings on inlet and outlet nozzles

Model Designation

T	B	S	R	-	040	-	W
Thrush	**Separation Type** *A=Air Only* *D=Dirt Only* *B=Both Air and Dirt* *4=Hydraulic Separator*	**Velocity** *S=Standard Velocity* *H=High Velocity*	**Head Type** *R=Removable* *F=Fixed*		**Connection Size** example: 025 = 2.5" or 100 = 10.0"		**Options** *W=with options* *X=less options*

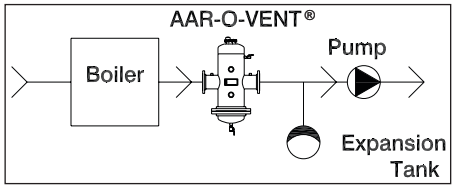
Air & Dirt Separator

High Velocity
Air & Dirt Separator

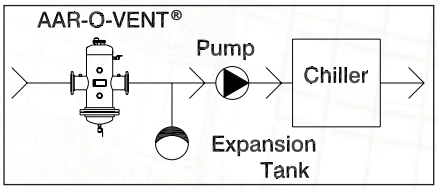
Air Separator

Dirt Separator

Heating System



Cooling System



Optimal performance of the Aar-O-Vent® is determined by proper system location.

Distributed By:

Thrush Co.Inc.

340 West 8th Street • P.O. Box 228 • Peru, IN 46970
Phone: (765) 472-3351 • Fax: (765) 472-3968
www.thrushco.com

Part # 9636-1180

Printed in U.S.A.

SUBSTITUTION REQUEST: DATE SUBMITTED 05/21/25

1.01 SUBMIT TO: Darek Olson,Senior Project Manager, at darek.olson@hmkco.org

1.02 PROJECT: Ridgeview High School

1.03 SPECIFIED ITEM:

A. SECTION NAME AND NUMBER: M0.3 - Mechanical Schedule

B. PRODUCT TYPE AND NAME AND MODEL: Plate and Frame Heat Exchanger HX-1

C. PARAGRAPH AND PRODUCT DESCRIPTION: Heat Exchanger Schedule

1.04 PROPOSED SUBSTITUTION:

A. MANUFACTURER AND MODEL NUMBER(S): Paul Mueller Heat Exchanger

B. PRODUCT DESCRIPTION: Plate and Frame Heat Exchanger

C. Attached data includes product description, specifications, drawings, photographs, performance, test data and **point by point comparative matrix** adequate for evaluation of request including identification of applicable data portions. Attached data also includes description of changes to Contract Documents the proposed substitution requires for proper installation.

D. It is the responsibility of the requestee to assemble a comparative matrix outlining key elements of proposed substitution.

1.05 UNDERSIGNED CERTIFIES FOLLOWING ITEMS, UNLESS MODIFIED BY ATTACHMENTS, ARE CORRECT:

A. Proposed substitution does not affect dimensions shown on the drawings.

B. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.

C. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.

D. Maintenance and service parts are available locally or readily obtainable for proposed substitution.

1.06 UNDERSIGNED FURTHER CERTIFIES FUNCTION, APPEARANCE, AND QUALITY OF PROPOSED SUBSTITUTION ARE EQUIVALENT OR SUPERIOR TO SPECIFIED ITEM.

1.07 UNDERSIGNED FURTHER CERTIFIES THAT THE MANUFACTURER OF THE PROPOSED SUBSTITUTION IS AWARE OF THIS SUBSTITUTION REQUEST AND AGREES TO THE STATEMENTS NOTED ABOVE.

1.08 UNDERSIGNED AGREES THAT THE TERMS AND CONDITIONS FOR SUBSTITUTIONS FOUND IN BIDDING DOCUMENTS APPLY TO THIS PROPOSED SUBSTITUTION.

1.09 SUBMITTED BY:

A. PRINT NAME: Rich Rowell

SIGNATURE: Rich Rowell

B. FIRM NAME: Proctor Sales Inc

C. FULL MAILING ADDRESS: 27180 SW 95th Ave, Suite 3370

City: Wilsonville State: OR Zip: 97070

D. PHONE: 503-278-6712 E-MAIL: rrowell@gopsi.com

1.10 FOR USE BY ARCHITECT OR ENGINEER

A. APPROVED OR APPROVED AS NOTED BY: Eric Weber, Morrison-Maierle

B. NOT APPROVED BY: _____

C. RECEIVED TOO LATE: _____

D. REMARKS: _____

E. DATE OF RESPONSE: May 22, 2025

END OF SECTION

Heat Transfer That Exceeds Expectations

ACCU-THERM® PLATE HEAT EXCHANGERS

MUELLER

Performance Guaranteed

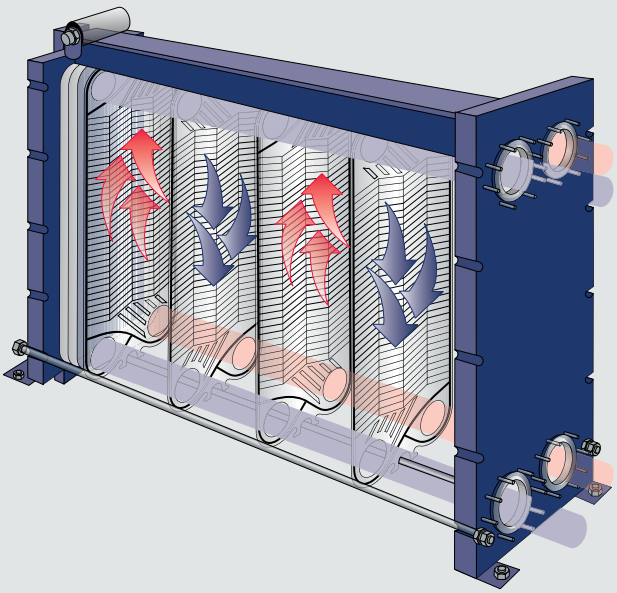
Heating and cooling processes can be difficult tasks that require time and money. Whether you are looking to conserve energy, save floor space, or make your operation more efficient, Mueller Accu-Therm® has helped improve operations in a number of different industries. Paul Mueller Company's Accu-Therm plate heat exchangers are designed to provide you worry-free, highly efficient heat transfer performance - whether you are processing simple fluids, viscous solutions, or particulates.

Every Mueller Accu-Therm unit receives rigorous quality inspections for leaks and pressure capabilities. We factor in safety, precision, maintenance and the needs of the application being performed. Combining these aspects into the design will be evident in your final product and for years to come. If your plate heat exchanger does not operate according to your exact specifications, our service technicians will make the necessary adjustments immediately.

TABLE OF CONTENTS

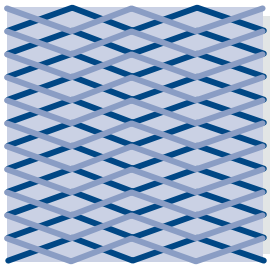
How Does Mueller Accu-Therm® Work?

An Accu-Therm Plate Heat Exchanger (PHE) consists of a series of embossed heat transfer plates with gaskets around the perimeter of every plate to contain pressure and control the flow of each medium. They can be designed for multiple fluids or thermal requirements in a single frame. Gasketed plates are assembled in a pack, mounted on upper and lower guide rails, and compressed between two end-frames with compression bolts.

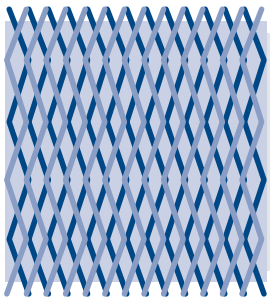


1. Fluids enter the PHE through end-frame connections and are distributed to the plates through portholes in the plates.
2. Directed by the gaskets, the fluid to be heated or cooled flows down one side of each plate, while the heating or cooling medium flows in the opposite direction on the other side of the plate.
3. The temperature difference created by these opposite flows results in the closest possible approach temperature for maximum heat transfer efficiency.
4. The heated or cooled fluid exits the PHE through end-frame connections.

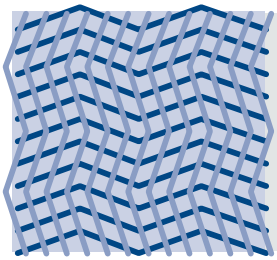
Plate Patterns



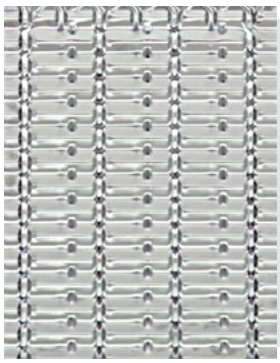
Horizontal (H)
Horizontal herringbone embossing. Highest heat transfer coefficients and pressure drop.



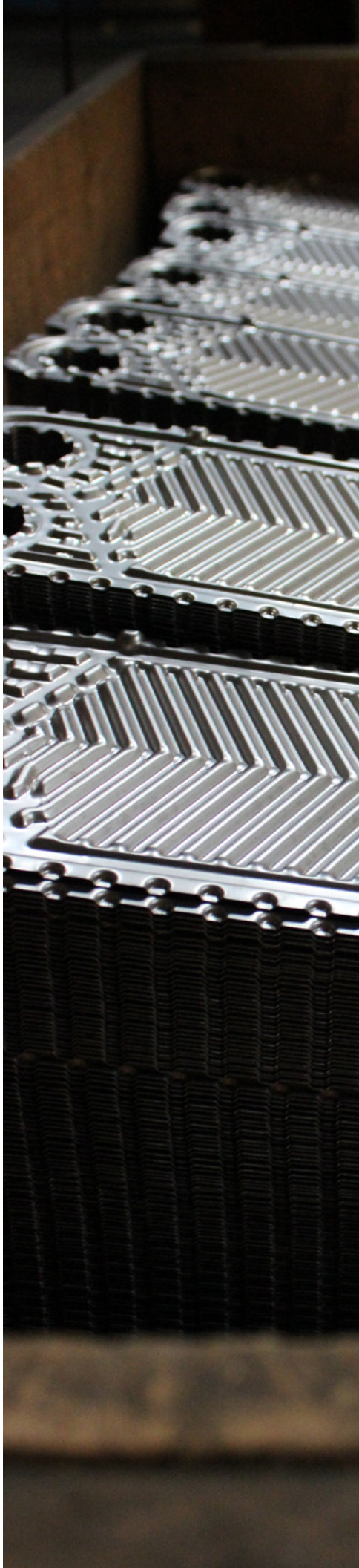
Vertical (V)
Vertical herringbone embossing. Slightly lower heat transfer coefficients and pressure drops.



Combination (H/V)
A combination of H and V plates for an intermediate range of heat transfer coefficients and pressure drop.



Free-Flow
Open fluid-flow channel, ideal for viscous products, slurries, and effluent streams that contain particles and fibers which can block the flow channels and plug up conventional heat exchangers.



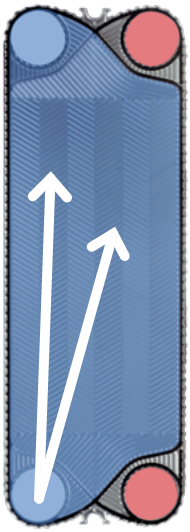
Gaskets

Mueller Accu-Therm plate heat exchangers provide efficient heat transfer by design. They can be designed for multiple fluids or thermal requirements in a single frame. The flow to individual passages between plates is controlled by alternate placement of port gaskets. Within the heat exchanger, the fluid to be heated (or cooled) flows down one side of each plate, while the heating (or cooling) medium flows in the opposite direction on the other side of the plate without cross contamination.

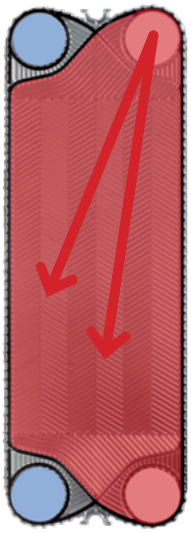
MATERIALS OF CONSTRUCTION:

- Nitrile (NBR)
- Ethylene Propylene Rubber
- Silicone
- Viton®/FKM
- Butyl (resin cured)

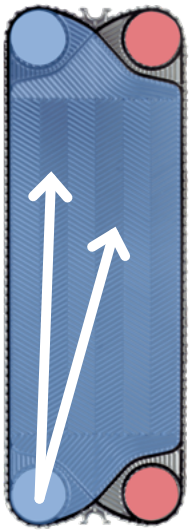
FIRST FLOW PLATE



SECOND FLOW PLATE



THIRD FLOW PLATE



Replacement Parts

When replacement parts are needed for your plate heat exchanger, contact our responsive team to get your equipment operating at maximum efficiency. Visit **paulmueller.com/heat-transfer-parts** and fill out the form to receive a quote or more information about replacement parts including:

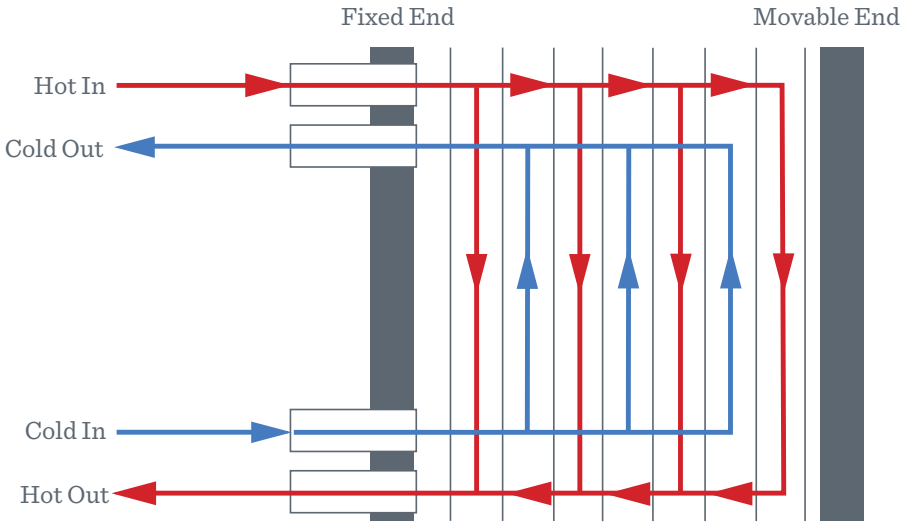
- Plate and gasket pack
- Loose gaskets
- Plate assemblies
- Port rings
- Boot liners
- Compression bolts
- Upper and lower guide bars
- Fixable and movable frames

Configurations

While hot and cold fluids flow in opposite directions across a single plate, the flow pattern between plates can vary. Plate heat exchanger flow patterns can be single or multi-pass.

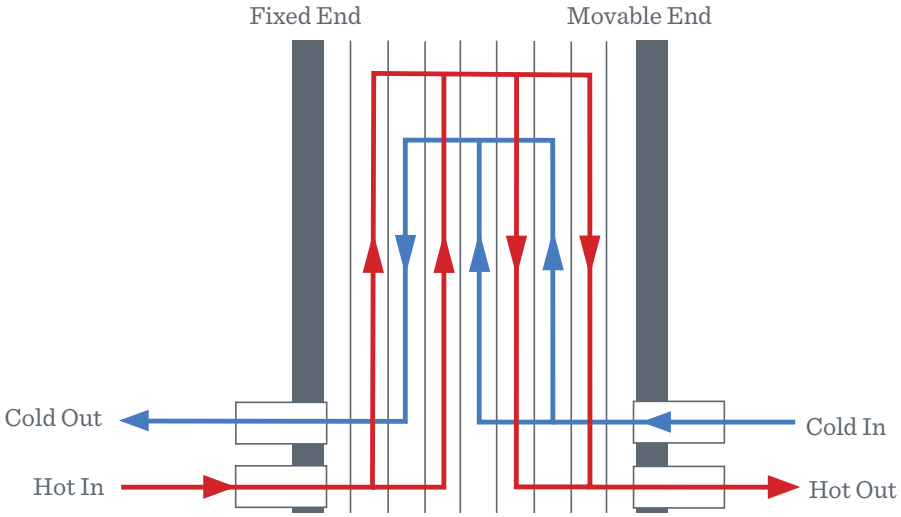
Single Pass

A single pass arrangement means each fluid flows in the same respective direction across all the plates in the unit. Single pass units are suitable for most applications.



Multi-Pass

A multi-pass arrangement is designed so fluids can change their respective flow directions. Extremely close temperatures or large temperature differences may call for a multi-pass configuration.



