City of Puyallup Development & Permitting Services ISSUED PERMIT
Building | Planning | Engineering | Public Works | Fire | Traffic

PRCTI20221460

MECHANICAL COMPLIANCE SUMMARY

THE APPROVED CONSTRUCTION PLANS, DOCUMENTS AND ALL ENGINEERING MUST BE POSTED ON THE JOB AT ALL INSPECTIONS IN A VISIBLE AND READILY ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE REQUIRED TO BE PROVIDED BY THE PERMITEE ON SITE FOR INSPECTION

2018 WSEC Compliance Forms for Commercial Buildings including Group R2, R3 & R4 over 3 stories and all R1

Project & Applicant Information	**Project Title**	Salud Bar & Grill - 2018 WSEC	For Building Department Use:	**Date: May 13, 2023**
	Project Address	3811 9th St SW Puyallup, WA 98373	City of Puyallup Building ACCEPTED JMontgomery 06/08/2023 9:06:24 AM	
	Applicant Name	Marshall Briggs		
	Applicant Phone	360-430-8703		
	Applicant Email	cbriggs@middlebrookeng.com		

For questions about this report, contact WSEC Commercial Technical Support at 360-539-5300 or via email at com.techsupport@waenergycodes.com

General Occupancy	All Commercial		**General Building Use Type**	Dining, Restaurant/Bar		**Building Cond. Floor Area**	6,752
General Project Types	Alteration	**New Building or Addition Mechanical Scope**		**Alteration Mechanical Scope**	Single Zone Systems & Equipment	**Project Cond. Floor Area**	6,752
						Floors Above Grade	1
						Compliance Method	Compliance Method 1 - General
Mechanical Project Description							

Mechanical Compliance Scope and Method	**Project Type**	**Mechanical Scope**	**Economizer Exception(s) Applied?**	**DOAS Ventilation Provided?**	**Higher Equipment Efficiency Option Applied?**	**Equipment Efficiency Compliance Verification**
	Alteration	Single Zone Systems & Equipment	Yes	No	NA	**COMPLIES**
Additional Efficiency Credits Included (AEC)						
Does building include occupancy classifications requiring DOAS?	No		**Does project include DOAS equipment?**			No
Based on project scope do TSPR requirements apply?	No		**Do all systems comply with Appendix D standard reference design or qualify for an exception to TSPR?**			No

Scope & Space Conditioning	**ALTERATION - SINGLE ZONE SYSTEMS & EQUIPMENT**	**Compliance Verification**	**COMPLIES**

Single Zone Air Systems Category - Air conditioner, unitary, thru-wall, SDHV

Air Systems Summary Information

System/Equip ID	Quantity of Items	Supply Airflow Control	Ventilation Standard	Ventilation CFM (Total if Multiple Items)	Ventilation Air Source	Paired with DOAS	Ventilation energy recovery	Energy Recovery Efficiency (%)
RTU-01		Constant volume	IMC Ventilation	770	Integral		Not provided, not required	
RTU-02		Constant volume	IMC Ventilation	1,225	Integral		Not provided, not required	
RTU-03		Constant volume	IMC Ventilation	960	Integral		Not provided, not required	

Air Systems & Equipment - Cooling

System/ Equip ID	Cooling System/Equip Type	Specific Type	Cooling Capacity per item (Btu/h)	AEC Efficiency Multiplier	Econo Exception Multiplier (FL & PL)	Combined Efficiency Multiplier (AEC & Econo)	Proposed Cooling Efficiency	CE Units	Proposed Part Load Efficiency	PL Units	Efficiency Compliance Verification
RTU-01	Air conditioner, air cooled	Single package DX	48,000	1	0	1	14.0	SEER		IEER	COMPLIES
RTU-02	Air conditioner, air cooled	Single package DX	92,300	1	0	1	11.0	EER	12.7	IEER	COMPLIES
RTU-03	Air conditioner, air cooled	Single package DX	58,500	1	0	1	14.0	SEER		IEER	COMPLIES

Air Systems & Equipment - Heating

System /Equip ID	Heating System/Equip Type	Specific Type	Heating Capacity	HC Units	Proposed Heating Efficiency	HE Units	Efficiency Compliance Verification
RTU-01	Furnace	Warm air, gas fired (AFUE)	60,000	Btu/h	82.0	AFUE	COMPLIES
RTU-02	Furnace	Warm air, gas fired (AFUE)	125,000	Btu/h	82.0	AFUE	COMPLIES
RTU-03	Furnace	Warm air, gas fired (AFUE)	60,000	Btu/h	82.0	AFUE	COMPLIES

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Air Systems & Equipment Details			
System/Equip ID	**Area(s) Served**	**Location In Project Documents - Plan/Detail #**	
RTU-01	Lounge, Entry	MH101, MH102, MH601	
	Heating Section/Auxiliary Heating Type: Furnace		Economizer Compliance Method: Air-side economizer provided
	WSEC Equip Efficiency Reference Table - Cooling: Table C403.3.2(1)A - Unitary Air Conditioners & Condensing Units		
	WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(4) Warm Air Furnaces		
RTU-02	Lounge, Bar	MH101, MH102, MH601	
	Heating Section/Auxiliary Heating Type: Furnace		Economizer Compliance Method: Air-side economizer provided
	WSEC Equip Efficiency Reference Table - Cooling: Table C403.3.2(1)A - Unitary Air Conditioners & Condensing Units		
	WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(4) Warm Air Furnaces		
RTU-03	Family Dining	MH101, MH102, MH601	
	Heating Section/Auxiliary Heating Type: Furnace		Economizer Compliance Method: Air-side economizer provided
	WSEC Equip Efficiency Reference Table - Cooling: Table C403.3.2(1)A - Unitary Air Conditioners & Condensing Units		
	WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(4) Warm Air Furnaces		

Single Zone Air Systems Category - Heat pump, unitary, thru-wall, SDHV

Air Systems Summary Information								
System/Equip ID	**Quantity of Items**	**Supply Airflow Control**	**Ventilation Standard**	**Ventilation CFM (Total if Multiple Items)**	**Ventilation Air Source**	**Paired with DOAS**	**Ventilation energy recovery**	**Energy Recovery Efficiency (%)**
OU-1 & IU-01		Constant volume	IMC Ventilation	960	Integral		Not provided, not required	
OU-2 & IU-02		Variable air volume	IMC Ventilation	850	Integral		Not provided, not required	

Air Systems & Equipment - Cooling											
System/ Equip ID	**Cooling System/Equip Type**	**Specific Type**	**Cooling Capacity per item (Btu/h)**	**AEC Efficiency Multiplier**	**Econo Exception Multiplier (FL & PL)**	**Combined Efficiency Multiplier (AEC & Econo)**	**Proposed Cooling Efficiency**	**CE Units**	**Proposed Part Load Efficiency**	**PL Units**	**Efficiency Compliance Verification**
OU-1 & IU-01	Heat pump, air cooled	Split system	92,300	1	0	1	11.0	EER	12.2	IEER	COMPLIES
OU-2 & IU-02	Heat pump, air cooled	Split system	92,300	1	0	1	11.0	EER	12.2	IEER	COMPLIES

Air Systems & Equipment - Heating										
System /Equip ID	**Heating System/Equip Type**	**Specific Type**	**Heat Pump Heating Capacity (Btu/h)**	**Cooling Capacity (Btu/h)**	**AEC Efficiency Multiplier**	**Proposed Heat Pump Heating Efficiency**	**HPH Units**	**Proposed Low OSA Temp Efficiency**	**LTH Units**	**Efficiency Compliance Verification**
OU-1 & IU-01	Heat pump, air cooled, heating	Split system	88,000	92,300	1	3.3	COP	2.3	COP	COMPLIES
OU-2 & IU-02	Heat pump, air cooled, heating	Split system	88,000	92,300	1	3.3	COP	2.3	COP	COMPLIES

Air Systems & Equipment Details			
System/Equip ID	**Area(s) Served**	**Location In Project Documents - Plan/Detail #**	
OU-1 & IU-01	Kitchen	MH101, MH102, MH601	
	System/Equip ID for a single or multiple items?: Single item		
	Heating Section/Auxiliary Heating Type: Electric resistance (or None)		Economizer Compliance Method: Economizer not required
	WSEC Equip Efficiency Reference Table - Cooling: Table C403.3.2(2) - Unitary and Applied Heat Pumps		
	Proposed Low OSA Temp Efficiency: 2.3		LTH Units: COP
	WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(2) - Unitary and Applied Heat Pumps		
OU-2 & IU-02	Kitchen	MH101, MH102, MH601	
	System/Equip ID for a single or multiple items?: Single item		
	Heating Section/Auxiliary Heating Type: Electric resistance (or None)		Economizer Compliance Method: Economizer not required
	WSEC Equip Efficiency Reference Table - Cooling: Table C403.3.2(2) - Unitary and Applied Heat Pumps		
	Proposed Low OSA Temp Efficiency: 2.3		LTH Units: COP
	WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(2) - Unitary and Applied Heat Pumps		

The following information is necessary to check a mechanical permit application for compliance with the mechanical systems and equipment requirements in the Washington State Energy Code, Commercial Provisions.