Types of Plate Heat Exchangers

Accu-Therm Plate Heat Exchanger

Accu-Therm Plate Heat Exchangers can be found in a wide variety of industries for a multitude of applications. Compact size, ease of maintenance, and high efficiency make them ideal for nearly any heating or cooling task. Available in an extensive range of sizes, alloys, and frame configurations to meet your needs in industries like HVAC, Chemical, Oil & Gas, and more.

Sanitary Plate Heat Exchanger

The sanitary Accu-Therm plate heat exchanger is designed to meet a variety of sanitary process applications such as Brewing, Dairy, and Food Processing. It meets or surpasses the most stringent sanitary requirements.

PHE
FRAME TYPES

B FRAME - For larger units or for applications where it is desirable to have heat transfer plates hanging from the upper guide bar.

C FRAME - These compact, cantilever-type frames are ideal for use where space is limited.

F FRAME - Intermediate-size frame.

Semi-Welded Plate Heat Exchanger

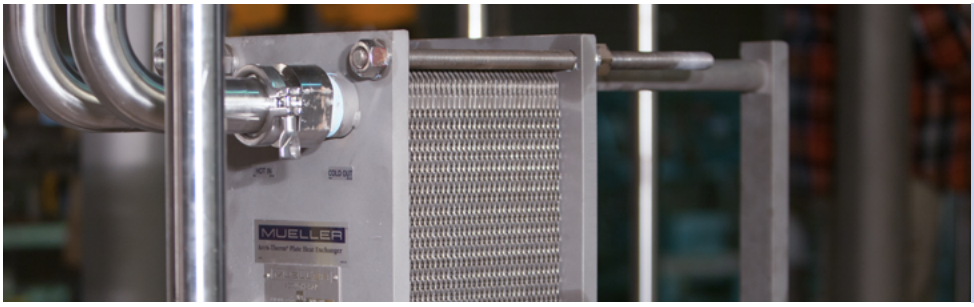
Paul Mueller Company's semi-welded plate heat exchanger is ideal for solution chilling and refrigerant condensing in refrigeration applications.

Semi-Welded applications typically use refrigerant or fluid that is corrosive to gasket materials on the welded side of the heat exchanger. The welded cassettes are designed for optimum gasket sealing. Higher pressures improve the sealing of the gaskets.

The plate pack is built utilizing welding cassettes (two plates welded together). The refrigerant side is contained within the welded portion of the cassette to include welding of the solution port. Gaskets are used to seal the secondary side, which makes the plate pack easy to disassemble and clean.

Brazed Plate Heat Exchanger

Paul Mueller Company offers an extensive range of brazed plate heat exchangers, large and small, to meet your application and the program is constantly being expanded. Many of these units are available in stock and can be shipped the next day in most cases. There is also a network of stocking distributors which can give you immediate access to things you need right away.



MATERIALS OF CONSTRUCTION:

- 304 and 316 Stainless Steel
- Hastelloy®
- Titanium
- Avesta SMO 254®
- Nickel
- Incolo

Applications

BEVERAGE

- Beer Fermenting
- Distilled Water
- Beverage Processing

CHEMICAL

- Chemical Storage
- Pilot Plant Scale Up
- Plating and Anodizing

FOOD

- Egg Processing
- Liquid Food Processing
- Fats and Oils Processing
- Equipment Cleaning
- Post Harvest Chilling
- Bakery Chilling

HEAT TRANSFER

- Custom Heat Transfer
- Energy Recovery
- Engine Cooling
- OEM
- Carpet Drying
- Industrial Tank Heating

HVAC

- Cooling Tower Isolation
- Free Cooling
- Steam to Water Heating

OIL & GAS

- Crude Oil Stabilization
- Gas Dehydration
- Condensing

PERSONAL CARE

- Hair Care
- Cosmetics
- Shower Gels

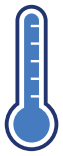
Features & Benefits

EFFICIENCY

- "U" values of 1,500 and greater are possible
- Accu-Therm plates promote high turbulence at low fluid velocities
- High turbulence results in very high heat transfer coefficients
- **Multiple Duties with a Single Unit:** Heat or cool two or more fluids within the same unit by installing intermediate divider sections
- **More Heat Transfer surface:** Up to 25,000 sq. ft. of heat transfer surface in a single exchanger

LOWER COSTS

- More economical than other types of heat exchangers due to the higher thermal efficiency and lower manufacturing costs



CLOSER APPROACH TEMPERATURES

- Approach temperatures of 2 to 3°F are possible because of the true counterflow and high heat transfer efficiency of the plates

EASE OF CLEANING AND MAINTENANCE

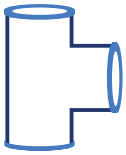
- Simply remove the compression bolts and slide away the moveable end frame to inspect 100% of the Accu-Therm heat transfer surface
- Easy and economical to clean-in-place (CIP)

EXPANDABLE

- Adjust the unit's thermal performance by adding or removing plates

CROSS CONTAMINATION ELIMINATED

- Each medium is individually gasketed
- The space between gaskets is vented to atmosphere



CONNECTIONS

- Studded ports are standard and can be fully lined to protect against erosion and corrosion of the frame
- Lap-joint, weld-neck, ferrule, and victaulic connections are also available
- Connections can be mixed and matched to suit individual needs

COMPACT AND LIGHTWEIGHT

- In comparison to shell and tube heat exchangers, PHE's of similar capacity require only $^{1}/_{5}$ to $^{1}/_{2}$ the floor space
- Lighter in total weight than equivalent heat exchangers because of reduced liquid volume and more efficient surface area for a given application

HIGH FLOW RATES

- Flows up to 24,000 gpm
- Port diameters up to 16"

INSPECTION AND TESTING

- Rigorous quality assurance inspections
- Each circuit independently tested at full design pressure
- ASME registration available

REDUCED FOULING

- High turbulence, uniform fluid distribution, smooth plate surface, and high shear stresses reduce fouling

SHROUDS

- Optional OSHA-approved plate pack shrouds are available in attractive and durable embossed aluminum or 2B stainless steel to protect personnel

How a Heat Transfer Consultation Saved a Brewery Money

Whether you are installing heat transfer in your end product or using it in your direct operations it can be a real energy saver. However getting the right specifications is crucial and understanding the detailed spec sheet can be daunting. There are always challenges - what if you don't get it right? What if the resulting product is not what you need? Sometimes it helps to double check the infinite details affecting flow rates, pressure drops, and heat loads. A quick phone consultation might even help you make beer better.

When Tanner Beers (yes, that's his real name) was head brewer at Anthem Brewery in Oklahoma City, Oklahoma, he found the value of a Paul Mueller Company heat transfer consultation after he found contamination in his beer. Tanner had purchased a used Paul Mueller Company plate heat exchanger on the open market. Because the used PHE came from an unknown source, there was no way to know if the heat exchanger was configured for a brewery, what kind of parts had been replaced on it or what the previous owners used to clean the plates.

Tanner called up Paul Mueller Company and the heat transfer group was able to help Tanner track down the origin of the unit. It was a dairy farm equipment plate heat exchanger from 2001!

Using City Water to Cool Wort

Mueller process engineer Victor Shafer consulted with Tanner on the contaminated beer and was able to determine Tanner had a leaky plate in his heat exchanger, but as he delved into Tanner's brewing process, he realized the brewery's chiller compressor was running constantly. It was taking too much energy to cool the wort.

Victor talked to Tanner about using city water to cool the wort down as a first step in decreasing the chiller compressor runtime. Paul Mueller Company also recommended a heat exchanger plate pack that worked more effectively in the brewery's operation.

"I was appreciative he called and talked me through some energy efficiency options that I wasn't even aware of." Said Tanner. "Everything worked the way Mueller said it would and I was able to knock out my brewing process 20% faster than before all while keeping the glycol cooler and the hot water hotter"

Continued Energy Savings in the Brewery

The energy savings will continue to add up over the lifetime usage of the upgraded cooling system, thanks to the consultation and a new plate pack!

You want to get the most efficient and cost savings solution you can too. We can offer you the same problem-solving guidance Tanner received, when you sign up for our free heat transfer consultation. Our experts have 75-years of experience guiding us and we want to support you by:

- Advising on how we have seen certain fluids affect certain materials
- Explaining how even slight temperature differences can change your process
- Calculating the right amount of heat and cold exchange needed for optimal efficiency
- Consulting on the best frame options for your needs today, with room for growth tomorrow

Academy

Get the most out of your Plate Heat Exchanger.

Find articles, guides, and other resources dedicated to PHE maintenance, applications, and more at **ACADEMY.PAULMUELLER.COM**

How to Troubleshoot a Plate Heat Exchanger

Plate Heat Exchangers are an integral part of your system, so when issues arise, it's important to determine whether the problem is a one-time complication or an inherent flaw in your system. Resolving any issue begins with identifying the symptoms of your under-performing heat exchanger. The most common of these symptoms are:

- Increased pressure drop from inlet to outlet
- Loss of heat transfer efficiency
- Loss of flow and performance
- Process fluid leakage

Pressure drop, transfer efficiency, and flow loss typically result from plate fouling while process fluid leakage usually develops from gasket failure. However, gasket failure or the more rare case of plate cracks can lead to any of the these symptoms. Taking the simple steps to determine the underlying cause is essential.

Gasket Failure

When troubleshooting PHEs, the easiest problem to identify is gasket failure. When a gasket fails, pressure forces fluid through the leak and it drips out of the PHE from the offending gasket, making it easy to locate. To resolve this issue, disassemble the PHE and remove both the plate with the failed gasket and an adjacent plate (to keep the flow pattern intact). If spare gaskets are available, simply replace the failed gasket, reassemble, tighten your PHE to specification, and put it back in service. If replacement parts are unavailable and downtime is not an option, the PHE can be closed and put back into service until new gaskets arrive. Operating with two fewer plates will only slightly impact performance. It's important to use caution when tightening a PHE with missing plates. Information on safe reassembly can be found in your manual or provided by the manufacturer.

The most common causes of a failed gasket are incompatible fluids and/or excessive pressure. Make sure your pressures are within specifications, your system is free of potential water hammers, and the gaskets are rated for your materials. If gaskets develop holes, your fluid is likely too hot or too corrosive and the gaskets should be replaced with those more suited to your process.

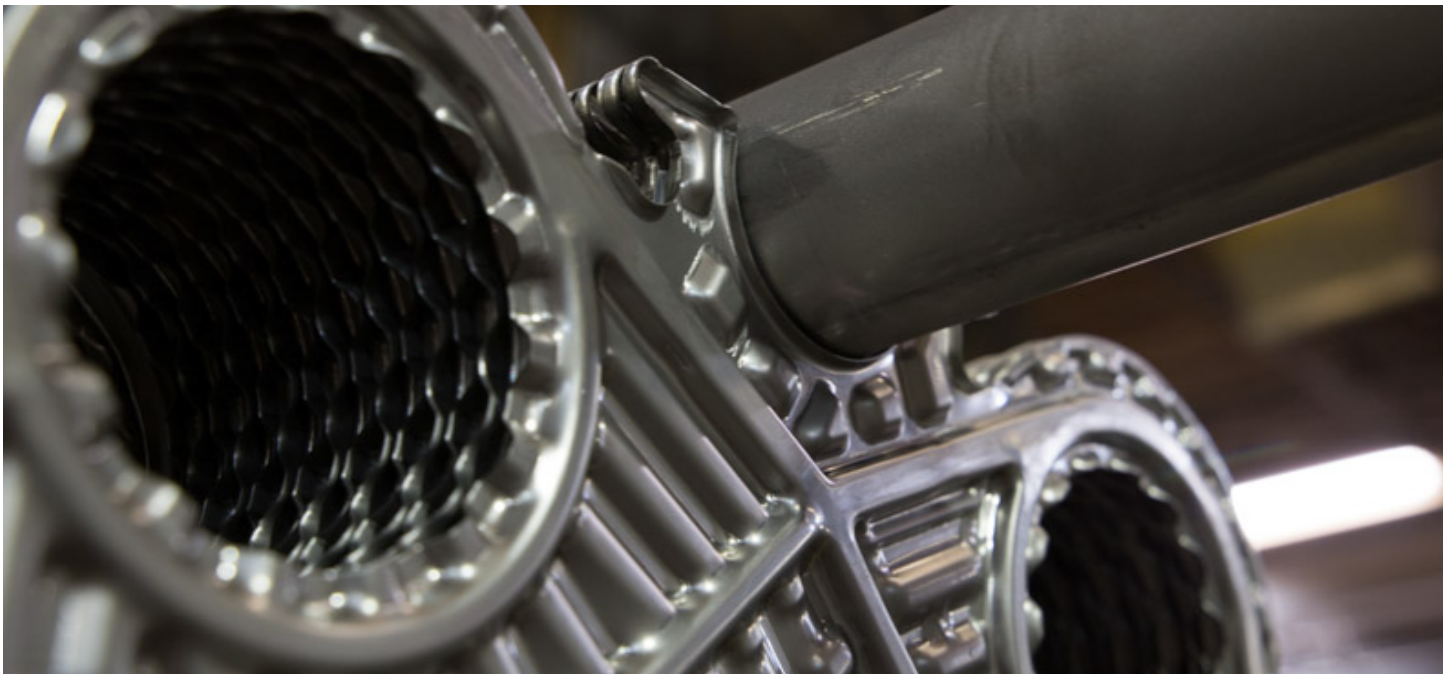
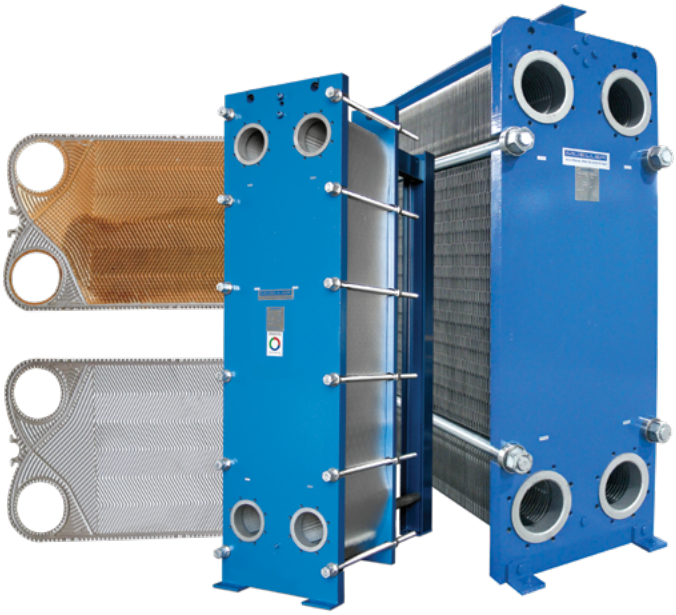


Plate Fouling and Corrosion

Plate fouling is a common issue with PHEs, but is preventable with a proper maintenance and cleaning schedule. Regular visual examinations are important–make sure the plate pack is tightened to specification, the carrying and guide bars are lubricated, and the gaskets are undamaged. Check the pressure gauges to ensure the pressure drop is within the expected limits. The best option for preventing plate fouling is cleaning your PHE regularly either through a clean-in-place (CIP) process or disassembly and manual cleaning. A CIP process involves draining both sides of the PHE and flushing them with water or a compatible cleaning agent to remove debris or build-up. In some cases, manual cleaning of the PHE may be required. Manual cleaning of plates can be done without removing them from the frame. Cleaning agents, a high pressure washer, and a soft bristle brush are recommended for proper manual cleaning of plates.



Routine cleaning and maintenance of your PHE are excellent preventative practices to avoid plate fouling or other issues that cause equipment to fail. For more information or questions regarding maintenance habits, contact one of our representatives at Paul Mueller Company.

Custom Designing your PHE

Let our engineers figure out the exact plate size and channel configuration to fit your custom application. The chart below includes the necessary information to report specs. For assistance or to submit your application, contact your Mueller representative or call +1-417-575-9000.

	Hot Side	Cold Side
Fluid Circulated		
Flow Rate, gpm		
Temperature In, °F		
Temperature Out, °F		
Max. Allowable Working		
Temperature		
Operating Pressure, psig		
Max. Allowable Working		
Pressure, psig		
Max. Pressure Drop, psi		
Specific Heat		
Specific Gravity		
Density		
Viscosity		
Thermal Conductivity		
Required Gasket Material		
Required Plate Material		
ASME Code		
Requirements		

FOR MORE INFORMATION OR TO SUBMIT YOUR APPLICATION, VISIT

paulmueller.com

Delivery of your PHE

Mueller Transportation Inc., a subsidiary of Paul Mueller Company, has the capability to deliver equipment by our own fleet of trucks and experienced drivers.

Seamless Equipment Transportation

Crafting your new equipment is just one piece of the project. Mueller Transportation Inc. provides complete oversight, care, and delivery of your equipment, no matter the shape or size. Safety and on-time delivery are top priorities as we make the transition from our manufacturing floor to your front door.

Hassle Free

Our team of specialized drivers and installers take full responsibility of your equipment through delivery, installation, and beyond. With more than 100 years of combined service and experience in the industry, Mueller Transportation minimizes risk and keeps your project on track.

Services

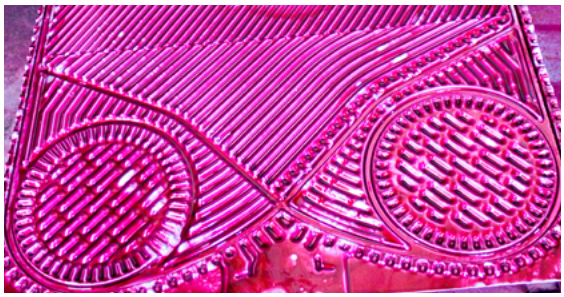
Heat Transfer Installation

Whether you need a new heat transfer system installed or your existing system modified, our Paul Mueller Company service technicians have the necessary experience to deliver your energy source where you need it most.

Depending on your specific application, we can help you engineer the most efficient heat transfer solution for your equipment and provide installation. With our expertise, we can ensure that your heat transfer system is keeping your process at the right temperatures.

Dye Penetrant Testing

To ensure the reliability and effectiveness of our plate heat exchangers, we utilize dye penetrant testing. This non-destructive method of testing allows for hygienic and thorough detection of potential defects such as leaks, cracks, and pinholes. By detecting these defects early, you can avoid equipment failure, cross-contamination of your products, and ultimately, loss of production time. We offer this service on any manufacturer's plate heat exchanger.

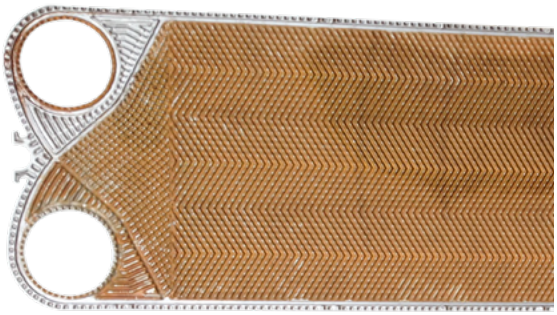


Modifications

As your processing needs change, it may become necessary for modifications to be made to your plate heat exchangers. No matter what heating or cooling requirements you may have, our field service team is fully equipped to make the transition that you need. With our expertise, we can get any manufacturer's heat exchanger functioning exactly the way your process requires.

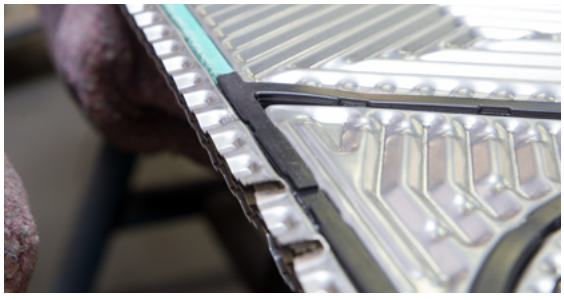
Fouling Removal

When debris and unwanted substances accumulate on the surfaces of your plate heat exchangers and cause fouling, your operational process can rapidly lose efficiency or even halt altogether. Our field service team is equipped with the expertise to quickly and efficiently remove fouling. With proven techniques, we ensure that your downtime is reduced and that your process gets back on track.



Leak Repair

Our expert team of technicians can identify and repair leaks in your plate heat exchangers so your process is back up and running at optimal efficiency.



Consult with Our Experts

THE AMERICAS

U.S. Headquarters
1600 W. Phelps St.
Springfield, MO 65802
+1-417-575-9000
contact@paulmueller.com

Iowa Manufacturing
1715 Tieken Dr.
Osceola, Iowa 50213
+1-641-342-6531

EUROPE, AFRICA, & MIDDLE EAST

The Netherlands
Noordgang 14, 7141 JP
Groenlo, Netherlands
+31 (0)88-683 0000
info@paulmueller.com

Netherlands Service
088-683 0010

ASIA PACIFIC

Vietnam
Unit 601, Empire Tower
26-28 Ham Nghi Street
District 1
Ho Chi Minh City, Vietnam
+84 982 071 506
infomuellerasia@paulmueller.com

Heat Transfer Manufacturing Representative Locator

Nearly 100 Paul Mueller Company representatives across the globe are trained, knowledgeable, and ready to provide a solution to your heat transfer needs.

Our online interactive tool displays our heat transfer representative names, locations,contact information, and directions. To speak to the representative nearest you, visit:

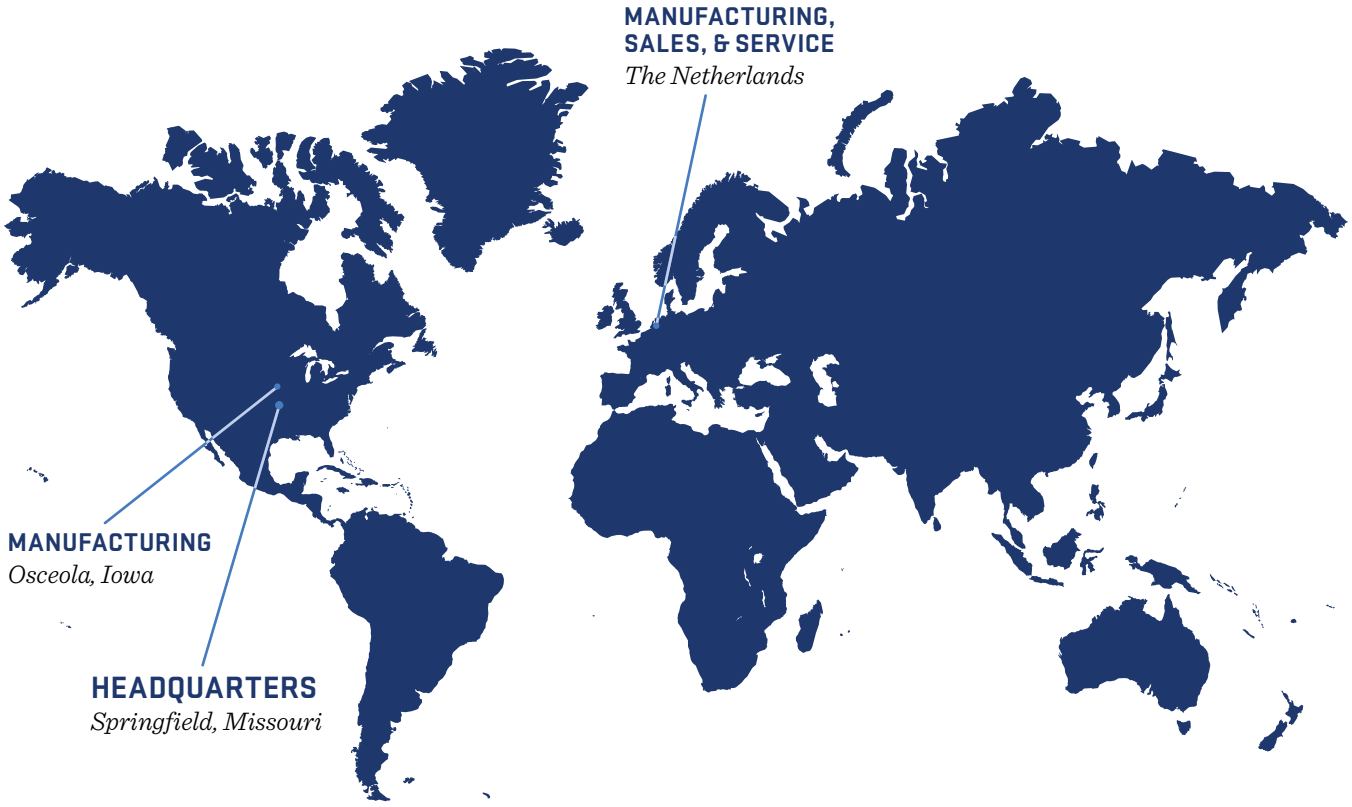
paulmueller.com/heat-transfer-representatives

Notes

PAUL MUELLER COMPANY

PAUL MUELLER, OUR FOUNDER

At Paul Mueller Company, we are united by a belief that the only quality that matters is quality that works for life. With every piece of processing equipment we build, our goal is to have lasting impact. This collective vision has led us from a small sheet metal shop to a global supplier of heating, cooling, processing, and storage solutions. Our equipment allows engineers, brewers, and food producers to keep operations running as intended. Whether our equipment is used to cool a ship engine or process a refreshing beverage, we are making an impact across the globe.



contact@paulmueller.com
1-800-MUELLER | WWW.PAULMUELLER.COM

MECHANICAL SPECIFICATIONS

GENERAL

1. THE MECHANICAL CONTRACTOR SHALL INCLUDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS AND METHODS LISTED, MENTIONED, OR SCHEDULED IN THESE SPECIFICATIONS AND THE ACCOMPANYING DRAWINGS. ALL MATERIAL, EQUIPMENT, AND LABOR SHALL BE FURNISHED TOGETHER WITH ALL INCIDENTAL ITEMS REQUIRED BY GOOD PRACTICE TO PROVIDE THE COMPLETE SYSTEMS DESCRIBED.
2. EXAMINE AND REFER TO ALL ARCHITECTURAL, CIVIL, STRUCTURAL, ELECTRICAL, UTILITY, LANDSCAPE AND MECHANICAL DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION CONDITIONS WHICH MAY AFFECT THE MECHANICAL WORK. INSPECT THE BUILDING SITE AND EXISTING FACILITIES FOR VERIFICATION OF PRESENT CONDITIONS. MAKE PROPER PROVISIONS FOR THESE CONDITIONS IN PERFORMANCE OF THE WORK AND COST THEREOF.
3. ALL WORK ON THE PROJECT SHALL CONFORM TO ALL ADOPTED CITY, STATE, AND NATIONAL CODES & REGULATIONS. SUCH CODES & REGULATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE IBC, IMC, IECC, UPC, NFPA, NEC, SERVICING UTILITY COMPANIES AND THE AUTHORITY HAVING JURISDICTION.
4. THE MECHANICAL AND ELECTRICAL CONTRACTORS SHALL BE RESPONSIBLE FOR AND PAY FOR ALL FEES AND PERMITS REQUIRED FOR WORK UNDER THEIR CONTRACT AND UNDER THEIR SUPERVISION BY SUBCONTRACT.
5. ALL USAGE CONTRACTS BETWEEN THE OWNER AND THE SERVING UTILITIES COMPANY, SUCH AS MEMBERSHIP AND USAGE CHARGES OR FEES, ETC., FOR THE PURPOSE OF OBTAINING THE SERVICES FOR THE UTILITY COMPANY SHALL BE APPLIED FOR AND PAID FOR BY THE OWNER.

RESPONSIBILITY

1. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF A SATISFACTORY AND COMPLETE SYSTEM IN ACCORDANCE WITH THE INTENT OF THE DRAWING AND SPECIFICATIONS. PROVIDE, AT NO EXTRA COST, ALL INCIDENTAL ITEMS, MATERIALS, ACCESSORIES AND LABOR REQUIRED FOR COMPLETION OF THE WORK EVEN THOUGH THEY ARE NOT SPECIFICALLY MENTIONED OR INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
2. THE DRAWINGS DO NOT ATTEMPT TO SHOW COMPLETE DETAILS OF THE BUILDING CONSTRUCTION WHICH AFFECT THE MECHANICAL INSTALLATION; AND REFERENCE IS THEREFORE REQUIRED TO THE ARCHITECTURAL, CIVIL, STRUCTURAL, LANDSCAPE AND ELECTRICAL DRAWINGS AND SPECIFICATIONS AND TO SHOP DRAWINGS OF ALL TRADES FOR ADDITIONAL DETAILS WHICH AFFECT THE INSTALLATION OF THE WORK COVERED UNDER THIS DIVISION OF THE CONTRACT.
3. LOCATION OF MECHANICAL SYSTEM COMPONENTS SHALL BE CHECKED FOR CONFLICTS WITH OPENINGS, STRUCTURAL MEMBERS AND COMPONENTS OF OTHER SYSTEMS HAVING FIXED LOCATIONS. IN THE EVENT OF ANY CONFLICTS, THE ARCHITECT/ENGINEER SHALL BE CONSULTED AND THEIR DECISION SHALL GOVERN. NECESSARY CHANGES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.
4. DO NOT INSTALL EQUIPMENT UNTIL COMPLETE SHOP DRAWINGS OF SUCH EQUIPMENT HAVE BEEN APPROVED BY THE ARCHITECT/ENGINEER. ANY WORK INSTALLED BY THE CONTRACTOR, PRIOR TO APPROVAL OF SHOP DRAWINGS, WILL BE AT THE CONTRACTOR'S RISK.
5. ALL MODIFICATIONS AND CHANGES REQUIRED DUE TO INSTALLATION OF EQUIPMENT OTHER THAN THE EQUIPMENT SCHEDULED AND SPECIFIED SHALL BE MADE AT THE CONTRACTOR'S EXPENSE, THIS INCLUDES WORK BY OTHER TRADES. IF THE INSTALLATION OF EQUIPMENT OTHER THAN THE SCHEDULED AND SPECIFIED EQUIPMENT REQUIRES MODIFICATIONS TO STRUCTURE, ELECTRICAL SYSTEMS, PLUMBING SYSTEMS, FIRE PROTECTION OR FIRE ALARM SYSTEMS, ANY AND ALL CHANGES SHALL BE MADE AT THE MECHANICAL CONTRACTORS EXPENSE.
6. ALL WORK TO BE PERFORMED SHALL FIRST BE SCHEDULED AND SUBMITTED TO THE OWNER'S REPRESENTATIVE FOR ACCEPTANCE.
7. THE CONTRACTOR SHALL BE CAREFUL NOT TO BLOCK ANY PATHS OF EGRESS WHILE PERFORMING THE WORK SPECIFIED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP OF ALL MATERIALS RESULTING FROM HIS/HER WORK. CLEANUP SHALL BE PERFORMED TO THE LEVEL OF ACCEPTANCE OF THE OWNER'S REPRESENTATIVE & THE ENGINEER.
9. THE CONTRACTOR SHALL GUARANTEE THAT ALL WORK EXECUTED UNDER THEIR CONTRACT SHALL BE FREE OF DEFECTS OF MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.

INTENT OF DRAWINGS

1. THE DRAWINGS ARE PARTLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EXACT LOCATION OF PIPING AND DUCTWORK UNLESS SPECIFICALLY DIMENSIONED. RISER AND OTHER DIAGRAMS ARE SCHEMATIC AND DO NOT NECESSARILY SHOW THE PHYSICAL ARRANGEMENT OF THE EQUIPMENT. THEY SHALL NOT BE USED FOR OBTAINING LINEAL RUNS OF PIPING OR DUCTWORK, NOR SHALL THEY BE USED FOR SHOP DRAWINGS FOR PIPING AND DUCTWORK FABRICATION OR ORDERING. DISCREPANCIES SHOWN ON DIFFERENT PLANS, OR BETWEEN PLANS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR RESOLUTION.