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Project:
Salud Bar & Grill - 2018 WSEC
3811 9th St SW
Puyallup, WA 98373

Date: 2023-05-12

Applies	Code Section	Code Provision	Compliance Information Required In Permit Documentation	Location in Documents	Building Department Notes
SCOPE					
	C103.1	Construction documents - General	For a shell & core or tenant space (first build-out) project, indicate if there is no mechanical scope included in the project.		
NA	C103.1	Construction documents - General	For an alteration project, indicate if there is no mechanical scope included in the project.		
PERFORMANCE CRITERIA & SYSTEM DESIGN					
NA	C403.1	Exempt process equipment	Identify equipment used by manufacturing, industrial or commercial processes that are not for space conditioning or maintaining comfort and amentities for occupants; identify provisions applicable to this equipment per C403.1 exception		
	C403.1.1	HVAC total system performance ratio (TSPR)	For systems serving office, retail, library or education occupancies, provide a TSPR report that demonstrates the proposed design ratio is equal to or greater than the standard reference design ratio, or exception applied		
YES	C403.1.2	Calculation of heating and cooling loads	Provide load calculations performed per ASHRAE Std 183 or equivalent, using design parameters per C302 and Appendix C; include load adjustments to account for energy recovery	ATTACHED	
NA	C403.1.3	Data centers	Provide documentation that demonstrates that data center systems comply with the maximum allowed Design MLC and Annualized MLC per ASHRAE 90.4 with 2018 WSEC adjustments per climate zone		
NA	C403.2.1 C403.4.2.2	Zone isolation	If there are HVAC zones that are intended to be occupied non-simultaneously, identify isolation zone areas on plans; if multiple zones intended to be occupied simultanteously will be combined into a single isolation zone, include on plans that the combined zone area does not exceed 25,000 sf and does not include more than one floor; or exception applied		
YES			Indicate locations of associated zone isolation dampers in HVAC distribution system	MH-001, 101, 701, 801	
YES			Refer to HVAC Controls section in Requirements List for applicable automatic setback and shutdown controls requirements	MH701	
EQUIPMENT SELECTION & PERFORMANCE					

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YES	C403.3.1	Equipment and system sizing	Indicate that output capacities of heating and cooling equipment and systems are no greater than the smallest available equipment size that exceeds the calculated loads; note exceptions applied	MH601	
YES	C403.3.2 C403.9.1	HVAC equipment performance requirements (efficiency)	Provide equipment schedules on plans and in WSEC mechanical equipment compliance reports; indicate equipment type, calculated loads, capacity, rated and WSEC minimum efficiencies for all heating and cooling equipment; include supply and ventilation air cfms and operating hours for all air systems; identify heating and cooling equipment that does not have a corresponding WSEC minimum efficiency (manufacturer rated)	MH601	
YES	C405.8	Electric motor efficiency	List all motors ≥ 1/12 hp (that are not integral to a rated piece of equipment) in the mechanical or electrical equipment schedules on plans; indicate motor type and applicable efficiency table, hp, rpm, number of poles and rated efficiency, or exception applied	MH601	
NA	C403.3.2	Gas and oil-fired forced air furnace and unit heaters	For forced air furnaces with capacity ≥ 225,000 Btu/h and all unit heaters, indicate in equipment schedule intermittent ignition or IID, flue or draft damper, and rated jacket loss		
YES	C403.3.2.4	Packaged electric heating / cooling equipment	Verify all packaged electric equipment with > 6,000 Btu/h cooling capacity and any amount of heating is a heat pump; include in equipment schedules	MH601	
NA	C403.3.3	Hot gas bypass limitation for DX cooling equipment	For cooling equipment with hot gas bypass, provide either multiple step unloading or continuous capacity modulation; indicate bypass capacity per Table C403.3.3		
NA	C403.3.2.5	Humidification	For cooling systems with humidification equipment that are also required to have air economizer, indicate humidifier is adiabatic (direct evaporative or fog atomization), or exception applied		
	C403.3.2	Hydronic equipment	Refer to Requirements List section Hydronic Systems - Equipment Selection & Performance for selection criteria specific to chillers and boilers		
NA	C403.9	Heat rejection equipment	Refer to Requirements List section Heat Rejection Systems - Equipment Selection & Performance for selection criteria specific to cooling towers, dry coolers and condensers (air-cooled and evaporative)		

EQUIPMENT SELECTION & PERFORMANCE - DEDICATED OUTSIDE AIR SYSTEMS (DOAS)

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	C403.3.5 C403.3.5.4	Dedicated outdoor air systems	For buildings with occupancies required to comply with the DOAS provisions per Table C403.3.5, identify on plans all occupancies in the building and indicate which occupied spaces are required to have ventilation air delivered by a DOAS; or exception applied		
			If natural ventilation exception is applied, identify these spaces on plans; indicate operable window area complies with IMC Section 402; provide documentation describing how required ventilation will be provided during all occupied hours, including during inclement weather		
			If high efficiency VAV exception is applied, identify these spaces on plans; refer to Single Zone VAV section for Groups A-1, A-2 and A-3 occupancy classifications, or Multiple Zone VAV for other than Groups A-1, A-2 and A-3 (per Table C403.3.5)		
			If compliance with the DOAS provisions is deemed to be impractical, provide documentation that demonstrates the alternate design strategy applied that achieves a comparable level of energy efficiency, as pre-approved by the AHJ		
			Refer to Requirements List section after Multiple-Zone Air Systems for High Efficiency Multiple-Zone VAV Systems exception to C403.3.5 DOAS		
			Refer to Requirements List section after High Efficiency Multiple-Zone Air Systems for High Efficiency Single-Zone VAV Systems exception to C403.3.5 DOAS		
	C403.3.5.1	DOAS energy recovery method and effectiveness	For all DOAS systems, indicate exhaust air ER method and basis of rated effectiveness (sensible or latent); indicate ≥ 60% sensible or ≥ 50% enthalpy ER effectiveness based on delta between outdoor air and return air enthalpies at design conditions; or exception applied		
			If applying exception for DCV, identify occupant load in space and airflow control configured to reduce ventilation rate by ≥ 50% when occupancy is less than design occupancy		
	C403.3.5.1	DOAS fan power	For DOAS with total system fan hp < 5 hp, indicate total system fan power does not exceed 1 watt per cfm		
			For DOAS with total system fan hp ≥ 5 hp, indicate total system fan power complies with fan power limitation per Section C403.8.1		

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	C403.3.5.2	Heating / cooling system controls with DOAS	Indicate systems and equipment associated with the delivery of zone level heating and cooling (fans, hydronic pumps, primary air dampers, etc) are configured to shut off, and central eqiupment is configured to turn down, when there is no call for heating or cooling in the zone they serve		
			If applying Exception to heating / cooling fans used for air mixing in the space during deadband periods, include fan watts per cfm in equipment schedule		
	C403.3.5.3	Decoupled DOAS supply air	Indicate method of delivery of DOAS supply air to the occupied space (directly into space, downstream of terminal heating / cooling coils); or exception applied		
	C403.6.1	Multiple zone DOAS	For DOAS serving multiple zones, indicate controls configured to reduce the volume of outdoor air in each zone independently when the zone is unoccupied; or exception applied		
ADDITIONAL EFFICIENCY CREDITS - DEDICATED OUTSIDE AIR SYSTEMS (DOAS)					
	C406.6	DOAS	For building occupancies not subject to the requirements of Section C403.3.5, to comply with this additional efficiency credit, provide calculations that demonstrate 90% or more of the total floor area of all occupied, conditioned spaces are served by a DOAS per C403.3.5		
	C406.7	High performance DOAS - Energy recovery effectiveness and fan power	For all building occupancies, to comply with this additional efficiency credit, demonstrate compliance with C406.6		
			Indicate energy recovery sensible effectiveness of all DOAS is ≥ 80%		
			For each system, indicate that total system fan power does not exceed 0.5 watts per cfm		
FANS AND FAN CONTROLS					
YES	C403.8.1	Fan power limitation	For all HVAC fan systems that provide heating and / or cooling and all DOAS, provide system total nameplate hp in equipment schedules on project plans	MH601	
NA			For all applicable HVAC systems with total fan motor nameplate hp > 5hp, verify fan system motor hp or bhp complies with fan power limits per equations in Table C403.8.1(1)		
NA			Terminal units installed in conjunction with a DOAS (hydroninc heat pumps, VRF heat pumps, chilled/hot water terminal units, variable volume terminal units) shall be treated as independent air-handling units for purposes of fan power calculations		

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NA	C403.8.2	Motor nameplate hp	For all applicable HVAC systems with total fan motor nameplate hp > 5hp, indicate fan motors specified are the smallest available motor hp size greater than fan bhp, note exceptions applied		
YES	C405.8	Fractional hp fan motors	For all fractional hp fan motors (1/12 - 1 hp), indicate that motors comply with applicable WSEC efficiency tables; if motor type is not listed in an efficiency table, indicate whether fan has an electronically commutated motor, has motor rated efficiency of at least 70%, or exception applied	MH601	
NA	C403.8.3	Fan efficiency	For individual fans > 5hp, and multiple fans combined in series or parallel that operate as the functional equivalent of a single fan with a combined total motor hp > 5hp, indicate in equipment schedule that rated FEG for all applicable fans is ≥ 67, or exception applied; indicate these fans are sized so total efficiency is within 15% of the fan maximum total efficiency		
	C403.8.4	Group R occupancy exhaust fan efficacy	For all exhaust fans ≤ 400 cfm in Group R occupancies, indicate in equipment schedule the fan flow rate and efficacy (cfm/watt), or exception applied; refer to Table C403.8.4		
NA	C403.2.3	Variable flow capacity - fans	For fan motors ≥ 7.5 hp, indicate method of variable flow control (VSD or equivalent method) in equipment schedule, or exception applied		
YES	C403.8.5.1	Fan airflow control	For DX air handling units with cooling capacity ≥ 42,000 Btu/h and evaporative and chilled water air handling units with fan ≥ 0.25 hp, indicate whether system is single zone or multiple zone and related control method (cooling capacity controlled in response to space temperature, space temperature is controlled by modulating supply airflow, or both)	MH-601, MH701	
YES			For mechanical cooling systems (includes DX and chilled water coils) that control cooling capacity in response to space temperature - Provide a minimum of two stages of fan control; indicate minimum fan speed is ≤ 66% of full speed drawing ≤ 40% of full speed fan power during periods of low cooling or ventilation only	MH-601, MH701	

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YES			For other mechanical cooling systems (includes DX and chilled water coils) that control space temperature by modulating airflow (in lieu of, or in addition to, controlling capacity in response to space temperature) - Provide fan controls for modulating supply airflow; indicate minimum fan speed is ≤ 50% of full speed drawing ≤ 30% of full speed fan power during periods of low cooling or ventilation only; or exception applied	MH601, MH701	
ADDITIONAL EFFICIENCY PACKAGE OPTION, MORE EFFICIENT HVAC EQUIPMENT & FAN PERFORMANCE - MUST COMPLY WITH ALL 3 PROVISIONS TO BE ELIGIBLE					
	C406.2.1	HVAC system selection	To comply with this additional efficiency credit, provide calculations that demonstrate (based on heating and cooling output capacity) that 90% or more of all HVAC equipment serving conditioned floor areas have a corresponding WSEC listed efficiency; or exception applied		
	C406.2.2	Minimum equipment efficiency	In addition to system selection requirement, indicate that all associated heating and cooling equipment have a rated efficiency for all equipment performance criteria (heating, cooling, full load, part load) that is at least 15% better than the listed WSEC efficiency; include specific equipment exceptions applied		
			For systems required to provide a TSPR report per C403.1.1, demonstrate that the proposed design ratio is at minimum 10% higher than the standard reference design ratio		
			For projects complying via weighted average efficiency exception, include calculations that demonstrate the overall average better than code efficiency of all equipment performance criteria for all equipment is ≥ 15%; indicate that all equipment has at least 5% better than code efficiency		
			For systems serving low energy and semi-heated spaces, indicate that 90% or more of installed heating output capacity is provided by electric infrared or gas-fired radiant equipment for localized heating applications only		
	C406.2.3	Minimum fan efficiency grade	In addition to system selection and efficiency requirements, indicate rated FEG of all ≥ 1 hp (750 watt) stand alone supply, return and exhaust fans is ≥ 71; indicate these fans are sized so the fan efficiency at design conditions is within 10% of the maximum total or static efficiency		
VENTILATION, EXHAUST & ENERGY RECOVERY					
YES	C403.2.2.1	Ventilation	Indicate method of ventilation air delivery (natural or mechanical) for each zone	MH601	

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YES			If mechanically delivered, indicate that ventilation systems are configured to provide not more than 150% of, but at least the minimum required volume of outdoor air to each zone per IMC, ASHRAE 62.1 or other applicable code (WAC, OSHA, etc); or exception applied	MH601, SEE CALCS	
			If delivered via natural ventilation, identify required elements per IMC including: minimum openable area to the outdoors or qualifying adjoining spaces; criteria for ensuring required ventilation is provided during all occupied hours of the year (including during inclement outdoor conditions)		
YES	C403.2.2.2	Exhaust	Indicate that exhaust systems are configured to provide not more than 150% of, but at least the minimum required volume from each zone per IMC, or other applicable code (WAC, OSHA, etc); or exception applied	MH601, SEE CALCS	
YES	C403.4.2.4	Exhaust system off-hour controls	Refer to Requirements List section HVAC Controls for off-hour controls requirements for exhaust systems	MH601, MH701	
	C403.3.6	Balanced ventilation for Group R-2 occupancy	For Group R-2 dwelling and sleeping units, indicate that each habitable space is provided with a balanced ventilation system; indicate system is provided with energy recovery with 60% sensible recovery effectiveness		
YES	C403.7.1	Demand controlled ventilation	Identify spaces > 500 sf with occupant load ≥ 25 people/1,000 sf per IMC; for each space indicate whether it is served by an HVAC system with total design ventilation air > 3,000 cfm, and / or the system has airside economizer or automatic modulating outdoor air damper; indicate controls are configured to provide demand controlled ventilation or provide supporting documentation for applied exception	MH601, MH701	
YES	C403.7.2	Occupancy sensors	For gyms, classrooms, auditoriums, conference rooms and other spaces with occupant load ≥ 25 people/1,000 sf per IMC, that have an area > 500 sf, indicate occupancy-based ventilation air control when space is unoccupied and method (closes outdoor air damper or shuts-off equipment); or alternate means provided to automatically reduce ventilation air when space is partially occupied; or exception applied	MH101, MH601, MH701	
YES	C403.7.3	Ventilation air heating control	For ventilation air systems that operate in conjunction with heating and cooling systems, indicate that ventilation air is tempered (via heating or heat recovery) to no greater than 60F when the space conditioning system is in cooling mode	MH601, MH701	

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	C403.7.4.2	Ventilation controls for Group R-1 guestrooms	Refer to Requirements List section HVAC Controls for Group R-1 temperature setback and set-up controls		
			Indicate method of ventilation and exhaust isolation for each guest room and automatic controls that are configured to turn off ventilation and exhaust airflow when each room is unoccupied		
	C403.8.4	Group R occupancy exhaust fan efficacy	Refer to Requirements List section Fans & Fan Controls		
	C403.7.5 C403.7.5.1	Enclosed loading dock ventilation	For enclosed loading docks, indicate ventilation / exhaust system method of activation (gas detection system for CO and NO2, or occupancy sensors), and control method (staged or modulating)		
	C403.7.5 C403.7.5.2	Enclosed parking garage ventilation	For enclosed parking garages, indicate ventilation / exhaust system activated by gas detection system for CO and NO2, and control method (staged or modulating); or exception applied		
NA	C403.7.6	Ventilation / exhaust systems energy recovery	For systems with design ventilation air > 5,000 cfm, or design supply air cfm and % ventilation air exceeding the values in Tables C403.7.6(1) or (2), indicate exhaust air energy recovery method; or exception applied with supporting calculations		
NA			For rooms served by multiple systems with aggegate design ventilation air > 5,000 cfm, or aggregate design supply air cfm and % ventilation air exceeding the values in Tables C403.7.6(1) or (2), indicate exhaust air energy recovery method; or exception applied with supporting calculations		
NA			Indicate energy recovery rated effectiveness that increases outdoor air enthalpy by ≥ 50% based on delta between outdoor air and return air enthalpies at design conditions		
YES	C403.7.7.1.1 C403.7.7.1.2 C403.7.7.1.3	Kitchen exhaust hood system	Indicate on plans the type, duty, UL rating and exhaust airflow rate of each kitchen hood	MH101, MH102, MH601	
YES			Provide calculations that show a balanced accounting of total kitchen exhaust (include all hoods) with % of: supply air, transfer air from adjacent spaces, and make-up air	MH101, MH102, MH601	
YES			For hoods with make-up air drawn directly into the exhaust air cavity of each hood, indicate that replacement air does not exceed 10% of hood exhaust airflow rate	MH101, MH102, MH601	
YES			For kitchens with total hood exhaust exceeding 2,000 cfm, indicate that each hood is UL 710 rated and maximum exhaust airflow rate of each hood is per Table C403.7.7.1.2; or exception applied	MH101, MH102, MH601	

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YES			For kitchens with total hood exhaust exceeding 2,000 cfm, indicate energy efficiency compliance method (demand ventilation, energy recovery, or transfer air that would otherwise be exhausted); or exception applied	MH- 101,102, 601	
	C403.7.7.2	Laboratory exhaust systems energy recovery	For buildings with total lab exhaust > 5,000 cfm, indicate method of energy recovery used to pre-condition laboratory make-up air; energy recovery effectiveness (min 25°F increase in outside air temperature); or alternative method per exception (VAV exhaust, semi-conditioned makeup, or CERM calculation)		
YES	C403.7.7.3	Transfer air	For spaces where conditioned supply air is utilized as transfer air to balance mechanical exhaust, indicate basis of transfer airflow (supply required to meet loads, health/safety requirement, air that would normally be exhausted); or exception applied	MH101, MH601, MH701	
YES	C403.7.8.1 C403.7.8.3	Shutoff dampers for building isolation	Indicate locations of outdoor air intake, exhaust and relief outlet dampers on plans; indicate whether dampers are Class 1 motorized, or gravity and exception applied (include leakage rating, cfm/sf)	MH101,MH102	
			Indicate location of stairway and elevator hoistway shaft vent dampers on plans; verify dampers are Class 1 motorized; or exception applied		
YES	C403.7.8.2 C403.7.8.3	Shutoff dampers for return air	Indicate locations of return air dampers that are integral to airside economizer operation; verify dampers are motorized; indicate whether dampers are Class 1, or within packaged equipment eligible for leakage rating exception (include leakage rating, cfm/sf)		
YES	C403.7.8.4	Damper actuation	Indicate automatic controls configured to close outdoor air intake, exhaust and relief outlet dampers during unoccupied equipment operation; not including economizer cooling, night flush or IMC required outdoor air / exhaust	MH101, MH701	
			Indicate method of activation of stairway and elevator hoistway shaft vent dampers (fire alarm or interruption of power)		
	C404.11.4	Exhaust system energy recovery for heated indoor pools and permanent spas	For buildings with pools or spas with water surface area > 200 sf, indicate exhaust air energy recovery method and use of waste heat (preheat ventilation air, pool water or service hot water); or exception applied		
			Indicate energy recovery system has the rated effectiveness and is configured to decrease the exhaust air temperature at design conditions by ≥ 36°F		

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HVAC CONTROLS					
YES	C403.4.1	Thermostatic controls (thermostats and humidistats)	Indicate locations of thermostatic and humidity control devices and the zones they serve on plans, including perimeter system zones	MH101, MH701	
			Where adjacent (neighboring) zones are controlled by separate thermostats (including perimeter systems used to offset heat gain or loss), and are connected by permanent openings > 10% of either zone sf area, indicate controls configured to prevent adjacent zones from operating in conflicting modes (one in heat, other in cool); applies to adjacent perimeter zones, adjacent nonperimeter zones, and adjacent perimeter and nonperimeter zones		
			If applying Exception 2 to nonperimeter zones adjacent to perimeter zones, indicate that setpoints and deadband settings in these zones are coordinated so cooling in a nonperimeter zone does not occur until the temperature in that zone is 5°F higher than the adjacent perimeter zone temperature in heating		
NA			If applying Exception 3 for DOAS, indicate supply air temperature heating setpoint is ≤ 65°F and cooling setpoint is ≥ 72°F, or method of supply air temperature reset		
YES	C403.4.1.1	Heat pump supplementary heat	Indicate staged heating operation with compression as the first stage of heating and supplemental heating controlled with outdoor lock-out temperature set to 40°F or less	MH601, MH701	
	C403.4.1.2	Deadband	Indicate zone thermostatic controls configured with 5°F minimum deadband for systems that control both heating and cooling		
	C403.4.1.3	Setpoint overlap restriction (thermostats)	If separate heating and cooling thermostatic control devices are used to serve a zone, indicate locations of both thermostatic control devices and the zone they serve on plans		
			Indicate a limit switch, mechanical stop or DDC control with programming to prevent simultaneous heating and cooling		
NA	C403.4.1.4	Heated or cooled vestibules	Indicate thermostatic controls within heating or cooled vestibules with a heating setpoint ≤ 60°F and cooling setpoint ≥ 85°F; indicate controls are configured to turn off heating when outdoor temperature is > 45°F; or note exception applied		
NA	C403.4.1.4	Heated air curtains	Indicate controls are configured to turn off air curtain heating when outdoor temperature is > 45°F		