MATERIALS AND EQUIPMENT

1. MANUFACTURER'S TRADE NAMES AND CATALOG NUMBERS ARE LISTED TO INDICATE THE QUALITY OF EQUIPMENT OR MATERIALS DESIRED FOR INSTALLATION. ALTERNATIVE EQUIPMENT OR MATERIALS MAY BE SUBMITTED FOR PRIOR APPROVAL BEFORE BIDDING THE PROJECT. NO SUBSTITUTIONS WILL BE ALLOWED AFTER BIDDING.
2. WRITTEN PRIOR APPROVAL FOR SUBSTITUTIONS MUST BE SUBMITTED TO AND RECEIVED BY THE ARCHITECT/ENGINEER SEVEN (7) DAYS PRIOR TO BID OPENING. REQUESTS FOR SUBSTITUTION ARE TO BE SUBMITTED SUFFICIENTLY AHEAD OF THE DEADLINE TO GIVE AMPLE TIME FOR EXAMINATION. PRIOR APPROVAL REQUEST FOR SUBSTITUTION MUST INDICATE THE SPECIFIC ITEM OR ITEMS TO BE FURNISHED IN LIEU OF THOSE SCHEDULED, TOGETHER WITH COMPLETE TECHNICAL AND COMPARATIVE DATA ON SCHEDULED ITEMS AND ITEMS PROPOSED FOR SUBSTITUTION.
3. HIGH ALTITUDE OPERATION: CAPACITY OF ALL EQUIPMENT IS TO BE SIZED AND MANUFACTURED TO PERFORM AT THE ELEVATION OF THE PROJECT SITE. IF NOT SPECIFICALLY INDICATED IN THE EQUIPMENT SCHEDULE OR IN THE SPECIFICATIONS PROVIDE ALL REQUIRED ACCESSORIES AND EQUIPMENT FOR PROPER OPERATION AT ELEVATION OF THE PROJECT SITE.
4. STORE MATERIALS AND EQUIPMENT INDOORS AT THE JOB SITE OR, IF THIS IS NOT POSSIBLE, STORE ON RAISED PLATFORMS AND PROTECT FROM THE WEATHER BY MEANS OF WATERPROOF COVERS. COVERINGS SHALL PERMIT CIRCULATION OF AIR AROUND THE MATERIALS TO PREVENT CONDENSATION OF MOISTURE. SCREEN OR CAP OPENINGS IN EQUIPMENT TO PREVENT THE ENTRY OF VERMIN.
5. ALL NEW PIPING SHALL BE IDENTIFIED WITH SETON SET MARK PIPE MARKERS, LETTERED TO MATCH EXISTING - IF APPLICABLE - AND MARKED AT A MAXIMUM OF EVERY 25 FT. ALL NEW VALVES SHALL BE IDENTIFIED WITH BRASS OR ALUMINUM VALVE TAGS.

MATERIALS AND EQUIPMENT (CONT.)

6. SEE THE DUCTWORK SCHEDULE AND MECHANICAL PIPING SCHEDULE ON THE DRAWINGS FOR MATERIAL AND INSULATION REQUIREMENTS.
7. COORDINATE THE INSTALLATION OF GRILLES, REGISTERS AND DIFFUSERS WITH THE ARCHITECTURAL REFLECTED CEILING PLANS AND THE ELECTRICAL LIGHTING PLANS.
8. VERIFY THE LOCATION OF THERMOSTATS AND SENSORS WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. INSTALL THERMOSTATS 48" ABOVE FINISHED FLOOR PER ADA REQUIREMENTS.
9. PROVIDE AND INSTALL SEISMIC BRACING FOR ALL EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE.
10. FLEXIBLE DUCTWORK BETWEEN BRANCH DUCTS AND GRILLES, REGISTERS OR DIFFUSERS SHALL BE LIMITED TO 5FT.
11. INSTALL ACCESSIBLE PLUMBING FIXTURES IN COMPLIANCE WITH ADA REQUIREMENTS. INSULATE ALL EXPOSED PIPING BELOW ADA ACCESSIBLE FIXTURES.
12. INSTALL FLOOR DRAIN STRAINERS AND CLEANOUT COVERS FLUSH AND LEVEL WITH FINISHED FLOOR.
13. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE-CAULKING ALL FIRE-RATED AND SMOKE-RATED WALL PENETRATIONS OF PIPING, DUCTWORK, ETC.
14. PROVIDE ACCESS DOORS TO ALLOW SERVICE AND INSPECTION OF EQUIPMENT, VALVES, DAMPERS AND DEVICES INSTALLED ABOVE NON-REMOVABLE CEILINGS.

SHOP DRAWINGS AND SUBMITTALS

1. WITHIN 30 DAYS OF AWARDING OF THE CONTRACT, THE MECHANICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND/OR SUBMITTALS FOR ALL SCHEDULED EQUIPMENT AND MATERIALS INCLUDED IN THE CONSTRUCTION DOCUMENTS.
2. ALL SHOP DRAWINGS AND SUBMITTALS SHALL BE IN THE FORM OF ELECTRONICALLY TRANSMITTED PDFS. SHOP DRAWINGS AND SUBMITTALS SHALL INCLUDE SHOP DRAWINGS AND LITERATURE SHOWING ITEMS TO BE USED, SIZE, DIMENSIONS, CAPACITY, ROUGH-IN, AND ANY OTHER INFORMATION NECESSARY FOR A COMPLETE REVIEW. MANUFACTURER'S LITERATURE SHOWING MORE THAN ONE ITEM SHALL BE CLEARLY MARKED AS TO WHICH ITEM IS BEING FURNISHED OR IT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
3. EACH SUBMITTED ITEM MUST BE CLEARLY MARKED WITH THE PROJECT NAME, DATE, BRANCH OF WORK, SUBMITTING PARTY, REVISION NUMBER, AND ASSOCIATED SCHEDULE. SUBMITTALS NOT IDENTIFIED AS DESCRIBED ABOVE WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
4. PRIOR TO THEIR SUBMISSION, EACH SUBMITTAL SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR COMPLIANCE WITH THE CONTRACT DOCUMENT REQUIREMENTS. EACH SUBMITTAL SHALL THEN BEAR A STAMP EVIDENCING SUCH CHECKING AND SHALL SHOW CORRECTIONS MADE, IF ANY. SUBMITTALS REQUIRING EXTENSIVE CORRECTIONS SHALL BE REVISED BEFORE SUBMISSION TO THE ENGINEER. EACH SUBMITTAL NOT STAMPED AND SIGNED BY THE CONTRACTOR EVIDENCING SUCH CHECKING WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
5. REVIEW OF THE SHOP DRAWINGS AND LITERATURE BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR FOR RESPONSIBILITY FOR DEVIATIONS FOR THE DRAWINGS OR SPECIFICATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN THE SHOP DRAWINGS OR LITERATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE MATERIALS AND EQUIPMENT WHICH MEET THE SPECIFICATIONS AND JOB REQUIREMENTS.

REVIEW & SITE INSPECTIONS

1. ALL WORK AND MATERIAL IS SUBJECT TO REVIEW AT ANY TIME BY THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE. IF THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE FINDS MATERIAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS OR THAT IS NOT PROPERLY INSTALLED OR FINISHED, CORRECT THE DEFICIENCIES IN A MANNER SATISFACTORY TO THE ARCHITECT/ENGINEER AT THE CONTRACTOR'S EXPENSE.

STARTUP, TESTING AND OWNER TRAINING

1. ENGAGE A FACTORY AUTHORIZED REPRESENTATIVE TO CONDUCT AN INSPECTION OF THE INSTALLATION OF THEIR COMPANY'S EQUIPMENT PRIOR TO START-UP OF ANY EQUIPMENT. THE REPRESENTATIVE SHALL SUBMIT A REPORT IDENTIFYING ANY DEFICIENCIES TO THE ARCHITECT, ENGINEER AND CONSTRUCTION MANAGER. ANY DEFICIENCIES IDENTIFIED SHALL BE ADDRESSED PRIOR TO START-UP. START-UP SHALL BE CONDUCTED BY A FACTORY AUTHORIZED REPRESENTATIVE. STARTUP REPORTS SHALL BE SUBMITTED TO THE ARCHITECT AND ENGINEER ONCE COMPLETED.
2. NEW AIR AND WATER SYSTEMS SHALL BE BALANCED IN THEIR ENTIRETY TO THE SATISFACTION OF THE ENGINEER IN ACCORDANCE WITH NEBB STANDARDS PROVIDED BY THE COMISSIONING PROVIDER. THE COMMISSIONING PROVIDER SHALL BE RESPONSIBLE OF SUBCONTRACTING THE TEST AND BALANCE CONTRACTOR. △3
3. THE MECHANICAL CONTRACTOR SHALL PROVIDE 2 HRS OF TRAINING TO THE OWNER TO ENSURE THE OWNER KNOWS HOW TO OPERATE THE SYSTEMS INSTALLED UNDER THE MECHANICAL CONTRACT. PROVIDE AN ADDITIONAL 2 HRS OF ADDITIONAL SERVICE THROUGH THE FIRST YEAR OF OPERATION TO ADDRESS QUESTIONS THAT MAY ARISE.

PROJECT CLOSEOUT

1. THE MECHANICAL CONTRACTOR SHALL MAINTAIN AT THE PROJECT SITE, A "RECORD SET OF DRAWINGS" SHOWING FIELD CHANGES, AS-BUILT ELEVATIONS, UNUSUAL CONDITIONS ENCOUNTERED DURING CONSTRUCTION, AND SUCH OTHER DATA AS REQUIRED TO PROVIDE THE OWNER WITH AN ACCURATE "AS CONSTRUCTED" SET OF RECORD DRAWINGS. THE CONTRACTOR SHALL FURNISH THIS "RECORD SET" TO THE ENGINEER FOLLOWING THE FINAL INSPECTION OF THE PROJECT.
2. THE MECHANICAL CONTRACTOR SHALL PROVIDE AN "OPERATION AND MAINTENANCE MANUAL" (O&M MANUAL) PRIOR TO THE COMMENCEMENT OF OWNER TRAINING. THE O&M MANUAL SHALL BE PROVIDED IN DIGITAL OR THREE PAPER COPIES (BOUND & LABELED) FORMAT AS REQUESTED BY THE ENGINEER OR OWNER. THE O&M MANUAL SHALL CONSIST OF A TITLE PAGE, TABLE OF CONTENTS, AND MANUAL CONTENTS. THE MANUAL CONTENTS SHALL CONSIST OF PRODUCT DATA INFORMATION, PRODUCT SERVICE/MAINTENANCE MANUAL, AND EXECUTED WARRANTY FOR EACH AND ALL EQUIPMENT AND PRODUCTS INSTALLED UNDER THE SCOPE OF THIS PROJECT.

PERMIT DRAWINGS
04/30/2025

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	DATE	BY
3	Addendum #3	05/21/2025	

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Morrison Maierle
engineers · surveyors · planners · scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

DRAWN BY: Author
DSGN. BY: Designer
APPR. BY: Approver
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON

MECHANICAL LEGEND & NOTES Copy 1

PROJECT NUMBER 10694.001
SHEET NUMBER 2
DRAWING NUMBER M0.2

Autodesk Docs://10694.001 - Redmond HS Cooling Upgrade/Redmond HS Cooling Upgrade.rvt

MECHANICAL PIPE SCHEDULE

NOTE:
1. INSULATION THICKNESS IS BASED ON A CONDUCTIVITY NOT EXCEEDING 0.27 BTU • INCH / (HR • FT² • °F)
2. PROVIDE SEISMIC BRACING OF PIPING 2-1/2" AND LARGER OR AS REQUIRED BY LOCAL CODES.
3. PIPE INSULATION MUST HAVE A FLAME SPREAD LESS THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL723.
4. EXPOSED PLASTIC PIPING IS NOT ALLOWED IN AIR PLENUMS. IF PLASTIC PIPE IS USED, IT MUST BE WRAPPED IN PLENUM RATED PIPE INSULATION.
5. HYDRONIC WATER PIPING SHALL BE ONE OF THE MATERIALS SPECIFIED AT THE CONTRACTORS OPTION.
6. PIPE CONNECTIONS OF DISSIMILAR METALS SHALL REQUIRE A DIELECTRIC NIPPLE. DIELECTRIC UNIONS ARE NOT ALLOWED.
7. PROVIDE FIBERGLASS ALL SERVICE JACKET (ASJ).
8. ASJ TO BE SEALED AT SEAMS AND EDGES.
9. PROVIDE PVC COATED JACKET ON EXPOSED PIPING.
10. PROVIDE ALUMINUM JACKET WITH UV PROTECTIVE COATING ON OUTDOOR PIPING INSTALLATIONS (POLYGUARD OR APPROVED EQUAL).
11. EXTERIOR WATER PIPING AND PIPING IN UNCONDITIONED SPACES SHALL BE ENCASED IN 3" OF INSULATION.
12. PAINT EXPOSED NATURAL GAS PIPING WITH TWO COATS OF RUST INHIBITING PAINT. COORDINATE COLOR WITH OWNER.

SYSTEM	ABBREV	PIPE MATERIAL	INSULATION
MINI-SPLIT - EXPANSION & SUCTION LINES	REF	'ACR' COPPER	1/2" ELASTOMERIC
CHILLED WATER SUPPLY & RETURN < 1-1/2"ø	CWS / CWR	'L' COPPER / STEEL	1/2"
CHILLED WATER SUPPLY & RETURN ≥ 1-1/2"ø	CWS / CWR	'L' COPPER / STEEL	1"

AIR/DIRT SEPARATOR SCHEDULE

REMARKS:
1. PROVIDE ASTM RATED UNIT WITH AIR VENT AND DRAIN VALVE.

MARK	MANUF.	MODEL	AREA SERVED	TYPE	FLOW (GPM)	WORKING FLUID	WPD (FT)	DIAMETER / HEIGHT (IN)
ADS-1	TACO	4905A	CHILLED WATER LOOP	AIR/DIRT	250	35%PG	2.0	14" / 34"

AUTOMATIC GLYCOL FEEDER SCHEDULE

REMARKS:
1. LOW LEVEL ALARM PANEL WITH REMOTE MONITORING, DRY CONTACTS AND SELECTABLE AUDIBLE ALARM.
2. CONNECT ALARM INTO BAS
3. LOW LEVEL PUMP SHUTOFF AND ALARM PRE-WIRED.

ELECTRICAL DATA:
SEE MEP COORDINATION SCHEDULE FOR STARTER/DISCONNECT AND ALL OTHER ELEC. DATA.

MARK	MANUF.	MODEL	TOTAL SYSTEM VOLUME	TANK SIZE (GAL)	WORKING FLUID	PRESSURE SETTING (PSI)
AGF-1	AXIOM	MF200	250 GAL	6.6	35% PG	25

EXPANSION TANK SCHEDULE

REMARKS:
1. THE LISTED SYSTEM FILL PRESSURE AND TOTAL SYSTEM VOLUME ARE ESTIMATES. IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO FIELD VERIFY THE REQUIRED SYSTEM PRESSURE TO ENSURE PROPER SYSTEM OPERATION AND TO CHARGE TANK AS REQUIRED.
2. PROVIDE SEISMIC BRACING AND SECURE EXPANSION TANK TO WALL PER SEISMIC CODE.

MARK	MANUF.	MODEL	SYSTEM FILL PRESSURE (PSI)	WORKING FLUID	TOTAL SYSTEM VOLUME	MIN. TANK / ACCEPTANCE (GAL)	TANK SIZE (GAL)	PHYSICAL DATA	
								HEIGHT (IN)	DIAMETER (IN)
ET-1	TACO	CA90-125		35%PG	250 GAL	23	23	30	20

FREEZE PROTECTION

THE EXISTING HEATING WATER SYSTEM IS 100% WATER. THE NEW CHILLED WATER SYSTEM, BETWEEN THE HEAT EXCHANGER AND THE EXISTING HEATING WATER SYSTEM WILL UTILIZE 100% WATER. THE CHILLER SUPPLY AND RETURN PIPING BETWEEN THE HEAT EXCHANGER AND THE CHILLER SHALL BE FILLED WITH:

- 35% PROPYLENE GLYCOL
- 65% WATER

EXISTING VRF SYSTEM

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THE EXISTING VRF SYSTEM IN THE BUILDING IS TO REMAIN AS-IS, EXCEPT FOR THE INDIVIDUAL WALL MOUNTED FANCOILS THAT WILL BE REPLACED WITH MINI-SPLIT COOLING SYSTEMS IN ROOMS G128, A125 AND A218. DEMOLISH THE EXISTING WALL MOUNTED VRF FANCOIL, AND CAP REFRIGERANT PIPING WITHIN ROOM. RECOVER REFRIGERANT IN BRANCH OF SYSTEM TO ISOLATE THE FANCOIL PRIOR TO DEMOLITION. LABEL EXISTING REFRIGERANT PIPING IN ROOM AS "ABANDONED VRF PIPING - NO REFRIGERANT"

HVAC COMISSIONING

THE PROJECT WILL NEED A THIRD PARTY COMISSIONING AGENT TO VERIFY THE INSTALLATION AND OPERATION OF HVAC AND CONTROLS EQUIPMENT. COMISSIONING AGENT SHALL BE A SUBCONTRACTOR DIRECT TO THE MECHANICAL OR GENERAL CONTRACTOR. MECHANICAL, ELECTRICAL AND CONTROLS CONTRACTOR SHALL INCLUDE TIME IN THEIR BID TO ACCOMODATE THE COMMISSIONING ACTIVITIES. SEE SPECIFICIATION SECATION 230800 AND 260800 FOR MORE DETAILS.

THE COMISSIONING CONTRACTOR SHALL SUBCONTRACT THE TEST AND BALANCE CONTRACTOR DIRECTLY.

AIR COOLED CHILLER SCHEDULE

ACCESSORIES:
1. PROVIDE INTEGRAL CIRCUIT BREAKER DISCONNECT
2. CHILLED WATER FLOW SWITCH.
3. PROVIDE SINGLE-POINT ELEC. CONNECTION.
4. PROVIDE AMPAD TYPE NRC VIBRARION ISOLATOR MAT UNDER.
5. PROVIDE LOW SOUND VARIABLE SPEED CONDENER FANS.

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REMARKS:
1. FURNISH STARTER COMPLETE WITH CONTROL CIRCUIT TRANSFORMER.
2. FURNISH BACNET DDC COMMUNICATION INTERFACE.

CONTROLS:
1. PROVIDE WHOLE BUILDING AUTOMATION SYSTEM (BAS) AS OUTLINED IN THE POINTS AND SEQUENCES OF OPERATION. SEE SPEC. SECTION 230900 "INSTRUMENTATION AND CONTROL FOR HVAC" FOR MORE INFORMATION.
2. UNIT TO BE CONTROLLED BY MANUFACTURER'S PACKAGED CONTROLLER.

ELECTRICAL DATA:
SEE MEP COORDINATION SCHEDULE FOR STARTER/DISCONNECT AND ALL OTHER ELEC. DATA.

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MARK	MANUF.	MODEL	CAPACITY (MBH)	REFRIGERANT	EFFICIENCY (EER)	EVAPORATOR				CONDENSER				COMPRESSORS		UNIT PHYSICAL DATA			
						DESIGN FLOW RATE (GPM)	MIN FLOW RATE (GPM)	EWT/LWT (°F)	WPD (FT)	AMBIENT AIR TEMP. DESIGN (°F)	AMBIENT AIR TEMP. MIN (°F)	FAN POWER (KW)	AIRFLOW (CFM)	QTY	TYPE	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	WEIGHT (LBS)
CH-1	Johnson Controls, Inc.	YLAA	1,125	454B	9.773	234.8	100	53/43	20.7	95	40	10.8	90,000	5	SCROLL	167	89	95	6268

HEAT EXCHANGER SCHEDULE - WATER TO WATER

NOTES:
1. 150 PSI WORKING PRESSURE (ASME).

MARK	MANUF.	MODEL	TYPE	PLATE MATERIAL	NO. OF PLATES	SURFACE AREA (FT²)	FOULING FACTOR (FT²•HR•°F/BTU)	LOAD (MBH)	SOURCE MEDIUM					TRANSFER MEDIUM					WEIGHT (LBS)
									FLOW (GPM)	EWT/LWT (°F)	WORKING FLUID	HEAD LOSS (FT)	VALVE	FLOW (GPM)	EWT/LWT (°F)	WORKING FLUID	HEAD LOSS (FT)	VALVE	
HX-1	TACO	PF040B	PLATE AND FRAME	AISI 304	289	1169.9	0.0000066	1104.66	234.8	43.0 / 53.0	35%PG	3.08	NONE	219.8	55.0 / 45.0	WATER	1.9	NONE	3307

DUCTLESS MINI-SPLIT SYSTEM SCHEDULE

ACCESSORIES:
1. LOW AMBIENT KIT, RATED COOLING LIMIT 0°F TO 115°F
2. PROVIDE BIG FOOT FIX-IT FOOT SUPPORT FOR OUTDOOR UNIT.
3. PROVIDE INTERNAL CONDENSATE PUMP FOR WALL-MOUNTED INDOOR UNIT.
4. CONTRACTOR TO CONFIRM LINESET LENGTHS PRIOR TO ORDERING EQUIPMENT.
5. 7 DAY PROGRAMMABLE THERMOSTAT.
6. CONNECT CONDENSATE DRAIN TO EXISTING VRF CONDENSATE PIPING NEARBY.

CONTROLS:
1. FACTORY PROVIDED CONTROLS - NO INTERCONNECTION TO THE DDC SYSTEM.
2. T.C.C. SHALL INDEPENDENTLY MONITOR THE SPACE TEMPERATURE. SEE POINTS/SEQUENCES FOR MORE INFORMATION.

ELECTRICAL DATA:
SEE MEP COORDINATION SCHEDULE FOR STARTER/DISCONNECT AND ALL OTHER ELEC. DATA.

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INDOOR COOLING UNIT		INDOOR COOLING UNIT				OUTDOOR HEAT PUMP				
MARK	MANUFACTURER	MODEL	TYPE	OUTSIDE AIR (CFM)	WEIGHT (LBS)	MARK	MODEL	TYPE	NOMINAL COOLING CAPACITY (MBH)	WEIGHT (LBS)
MS-1A	LG	KNSAP261A	WALL MOUNT	0	41	MS-1	KUSAP361A	SINGLE ZONE HEAT PUMP	33,000	148
MS-2A	LG	KNSAP261A	WALL MOUNT	0	41	MS-2	KUSAP361A	SINGLE ZONE HEAT PUMP	33,000	148
MS-3A	LG	KNSAP261A	WALL MOUNT	0	41	MS-3	KUSAP361A	SINGLE ZONE HEAT PUMP	33,000	148

PUMP SCHEDULE

REMARKS:
1. PROVIDE WITH DISCONNECT.
2. PROVIDE WITH ABB VFD PER SCHOOL DISTRICT STANDARDS.

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CONTROLS:
1. PROVIDE WHOLE BUILDING AUTOMATION SYSTEM (BAS) AS OUTLINED IN THE POINTS AND SEQUENCE OF OPERATION.

ELECTRICAL DATA:
SEE MEP COORDINATION SCHEDULE FOR STARTER/DISCONNECT AND ALL OTHER ELEC. DATA.

MARK	MANUF.	MODEL	DESCRIPTION	WORKING FLUID	FLOW (GPM)	PRESSURE DROP (FT)	MOTOR HP	MOTOR RPM	EFFICIENCY (%)	VARIABLE SPEED
CHP-1	TACO	3007D	EVERTICAL CLOSED COUPLED PUMP	WATER	250.0	65	7.5	1760	78	YES
CWP-1	TACO	3007D	EVERTICAL CLOSED COUPLED PUMP	WATER	225.0	40.0	5.0	1760	89.4	YES

CHILLED WATER COIL SCHEDULE

REMARKS:
1. COIL SELECTED AT 3000 FT ELEVATION.
2. PROVIDE CONDENSATE DRAIN PAN UNDER NEW AND EXISTING COILS. ROUTE PIPING TO FLOOR SINK IN MECHANICAL ROOM.

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MARK	AHU	MANUF.	MODEL	TYPE	COIL SIZE (L"xH"xW")	QTY	ROWS	FINS PER INCH	TUBE DIAMETER (IN)	AIRFLOW (CFM)	APD (IN WC)	FACE VELOCITY (FPM)	EAT / LAT (°F)	WORKING FLUID	CAPACITY (BTU)	FLOW (GPM)	WPD (FT)	EWT / LWT (°F)
CWC-1	AHU-1	EXISTING	- -	CHANGOVER	EXISTING	2	3	11	0.625	16,000	0.15	479	80.0 / 58.1	100% WATER	305,189	46.5	5.2	45.0 / 58.1
CWC-2	AHU-4	DAIKIN	5WH1303A	CHILLED WATER	FIELD VERIFY	1	3	11	0.625	7,150	0.18	511	80.0 / 61.7	100% WATER	128,473	18.0	2.0	45.0 / 59.3
CWC-3	AHU-5	DAIKIN	5WH0904A	CHILLED WATER	FIELD VERIFY	1	4	9	0.625	5,000	0.21	523	81.3 / 62.0	100% WATER	106,527	21.0	4.0	45.0 / 55.1
CWC-4	AHU-7	DAIKIN	5WH0903A	CHILLED WATER	FIELD VERIFY	1	3	9	0.625	4,500	0.13	471	80.4 / 62.0	100% WATER	67,747	10.8	0.9	45.0 / 57.5
CWC-5	AHU-15	EXISTING	- -	CHANGOVER	EXISTING	1	3	8	0.625	11,720	0.17	552	81.5 / 63.6	100% WATER	228,037	63.4	22.5	45.0 / 52.2
CWC-6	AHU-16	DAIKIN	5WH0903A	CHILLED WATER	FIELD VERIFY	1	3	9	0.625	11,545	0.17	543	80.0 / 63.0	100% WATER	185,317	27.6	4.7	45.0 / 58.4
CWC-7	AHU-17	DAIKIN	5WH0803A	CHILLED WATER	FIELD VERIFY	1	3	8	0.625	14,750	0.17	560	80.0 / 63.0	100% WATER	221,207	35.4	3.5	45.0 / 57.5

MEP COORDINATION SCHEDULE

CONTROL TYPE:
- BAS BUILDING AUTOMATION SYSTEM
- CO CARBON MONOXIDE DETECTOR
- CONT CONTINUOUS OPERATION
- EF INTERLOCK WITH EXHAUST FAN
- HCP HOOD CONTROL PANEL
- INT INTEGRAL
- L LIGHT SWITCH
- MS MANUAL SWITCH
- OS OCCUPANCY SENSOR
- PS PRESSURE SWITCH
- T THERMOSTAT
- TC TIME CLOCK
- UC UNIT CONTROLLER
- VE VEHICLE EXHAUST DETECTION SYSTEM
- N/A NOT APPLICABLE

DISCONNECT/STARTER TYPE:
- CB PANELBOARD CIRCUIT BREAKER WITHIN SIGHT OF EQUIPMENT
- CSFD COMBINATION STARTER/DISCONNECT - HOA
- FD FUSED DISCONNECT
- FST FUSTAT
- FW FACTORY-WIRED SINGLE POINT CONNECTION WITH INTEGRAL DISCONNECTING MEANS
- MOCP MOTOR OVER-CURRENT PROTECTION
- MSS MANUAL STARTER SWITCH WITH THERMAL OVERLOADS (1-, 2- OR 3-POLE AS REQUIRED)
- NFD NON-FUSED DISCONNECT
- RCPT 20A DUPLEX RECEPTACLE (GFCI PROTECTED AS REQUIRED), CORD AND PLUG
- RVSS REDUCED VOLTAGE SOLID-STATE
- VFD VARIABLE FREQUENCY DRIVE - HOA
- N/A NOT APPLICABLE

DIVISION OF RESPONSIBILITIES:
- 22/22 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 22
- 22/26 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 26
- 23/23 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 23
- 23/26 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 26
- 26/26 FURNISHED AND INSTALLED BY DIV. 26, WIRED BY DIV. 26

NOTES:
1. INTEGRAL DISCONNECTS AND OVERLOADS
2. INTEGRAL OVERLOADS
3. SINGLE POINT CONNECTION
4. PROVIDE RECEPTACLE AND DATA CONNECTION FOR PANEL
5. MOUNT ON UNI-STRUT IN FRONT OF UNIT
6. SIZE FUSES IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES FOR INSTALLED EQUIPMENT
7. INTEGRAL VARIABLE FREQUENCY DRIVE
8. DUCT SMOKE DETECTOR(S) REQUIRED
9. INDOOR FANCOIL POWERED BY OUTDOOR UNIT. PROVIDE INTERCONNECTION WIRING BETWEEN UNITS PER MANUFACTURER'S REQUIREMENTS.
10. REFER TO ONE-LINE DIAGRAM FOR REQUIREMENTS.
11. VFD PROVIDED BY DIV.23 CONTRACTOR, INSTALLED BY DIV 26 CONTRACTOR. PROVIDE VFD WITH INTEGRAL DISCONNECTING MEANS.
12. LOCKABLE DISCONNECTING MEANS PROVIDED AT OUTDOOR UNIT.

GENERAL NOTES:
A. CONTROL WIRING SHALL BE CONCEALED WITHIN WALL CONSTRUCTION, ABOVE CEILING, OR RUN IN CONDUIT. EXPOSED CONTROL WIRING IS UNACCEPTABLE.
B. UNLESS SPECIFICALLY NOTED, ALL FEEDERS SHALL INCLUDE A FULL SIZE NEUTRAL. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY WITH THE MANUFACTURER OF THE ACTUAL EQUIPMENT BEING SUPPLIED WHETHER A NEUTRAL IS REQUIRED PRIOR TO ROUGH-IN.
C. ALL DUCT SMOKE DETECTORS FURNISHED BY DIV. 26, INSTALLED BY DIV. 23, AND WIRED BY DIV. 26. DIV. 26 SHALL WIRE ALL FANS TO SHUT DOWN WHEN ALARM IS INITIATED BY ANY DUCT SMOKE DETECTOR.

3

MARK	DESCRIPTION	ELECTRICAL DATA			CONTROL		NOTES	DISCONNECT / STARTER		DISCONNECT				FEEDER	
		LOAD	MOCP	VOLT-PHASE	TYPE	DIV		TYPE	DIV	SIZE (NEMA)	SWITCH (AMPS)	FUSE (AMPS)	ENCLOSURE (NEMA)	COPPER WIRE (AWG)	CONDUIT (INCHES)
AGF-1	AUTOMATIC GLYCOL FILLER	50 W	15 A	120-1	INT	23/23	-	RCPT	26/26	-	-	-	-	#12	3/4"
CH-1	AIR COOLED CHILLER	225 MCA	250 A	460-3	INT	23/23	6	FD	26/26	-	400 A	NOTE 6	3R	NOTE 10	NOTE 10
CHP-1	CHILLER PUMP - CHILLER SIDE	7.5 HP	20 A	460-3	BAS	23/23	11	VFD	23/26	-	-	-	-	#12	3/4"
CWP-1	CHILLED WATER PUMP - BUILDING SIDE	5 HP	20 A	460-3	BAS	23/23	11	VFD	23/26	-	-	-	-	#12	3/4"
MS-1	MINI-SPLIT OUTDOOR HEAT PUMP	23 MCA	30 A	208-1	INT	23/23	6	FD	26/26	-	30 A	NOTE 6	3R	#10	3/4"
MS-1A	MINI-SPLIT INDOOR FANCOIL	- -	- -	- -	T	23/23	12	NOTE 12	-	-	-	-	-	NOTE 9	3/4"
MS-2	MINI-SPLIT OUTDOOR HEAT PUMP	23 MCA	30 A	208-1	INT	23/23	6	FD	26/26	-	30 A	NOTE 6	3R	#10	3/4"
MS-2A	MINI-SPLIT INDOOR FANCOIL	- -	- -	- -	T	23/23	12	NOTE 12	-	-	-	-	-	NOTE 9	3/4"
MS-3	MINI-SPLIT OUTDOOR HEAT PUMP	23 MCA	30 A	208-1	INT	23/23	6	FD	26/26	-	30 A	NOTE 6	3R	#10	3/4"
MS-3A	MINI-SPLIT INDOOR FANCOIL	- -	- -	- -	T	23/23	12	NOTE 12	-	-	-	-	-	NOTE 9	3/4"

PERMIT DRAWINGS
04/30/2025

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	DATE	BY
3	Addendum #3	05/21/2025	

PLOTTED ON: 5/22/2025 2:21:24 PM

Morrison Maierle
engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

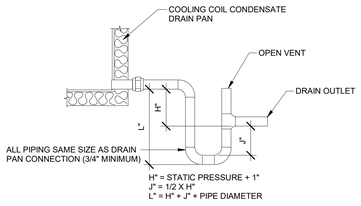
DRAWN BY: EJW
DSGN. BY: EJW
APPR. BY: MWC
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON

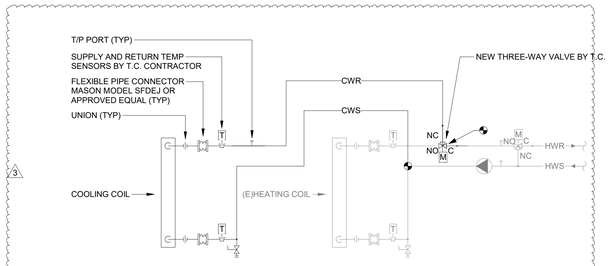
MECHANICAL SCHEDULES

PROJECT NUMBER 10694.001
SHEET NUMBER 3
DRAWING NUMBER M0.3

Autodesk Docs://10694.001 - Redmond HS Cooling Upgrade/Redmond HS Cooling Upgrade.rvt