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NA	C403.4.1.6	Door switches for HVAC system thermostatic control	Where doors open to the outdoors from a conditioned space, indicate automatic controls configured to setback the HVAC system(s) when the door is open for > 5 minutes; indicate method of HVAC system setback control (turns off the HVAC system or resets the heating setpoint to 55°F and cooling setpoint to 85°F), or exception applied		
YES	C403.4.2 C403.4.2.1 C403.4.2.2	Automatic setback and shutdown	Indicate zone thermostatic controls configured with required automatic setback and manual override functions, setback temperatures, and control method (automatic time clock or 7 day programmable controls); note exceptions applied	MH601, MH701	
YES	C403.4.2.3	Automatic (optimum) start and stop	Indicate all HVAC systems are provided with automatic start and stop controls; indicate start controls are configured to adjust the equipment start time as required to bring each area served up to design temperature just prior to scheduled occupancy; indicate stop controls are configured to reduce heating setpoint and increase cooling setpoint by at least 2°F prior to scheduled unoccupied periods	MH601, MH701	
YES	C403.4.2.4	Exhaust system off-hour controls	For exhaust systems serving conditioned spaces in all occupancies other than Group R, indicate method of control and that controls are configured to turn exhaust systems on and off in concert with the ventilation air systems providing their make-up air, or exception applied	MH601, MH701	
NA	C403.4.2.5	Transfer and destratification fan system off-hour controls	For transfer fan or mixing fan systems serving conditioned spaces in all occupancies other than Group R, indicate method of control and that controls are configured to turn fans on and off in concert with the associated HVAC systems, or exception applied		
NA	C403.4.7	Combustion heating equipment	For combustion heating equipment other than boilers or radiant heaters with output capacity > 225,000 Btu/h, indicate modulating or staged combustion control		
NA	C403.4.7.1	Combustion decorative vented appliance, combustion fireplace and fire pit controls	Indicate controls that are configured to limit operation of combustion appliance, fireplace and fire pit to ≤ 1 hour without override, or that occupancy sensor controls are provided		

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	C403.7.4.1	Temperature setpoint controls for Group R-1 guestrooms	For hotels / motels with over 50 guest rooms, indicate automatic controls for HVAC equipment serving guest rooms are configured to setback (heating) and set-up (cooling) temperature setpoint by at least 4°F when room is unoccupied, and adjust setpint to 60°F (heating) and 80°F (cooling) when room is unrented / vacated; indicate control method - activated by room entry, occupancy sensor or networked guestroom control system		
	C403.7.4.2	Ventilation controls for Group R-1 guestrooms	Refer to Requirements List section Ventilation, Exhaust & Energy Recovery		
	C403.4.9 C403.4.10	Thermostatic controls for Group R2 / R3 dwelling units and Group R2 sleeping units	For primary space conditioning systems, indicate 5-2 programmable thermostats capable of two setback periods per day; indicate each non-primary system is provided with at minimum an adjustable thermostat, or exception applied. For all thermostats indicate purpose (heating only, cooling only, or both) and required temperature range; indicate thermostats are configured for at minimum a 5°F deadband		
NA	C403.4.11.1 C403.4.11.2 C403.4.11.3	DDC system applications, controls and display	Provide central and zone level DDC controls as required based on system application, capacity or size thresholds and other qualification per Table C403.4.11.1		
NA			Identify all DDC system input / output control points in project documents		
NA			Indicate control capability includes monitoring zone and system level demand for fan pressure, pump pressure, heating and cooling; indicate capability to transfer demand information from zones to air / hydronic distribution system controllers, and to central plant systems and equipment controllers		
NA			Indicate system has the capability for trending and graphically displaying input / output points		
YES	C403.5.1	DX air handler variable cooling control(Located under Integrated Economizer Control)	For DX air handlers with cooling capacity ≥ 65,000 Btu/h, indicate number of cooling stages provided and method (multiple compressors and / or variable speed compressors); indicate minimum displacement (capacity reduction) as % of full load; indicate thermostats are configured with the same number of cooling stages and displacement	MH601, MH701	
YES			Indicate control method (cooling capacity controlled in response to space temperature, space temperature controlled by modulating supply airflow, or both)	MH601, MH701	
DUCTWORK, SHAFTS AND PLENUMS					

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YES	C403.10.1.1 C403.10.2	Duct construction	Indicate on plans that all ductwork is constructed and sealed per IMC	MH- 001, 501, 801	
YES			For outdoor air ductwork, also indicate on plans that ductwork meets air leakage requirements per C402.5 and vapor retarder requirements per the IBC	MH- 001, 501, 801	
YES	C403.10.2.1 C403.10.2.2 C403.10.2.3	Duct pressure classifications	Identify location of low, medium and high pressure ductwork on plans	MH- 001, 501, 801	
NA	C403.10.2.3	High pressure duct leakage test	Indicate high pressure duct leakage testing requirements on plans; provide test results to jurisdiction when completed		
YES	C403.10.1.1 C403.10.1.2	Duct insulation	For outdoor air ductwork located within conditioned space (upstream or downstream of shutoff damper), identify climate zone and indicate ductwork insulation R-value per Table C403.10.1.1 on plans; or exception applied	MH- 001, 501, 801	
YES			For supply and return air ductwork located within unconditioned space or outdoors, identify climate zone and indicate ductwork insulation R-value per Table C403.10.1.2 on plans; or exception applied	MH- 001, 501, 801	
YES			For supply air ductwork located within conditioned space, identify on plans if design supply air temperature is < 55°F or > 105°F; indicate ductwork insulation R-value per Table C403.10.1.2 on plans; or exception applied	MH- 001, 501, 801	
YES			For return and exhaust air ductwork located within conditioned space (upstream of the shutoff damper) and downstream of an energy recovery media, indicate ductwork insulation R-value per Table C403.10.1.2; or exception applied	MH- 001, 501, 801	
YES			For exhaust and relief air ductwork located within conditioned space and downstream of the shutoff damper, indicate ductwork insulation R-value per Table C403.10.1.2; or exception applied	MH- 001, 501, 801	
NA	C403.10.1.1 C402.1.3	Shaft and plenum insulation	For outdoor air shafts and plenums, indicate on plans that the R-value of insulation on these elements complies with Table C402.1.3 for steel-framed walls		
PIPING					
	C403.10.3	Piping insulation	Indicate design temperature range of fluid conveyed in piping and thickness of insulation (in inches) on hydronic piping plans; or exception applied		
	C403.10.3.1	Protection of piping insulation	Indicate method of protection of pipe insulation from damage / degredation on hydronic piping plans		

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ECONOMIZERS					
YES	C403.5	Air economizer required	Identify all cooling systems requiring air economizer controls in equipment schedules on plans and in WSEC mechanical equipment compliance reports	MH601, MH701	
YES			Indicate all systems utilizing air economizer exceptions in WSEC mechanical equipment compliance report, including those with water-side economizer in lieu of air economizer; indicate on plans and in WSEC mechanical equipment compliance reports all eligible exception(s) taken and measures to comply with exception(s)	MH601, MH701	
YES	C403.4.1 C403.5.1	Integrated economizer operation - air and water	Indicate air and water-side economizers are configured for partial cooling operation even where additional mechanical cooling is required to meet the load	MH601, MH701	
YES			For DX air handlers with single or multiple stages of mechanical cooling; indicate controls are configured with air economizer as the first stage of cooling	MH601, MH701	
YES			Refer to Requirements List section HVAC Controls for additional requirements for DX air handlers	MH601, MH701	
YES	C403.5.2	Economizer heating system impact - air and water	Verify control method of HVAC systems with economizers does not increase building heating energy usage during normal operation	MH601, MH701	
YES	C403.5.3.1	Air economizer capacity	Indicate modulating outdoor air and return air dampers are configured to provide up to 100% outdoor air for cooling	MH601, MH701	
YES	C403.5.1 C403.5.3.2	Air economizer controls and integrated operation	Indicate that economizer controls are configured to provide partial economizer cooling when additional mechanical cooling is also required to meet the cooling load	MH601, MH701	
YES			Indicate that control of economizer dampers is not based only on mixed air temperature; or exception applied for systems with cooling capacity ≤ 65,000 Btu/h	MH601, MH701	
YES	C403.5.3.3	Air economizer high limit controls	Indicate high limit shut-off control method and required high limit per Table C403.5.3.3	MH601, MH701	
NA	C403.5.3.4	Relief of excess outdoor air	Refer to Requirements List section Ventilation, Exhaust & Energy Recovery		
YES			Indicate relief air outlets are sized and configured to relieve excess building air during air economizer operation to prevent building over-pressurization	MH101, MH102, MH601	
YES			Indicate relief air outlet are located to avoid recirculation into the building	MH101, MH102, MH601	

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	C403.5.4.1	Water economizer capacity	For eligible systems where water-side economizer may be provided in lieu of air economizer, indicate system is capable of 100% design cooling capacity at 50°F db / 45°F wb outdoor air temperatures; indicate if threshold for 100% design cooling capacity via economizer must be lowered to 45°F db / 40°F wb due to dehumidification requirements		
	C403.5.4.2	Water economizer maximum pressure drop	Indicate that the pressure drop across precooling coils and heat exchangers in water economizer systems do not exceed 15 feet (4572 mm)		
YES	C403.5.5	DX equipment economizer fault detection and diagnostics	For DX air handlers with economizer and cooling capacity ≥ 54,000 Btu/h, provide a fault detection and diagnostics (FDD) system to monitor economizer system operation and report faults	MH601, MH701	
HYDRONIC SYSTEMS - EQUIPMENT SELECTION & PERFORMANCE					
	C403.3.2.1	Maximum air cooled chiller capacity	For chilled water plants and buildings with > 500 tons of cooling capacity, indicate air-cooled chiller capacity is ≤ 100 tons, or exception applied		
	C403.6.7	Large capacity cooling systems	For buildings ≥ 300 tons of cooling capacity, indicate method of multi-stage or variable capacity control (VSD, multiple staged compressors, or max capacity of any single unit		
	C403.3.2.2	Non-standard water-cooled centrifugal chillers	For water-cooled centrifugal chillers not designed for operation at standard conditions, provide calculations documenting maximum full load and part load rated equipment performance requirements		
	C403.3.3	Hot gas bypass limitation for chillers	For cooling equipment with hot gas bypass, provide either multiple step unloading or continuous capacity modulation; indicate bypass capacity per Table C403.3.3		
	C403.4.3 C403.3.4	Large capacity boiler systems	For hydronic systems with only a single boiler that has > 500,000 Btu/h input capacity, indicate multi-stage or modulating burner		
			For boiler system (single or mulltiple) with > 1,000,000 Btu/h input capacity, indicate turndown ratio per Table C403.3.4 and method (multiple single input boilers, modulating boilers, or combination)		
	C403.2.3	Variable flow capacity - pumps	For pump motors ≥ 7.5 hp, indicate method of variable flow control (VSD or equivalent method) in equipment schedule, or exception applied		
HYDRONIC SYSTEMS - CONTROLS					
	C403.4.3	Boiler sequencing	Indicate automatic controls that sequence operation of multiple boilers		

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	C403.4.3.2	Two-pipe changeover systems	Indicate changeover deadband is ≥ 15°F outdoor air temperature; indicate controls are configured so that heating / cooling modes are active for at minimum 4 hours before changeover and that the delta between heating / cooling supply temperatures at changeover point is		
	C403.4.1.5	Heating water temperature setback	For boilers that provide building heating via one- or two-pipe systems, indicate controls that provide heating water temperature setback based on outdoor temperature		
	C403.4.4	Hydronic system part load controls and supply-water temperature reset	For heating and chilled water systems with ≥ 300,000 Btu/h output capacity, indicate system controls are configured to automatically reset supply water temperature based upon demand; or exception applied		
			Indicate automatic pump flow controls are configured to reduce system flow rate by ≥ 50%, or the maximum allowed by the equipment manufacturer, based upon the heating or cooling loads; or decribe why not required		
			For hydronic systems with output capacity ≥ 300,000 Btu/h that serve heating water systems, chilled water systems and water-cooled unitary air conditioners, indicate that pumps are provided with a variable speed drive if one of the following conditions apply: 1) System pump motor hp is ≥ 2 hp and pumps are designed to operate continuously or per time schedule; 2) System pump motor hp is ≥ 7.5 hp and pumps are controlled by automatic DDC configured to only operate pumps when there is a call for zone heating or cooling		
			Where variable speed drives are required, indicate system is configured so that pump motor power is ≤ 30% of design wattage at 50% of design flow rate; indicate pump flow is controlled to maintain one control valve nearly wide open, or to maintain a mimimum differential pressure; or exception applied		
	C403.4.6	Hydronic system variable pump flow control	For individual pumps required to have variable speed controls, indicate manner of pump speed control (differential pressure, static pressure setpoint, zone heating or cooling demand, or based on the relationship between variable speed controller fequency and power)		
	C403.4.5	Chiller / boiler plant pump isolation	Indicate controls are configured to automatically reduce overall plant flow and shut-off flow through individual chillers and boilers when not in use		

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	C403.4.3.3.1	Water loop heat pump - temperature deadband	Indicate method of water loop temperture control (central plant equipment controls are configured to provide ≥ 20°F water supply temperature deadband between heat rejection and heat addition modes, or controls are configured for system loop temperature optimization		
	C403.4.3.3.2	Water loop heat pump - heat rejection equipment	Indicate type of cooling tower (open- or closed-circuit) in equipment schedule; indicate whether the cooling tower is used directly in the heat pump loop or in conjunction with a separate heat exchanger; indicate method used to limit system heat loss when heat rejection is not needed		
	C403.4.3.3.3	Water loop heat pump - isolation valves	For hydronic heat pump systems with total system power > 10 hp, indicate 2-way isolation valves on each heat pump and variable flow system control		
HEAT REJECTION SYSTEMS - EQUIPMENT SELECTION & PERFORMANCE					
	C403.9.1.3	Centrifugal fan open-circuit cooling towers	For open-circuit centrifugal fan cooling towers with ≥ 1,100 gpm capacity, indicate cooling towers comply with efficiency requirements for axial fan open circuit cooling towers		
HEAT REJECTION & RECOVERY - CONTROLS					
	C403.9.1.1C 403.9.1.2	Fan speed control	For each fan powered by an individual motor or array of motors, with total connected fan power ≥ 5 hp (including motor service factor), indicate method of automatic fan speed control (adjusted based on leaving fluid temperature or condenser temperature / pressure of heat rejection device); verify fan selection provides ≤ 30% design wattage at 50% design airflow		
			For multiple-cell heat rejection equipment with VSD, indicate controls are configured to ramp all fans in unison (not staged on / off operation)		
	C403.9.1.4	Cooling tower flow turndown	For open-circuit cooling towers configured with multiple- or variable-speed condenser water pumps, indicate system is designed so all cells can be run in parallel; indicate method of condenser pump turn down control		
	C403.9.2.1	Heat recovery for service water heating	For buildings with 24-hour operation and > 1,500,000 Btu/h of heat rejection capacity and design service hot water load > 250,000 Btu/h, indicate condenser heat recovery to pre-heat service water; or exception applied. Provide calculations showing the amount of recovered heat that is utilized (60% of peak heat rejection load or pre-heat service water to 85°F).		

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	C403.9.2.2	Steam condensate systems heat recovery	For buildings with on-site steam heating systems, indicate condensate water heat recovery and use of recovered heat		
			For buildings that use off-site generated steam where condensate is not returned to the source, indicate on-site condensate water heat recovery		
	C403.9.2.3	Refrigeration condenser heat recovery	For buildings with food service, meat or deli departments that have ≥ 500,000 Btu/h of remote refrigeration capacity for coolers / freezers, indicate condenser heat recovery and use of captured energy (service water heating, space heating, or dehumidification reheating)		
			For buildings with ≥ 40,000 sf conditioned floor area and ≥ 1,000,000 Btu/h of remote refrigeration capacity, indicate condenser heat recovery to pre-heat service water; indicate remaining recovered heat is applied to space heating or dehumidification reheating		
	C403.9.2.4	Heat recovery for space heating	For buildings that operate > 70 hour per week, that are not served by a DOAS with energy recovery, and have > 1,500,000 Btu/h of heat rejection capacity and ≥ 0.45 cfm per sf of design minimum supply airflow with reheat, indicate condenser heat recovery is provided for space heating that complies with Sections C403.9.2.4.1 or C403.9.2.4.2 or C403.9.2.4.4		
	C403.9.2.4.1 C403.9.2.4.4	Water to water heat recovery	Indicate that 90% or more of the total building space heating and ventilation air design loads are served by heat energy rejected from either a heat recovery chiller or the cooling loop of water to water heat pump equipment		
	C403.9.2.4.2	Exhaust heat recovery	Indicate that waste heat is recovered from least 90% of the total building exhaust airflow such that leaving exhaust air temperature while in heat recovery mode is 55 deg F dry bulb; note exhaust air systems eligible for exception to this requirement		
	C403.9.2.4.3	Process heat recovery	In spaces with 5 watts per sf year-round cooling loads from lights and equipment, indicate these spaces are served by water-cooled equipment configured for heat recovery		
			If these spaces are served by economizer (air or water), indicate automatic controls are configured to disable economizer operation while system is in heat recovery mode		

MULTIPLE ZONE AIR SYSTEMS

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	C403.6.1	Air systems serving multiple zones	Identify supply air systems serving multiple zones and the zones they serve on plans; indicate whether system is VAV and method of primary air control; or provide supporting documentation for applied exception to VAV		
	C403.6.1	VAV air terminal primary supply airflow	Provide equipment schedules on plans that list all VAV air terminals and types (fan-powered series and parallel air terminals, single duct and dual duct air terminals, etc)		
			For each air terminal include: maximum primary supply airflow rates during zone peak heating and zone peak cooling; maximum terminal airflow during reheating, recooling or mixing; minimum ventilation airflow rate, and the basis for these values; if IMC or ASHRAE 62.1 multiple zone equation is the basis for minimum flow rates, provide this calculation on plans		
	C403.6.2	Single duct VAV terminal units	Indicate single duct terminal units are configured to reduce primary supply air before reheating or recooling		
	C403.6.3	Dual duct systems - terminal units	For systems with separate warm air and cool air ducts, indicate terminal units are configured to reduce the flow from one duct to minimum before mixing with air from the other duct		
	C403.6.8C403.6.9	VAV system static - pressure sensors and DDC set points	Indicate locations of duct static pressure sensors on plans; include at least one sensor per major duct branch; verify controller setpoint pressure at each sensor is ≤ 1.2 inch w.g.		
			For systems with zone level DDC, indicate controls are configured to monitor zone damper positions and reset static pressure setpoint based on the zone requiring most pressure; include control logic that automatically detects and generates an alarm if any zone excessively drives reset logic, and allows building operators to exclude zones from reset logic		
	C403.6.4	VAV system supply air reset	Indicate controls automatically reset supply air temperature in response to building loads or outdoor air temperature; or exception applied		
	C403.6.5	Multiple-zone VAV system ventilation optimization controls	For systems with zone level DDC controls, indicate controls are configured to automatically reduce outdoor airflow in response to changes in system ventilation efficiency; or exception applied		

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	C403.6.6	Parallel fan powered VAV air terminals	Indicate controls automatically activate or shut off the air terminal fan based on call for heating and / or ventilation; indicate controls are configured to activate the terminal fan as the first stage of heating prior to activating the heating coil; indicate control method of primary air during warmup or temperature setback mode		
HIGH EFFICIENCY MULTIPLE-ZONE VAV SYSTEMS - EXCEPTION TO C403.3.5 DOAS, MUST COMPLY WITH ALL 15 PROVISIONS TO BE ELIGIBLE					
	C403.6.10,Item 1	Minimum area served and zoning	Indicate that each high efficiency multiple-zone VAV systems serves an area ≥ 3,000 sf and includes ≥ 5 zones		
	C403.6.10, Item 2	Air economizer	Indicate system is configured for 100% air economizer operation and complies with all related economizer requirements per C403.5 (without economizer exceptions)		
	C403.6.10, Item 3	Direct digital controls (DDC)	Provide DDC controls for all components of system per C403.4.11 (regardless of system size); identify all DDC system input / output control points; indicate capability for trending and graphical display		
	C403.6.10, Items 4 and 5	Supply and outdoor airflow measurement and control	For systems with minimum required outdoor air > 2,500 cfm, provide an airflow monitoring station that is configured to measure outdoor air intake under all load conditions; indicate control sequence that increases or reduces outdoor air cfm based on VAV terminal feedback of ventilation efficiency (per C403.6.5 without exceptions) or and DCV (per C403.7.1)		
			Provide a suppy airflow monitoring station that is configured to measure supply air delivered to VAV terminals under all load conditions		
	C403.6.10,Item 6	Zone isolation and maximum area served	Verify maximum area served by a single VAV system is ≤ 50,000 sf, or one entire floor, whichever is greater; in addition if a system serves > 25,000 sf, that includes areas that are expected to be occupied non-simultaneously, indicate zone isolation controls per C403.2.1		
	C403.6.10, Item 7	Interior / exterior zone design supply air temperature	Verify that VAV terminals serving interior cooling driven loads are sized per a design supply air temperature that is 5°F higher than VAV terminals serving exterior zones while in cooling mode		
	C403.6.10, Item 8	Maximum air terminal inlet velocity and fan power	Identify all air terminals with minimum primary airflow setpoints > 50% of maximum setpoint in mechanical equipment schedule for these air terminals indicate inlet velocity does not exceed 900 fpm		