1 CONDENSATE DETAIL
N.T.S.



2 AHU HEATING/COOLING COIL PIPING DETAIL
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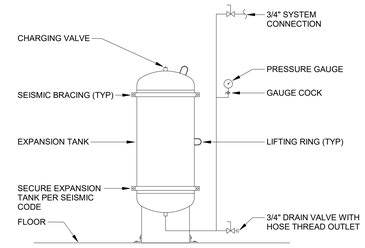

3 EXPANSION TANK PIPING DETAIL
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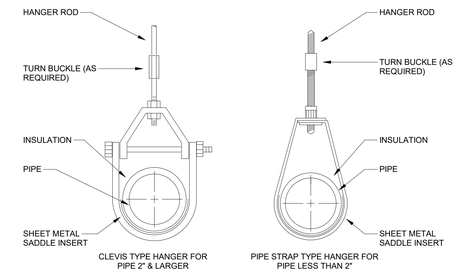

4 PIPE HANGER DETAIL
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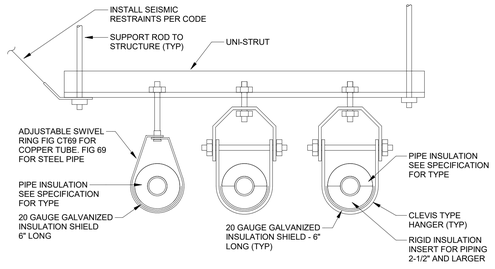

5 PIPE HANGER DETAIL
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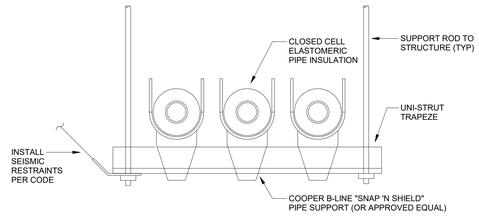

6 REFRIGERANT PIPE SUPPORT DETAIL
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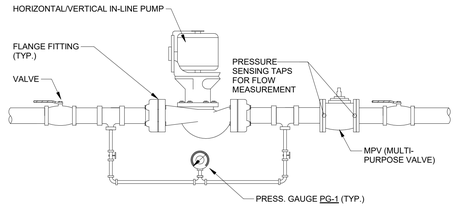

7 HORIZONTAL/VERTICAL IN-LINE PUMP DETAIL
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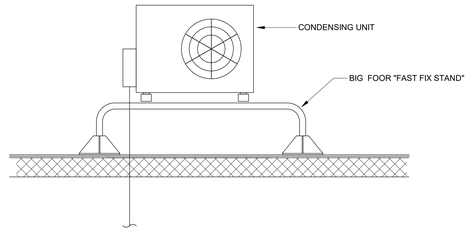
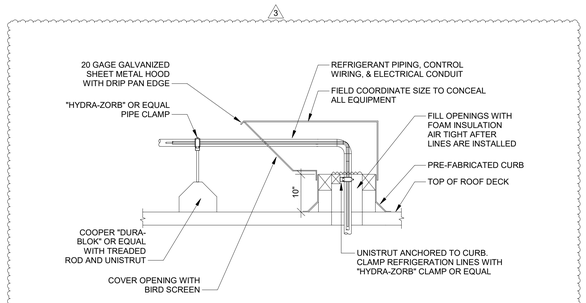


9 MINI-SPLIT CONDENSING UNIT ROOF MOUNTING DETAIL
N.T.S.



10 REFRIGERANT PIPING ROOF PENETRATION HOOD DETAIL
N.T.S.

DETAIL KEY NOTES

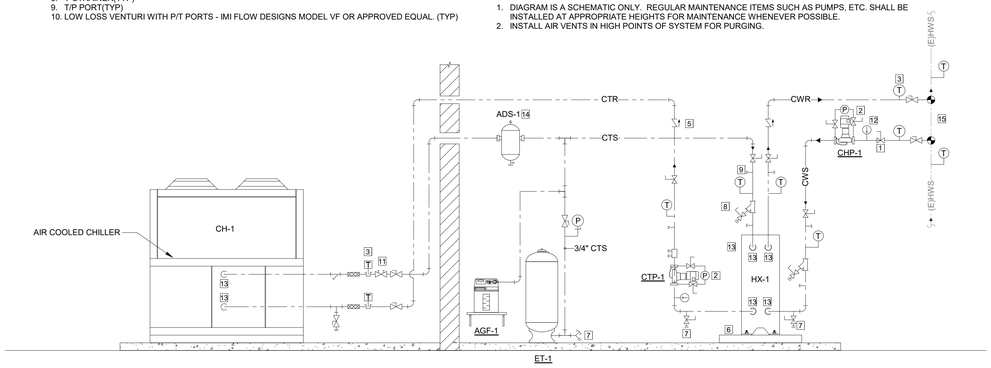
1. ISOLATION VALVE (TYP)
2. PRESSURE GAUGE (TYP)
3. TEMPERATURE GAUGE (TYP)
4. TEMPERATURE SENSOR (BAS). (TYP)
5. CHECK VALVE (TYP)
6. PROVIDE 6" HOUSEKEEPING PAD FOR ALL FLOOR MOUNTED EQUIPMENT. (TYP)
7. DRAIN VALVE WITH HOSE THREAD OUTLET AND CAP. (TYP)
8. Y-STRAINER(TYP)
9. T/P PORT(TYP)
10. LOW LOSS VENTURI WITH P/T PORTS - IMI FLOW DESIGNS MODEL VF OR APPROVED EQUAL. (TYP)

DETAIL KEY NOTES

11. MANUAL FLOW CONTROL VALVE
12. PROVIDE 6" CONCRETE HOUSEKEEPING PAD.
13. FLEXIBLE CONNECTOR.
14. ROUTE AIR VENT DISCHARGE TO AUTOMATIC GLYCOL FILL TANK.
15. CLOSESLY SPACED TEES NO MORE THAN 12" APART.

GENERAL NOTES:

1. DIAGRAM IS A SCHEMATIC ONLY. REGULAR MAINTENANCE ITEMS SUCH AS PUMPS, ETC. SHALL BE INSTALLED AT APPROPRIATE HEIGHTS FOR MAINTENANCE WHENEVER POSSIBLE.
2. INSTALL AIR VENTS IN HIGH POINTS OF SYSTEM FOR PURGING.



8 CHILLED WATER DIAGRAM
N.T.S.

PERMIT DRAWINGS
04/30/2025

VERIFY SCALE!
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MODIFY SCALE ACCORDINGLY!

REVISIONS

NO.	DESCRIPTION	DATE	BY
3	Addendum #3	05/21/2025	

PLOTTED ON: 5/21/2025 6:35:47 PM

Morrison Maierle
engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

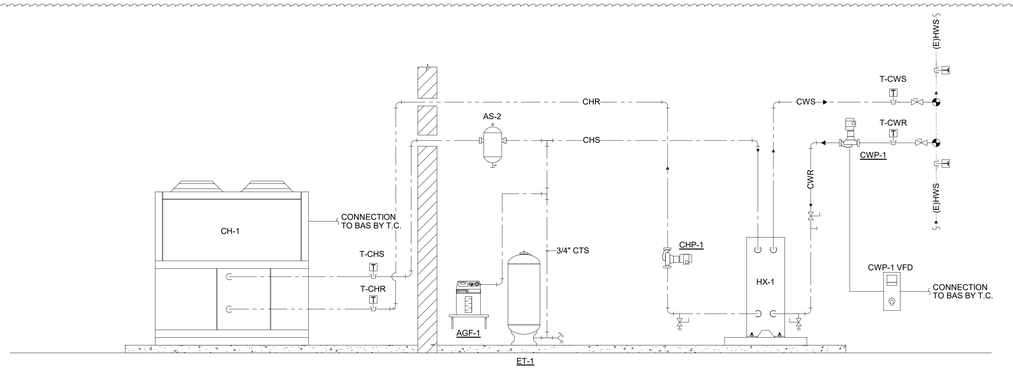
DRAWN BY: EJW
DSGN. BY: EJW
APPR. BY: Approver
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON

MECHANICAL DETAILS

PROJECT NUMBER 10694.001
SHEET NUMBER 4
DRAWING NUMBER M0.4

Autodesk Docs://10694.001 - Redmond HS Cooling Upgrade/Redmond HS Cooling Upgrade.rvt



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CHILLED WATER DIRECT DIGITAL CONTROL POINTS LIST

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS							NOTES
	AI	AO	BI	BO	AV	BV	ADJ	SCH	TRD	ALM	DISP	
CHILLED WATER SYSTEM ENABLE				X			X		X		X	
CHILLED WATER SYSTEM SETPOINT		X					X		X		X	
CHILLER SYSTEM SUPPLY TEMP. - T-CHS	X								X	X	X	ALARM ON HIGH LIMIT (55ºF)
CHILLER SYSTEM RETURN TEMP. - T-CHR	X								X	X	X	ALARM ON HIGH LIMIT (65ºF)
CHILLED WATER SYSTEM SUPPLY TEMP. - T-CWS	X								X	X	X	ALARM ON HIGH LIMIT (55ºF)
CHILLED WATER SYSTEM RETURN TEMP. - T-CWR	X								X	X	X	ALARM ON HIGH LIMIT (65ºF)
AIR COOLED CHILLER CONTROLLER					X			X	X	X	X	INDEX ALL CONTROLLER POINTS AND ALARMS TO THE BMS
CHILLED WATER SYSTEM PUMP CWP-1 VFD START/STOP				X			X		X		X	
CHILLED WATER SYSTEM PUMP CWP-1 VFD STATUS						X			X	X	X	ALARM ON LOSS OF STATUS
CHILLED WATER SYSTEM PUMP CWP-1 VFD SPEED						X	X		X		X	
CHILLED WATER SYSTEM PUMP CWP-1 VFD FAULT						X			X	X	X	
CHILLER SYSTEM PUMP CHP-1 VFD START/STOP				X			X		X		X	
CHILLER SYSTEM PUMP CHP-1 VFD STATUS						X			X	X	X	ALARM ON LOSS OF STATUS
CHILLER SYSTEM PUMP CHP-1 VFD SPEED						X	X		X		X	
CHILLER SYSTEM PUMP CHP-1 VFD FAULT						X			X	X	X	
AUTOMATIC GLYCOL FEEDER - AGF-1			X							X	X	ALARM ON LOW LEVEL

CHILLED WATER SEQUENCE OF OPERATIONS

GENERAL:

THE CHILLED WATER SYSTEM IS A MODIFICATION TO THE EXISTING HYDRONIC SYSTEM IN THE BUILDING, MAKING THE HYDRONIC PIPING A CHANGEOVER SYSTEM. THE HEATING WATER PIPING WILL CONVERT TO CHILLED WATER PIPING WITH THE FOLLOWING SEQUENCE IN COOLING OPERATION.

THE CHILLED WATER SYSTEM CONSISTS OF AN AIR COOLED CHILLER, CHILLER PUMP, CHILLED WATER PUMP, CHILLED WATER PUMPS, HEAT EXCHANGER AND SUPPLY AND RETURN DISTRIBUTION PIPING. THE CHILLED WATER SYSTEM PROVIDES CHILLED WATER TO THE AIR HANDLING UNITS VIA CHANGING OVER THE HEATING WATER LOOP TO CHILLED WATER. THE EXISTING GRAPHICAL USER INTERFACE IS TO BE MODIFIED TO INTEGRATE ALL NEW SYSTEM COMPONENTS.

OPERATING MODE:

THE CHILLED WATER SYSTEM SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60°F (ADJ). THE AIR COOLED CHILLER SHALL ENABLE WHEN CHILLED WATER FLOW IS ESTABLISHED AND THE FACTORY CONTROLLER SHALL CONTROL THE CHILLER TO PRODUCE A CHILLED WATER SUPPLY TEMPERATURE T-CHWS OF 43ºF (ADJ.).

INTEGRATE ALL POINTS RELEVANT TO NORMAL OPERATION OF CHILLER AND NOTIFICATION OF ALARMS.

CHILLED WATER PUMPS:

CHILLED WATER PUMP CHP-1 IS A VARIABLE SPEED CIRCULATING PUMP THAT SUPPLIES CHILLED WATER TO THE MAIN HYDRONIC LOOP IN THE BUILDING. CHP-1 SHALL MODULATE SPEED TO MAINTAIN 45°F (ADJ) IN THE MAIN HYDRONIC SUPPLY PIPING IN THE BUILDING.

CHILLER PUMP CHP-1 SHALL MODULATE SPEED VIA PACKAGED CHILLER CONTROLS TO MAINTAIN A DISCHARGE TEMPERATURE OF 43°F (ADJ).

1 CHILLED WATER PLANT CONTROL DETAIL
N.T.S.

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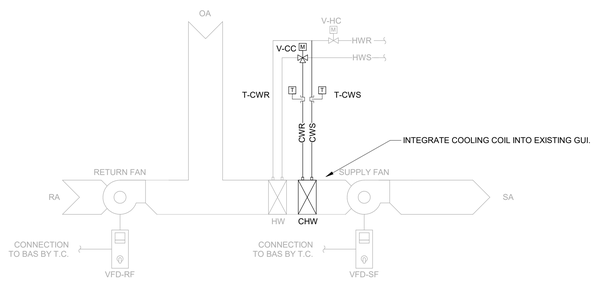

DIRECT DIGITAL CONTROL POINTS LIST

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS							NOTES
	AI	AO	BI	BO	AV	BV	ADJ	SCH	TRD	ALM	DISP	
VALVE - CHILLED WATER (MODULATE)		X							X		X	2-WAY OR 3-WAY VALVE UNIQUE TO EACH UNIT
CHILLED WATER SUPPLY TEMPERATURE - T-CWS	X								X		X	
CHILLED WATER RETURN TEMPERATURE - T-CWR	X								X		X	

SEQUENCE OF OPERATIONS

GENERAL:

THE EXISTING DEDICATED OUTDOOR AIR UNITS (DOAS) PROVIDE HEATING TO THE SPACE. ADDITION OF COOLING COILS WILL PROVIDE COOLING TO THE SPACE. THE EXISTING CONTROL SEQUENCE AND GRAPHICAL USER INTERFACE IS TO BE REVISED TO INCORPORATE THE ADDITION OF THE CHILLED WATER COIL.

DISCHARGE AIR CONTROL: CHILLED WATER VALVE MODULATED/STAGED IN SEQUENCE TO MAINTAIN DISCHARGE AIR TEMPERATURE AT SET-POINT.

THE CHILLED WATER VALVE SHALL BE LIMITED TO MODULATING AT A 10% MAX RATE OF CHANGE PER MINUTE.

2 CHILLED WATER COIL CONTROL DETAIL
N.T.S.

DDC POINTS GENERAL NOTES, LEGEND, ABBREVIATIONS

DDC GENERAL NOTES:

GENERAL
- REFER TO SPEC. SECTION 230900 HVAC CONTROLS FOR MORE INFORMATION.
- CONTRACTOR REQUIRED TO PROVIDE ALL LOW AND LINE VOLTAGE WIRING FOR A COMPLETE AND FUNCTIONAL SYSTEM.

BUILDING SCHEDULE
- BUILDING SCHEDULE DICTATES OCCUPIED AND UNOCCUPIED PERIODS OF THE BUILDING.
- COORDINATE WITH OWNER TO DETERMINE BUILDING SCHEDULE.
- BUILDING TO ENTER OCCUPIED PERIOD PRIOR TO BUILDING OCCUPIED TIMES TO ENSURE BUILDING IS AT OCCUPIED TEMPERATURE SETPOINT WHEN OCCUPANTS ARRIVE.