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	C403.6.10,Item 8	Maximum allowable system brake horsepower	For each multiple-zone VAV system, provide calculations that verify total fan system bhp is ≤ 90% of the total allowable fan system bhp per Option 2 equation in Table C403.8.1.1		
	C403.6.10,Item 9	Fan-powered terminal unit motor and control	Indicate all series and parallel fan-powered terminals have electronically commutated motors (ECM); indicate DDC control system is configured to vary air terminal fan speed as a function of the load; indicate fan speed during periods of low heating, low cooling, or ventilation-only mode is ≤ 66% of peak design air flow, or provide supporting documentation for applied exception		
	C403.6.10, Item 10	Application of single duct and fan-powered terminal units	Indicate VAV terminal types on plans; verify fan-powered terminal units only serve perimeter zones with envelope loads and interior zones with high occupant density and DCV per C403.7.1; verify all other zones are served by single duct terminal units		
	C403.6.10, Item 11	Fan-powered terminal unit primary air reset	Indicate DDC controls are configured to automatically reset the primary supply air cfm setpoint of all fan-powered terminal units to the minimum required to maintain ventilation during occupied heating or deadband mode, based upon the VAV air handling unit minimum ventilation air fraction		
	C403.6.10,Item 12	Controls for high occupant density spaces	For zones > 150 sf with high occupant density (≥ 25 people / 1000 sf), indicate zone is served by a dedicated terminal unit with DCV control that resets terminal unit ventilation setpoint based on measured CO2; also indicate occupancy sensor control that automatically reduces minimum ventilation to zero and sets back room heating and cooling setpoints by ≥ 5°F when space in unoccupied		
	C403.6.10, Item 13	Dedicated cooling systems serving data centers and server, electronic equipment and telecom spaces	For data centers and server, electronic equipment, telecom or similar spaces with design cooling loads > 5 W/sf, indicate spaces are served by dedicated cooling systems that are independent of the HPVAV systems serving the rest of building		
			Indicate dedicated cooling systems are configured for 100% air economizer operation and comply with all related economizer requirements per C403.5 (without economizer exceptions), or heat recovery per C403.5, Exception 9		
	C403.6.10, Item 14	Central plant efficiency	Indicate whether systems are served by a high efficiency heating water plant, or a high efficiency chilled water plant		

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			If complying via high efficiency heating water plant: Indicate all VAV terminals have hydronic heating coils served by a heating water system with either gas-fired boiler(s) with thermal efficiency (Et) ≥ 92%, air-to-water heat pumps, or heat recovery chillers; indicate hydronic heating coils are sized per a maximum 120°F entering water temperature during peak demand		
			If complying via high efficiency chilled water plant: Indicate all VAV air handlers have cooling coils served by chillers with rated IPLV efficiency that exceeds WSEC listed IPLV by at least 25% per Table C403.3.2(7) (note water-cooled IPLV is max, all others are min); indicate smallest chiller or compressor in plant is ≤ 20% of the total plant capacity, or provide thermal storage sized for ≥ 20% of total plant capacity		
	C403.6.10, Item 15	Fault detection and diagnostics	Indicate DDC system includes automatic fault detection and diagnostics (FDD) configured to monitor operation and provide fault reporting of all required parameters for all VAV air handlers and VAV air terminal units in the HPVAV system		
HIGH EFFICIENCY SINGLE-ZONE VAV SYSTEMS - EXCEPTION TO C403.3.5 DOAS, MUST COMPLY WITH ALL 8 PROVISIONS TO BE ELIGIBLE					
	C403.12, Item 1	Air economizer	Indicate system is configured for 100% air economizer operation and complies with all related economizer requirements per C403.5 (without economizer exceptions)		
	C403.12, Item 2	Direct digital controls (DDC)	Provide DDC controls for all components of system per C403.4.11 (regardless of system size); identify all DDC system input / output control points; indicate capability for trending and graphical display		
	C403.12,Item 3	Outdoor airflow measurement and control	For systems with minimum required outdoor air ≥ 1,000 cfm, provide an airflow monitoring station that is configured to measure outdoor air intake under all load conditions; indicate controls that adjust outdoor air cfm via DCV per C403.7.1		
	C403.12,Item 4	Maximum allowable system brake horsepower	For each single-zone VAV system, provide calculations that verify total fan system bhp is ≤ 90% of the total allowable fan system bhp per Option 2 equation in Table C403.8.1.1		
	C403.12, Item 5	Supply airflow control	Provide controls that adjust supply airflow based on the heating and cooling loads; indicate control sequence that limits minimum fan speed to 30% of peak design airflow or required ventilation during unoccupied mode, whichever is less		

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	C403.12,Item 6	Controls for high occupant density spaces	For zones > 150 sf with high occupant density (≥ 25 people / 1000 sf), indicate DCV control that resets ventilation setpoint based on measured CO2; also indicate occupancy sensor control that automatically reduces minimum ventilation to zero and sets back room heating and cooling setpoints by ≥ 5°F when space in unoccupied		
	C403.12, Item 7	High efficiency system option	Indicate which system performance option is applied - high efficiency DX cooling and heat pump or high efficiency gas heating; or heating coils served by a high efficiency heating water plant; or cooling coils served by high efficiency chilled water plant		
			If complying via high efficiency DX: Indicate full load and part load rated cooling efficiency exceeds WSEC listed efficiency by at least 15%; if heating is supplied by a gas-fired furnace, indicate thermal efficiency (Et) is ≥ 90%; if system is a heat pump, indicate heating efficiency (HSPF or COP) exceeds WSEC listed efficiency by at least 10%; control of cooling and heating coil output shall be configured with a minimum of 2-stages or modulating		
			If complying via high efficiency heating water plant: Indicate hydronic heating coils are served by a heating water system with either gas-fired boiler(s) with thermal efficiency (Et) ≥ 92%, air-to-water heat pumps, or heat recovery chillers; indicate hydronic heating coils are sized per a maximum 120°F entering water temperature during peak demand		
			If complying via high efficiency chilled water plant: Indicate cooling coils are served by chillers with rated IPLV efficiency that exceeds WSEC listed IPLV by at least 25% per Table C403.3.2(7) (note water-cooled IPLV is max, all others are min); indicate smallest chiller or compressor in plant is ≤ 20% of the total plant capacity, or provide thermal storage sized for ≥ 20% of total plant capacity		
	C403.12, Item 8	Fault detection and diagnostics	Indicate DDC system includes automatic fault detection and diagnostics (FDD) configured to monitor operation and provide fault reporting of all required parameters for all HPVAV single-zone air systems		
EXTERIOR HEATING SYSTEMS					
	C403.11.1	Heating outside a building	Indicate systems providing heating in non-enclosed outdoor occupied spaces are radiant systems		

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			Indicate occupancy sensing or timer switch controls configured to automatically shut off heating system when area served is unoccupied		
	C403.11.2	Snow melt systems	Indicate automatic controls configured to shut off system when pavement temperature exceeds 50°F and no precipitation is falling, and when outdoor air temperature exceeds 40°F		
	C403.11.3	Freeze protection system controls	Indicate automatic controls to shut off system when outdoor temperature exceeds 40°F, or conditions protect fluid from freezing		
HVAC EQUIPMENT ENERGY USE METERING					
	C409.3.1	HVAC equipment energy use metering	For new buildings > 50,000 sf and building additions > 25,000 sf, verfiy energy use metering of all equipment used to provide space heating and cooling, dehumidification and ventilation will be provided per C409; indicate equipment eligible for exception		
DOCUMENTATION AND SYSTEM SPECIFIC REQUIREMENT TO SUPPORT COMMISSIONING (CX)					
YES	C408.1	Scope of mechanical systems commissioning	For buildings with ≥ 240,000 Btu/h total output cooling capacity or ≥ 300,000 Btu/h total output heating capacity, indicate that all mechanical systems regardless of individual capacity are required to be commissioned; or provide building heating / cooling capacity calculation demonstrating eligibilty for exception	MH101, MH701, MH801	
YES			Indicate that all systems, equipment and controls for which the WSEC requires control functions and / or configuration to perform specific functions are included in the Cx scope	MH101, MH701, MH801	
YES	C408.1.1 C408.1.4.1	Commissioning requirements in construction documents	Indicate in plans and specifications that Cx per C408 is required for all applicable mechanical systems	MH101, MH701, MH801	
YES			Include general summary that includes at minimum: narrative description of activites, responsibilities of the Cx team, schedule of activities including verification of project close out documentation per C103.6, and conflict of interest plan (if required)	MH101, MH701, MH801	
YES			Include in general summary that a Cx project report or Compliance Checklist (Figure C408.1.4.1) shall be completed by the Certified Cx Professional and provided to the owner prior to the final mechanical inspection.	MH101, MH701, MH801	

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YES	C408.1.2.2	Functional performance testing criteria	Identify in plans and specifications the intended operation of all equipment and controls during all modes of operation, including interfacing between new and existing-to-remain systems	MH101, MH701, MH801	
YES	C408.2.2	Air system and hydronic system balancing	Indicate in plans that air and fluid flow rates shall be tested and balanced within the tolerances defined in the specifications; indicate systems shall be balanced in a manner to first minimize throttling losses, then adjusted to meet design flow conditions	MH101, MH701	
YES	C408.2.2.1	Air system balancing devices	Indicate devices that provide the capability to balance all supply air outlets, zone terminals and air handling equipment requiring system balancing	MH101, MH801	
	C408.2.2.2	Hydronic system balancing devices	Indicate devices that provide the capability to isolate, balance and measure flow across all hydronic equipment requiring system balancing including heating and cooling coils and pumps; or exception applied		
PROJECT CLOSE OUT DOCUMENTATION					
YES	C103.6	Documentation and project close out submittal requirements	Indicate in plans that project close out documentation and training of building operations personnel is required for all mechanical components, equipment and systems governed by this code; indicate close out documentation shall include: record documents, O&M manuals, applicable WSEC mechanical equipment compliance reports and calculations	MH801	

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VENTILATION SCHEDULE

ZONE NUMBER	ZONE NAME	PRIMARY AIRFLOW	ZONE OSA, V_{OT}	ROOM NAME	OCCUPANCY DESCRIPTION	A_Z	P_Z DENSITY	P_Z	R_P	OSA_P	R_A	OSA_A	MISC	V_{BZ}	DISTRIBUTION EFFECTIVENESS	TOTAL OSA V_{OZ}	EA PER SF	# OF TOILETS	# OF SHOWERS	REQUIRED EA	NOTES
1				101 LOUNGE (N)	DINING ROOM	864.2	70	61	7.5	457.5	0.18	156		613.5	0.8	767				0.0	
				101 LOUNGE (MIDDLE)	DINING ROOM	1217.37	70	86	7.5	645	0.18	220		865	0.8	1082				0.0	
				101 LOUNGE (S)	DINING ROOM	1044.89	70	74	7.5	555	0.18	189		744	0.8	930				0.0	
				103 BAR	RECEPTION	466.78	30	15	5	75	0.06	29		104	0.8	130				0.0	
				3 MEN	RESTROOM	137.21	0	0	0	0	0	0		0	0.8	0		3		210.0	
				2 WOMEN	RESTROOM	183.36	0	0	0	0	0	0		0	0.8	0		4		280.0	
				4 MECH	STORAGE	100.36	0	0	0	0	0.12	13		13	0.8	17				0.0	
				106 DRY STORAGE	STORAGE	144.78	0	0	0	0	0.12	18		18	0.8	23				0.0	
				107 OFFICE	OFFICE	78.06	5	1	5	5	0.06	5		10	0.8	13				0.0	
				7 STORAGE	STORAGE	47.13	0	0	0	0	0.12	6		6	0.8	8				0.0	
				9 KITCHEN	KITCHEN	1210.42	20	25	7.5	187.5	0.12	146		333.5	0.8	417	0.7			847.3	
				STORAGE	STORAGE	296.03	0	0	0	0	0.12	36		36	0.8	45				0.0	
				CORRIDOR	CORRIDOR	390.46	0	0	0	0	0.06	24		24	0.8	30				0.0	
				VESTIBULE	CORRIDOR	106.84	0	0	0	0	0.06	7		7	0.8	9				0.0	

Air System Sizing Summary for KITCHEN

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
10:57AM

PRCTI20221460

Air System Information

Air System Name	**KITCHEN**		Number of zones	**1**	
Equipment Class	**UNDEF**		Floor Area	**1776.4**	ft²
Air System Type	**SZCAV**		Location	**Tacoma, Washington**	

Sizing Calculation Information

Calculation Months	**Jan to Dec**	Zone CFM Sizing	**Sum of space airflow rates**
Sizing Data	**Calculated**	Space CFM Sizing	**Individual peak space loads**

Central Cooling Coil Sizing Data

Total coil load	**5.0**	Tons	Load occurs at	**Jul 1400**	
Total coil load	**59.9**	MBH	OA DB / WB	**85.3 / 64.8**	°F
Sensible coil load	**53.8**	MBH	Entering DB / WB	**78.4 / 64.4**	°F
Coil CFM at Jul 1400	**2378**	CFM	Leaving DB / WB	**57.2 / 55.9**	°F
Max block CFM	**2378**	CFM	Coil ADP	**54.9**	°F
Sum of peak zone CFM	**2378**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.898**		Resulting RH	**52**	%
CFM/Ton	**476.3**		Design supply temp.	**55.0**	°F
ft²/Ton	**355.8**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**33.7**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**11.99**	gpm			

Central Heating Coil Sizing Data

Max coil load	**44.7**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**2378**	CFM	BTU/(hr·ft²)	**25.1**	
Max coil CFM	**2378**	CFM	Ent. DB / Lvg DB	**58.3 / 75.9**	°F
Water flow @ 20.0 °F drop	**4.47**	gpm			

Supply Fan Sizing Data

Actual max CFM	**2378**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**2350**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**1.34**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**516**	CFM	CFM/person	**19.85**	CFM/person
CFM/ft²	**0.29**	CFM/ft²			

Zone Sizing Summary for KITCHEN

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
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Air System Information

Air System Name ..... **KITCHEN**
Equipment Class ..... **UNDEF**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **1776.4** ft²
Location ..... **Tacoma, Washington**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	2378	2378	1.34	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	50.2	Jul 1400	16.7	1776.4

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
1 - STORAGE	1	3.1	Jun 1500	164	4.4	296.0	0.55
106 DRY STORAGE	1	1.1	Jul 1400	52	1.2	144.8	0.36
107 OFFICE	1	1.1	Jun 1400	53	0.6	78.1	0.68
7 STORAGE	1	0.4	Jul 1500	25	0.7	47.1	0.53
9 KITCHEN	1	44.5	Jul 1400	2084	9.9	1210.4	1.72

Air System Design Load Summary for KITCHEN

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1400 COOLING OA DB / WB 85.3 °F / 64.8 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 18.0 °F / 14.8 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	21 ft²	188	-	21 ft²	-	-
Wall Transmission	436 ft²	376	-	436 ft²	1433	-
Roof Transmission	1870 ft²	6348	-	1870 ft²	4871	-
Window Transmission	21 ft²	35	-	21 ft²	295	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	1776 ft²	0	-	1776 ft²	264	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1776 W	6061	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	78 W	266	-	0	0	-
People	26	7655	11645	0	0	0
Infiltration	-	1958	-1421	-	9861	0
Miscellaneous	-	27300	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**50188**	**10225**	**-**	**16724**	**0**
Zone Conditioning	-	48949	10225	-	16298	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2378 CFM	0	-	2378 CFM	0	-
Ventilation Load	516 CFM	4867	-4127	516 CFM	28364	0
Supply Fan Load	2378 CFM	0	-	2378 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**53817**	**6098**	**-**	**44662**	**0**
Central Cooling Coil	-	53817	6101	-	0	0
Central Heating Coil	-	0	-	-	44662	-
>> Total Conditioning	**-**	**53817**	**6101**	**-**	**44662**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Air System Sizing Summary for LOUNGE & BAR

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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Air System Information

Air System Name	**LOUNGE & BAR**		Number of zones	**1**	
Equipment Class	**UNDEF**		Floor Area	**1791.0**	ft²
Air System Type	**SZCAV**		Location	**Tacoma, Washington**	

Sizing Calculation Information

Calculation Months	**Jan to Dec**		Zone CFM Sizing	**Sum of space airflow rates**	
Sizing Data	**Calculated**		Space CFM Sizing	**Individual peak space loads**	

Central Cooling Coil Sizing Data

Total coil load	**5.4**	Tons	Load occurs at	**Jun 1500**	
Total coil load	**64.2**	MBH	OA DB / WB	**85.0 / 65.0**	°F
Sensible coil load	**57.8**	MBH	Entering DB / WB	**80.9 / 65.2**	°F
Coil CFM at Jun 1500	**2279**	CFM	Leaving DB / WB	**57.2 / 55.7**	°F
Max block CFM	**2279**	CFM	Coil ADP	**54.6**	°F
Sum of peak zone CFM	**2279**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.899**		Resulting RH	**57**	%
CFM/Ton	**425.8**		Design supply temp.	**55.0**	°F
ft²/Ton	**334.6**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**35.9**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**12.85**	gpm			

Central Heating Coil Sizing Data

Max coil load	**91.0**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**2279**	CFM	BTU/(hr·ft²)	**50.8**	
Max coil CFM	**2279**	CFM	Ent. DB / Lvg DB	**41.8 / 79.2**	°F
Water flow @ 20.0 °F drop	**9.10**	gpm			

Supply Fan Sizing Data

Actual max CFM	**2279**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**2252**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**1.27**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**1221**	CFM	CFM/person	**15.26**	CFM/person
CFM/ft²	**0.68**	CFM/ft²			

Zone Sizing Summary for LOUNGE & BAR

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
10:57AM

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Air System Information

Air System Name ..... **LOUNGE & BAR**
Equipment Class ..... **UNDEF**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **1791.0** ft²
Location ..... **Tacoma, Washington**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	2279	2279	1.27	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	48.0	Jul 1400	25.1	1791.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
101 LOUNGE (MIDDLE)	1	37.4	Jul 1400	1753	18.1	1217.4	1.44
103 BAR	1	8.6	Jul 1400	403	3.8	466.8	0.86
VESTIBULE	1	2.0	Jun 1500	123	3.3	106.8	1.15

Air System Design Load Summary for LOUNGE & BAR

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 85.0 °F / 65.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 18.0 °F / 14.8 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	256 ft²	5181	-	256 ft²	-	-
Wall Transmission	1037 ft²	2066	-	1037 ft²	3408	-
Roof Transmission	1824 ft²	5921	-	1824 ft²	4751	-
Window Transmission	256 ft²	661	-	256 ft²	5756	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	21 ft²	75	-	21 ft²	655	-
Floor Transmission	1791 ft²	0	-	1791 ft²	627	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1791 W	6111	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	842 W	2873	-	0	0	-
People	80	22400	21600	0	0	0
Infiltration	-	1912	-1935	-	9942	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**47199**	**19665**	**-**	**25139**	**0**
Zone Conditioning	-	46319	19665	-	24194	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2279 CFM	0	-	2279 CFM	0	-
Ventilation Load	1221 CFM	11433	-13194	1221 CFM	66784	0
Supply Fan Load	2279 CFM	0	-	2279 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**57752**	**6471**	**-**	**90978**	**0**
Central Cooling Coil	-	57752	6473	-	0	0
Central Heating Coil	-	0	-	-	90978	-
>> Total Conditioning	**-**	**57752**	**6473**	**-**	**90978**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Air System Sizing Summary for LOUNGE & RESTROOMS

Project Name: 2023-015 Salud Bar and Grill — 05/04/2023
Prepared by: Middlebrook Engineering — 10:57AM