SPACE TEMPERATURE CONTROL
- EACH SPACE WITH TEMPERATURE CONTROL SHALL HAVE AN OCCUPIED TEMPERATURE SETPOINT (ADJ.) AND UNOCCUPIED HIGH / LOW LIMIT TEMPERATURE SETPOINTS (ADJ.)
- HVAC EQUIPMENT TO CONDITION EACH SPACE TO TEMPERATURE SETPOINT DURING OCCUPIED PERIODS.
- HVAC EQUIPMENT SHALL ALLOW THE SPACE TEMPERATURE TO FLOAT BETWEEN HIGH AND LOW LIMIT TEMPERATURE SETPOINTS (ADJ.) DURING UNOCCUPIED PERIODS
- EACH SPACE WITH TEMPERATURE CONTROL SHALL HAVE A BUILDING SCHEDULE MANUAL OVERRIDE SWITCH THAT PLACES THE SPACE TEMPERATURE INTO OCCUPIED TEMPERATURE SETPOINT (ADJ.) AND SERVING HVAC EQUIPMENT INTO OCCUPIED MODE

TEMPERATURE CONTROL PANELS
- SEE PLANS FOR LOCATIONS. COORDINATE NEW OR ADDITIONAL TEMPERATURE CONTROL PANEL LOCATIONS WITH ENGINEER.
- ALL TEMPERATURE CONTROL PANELS ARE TO BE BACKED UP WITH UPS BATTERY BACKUP.

TEMPERATURE SENSORS
- SEE PLANS FOR LOCATIONS.
- PROVIDE SENSOR TYPE AS SHOWN ON PLANS. IN SOME CASES PROVIDE A NON-ADJUSTABLE, BLANK, WALL PLATE TEMPERATURE SENSOR AND IN SOME CASES PROVIDE AN ADJUSTABLE SENSOR WITH DISPLAY. REGARDLESS OF WHAT TYPE IS SPECIFIED, RUN ENOUGH CONDUCTORS TO BE ABLE TO USE THE ADJUSTABLE WITH DISPLAY VERSION IN ALL LOCATIONS IN CASE IT IS DESIRED AT A LATER DATE TO SWITCH.

DEFINITIONS

HARDWARE POINTS				SOFTWARE POINTS						
AI	AO	BI	BO	AV	BV	ADJ	SCH	TRD	ALM	DISP
ANALOG INPUT	ANALOG OUTPUT	BINARY INPUT	BINARY OUTPUT	ANALOG VALUE	BINARY VALUE	ADJUSTABLE	SCHEDULE	TREND	ALARM	DISPLAY

ABBREVIATIONS

A	ALARM	H	HUMIDITY SENSOR	SPT	SETPOINT
C	COMMAND	HTG	HEATING	SS	SAIL SWITCH
CLG	COOLING	NC	NORMALLY CLOSED	S/S	START/STOP
CO	CARBON MONOXIDE	NO	NORMALLY OPEN	T	TEMPERATURE SENSOR
CO2	CARBON DIOXIDE	P	PRESSURE	VFD	VARIABLE FREQ. DRIVE
CS	COMMAND STATUS	R	RELAY	ZN	ZONE
CT	CURRENT TRANSDUCER	S	STATUS		
DP	DIFFERENTIAL PRESSURE	SP	STATIC PRESSURE		

LEGEND

- FAN
- DUCT TEMPERATURE SENSOR - AVERAGING
- DUCT STATIC PRESSURE SENSOR
- DUCT-MOUNTED CO2 SENSOR
- MOTORIZED DAMPER WITH ACTUATOR
- MANUAL RESET FREEZESTAT
- AIR FILTER DIFFERENTIAL PRESSURE SENSOR
- AIRFLOW MEASURING STATION
- DUCT TEMPERATURE SENSOR - SINGLE POINT
- MANUAL RESET HIGH LIMIT DUCT PRESSURE SENSOR
- DUCT SMOKE DETECTOR
- HEATING/COOLING COIL
- TEMPERATURE SENSOR - IMMERSION TYPE
- VARIABLE FREQUENCY DRIVE
- OUTSIDE AIR TEMPERATURE SENSOR
- CURRENT TRANSDUCER
- DIFFERENTIAL PRESSURE SENSOR
- SPACE CO2 SENSOR
- OUTSIDE AIR CO2 SENSOR
- CONTROL RELAY
- MODULATING CONTROL VALVE WITH ACTUATOR (SEE SCHEDULE FOR TYPE)
- SPACE TEMPERATURE SENSOR (SEE FLOOR PLANS FOR TYPE)
- SPACE PRESSURE SENSOR
- SCHEMATIC PUMP
- SPACE HUMIDITY SENSOR

SPACE MONITORING: G128, A125, A218

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS							NOTES
	AI	AO	BI	BO	AV	BV	ADJ	SCH	TRD	ALM	DISP	
TEMPERATURE - SPACE	X								X	X	X	SPACE TEMPERATURE SENSOR (T-SP)

SEQUENCE OF OPERATION: MS-# THRU #

ALARMS
- GENERATE ALARM WHEN SPACE TEMPERATURE RISES ABOVE SPACE HIGH TEMPERATURE ALARM SETPOINT (ADJ.)

T-SP

GENERAL CONTROL NOTES

3

THE BUILDING HVAC SYSTEM IS CONTROLLED BY AN EXISTING HONEYWELL DDC CONTROL SYSTEM. MECHANICAL CONTRACTOR SHALL SUBCONTRACT TO A CONTROLS CONTRACTOR CERTIFIED AND QUALIFIED TO MODIFY THE EXISTING HONEYWELL DDC SYSTEM TO INCORPORATE THE NEW CHILLED WATER CHANGEOVER LOOP. MECHANICAL CONTRACTOR SHALL INCLUDE TIME TO COORDINATE WITH SELECTED CONTROLS CONTRACTOR TO INSTALL, TEST, AND/OR MODIFY EXISTING CONTROLS.

PERMIT DRAWINGS
04/30/2025

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!

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REVISIONS			
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3	Addendum #3	05/21/2025	

Morrison Maierle
engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

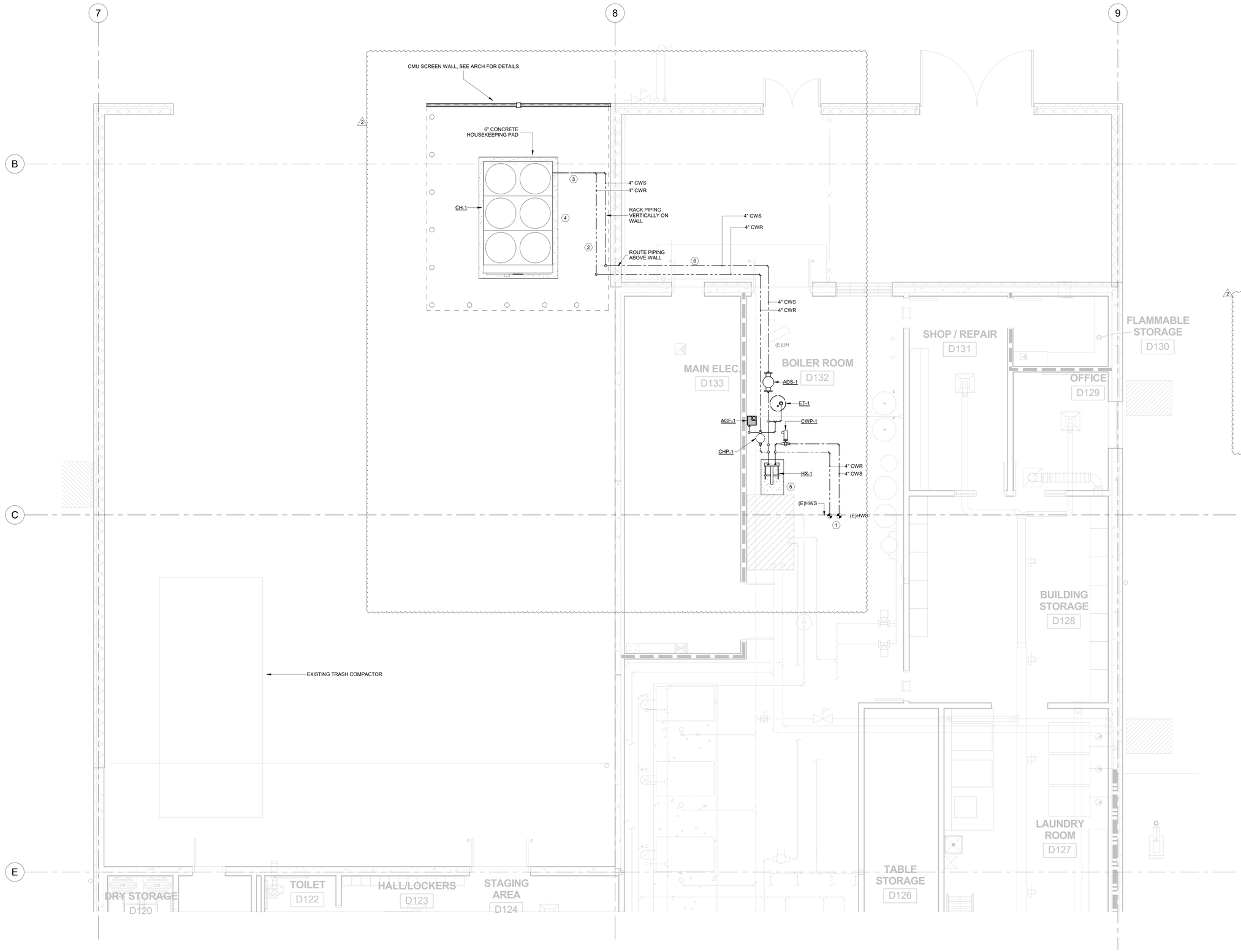
DRAWN BY: EJW
DSGN. BY: EJW
APPR. BY: Approver
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON

MECHANICAL CONTROL DETAILS

PROJECT NUMBER 10694.001
SHEET NUMBER 5
DRAWING NUMBER M0.5

Autodesk Docs://10694.001 - Redmond HS Cooling Upgrade/Redmond HS Cooling Upgrade.rvt



1 MECHANICAL ROOM PIPING PLAN
1/4" = 1'-0"

MECHANICAL PLAN NOTES

A. VERIFY THE LOCATION OF THERMOSTATS AND SENSORS WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. INSTALL THERMOSTATS 48" ABOVE FINISHED FLOOR PER ADA REQUIREMENTS.
B. PROVIDE AND INSTALL SEISMIC BRACING FOR EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE CURRENTLY ADOPTED INTERNATIONAL BUILDING CODE.
C. FLEXIBLE DUCTWORK BETWEEN BRANCH DUCTS AND GRILLES, REGISTERS, OR DIFFUSERS SHALL BE LIMITED TO 5 FT. FLEXIBLE DUCT SHALL NOT BE USED IN PLACE OF ELBOWS.
D. PROVIDE AND INSTALL FIRE, SMOKE, OR COMBINATION FIRE/SMOKE DAMPERS WHERE DUCTWORK PASSES THROUGH RATED ASSEMBLIES. ASSOCIATED DUCT DETECTORS SHALL BE ADDRESSABLE. SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS SHALL INCLUDE A KEYED REMOTE TEST SWITCH LOCATED IN AN ACCESSIBLE LOCATION. FIELD COORDINATE THE LOCATION OF TEST SWITCHES WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.
E. SEAL DUCT AND PIPE PENETRATIONS THROUGH FIRE RATED ASSEMBLIES WITH A UL-APPROVED FIRE STOP SYSTEM.
F. MAINTAIN THE INTEGRITY OF DRAFTSTOPPING WHERE DUCTWORK AND PIPING PENETRATE DRAFTSTOPPING MATERIALS.
G. PROVIDE ACCESS DOORS TO ALLOW SERVICE AND INSPECTION OF EQUIPMENT, VALVES, DAMPERS AND DEVICES INSTALLED IN INACCESSIBLE LOCATIONS. COORDINATE SUCH INSTALLATIONS WITH THE ARCHITECT AND ENGINEER.
H. DUCTWORK DIMENSIONS INDICATE THE CLEAR WIDTH/HEIGHT AND HAVE NOT BEEN INCREASED TO ACCOMMODATE DUCT LINER. INSTALLED DUCT SHALL BE INCREASED TO ACCOMMODATE LINER THICKNESS WHERE LINER IS INDICATED IN THE DRAWINGS OR SPECIFICATIONS.
I. EXPOSED DUCTWORK TO BE HOT DIPPED GALVANIZED STEEL AND PAINTED PER ARCHITECTURAL. CONTRACTOR TO CLEAN AND DRY DUCTWORK PRIOR TO PAINTING.
J. GAS PIPING TO BE WELDED IN CONCEALED SPACES.
K. PIPING SHALL BE IDENTIFIED WITH PIPE LABELS MARKED AT A MAXIMUM OF EVERY 25 FT. VALVES SHALL BE IDENTIFIED WITH BRASS OR ALUMINUM VALVE TAGS.
L. PROVIDE AND INSTALL PIPE GUIDES, EXPANSION JOINTS, AND HANGERS PER MANUFACTURER'S RECOMMENDATIONS.
M. PIPING WALL PENETRATIONS SHALL SHALL BE FINISHED WITH A CHROME ESCUTCHEON PLATE.
N. MINIMUM TERMINAL DEVICE BRANCH PIPE SIZE IS 3/4"ø UNLESS OTHERWISE NOTED.
O. PROVIDE HIGH POINT AIR VENTS, LOW POINT DRAINS (WITH CAPPED HOSE CONNECTIONS), AND SLOPE PIPING AS NECESSARY TO ALLOW FOR COMPLETE DRAINAGE OF THE HYDRONIC SYSTEMS.

KEY NOTES:

1. CONNECT TO EXISTING 6" HEATING WATER PIPING WITH CLOSELY SPACED TEES AND POINT OF CONNECTIONS SHOWN.
2. RACK PIPING VERTICALLY ON EXISTING CMU WALL WITH UNISTRUT SUPPORTS.
3. ROUTE PIPING ON UNISTRUT SUPPORTS WITH RUBBER MOUTNING PADS ON EXISTING SURFACE.
4. 6" CONCRETE HOUSEKEEPING PAD.
5. 4" CONCRETE HOUSEKEEPING PAD.
6. RACK PIPING VERTICALLY ON FACE OF BRICK WALL ON UNISTRUT SUPPORTS. AVOID ELECTRICAL PANEL CLEARANCE. CORE THROUGH BRICK WALL INTO MECHANCIAL ROOM. INSTALL ESCUTCHEON AND FILL VOID AROUND PIPING WITH FOAM FOR AN AIRTIGHT SEAL.