PRCTI20221460

Air System Information

Air System Name	**LOUNGE & RESTROOMS**		Number of zones	**1**	
Equipment Class	**UNDEF**		Floor Area	**1756.0**	ft²
Air System Type	**SZCAV**		Location	**Tacoma, Washington**	

Sizing Calculation Information

Calculation Months	**Jan to Dec**		Zone CFM Sizing	**Sum of space airflow rates**	
Sizing Data	**Calculated**		Space CFM Sizing	**Individual peak space loads**	

Central Cooling Coil Sizing Data

Total coil load	**4.8**	Tons	Load occurs at	**Jun 1400**	
Total coil load	**57.5**	MBH	OA DB / WB	**84.3 / 64.8**	°F
Sensible coil load	**49.9**	MBH	Entering DB / WB	**80.0 / 65.1**	°F
Coil CFM at Jun 1400	**2028**	CFM	Leaving DB / WB	**57.0 / 55.6**	°F
Max block CFM	**2028**	CFM	Coil ADP	**54.4**	°F
Sum of peak zone CFM	**2028**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.868**		Resulting RH	**57**	%
CFM/Ton	**423.6**		Design supply temp.	**55.0**	°F
ft²/Ton	**366.7**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**32.7**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**11.50**	gpm			

Central Heating Coil Sizing Data

Max coil load	**75.1**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**2028**	CFM	BTU/(hr·ft²)	**42.8**	
Max coil CFM	**2028**	CFM	Ent. DB / Lvg DB	**45.2 / 79.9**	°F
Water flow @ 20.0 °F drop	**7.52**	gpm			

Supply Fan Sizing Data

Actual max CFM	**2028**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**2005**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**1.15**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**960**	CFM	CFM/person	**12.97**	CFM/person
CFM/ft²	**0.55**	CFM/ft²			

Zone Sizing Summary for LOUNGE & RESTROOMS

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
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PRCTI20221460

Air System Information

Air System Name ..... **LOUNGE & RESTROOMS**
Equipment Class ..... **UNDEF**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **1756.0** ft²
Location ..... **Tacoma, Washington**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	2028	2028	1.15	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	43.1	Aug 1400	21.5	1756.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
101 LOUNGE (S)	1	36.5	Aug 1400	1708	13.9	1044.9	1.63
2 - CORRIDOR	1	3.5	Jul 1400	164	4.1	390.5	0.42
2 WOMEN	1	2.2	Aug 1400	101	2.3	183.4	0.55
3 MEN	1	1.2	Jul 1400	54	1.1	137.2	0.39

Air System Design Load Summary for LOUNGE & RESTROOMS

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1400 COOLING OA DB / WB 84.3 °F / 64.8 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 18.0 °F / 14.8 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	132 ft²	2620	-	132 ft²	-	-
Wall Transmission	1097 ft²	2295	-	1097 ft²	3602	-
Roof Transmission	1756 ft²	6781	-	1756 ft²	4574	-
Window Transmission	132 ft²	187	-	132 ft²	1853	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	21 ft²	66	-	21 ft²	655	-
Floor Transmission	1756 ft²	0	-	1756 ft²	1047	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1756 W	5991	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	522 W	1783	-	0	0	-
People	74	20720	19980	0	0	0
Infiltration	-	1748	-1921	-	9747	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**42191**	**18059**	**-**	**21479**	**0**
Zone Conditioning	-	41501	18059	-	22102	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2028 CFM	0	-	2028 CFM	0	-
Ventilation Load	960 CFM	8398	-10505	960 CFM	53020	0
Supply Fan Load	2028 CFM	0	-	2028 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**49900**	**7554**	**-**	**75122**	**0**
Central Cooling Coil	-	49900	7559	-	0	0
Central Heating Coil	-	0	-	-	75122	-
>> Total Conditioning	**-**	**49900**	**7559**	**-**	**75122**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Air System Sizing Summary for LOUNGE 1

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
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Air System Information

Air System Name	**LOUNGE 1**		Number of zones	**1**
Equipment Class	**UNDEF**		Floor Area	**864.2** ft²
Air System Type	**SZCAV**		Location	**Tacoma, Washington**

Sizing Calculation Information

Calculation Months	**Jan to Dec**	Zone CFM Sizing	**Sum of space airflow rates**
Sizing Data	**Calculated**	Space CFM Sizing	**Individual peak space loads**

Central Cooling Coil Sizing Data

Total coil load	**3.5**	Tons	Load occurs at	**Jun 1400**	
Total coil load	**41.5**	MBH	OA DB / WB	**84.3 / 64.8**	°F
Sensible coil load	**35.4**	MBH	Entering DB / WB	**80.8 / 65.2**	°F
Coil CFM at Jun 1400	**1354**	CFM	Leaving DB / WB	**56.3 / 54.9**	°F
Max block CFM	**1354**	CFM	Coil ADP	**53.6**	°F
Sum of peak zone CFM	**1354**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.854**		Resulting RH	**58**	%
CFM/Ton	**391.6**		Design supply temp.	**55.0**	°F
ft²/Ton	**250.0**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**48.0**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**8.30**	gpm			

Central Heating Coil Sizing Data

Max coil load	**56.0**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**1354**	CFM	BTU/(hr·ft²)	**64.8**	
Max coil CFM	**1354**	CFM	Ent. DB / Lvg DB	**40.4 / 79.1**	°F
Water flow @ 20.0 °F drop	**5.60**	gpm			

Supply Fan Sizing Data

Actual max CFM	**1354**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**1338**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**1.57**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**767**	CFM	CFM/person	**12.57**	CFM/person
CFM/ft²	**0.89**	CFM/ft²			

Zone Sizing Summary for LOUNGE 1

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
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Air System Information

Air System Name ..... **LOUNGE 1**
Equipment Class ..... **UNDEF**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **864.2** ft²
Location ..... **Tacoma, Washington**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	1354	1354	1.57	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	28.9	Jun 1400	13.6	864.2

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
101 LOUNGE (N)	1	28.9	Jun 1400	1354	13.6	864.2	1.57

Air System Design Load Summary for LOUNGE 1

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1400 COOLING OA DB / WB 84.3 °F / 64.8 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 18.0 °F / 14.8 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	232 ft²	2546	-	232 ft²	-	-
Wall Transmission	781 ft²	801	-	781 ft²	2565	-
Roof Transmission	864 ft²	2863	-	864 ft²	2251	-
Window Transmission	232 ft²	328	-	232 ft²	3257	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	864 ft²	0	-	864 ft²	750	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	864 W	2949	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	432 W	1474	-	0	0	-
People	61	17080	16470	0	0	0
Infiltration	-	860	-1054	-	4797	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**28901**	**15416**	**-**	**13620**	**0**
Zone Conditioning	-	28750	15416	-	13718	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1354 CFM	0	-	1354 CFM	0	-
Ventilation Load	767 CFM	6669	-9358	767 CFM	42241	0
Supply Fan Load	1354 CFM	0	-	1354 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**35419**	**6058**	**-**	**55959**	**0**
Central Cooling Coil	-	35419	6060	-	0	0
Central Heating Coil	-	0	-	-	55959	-
>> Total Conditioning	**-**	**35419**	**6060**	**-**	**55959**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Air System Sizing Summary for MISC.

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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Air System Information

Air System Name	**MISC.**		Number of zones	**1**	
Equipment Class	**UNDEF**		Floor Area	**100.4**	ft²
Air System Type	**SZCAV**		Location	**Tacoma, Washington**	

Sizing Calculation Information

Calculation Months	**Jan to Dec**		Zone CFM Sizing	**Sum of space airflow rates**	
Sizing Data	**Calculated**		Space CFM Sizing	**Individual peak space loads**	

Central Cooling Coil Sizing Data

Total coil load	**0.1**	Tons	Load occurs at	**Aug 1400**	
Total coil load	**1.3**	MBH	OA DB / WB	**85.3 / 64.8**	°F
Sensible coil load	**1.3**	MBH	Entering DB / WB	**78.4 / 62.4**	°F
Coil CFM at Aug 1400	**65**	CFM	Leaving DB / WB	**60.0 / 55.6**	°F
Max block CFM	**65**	CFM	Coil ADP	**57.9**	°F
Sum of peak zone CFM	**65**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**1.000**		Resulting RH	**44**	%
CFM/Ton	**610.6**		Design supply temp.	**55.0**	°F
ft²/Ton	**942.6**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**12.7**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**0.26**	gpm			

Central Heating Coil Sizing Data

Max coil load	**2.6**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**65**	CFM	BTU/(hr·ft²)	**26.0**	
Max coil CFM	**65**	CFM	Ent. DB / Lvg DB	**55.4 / 93.1**	°F
Water flow @ 20.0 °F drop	**0.26**	gpm			

Supply Fan Sizing Data

Actual max CFM	**65**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**64**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**0.65**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**17**	CFM	CFM/person	**0.00**	CFM/person
CFM/ft²	**0.17**	CFM/ft²			

Zone Sizing Summary for MISC.

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

05/04/2023
10:57AM

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Air System Information

Air System Name ..... **MISC.**
Equipment Class ..... **UNDEF**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **100.4** ft²
Location ..... **Tacoma, Washington**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	65	65	0.65	0.0	0.00	0.0	0.00	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	1.2	Aug 1400	1.7	100.4

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
4 MECH	1	1.2	Aug 1400	65	1.7	100.4	0.65

Air System Design Load Summary for MISC.

Project Name: 2023-015 Salud Bar and Grill
Prepared by: Middlebrook Engineering

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1400 COOLING OA DB / WB 85.3 °F / 64.8 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 18.0 °F / 14.8 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	102 ft²	323	-	102 ft²	336	-
Roof Transmission	100 ft²	370	-	100 ft²	262	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	21 ft²	60	-	21 ft²	502	-
Floor Transmission	100 ft²	0	-	100 ft²	78	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	100 W	343	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	111	0	-	557	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**1206**	**0**	**-**	**1736**	**0**
Zone Conditioning	-	1108	0	-	1695	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	65 CFM	0	-	65 CFM	0	-
Ventilation Load	17 CFM	170	0	17 CFM	919	0
Supply Fan Load	65 CFM	0	-	65 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**1278**	**0**	**-**	**2614**	**0**
Central Cooling Coil	-	1278	0	-	0	0
Central Heating Coil	-	0	-	-	2614	-
>> Total Conditioning	**-**	**1278**	**0**	**-**	**2614**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		