PERMIT DRAWINGS
04/30/2025

VERIFY SCALE!
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2	Addendum #2	05/19/2025	

Morrison Maierle
engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

DRAWN BY: EJW
DSGN. BY: EJW
APPR. BY: MWC
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON
ENLARGED MECHANICAL ROOM PLAN

PROJECT NUMBER 10694.001
SHEET NUMBER 7
DRAWING NUMBER M5.0

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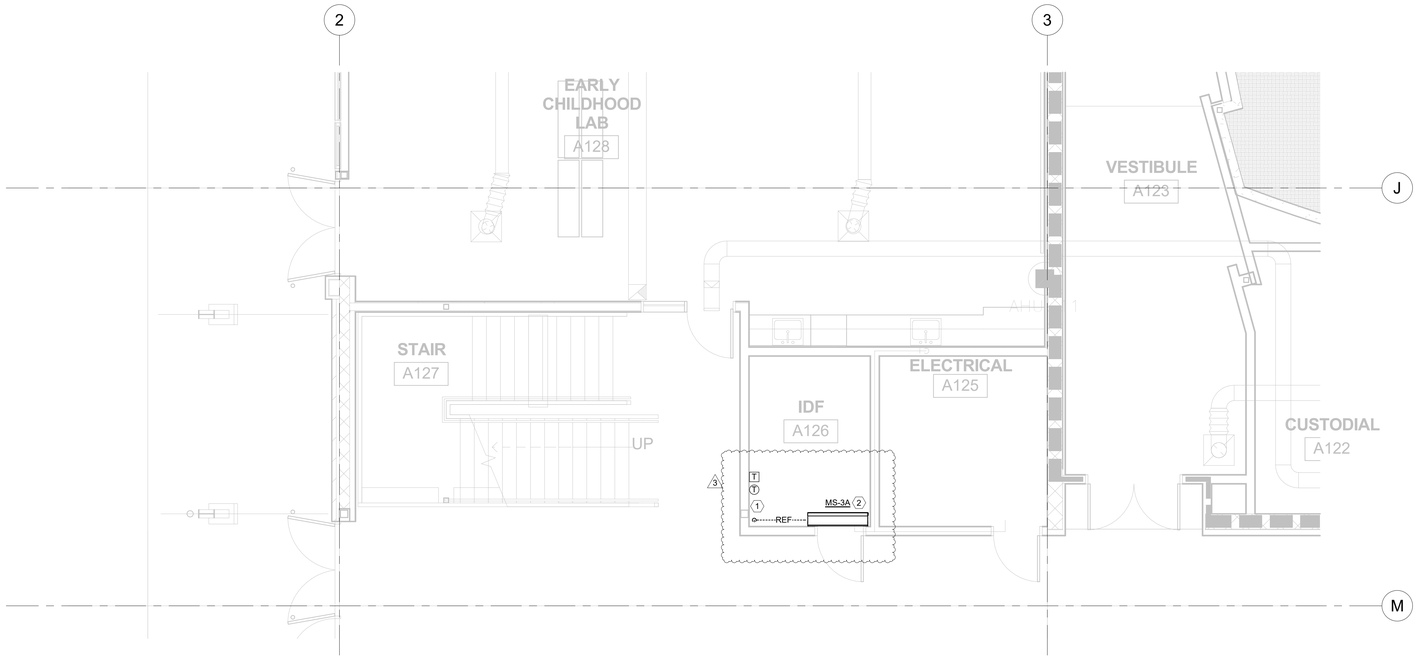
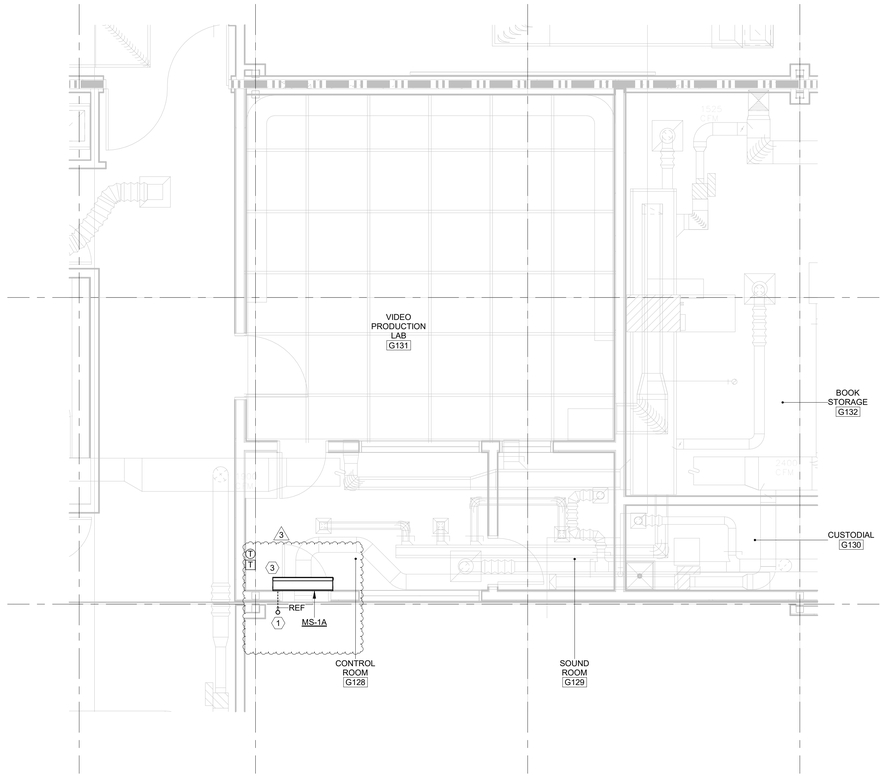
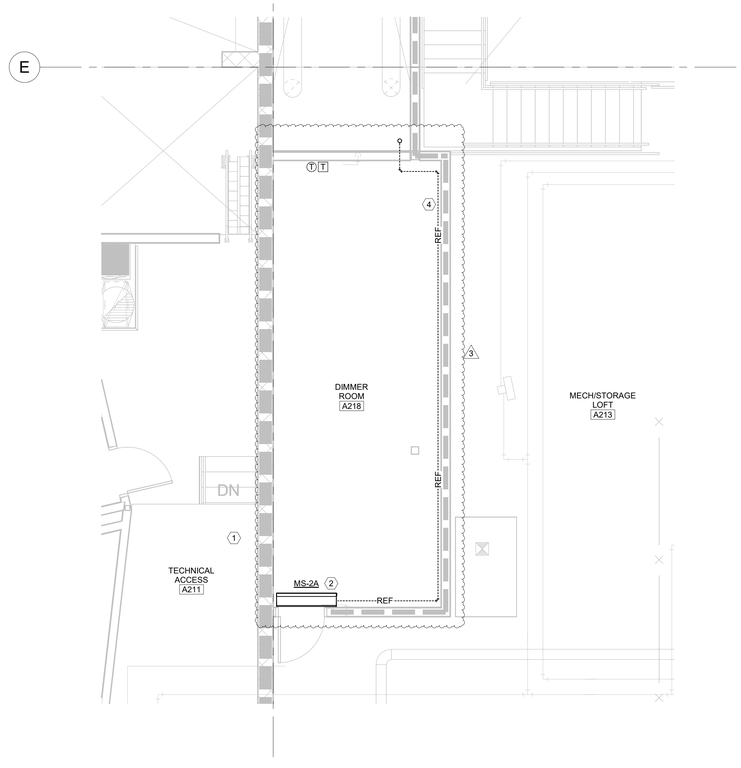


1 ENLARGED MECHANICAL PLAN - ELECTRICAL ROOM A125
1/4" = 1'-0"



2 ENLARGED MECHANICAL PLAN - CONTROL ROOM G128
1/4" = 1'-0"



3 ENLARGED MECHANICAL PLAN - DIMMER ROOM A218
1/4" = 1'-0"

MECHANICAL PLAN NOTES

A. VERIFY THE LOCATION OF THERMOSTATS AND SENSORS WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. INSTALL THERMOSTATS 48" ABOVE FINISHED FLOOR PER ADA REQUIREMENTS.
B. PROVIDE AND INSTALL SEISMIC BRACING FOR EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE CURRENTLY ADOPTED INTERNATIONAL BUILDING CODE.
C. FLEXIBLE DUCTWORK BETWEEN BRANCH DUCTS AND GRILLES, REGISTERS, OR DIFFUSERS SHALL BE LIMITED TO 5 FT. FLEXIBLE DUCT SHALL NOT BE USED IN PLACE OF ELBOWS.
D. PROVIDE AND INSTALL FIRE, SMOKE, OR COMBINATION FIRE/SMOKE DAMPERS WHERE DUCTWORK PASSES THROUGH RATED ASSEMBLIES. ASSOCIATED DUCT DETECTORS SHALL BE ADDRESSABLE. SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS SHALL INCLUDE A KEYED REMOTE TEST SWITCH LOCATED IN AN ACCESSIBLE LOCATION. FIELD COORDINATE THE LOCATION OF TEST SWITCHES WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.
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F. MAINTAIN THE INTEGRITY OF DRAFTSTOPPING WHERE DUCTWORK AND PIPING PENETRATE DRAFTSTOPPING MATERIALS.
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K. PIPING SHALL BE IDENTIFIED WITH PIPE LABELS MARKED AT A MAXIMUM OF EVERY 25 FT. VALVES SHALL BE IDENTIFIED WITH BRASS OR ALUMINUM VALVE TAGS.
L. PROVIDE AND INSTALL PIPE GUIDES, EXPANSION JOINTS, AND HANGERS PER MANUFACTURER'S RECOMMENDATIONS.
M. PIPING WALL PENETRATIONS SHALL SHALL BE FINISHED WITH A CHROME ESCUTCHEON PLATE.
N. MINIMUM TERMINAL DEVICE BRANCH PIPE SIZE IS 3/4"ø UNLESS OTHERWISE NOTED.
O. PROVIDE HIGH POINT AIR VENTS, LOW POINT DRAINS (WITH CAPPED HOSE CONNECTIONS), AND SLOPE PIPING AS NECESSARY TO ALLOW FOR COMPLETE DRAINAGE OF THE HYDRONIC SYSTEMS.

KEY NOTES:

3
1. ROUTE PIPING UP THROUGH ROOF AS SHOWN ON PLANS. PATCH ROOFING PER MANUFACTURER INSTRUCTIONS.
2. INSTALL WALL MOUNTED FANCOIL IN SAME LOCATION AS EXISTING VRF FANCOIL PREVIOUSLY DEMOLISHED. CONNECT TO EXISTING FANCOIL CONDENSATE DRAIN.
3. INSTALL FANCOIL ABOVE DOORWAY. MAINTAIN MANUFACTURER REQUIRED CLEARANCES.
4. ROUTE REFRIGERANT PIPING SURFACE MOUNT IN DIMMER ROOM AS HIGH AS POSSIBLE. ROUTE TO ABOVE CEILING IN SCENE SHOP HALLWAY TO ROOF.

PERMIT DRAWINGS
04/30/2025

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engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

DRAWN BY: EJW
DSGN. BY: EJW
APPR. BY: MWC
DATE: 04/22/2025
Q.C. REVIEW BY: MWC
DATE: 03/28/25

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON
ENLARGE MECHANICAL PLANS

PROJECT NUMBER 10694.001
SHEET NUMBER 8
DRAWING NUMBER M5.1

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MECHANICAL PLAN NOTES

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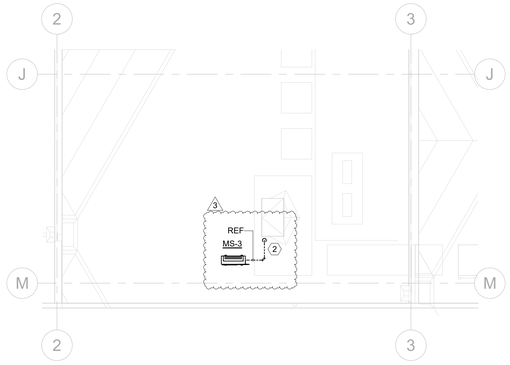
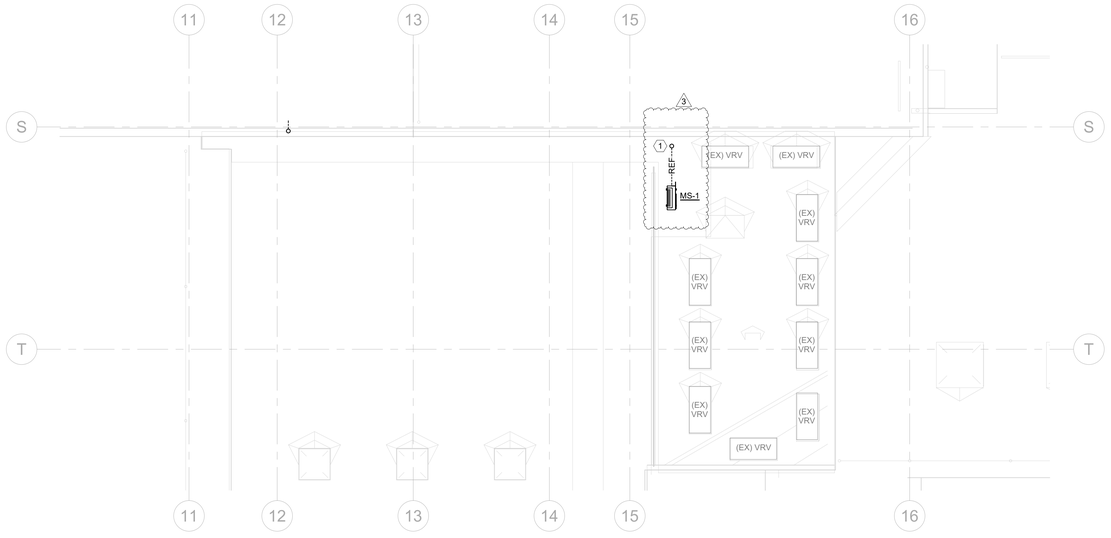
(#) KEY NOTES:

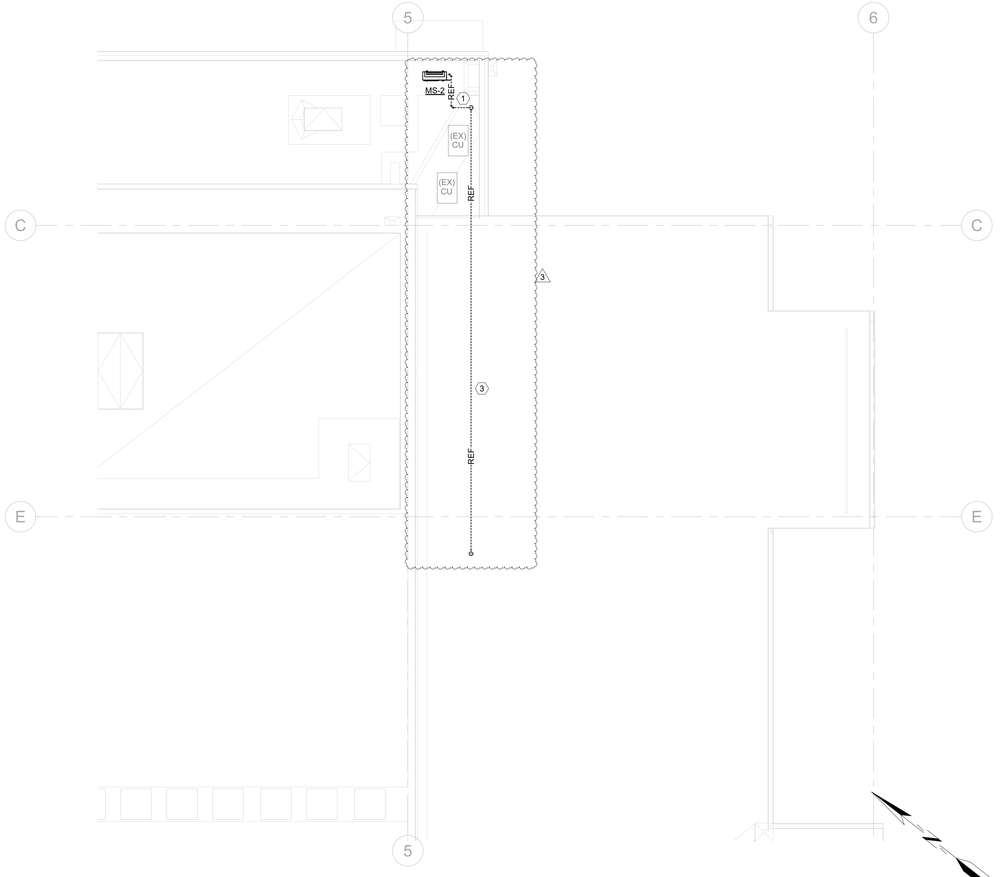
3
1. ROUTE REFRIGERANT PIPING ACROSS ROOF. PENETRATE ROOF WHERE SHOWN. PATCH ROOFING TO MANUFACTURER SPECIFICATIONS.
2. ROUTE REFRIGERANT PIPING ACROSS ROOF. PEENTRATE ROOF WHERE SHOWN. PATCH ROOFING TO MANUFACTURER SPECIFICATIONS. ROUTE PIPING THROUGH 2ND FLOOR MECHANICAL ROOM AND DOWN TO IDF ROOF ON FIRST FLOOR.
3. ROUTE REFRIGERANT PIPING ABOVE SCENE SHOP CILING AND UP TO ROOF. PATCH ROOFING TO MANUFACTURER SPECIFICATIONS.



3 ENLARGED ROOF MECHANICAL PLAN - IDF A126 MECHANICAL UNIT
1/8" = 1'-0"



1 ENLARGED ROOF MECHANICAL PLAN - CONTROL G128 MECHANICAL UNIT
1/8" = 1'-0"



2 ENLARGED ROOF MECHANICAL PLAN - DIMMER ROOM A218 MECHANICAL UNIT
1/8" = 1'-0"

PERMIT DRAWINGS
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engineers • surveyors • planners • scientists
1001 SW Disk Dr, Suite 110
Bend, OR 97702
541.699.5432
www.m-m.net

DRAWN BY: NGB
DSGN. BY: NGB
APPR. BY: NGB
DATE: 04/22/2025
Q.C. REVIEW BY: RJH
DATE: 03/27/2025

REDMOND SCHOOL DISTRICT
RIDGEVIEW HIGHSCHOOL COOLING UPGRADE
REDMOND OREGON

ENLARGED MECHANICAL PLANS - ROOF

PROJECT NUMBER 10694.001
SHEET NUMBER 9
DRAWING NUMBER M5.2

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